



Acupuncture Expansion in the Oregon Healthcare System: Acupuncture for Pain Management, Substance Use, and Mental Health

**submitted by the Oregon Acupuncture Association (OAA) Chair, Kelly Ilseman, LAc
to the Oregon Health Authority's Health Evidence Review Commission (HERC)
Value-based Benefits Subcommittee (VbBs)**

January 2025, May 2025

editorial update June 2026

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Audience: Oregon Health Authority Health Evidence Review Commission (HERC)
Value-Based Benefits Subcommittee (VbBS)

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A. Statement of Purpose

1. Proposal to Expand Acupuncture Insurance Coverage

The Oregon Acupuncturists Association (OAA) Research Committee submits this literature review to the Oregon Health Authority's (OHA's) Health Evidence Review Commission (HERC) for review. The OAA **requests that the OHA's Health Evidence Review Commission (HERC) via the Values-Based Benefits Subcommittee (VbBs) review the current peer-reviewed scientific evidence** for the clinical- and cost-effectiveness, safety, and patient satisfaction of acupuncture for the following conditions *chronic and acute pain, substance use, mental health (depression, anxiety, insomnia, PTSD), women's non-pain health conditions (hot flashes, infertility, breech*



presentation, labor induction), gastrointestinal symptoms (general, post-prandial, gastrointestinal reflux disease, pregnancy-related, cancer treatment-related), and allergic rhinitis. We ask that the HERC **consider expanding Oregon Health Plan (OHP) insurance coverage**, the Oregon state Medicaid plan, for **above-the-line funding for acupuncture treatment for the conditions contained in this review.** We also ask that the ***number of allotted visits increase from 12 to 20 visits/year for pain conditions*** and to ***36 visits/year for mental health conditions*** (if these are covered above the line), given the data from the literature on treatment effectiveness over time and the current mental health crisis. This will increase access to continuous care for patients and reduce administrative burden on practitioners.

2. **Why Expand Acupuncture Coverage?** The **evidence base for the clinical effectiveness, cost effectiveness, safety, and patient satisfaction of acupuncture has increased substantially** since the last health evidence reviews for each of these conditions. **Updates to landmark research studies** continue to show the **clinical effectiveness of acupuncture for a variety of conditions.** Increasingly higher quality research continues to be produced at a rapid rate; **recent high, moderate, and low quality evidence gleaned from systematic reviews** that trends in a favorable direction towards the effectiveness of acupuncture.

B. Context: Last Time Evidence Reviewed

1. A History of Submission to the Oregon HERC from 2010-2020 Regarding the Effectiveness of Acupuncture to Treat Various Conditions

A history of prior HERC submissions was obtained from Laura Ocker, former President of the Oregon Association of Acupuncture and Oriental Medicine (OAAOM), an organization now called the Oregon Acupuncturists Association (OAA). Laura Ocker provided the OAA Research Committee with the following information about prior HERC submissions.

From 2010 - 2020, there were five collaborative submissions of evidence to the HERC from the OAAOM and Oregon College of Oriental Medicine (OCOM). During this time period, there were also three requests for evidence from the HERC and one notification of evidence from the HERC.

a. 2010 - 2011

Evidence submitted by: the OAAOM (Laura Ocker) and the Oregon College of Oriental Medicine (OCOM) (Ryan Milley); information gathered by Dessia Bingley, Kim Blaufuss, Kami Schott, Corinna Wijma, and Chris Withey

Evidence submitted for the following conditions: hyperemesis gravidarum, breech presentation, back and pelvic pain during pregnancy, depression and mood disorders, tension headache, and migraine headache

Submission Outcome: Acupuncture was restored to Oregon's Prioritized List of Health Services for the following conditions:



- Nausea and vomiting in pregnancy
- Breech presentation in pregnancy
- Back and pelvic pain in pregnancy
- Depression (limited to post-stroke depression)
- Tension headache (included below the funding line)
- Migraine headache

b. 2011 - 2012; January 2013

Evidence submitted by: the OAAOM (Laura Ocker) and OCOM (Ryan Milley)

Evidence submitted for the following conditions: chronic pain (particularly neck pain), osteoarthritis, and shoulder pain

Submission Outcome: Acupuncture was restored to Oregon's Prioritized List of Health Services for the following conditions:

- Neck pain
- Osteoarthritis (specifically OA of the knee)

c. 2013

Evidence prepared by: the OAAOM and OCOM Graduate Students, Kathryn Carr and Cissey Ye with assistance from Ben Marx (OCOM Research Chair), Shelley Stump (OCOM Graduate Student), and Laura Ocker (OAAOM President)

Evidence submitted for the following conditions: temporomandibular joint disorder (TMJ), dysmenorrhea, labor and obstetrics pain, peri-/post-operative pain

Submission Outcome: The HERC deemed insufficient high-quality evidence to warrant inclusion of acupuncture on the Prioritized List.

d. 2014

Inquiry from the HERC to the OAA about acupuncture for smoking cessation.

e. 2015

Evidence prepared by: The Back Pain Lines Reorganization Task Force, an interdisciplinary group convened by the Health Evidence Review Commission; Laura Ocker served on this task force representing the acupuncture community.

Evidence submitted: a review of the prioritization of back pain treatments for Medicaid

Submission Outcome: Acupuncture, chiropractic, and physical therapy were added to Oregon's Prioritized List of Health Services for conditions of the neck and back, including scoliosis and neck/back pain

f. 2017 – 2019

Evidence prepared by: The Chronic Pain Task Force, an interdisciplinary review group, convened by the Health Evidence Review Commission; Laura Ocker was the member representing the acupuncture community

Evidence submitted: a review of the prioritization of treatments of several chronic pain conditions for Medicaid.



Submission Outcome: In an effort to mitigate opioid use/access and to offer evidence-based services to support people with chronic pain, opioid tapering requirements got rolled into a policy recommendation that encouraged increased access to acupuncture, physical therapy, chiropractic, and behavioral health for chronic pain. Organized public outcry protested this policy, with many patients highly fearful about losing access to opioid medications. No changes were made: additional therapies (including acupuncture) were not included on the Prioritized List for chronic pain disorders.

g. 2019

HERC Request for Evidence: The HERC requested evidence from the acupuncture community to support acupuncture for anxiety and PTSD, due to a request from the OHA Medical Director, Pat Allen.

From Pat Allen, Director of OHA (pulled from 2019 HERC meeting minutes): *“Consider pairing alternative treatments (such as acupuncture and yoga) with PTSD and other anxiety-related diagnoses that are a result of trauma to decrease demand for psychiatric medication management. OHA believes it would be appropriate for Oregon’s Health Evidence Review Commission (HERC) to consider this recommendation. HERC staff will review the literature on alternative therapies, including acupuncture and yoga, for the treatment of PTSD and anxiety. If the literature shows that these treatments are effective, then we will ask the HERC to consider pairing these treatments with anxiety related conditions on the Prioritized List of Health Services.”*

Evidence prepared by: Laura Ocker, in close collaboration with Rosa N. Schnyer, DAOM, IFMCP, LAc (Board Member of the Society of Acupuncture Research)

Evidence submitted for the following conditions: anxiety and PTSD (evidence submitted in the form of a presentation to HERC’s VbBS.

Submission Outcome: Though HERC's Behavioral Health Advisory Panel (BHAP) was supportive, ultimately the HERC did not elect to include acupuncture on the Prioritized List for anxiety or PTSD due to insufficient evidence / poor quality evidence.

h. 2020

HERC Notification of Evidence: The HERC reached out to Laura Ocker to inform that a recent article published in *JAMA* showed high quality evidence for acupuncture for cancer pain.

Source of Evidence: article published in *JAMA* regarding acupuncture for cancer pain

Submission Outcome: Based on this publication, the HERC decided to add acupuncture to the Prioritized List for cancer pain.

2. Updates to Previous Evidence



- a. **2017-2019 Chronic pain.** Strong evidence continues to be published for the effectiveness of acupuncture to treat **chronic pain** as well as **acute pain** conditions. Building upon the landmark **Department of Veterans Affairs 2017 Evidence Map of Acupuncture¹** research and **McDonald and Janz’ 2014 Acupuncture Evidence Project²** research, **Vickers, et al., published 2012³ and 2018⁴** studies demonstrating clear efficacy of acupuncture to treat a variety of chronic pain conditions. Additionally, the CDC published the new **Opioid Prescription Guidelines⁵** in 2022 that emphasize non-pharmacological pain management options (including acupuncture) for chronic pain in general and several specific chronic pain conditions.⁵ A large German study⁶ involving over 50,000 participants found strong evidence for the effectiveness and cost-effectiveness of acupuncture to treat a variety of chronic pain conditions. **MacPherson’s 2014 study⁷** also showed acupuncture’s effectiveness to treat chronic pain.

Included in this review are a **selection of 108 studies** (the majority published between 2020-2024 and a selection published between 2006-2019) that demonstrate the effectiveness of acupuncture for the treatment of chronic pain. This selection comprises a strong sample of the current literature for acupuncture pain management. With the sheer volume of scientific literature demonstrating the effectiveness of acupuncture for this subject, this literature review is not exhaustive.

- i. **Chronic Low Back Pain.** The Evidence Map of Acupuncture,¹ the Acupuncture Evidence Project,² both 2012³ and 2018⁴ Vickers studies, the CDC’s new Opioid Prescription Guidelines,⁵ and the large German study⁶ all found strong evidence to support the efficacy of acupuncture to treat chronic low back pain. We have included 25 studies and one large scoping published guideline (including 20 systematic reviews/meta-analyses published since 2018 and the 6 aforementioned large scoping studies/published guidelines^{1,2,3,4,5,6} published between 2009-2022) have been included regarding the effectiveness and cost-effectiveness of acupuncture to treat chronic low back pain. *Note: one of the included studies showed a **dose-response relationship** between more acupuncture treatments (higher dose) and significant low back pain reduction.* See the Dose-Response section below or the “Acupuncture for Chronic Low Back Pain” section for more information.
- ii. **2010-11 Tension Headaches.** We have included 15 studies, including 10 noteworthy systematic reviews/meta-analyses published since 2016 and 5 large scoping studies (2009 German study,⁶ 2012+2018^{3,4} Vickers studies, 2014 VA Evidence Map of Acupuncture,¹ 2017 Acupuncture Evidence Project²) that demonstrate the effectiveness of acupuncture for the treatment of tension headache or chronic headache pain, as well as the cost-effectiveness of acupuncture to treat headache pain. All showed clinically effective and/or statistically significant impacts of acupuncture or electroacupuncture upon at least one tension-headache outcome per study, equivalent results to usual care, and better results when combined with usual care.



- iii. **2010-11 Migraine Headaches.** We have included 23 studies (20 noteworthy systematic reviews/meta-analyses published since 2020 and 3 large scoping studies published from 2009-2017) that demonstrate the effectiveness of acupuncture and/or cupping for the treatment of migraine headache pain. *Note: one study (Yang, et al., 2024)³⁵ showed the **peak benefit acupuncture dose for migraine treatment occurred at 2 months.*** See Dose-Response section below or the “Acupuncture for Episodic Migraines” section for more information.
- iv. **2010-11 Shoulder Pain.** We have included 10 (7 noteworthy systematic reviews/meta-analyses published since 2014 (one in 2024, two in 2023, two in 2022, one in 2020, and one in 2014), the MacPherson⁷ study, and the two Vickers studies^{3,4}) that demonstrate the effectiveness of acupuncture for the treatment of shoulder pain, including post-stroke shoulder pain, frozen shoulder, and shoulder impingement syndrome that demonstrate the clinical impacts of acupuncture or electroacupuncture upon shoulder outcomes.
- v. **2011-2012 Neck Pain.** We have included 10 pieces of literature, including 9 studies and one major 2022 CDC publication⁵ demonstrating the effectiveness of acupuncture to treat neck pain. A 2009 German study⁶ also referenced cost-effectiveness of acupuncture to treat neck pain. The oldest study (2006)³² was included because it is a Cochrane review.
- vi. **2011 - 2012 Osteoarthritis Pain.** We have included 24 studies and 1 major CDC publication (19 noteworthy systematic reviews/meta-analyses published since 2010 with 13 of these published since 2021 and 5 of the large scoping studies/publications published from 2009-2022) that demonstrate the effectiveness and cost-effectiveness of acupuncture to treat knee osteoarthritis and osteoarthritis. *Note: 3 of the included studies show a **dose-response relationship between higher acupuncture dose (number of treatments) and significant knee osteoarthritis pain relief.*** See Dose-Response section below for more information.
- vii. **2013 Temporomandibular joint disorder (TMJ).** We have included 10 systematic reviews/meta-analyses published between 2021-2024 (5 of which were published in 2024) demonstrating the effectiveness of acupuncture for the treatment of TMJ pain.
- viii. **2013 Dysmenorrhea.** We have included 2 systematic reviews/meta-analyses published in 2018 and 2019 that demonstrate the effectiveness of acupuncture for the treatment of dysmenorrhea/premenstrual syndrome (PMS).
- ix. **Endometriosis pain.** We have included 2 studies involving the effectiveness of acupuncture to treat endometriosis pain published in 2024 and 2017. This is a new submission and not an update to a prior HERC submission.



- x. **2020 Cancer pain.** We have included 6 systematic reviews/meta-analyses (5 published between 2011-2021 regarding the effectiveness of acupuncture to treat cancer pain and one additional 2017 systematic review/meta-analysis) involving the effectiveness of acupuncture to treat disease-related pain.
 - xi. **Plantar Fasciitis Heel pain.** We have included 3 systematic reviews/meta-analyses (one in 2017, two in 2021) regarding the effectiveness of acupuncture to treat plantar fasciitis heel pain. This is a new submission and not an update to a previous HERC submission.
- b. **2013 Acute pain (Labor and Obstetrics Pain, Peri-/Post-Operative Pain)** We have included 28 pieces of literature (27 systematic reviews/meta-analyses published between 2013-2024, including 1 general acute pain study: 2022; 1 large CDC publication guideline: 2022; 2 acute pancreatitis studies: 2021, 2019; 4 acute low back pain studies: 2024, 2021, 2015, 2013; 1 acute post-tonsillectomy study: 2014; 2 premenstrual pain studies: 2018, 2019; 11 labor, obstetrics, and postpartum pain systematic reviews/meta-analyses published from 2020-2024, and 6 peri- and post-operative pain systematic reviews/meta-analyses published since 2015,^{2,101,114,178,191,194}) demonstrating the effectiveness and cost-effectiveness of acupuncture to treat acute pain conditions. **Note:** The **peri- and post-operative** studies are found in various sections throughout this review. They can be found by searching the document for keywords “post-operative,” “surgery,” and “endoscopy.” This is not an exhaustive review of the current literature for peri- and post-operative pain and was not originally included as a literature search category.
- c. **Substance Use:** A steady stream of research continues to show the benefits of acupuncture as a non-pharmacological pain management option to reduce the need for opioids during and after surgery, to reduce opioid dependence, and to reduce nicotine dependence. To these ends, we have included 18 pieces of literature (11 systematic reviews/meta-analyses, 1 prospective cohort trials, 2 retrospective observational trials/cohorts, 1 parallel arm randomized controlled trial (RCT), 1 randomized pilot trial, and 1 large CDC publication published since 2017, with 12 of these since 2021) demonstrating the effectiveness of acupuncture for substance use/use reduction.
- i. **2014 Smoking cessation:** We have included 4 systematic reviews/meta-analyses (2024, 2023, 2022, 2021) published since 2014 that explore the effectiveness of acupuncture to assist with smoking cessation. This number is included in the above substance use section.
- d. **Mental Health:** We have included 77 studies related to the efficacy of acupuncture to treat mental health conditions, including depression, anxiety, insomnia, and PTSD. *We present the literature in this section to you with hope and urgency, given the mental health crisis and high need for effective mental health services. The literature in this*



section is substantial and the quality of the studies and evidence is strong.

i. **2010-11 Depression:** Post-stroke depression was included on the Prioritized List after the acupuncture community submitted research to the HERC in 2010-11. Since then a multitude of systematic reviews have been published on the efficacy of acupuncture for the treatment of depression and depression in conjunction with other conditions, such as but not limited to post-stroke depression. We have included 30 studies (15 systematic reviews/meta-analyses published between 2019-2023, 9 systematic reviews/meta-analyses published between 2013-2024 regarding a combination of depression with anxiety and/or insomnia, 1 large scoping 2017 study by McDonald & Janz, 2022 and 2021 studies related to depression as a symptom of cancer, 2018 and 2021 studies related to opioid symptoms, and a 2023 study related to nicotine withdrawal symptoms) that demonstrate efficacy of acupuncture to treat depression. *Of note, a 2022 systematic review/meta-analysis by Xu and colleagues (see reference #219) revealed a **dose-response relationship** for acupuncture treatment of depression that maxed at 36 visits; this is the number of visits needed to achieve an optimally effective clinical response.*

ii. **2019 Anxiety and PTSD:** In 2019, evidence was submitted to HERC for the effectiveness of acupuncture to treat anxiety and PTSD.

a. **Anxiety:** We have included 21 studies (13 systematic reviews/meta-analyses published between 2016-2024 and 7 systematic reviews/meta-analyses published between 2013-2023 that combine anxiety with other conditions such as depression and insomnia) regarding the effectiveness of acupuncture to treat anxiety.

b. **PTSD:** We have included 4 studies (one 2020 systematic review/meta-analysis, one 2014 randomized trial, one 2007 randomized pilot trial and one large scoping 2014 study) on the efficacy of acupuncture to treat PTSD.

iii. **Insomnia** To our knowledge, no one has previously submitted evidence to the HERC regarding the effectiveness of acupuncture to treat insomnia. We have included 38 systematic reviews/meta-analyses (34 published between 2016-2024 involving acupuncture for anxiety alone and 4 published between 2017-2023 for insomnia plus depression and anxiety) that demonstrate the effectiveness of acupuncture to treat various types of insomnia.

e. **2010-11 Women's Health (non-pain-related):**

i. **2010-11 hyperemesis gravidarum.** In 2010-11 evidence for hyperemesis gravidarum and breech presentation was submitted to HERC; this condition was restored to the Prioritized List. We have included 6 systematic reviews published between 2021-2024 demonstrating evidence for the effectiveness of acupuncture upon the gastrointestinal symptoms of nausea and vomiting during pregnancy. These literature summaries are



included in the “Gastrointestinal Symptoms” section.

ii. **2010-11 breech presentation.** In 2010-11 evidence for breech presentation was submitted to HERC; this condition was restored to the Prioritized List. We have included 2 systematic reviews/meta-analyses (2021, 2023) supporting the use of acupuncture for breech presentation. These studies are in the Women’s Health (non-pain-related) section.

iii. **infertility.** We have included 13 systematic reviews/meta-analyses published between 2019-2024 regarding the effectiveness of acupuncture to treat infertility. This is a new submission and not an update to a previous HERC submission. These studies are in the Women’s Health (non-pain-related) section.

iv. **peri-menopause and menopausal- and cancer-related hot flashes.** We have included 12 studies related to perimenopause/menopause symptoms and cancer-related hot flashes (10 systematic reviews/meta-analyses published between 2019-2023 regarding the effectiveness of acupuncture to treat perimenopausal/menopausal symptoms, including hot flashes, and two studies in 2021 and 2024 related to hot flashes due to cancer treatment). This is a new submission and not an update to a previous HERC submission. These studies are in the Women’s Health (non-pain-related) section. The studies regarding cancer-related hot flashes pertain to all humans experiencing this condition, regardless of sex/gender.

- f. **2010-11 Gastrointestinal Symptoms:** We have included 29 studies (28 systematic reviews/meta-analyses published between 2016-2024 and one large scoping study from 2017) demonstrating the effectiveness of acupuncture to treat a variety of gastrointestinal symptoms, including general gastrointestinal issues, postprandial distress, gastrointestinal reflux disease (GERD), pregnancy-, cancer-, and surgery-related nausea and vomiting, as well as constipation.
- g. **Allergic Rhinitis:** We have included 9 studies (8 systematic reviews/meta-analyses published between 2015-2024 and one large scoping 2017 study) demonstrating the effectiveness of acupuncture to treat allergic rhinitis related symptoms. This is a new submission and not an update to a previous HERC submission.
- h. **Dose-Response Relationships:** Acupuncture has demonstrated dose-response relationships; in other words, patients benefit from greater treatment frequency (or “dose”) of acupuncture. Seven of the included articles reference dose-response relationship between acupuncture treatment and clinical effectiveness. The studies are as follows: Yang, et al. (2024)³⁵ showed peak benefit of acupuncture for migraine treatment at 2 months; Mao, et al. (2024)⁹ showed a higher dose of laser acupuncture resulted in significantly lower low back pain; Liu, et al. (2024)⁶⁷ demonstrated that a higher dose of acupuncture for knee osteoarthritis resulted in significantly greater pain relief when compared with NSAIDs; Xu, et al. (2022)²¹⁸ showed that 36 acupuncture



treatments are optimal for treating major depressive disorder; Zheng, et al. (2022)¹⁴³ demonstrated significant endometrial receptivity from a moderate/high dose of acupuncture vs low dose; Lin, et al. (2020)⁷⁷ showed a dose-response relationship for acupuncture treatment of knee osteoarthritis; Sun, et al. (2019)⁷⁸ found a higher dose of acupuncture resulted in greater pain relief for knee osteoarthritis. These studies are found throughout this literature review and can be found by searching the terms “dose” or “dose-response.”

- i. **Safety:** New research affirms that acupuncture continues to demonstrate safety. We have included 73 studies whose authors report on the safety and low adverse events associated with acupuncture. At least seven of these studies^{152,283-287,312} specifically involve acupuncture safety and/or reporting of adverse events as the primary outcomes. For the additional 66 studies, this document can be searched using the terms “safe” or “adverse event.”
- j. **Cost-effectiveness:** New research affirms that acupuncture continues to demonstrate cost-effectiveness. We have included 31 studies published from 2005 - 2024 regarding the cost-effectiveness of acupuncture to treat various conditions, including general cost-effectiveness,^{288,289,290} chronic pain,^{2,3,4,6,7} chronic and acute low back pain,^{292,293,294,295,296,297,286} pelvic/low back pain,²⁹⁹ chronic neck pain,³⁰⁰ headaches,³⁰¹ osteoarthritis,^{302,303,304} chronic non-cancer pain,³⁰⁵ peripheral neuropathic pain,³⁰⁶ dysmenorrhea,³⁰⁷ moxa to turn a breech baby,³⁰⁸ allergic rhinitis,³⁰⁹ and opioid use.^{198,310} One strong 2017 study² found cost-effectiveness for the following conditions: chronic pain, low back pain, migraine, neck pain, osteoarthritis, ambulatory anesthesia, depression, dysmenorrhea, headache, post-operative nausea and vomiting, and allergic rhinitis.
- k. **Patient Satisfaction:** The literature shows increased patient satisfaction with use of acupuncture. These statements are supported by the extensive literature review contained in this document. We have included 13 studies published from 2005 - 2024 (with the majority published since 2020) that aim to demonstrate patient satisfaction with acupuncture.

C. Clinical Effectiveness of Acupuncture: Evidence-Based Research

Clinical Effectiveness Abstract

Acupuncture is a **safe**,^{2,13,16,18,20,21,27,28,29,40,42,50,55,57,58,66,73,80,104,112,116,134,136,137,139,140,141,149,152,162,164,165,166,167,168,172,173,179,181,184,188,189,195,202,209,212,213,214,222,223,225,226,233,234,237,248,256,257,262,263,264,265,267,274,275,276,279,282-286,311} **clinically** **effective**,¹⁻²⁸¹ **cost-effective**,^{2,4,6,50,198,206,253,280,287-309} and **evidence-based**¹⁻³⁷⁰ non-pharmacological pain management option for chronic and acute pain,¹⁻¹²⁹ women’s health non-pain conditions,^{130-136,139-153} cancer-related hot flashes,^{137,138} gastrointestinal symptoms,¹⁵⁴⁻¹⁸¹ allergic rhinitis,^{2,182-189} substance use,^{5,100,190-205} and improved mental health outcomes.^{1,206-281} The **benefits persist over time**,^{6,50,206,253,280} underscoring the cost-effectiveness of acupuncture as a first-line treatment for chronic and acute pain^{2,4,6,50,206,253,280,287-308} and for the opioid epidemic.^{198,309} **Patients report high satisfaction** with acupuncture services and clinical outcomes.^{116,121,126,128,152,179,184,283,287,295,310,311} Equivalent outcomes between verum and sham/minimal



acupuncture^{2,7,52,60,102,114,118,126,131,135-137,152,160,166,167,202,204,210,213,228,237,252,258,268-270,290,313-317} may have created “**consistent underestimation of the true effect size of acupuncture interventions,**”^{2,3,4,7} under-reporting in the early literature.^{3,4,6,7,313-317} Sham and placebo-controlled acupuncture produce demonstrated treatment effects.^{2,3,4,6,7,19,32,62,63,115,206,211,219,227,228,252,253,257,288,317} Clinical effectiveness comparison outcomes are emerging as the new standard in acupuncture research, wherein acupuncture often demonstrates superior outcomes to standard care,^{1,6,7,11,13,27,30,36,39,40,41,44-47,49,50,53,54,56,61,63,67,75,76,85-87,92,97,99,102,103,112,124,126,130-132,134,137,140,145,146,148,149,155,164-166,168,170,184,187,199,207,208,209,211,213,215,224,226-228,231,232,235,242,245,247,249,250,255,256,258,259,261,269-272,274,276,277,280,281,295,298,301,304-307} and to no intervention controls,^{3,4,6,19,32,63,228,252,315,316} equivalent clinical effects to standard care with fewer side effects,^{56,61,85,131,132,133,197,203,204,213,235,270,271,295} and superior treatment effects when combined with usual care.^{6,11,12,16,17,19,22,25,41,49,53,54,58,61,62,69,70,86,96,100,116,119,123,125,129,130,147,149,150,152,163,171,174,178,181,182,186,188,193,198,201,209,214,215,219-225,247,258,274,277,285,290,308} The “**placebo effect**” may be a collection of treatment effects^{3,4,314,318-329} that causes physiological change³²⁵ and clinically measurable benefits.^{321,325} The large body of evidence points to acupuncture’s beneficial effects on pain management, and questions surrounding placebo effect merely detract from this consideration. Biomedical understanding of the mechanisms of acupuncture is emerging at the forefront of biological research at a level of physiological detail on par with other biological science disciplines^{26,38,51,154,333-370} and is understood to work via the connective tissue stimulating structural/mechanical changes leading to biochemical, bioelectrical, and molecular cascades, producing tangible physiological effects that can reduce pain/inflammation, and the experience of pain.^{26,38,51,154,333-370} Questions about *how acupuncture works* can now be answered along with demonstration of clinical effectiveness. New acupuncture research is increasingly rigorous and high-quality, as consistent research methods and reporting guidelines are adopted. In the conclusion section of scientific papers, research investigators *traditionally state the need for higher-quality studies and more rigorous research* as a standard of scientific writing. These standard statements should not detract from the measurable clinical benefits shown in these acupuncture studies.

1. Acupuncture for Pain

Hempel S, Shekelle PG, Taylor SL, Solloway MR. The evidence map of acupuncture. Department of Veterans Affairs VA-ESP Project #05-226. January 2014. <https://www.hsrd.research.va.gov/publications/esp/acupuncture.pdf>¹

- 1,223 studies electronically located, of which 183 met inclusion criteria (65 for pain, 44 for wellness, 20 for mental health, and 49 for “other”)
- Strong evidence of a positive effect from acupuncture found for headaches, chronic pain, and migraines
- Potential positive effects found for dysmenorrhea, osteoarthritis, general pain, cancer pain, labor pain, prostatitis, temporomandibular pain, plantar heel pain, pregnancy pain, and ankle sprain
- Unclear, but high-level, evidence found for back and neck pain
- Unclear evidence found for surgery analgesia, post-operative pain, fibromyalgia, shoulder pain, and rheumatoid arthritis
- No evidence found for effectiveness with carpal tunnel

McDonald J, Janz S. The acupuncture evidence project: a comparative literature review. Australian Acupuncture and Chinese Medicine Association. January 2017.²



- 122 conditions reviewed m
- “Evidence of effect” found for 117 conditions
- No evidence of effect found for five conditions
- Level of “evidence of effect” increased for 24 conditions over time
- **Positive acupuncture treatment effect** for eight conditions: low back pain, migraines, knee osteoarthritis, headache, post-operative pain, chronic allergic rhinitis, and both chemotherapy-induced and post-operative nausea/vomiting.
- **Cost-effectiveness** identified for 10 conditions: chronic pain, low back pain, migraine, neck pain, osteoarthritis, ambulatory anesthesia, depression, dysmenorrhea, headache, post-operative nausea and vomiting, and allergic rhinitis.
- **Evidence of safety** identified for 9 conditions: low back pain, migraine, knee osteoarthritis, prostatitis pain, chronic pelvic pain, ambulatory anesthesia, Alzheimer's disease, cancer-related psychological symptoms, depression, and allergic rhinitis.
- **Conclusions:** Acupuncture demonstrated a positive treatment effect for eight conditions: migraine prophylaxis, headache, chronic low back pain, allergic rhinitis, knee osteoarthritis, chemotherapy-induced nausea and vomiting, post-operative nausea and vomiting, and post-operative pain.

Vickers AJ, Cronin AM, Maschino AC, Lewith G, MacPherson H, Foster NE, et al. Acupuncture for chronic pain: individual patient data meta-analysis. *Arch Intern Med.* 2012;172(19):1444-53. ³

- 39 studies involving 20,827 patients
- True acupuncture significantly outperformed sham acupuncture ($P < 0.001$)
- **Treatment effects persisted over time**, decreasing by only about 15% at one year
- Referral for acupuncture is a reasonable clinical decision for chronic pain patients
- Conclusions and a Note on Sham Acupuncture: Current knowledge that sham and placebo-controlled acupuncture both produce treatment effects has created a “consistent underestimation of the true effect size of acupuncture interventions” in previous acupuncture literature.

Vickers AJ, Vertosick EA, Lewith GL, MacPherson H, Foster NE, Sherman KJ, Irnich D, Witt CM. Acupuncture for chronic pain: update of an individual patient data meta-analysis. *J Pain.* 2018 May;19(5): 455–474. doi:10.1016/j.jpain.2017.11.005. ⁴

- Updated 2012 individual patient data meta-analysis: acupuncture effects on 4 chronic pain conditions (non-specific musculoskeletal pain, osteoarthritis, chronic headache, shoulder pain)
- MEDLINE and Cochrane Central Registry of Controlled Trials searched for randomized trials (acupuncture vs. sham + acupuncture vs. no control) through December 31, 2015



- Additional 13 RCTs; total of 42 studies and 20,827 patients
- Main outcome measures: pain and function
- **Results** similar to 2012 study: “**Acupuncture was superior to both sham and no acupuncture control for each pain condition (all $p < 0.001$).**”
 - acupuncture vs no acupuncture control: ~0.5 standard deviations (SD)
 - acupuncture vs sham: ~0.2 SDs
- The authors “found **clear evidence that the effects of acupuncture persist over time** with only a small decrease, approximately 15%, in treatment effect at one year.”
- Acupuncture **effect sizes related to type of control used**; smaller differences between acupuncture and sham acupuncture groups.

Dowell D, Ragan KR, Jones CM, Baldwin GT, Chou R. CDC Clinical Practice Guideline for Prescribing Opioids for Pain — United States, 2022. MMWR Recomm Rep 2022;71(No. RR-3):1–95. doi: <http://dx.doi.org/10.15585/mmwr.rr7103a1>.⁵

- **Purpose:** To provide *clinical recommendations for adult (≥ 18 years) pain care, including opioid prescriptions*. This document “updates the CDC Guideline for Prescribing Opioids for Chronic Pain — United States, 2016 (MMWR Recomm Rep 2016;65[No. RR-1]:1–49) and includes recommendations for managing acute (duration of < 1 month), subacute (duration of 1–3 months), and chronic (duration of > 3 months) pain.”
- **Four Main Focus Areas:**
 - 1) ascertaining choice to use opioids
 - 2) choosing opioids and “determining opioid dosages”
 - 3) “deciding duration of initial opioid prescription and conducting follow-up”
 - 4) “assessing risk and addressing potential harms of opioid use.”
- **Evidence Quality:** Grading of Recommendations Assessment, Development, and Evaluation (GRADE) framework (consider scientific evidence, benefits and harms, patient/clinician values/preferences, resources)
- **Consulting Bodies:** Board of Scientific Counselors of the National Center for Injury Prevention and Control (a federally chartered advisory committee), the public, and peer reviewers
- **Results:**
 - “CDC recommends that persons with pain receive appropriate pain treatment, with careful *consideration of the benefits and risks of all treatment options* in the context of the patient’s circumstances. Recommendations *should not be applied as inflexible standards* of care across patient populations. This clinical practice guideline is intended to improve communication between clinicians and patients



about the benefits and risks of pain treatments, including opioid therapy; improve the effectiveness and safety of pain treatment; mitigate pain; improve function and quality of life for patients with pain; and reduce risks associated with opioid pain therapy, including opioid use disorder, overdose, and death.”

- Acupuncture is recommended multiple times in the 2022 guidelines (versus 0 times in the 2016 guidelines) as a non-pharmacological pain-management option for the following conditions:
 - acute low back pain
 - low back pain
 - chronic pain
 - neck pain
 - knee osteoarthritis

Cummings M. Modellvorhaben Akupunktur—a summary of the ART, ARC and GERAC trials. *Acupunct Med.* 2009;27(1):26-30. ⁶

- **Study:** German Federal Committee of Physicians and Health Insurers October 2000 recommendation to implement Model Projects on Acupuncture ("Modellvorhaben Akupunktur") study “to determine the evidence-based role of acupuncture in the treatment of certain illnesses.”
 - 51,666 participants in ART, ARC, GERAC combined; COMP participant numbers not reported (recruitment goal 480)
 - “Largest clinical studies on acupuncture ever performed.”
- **(1) Acupuncture Randomized Trials (ART)**
 - **Study:** 4 RCT’s involving 300 participants at 18-30 outpatient centers in Germany; acupuncture for treatment of migraine, tension-type headache, chronic low back pain, and knee osteoarthritis
 - **Design:** 3 parallel randomized controlled arms with 2:1:1 subject distribution (acupuncture group (n=~150); sham/minimal acupuncture group (n=~75); waitlist control (n=~75)); 12 acupuncture treatments over 8 weeks
 - **Migraine and tension-type headache outcomes:** number of days with moderate-severe intensity headache assessed at baseline (4 weeks prior to treatment), 8 weeks, 26 weeks, and 52 weeks; “responders” defined after study: “those with a 50% reduction or greater in days with moderate or severe pain (headache).”



- **Low back pain outcomes:** change in low back pain intensity from baseline to week 8 as assessed by Visual Analogue Scale (VAS); “responders” defined after study as those with “at least 50% reduction in pain intensity”
- **Knee osteoarthritis outcomes:** change in Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) at baseline and 8 weeks; “responders” defined after study as those with “a decrease of at least 50% in WOMAC index score”
- **Overall ART Results:**
 - acupuncture vs waitlist: significant short-term differences
 - acupuncture vs minimal acupuncture: significant difference in osteoarthritis group
 - treatment effects maintained at 21-24 weeks for migraine and tension headache, and at 52 weeks for low back pain and knee osteoarthritis
- **(2) Acupuncture in Routine Care (ARC)**
 - **Study:** series of large pragmatic (test treatments in real-world clinical settings) randomized controlled trials (RCT’s) with non-randomized cohorts selected from a “social health insurance fund” in Germany to test acupuncture clinical- and cost-effectiveness to treat 7 conditions
 - **Participant Numbers and Conditions Studied:** acupuncture to treat knee/hip osteoarthritis (n=3,633), chronic neck pain (n=14,161), chronic low back pain (n=11,630), chronic headache (n=15,056), dysmenorrhea (n=649), allergic rhinitis (n=5,237), and asthma (awaiting publication)
 - **Note:** participants allowed to choose to receive acupuncture immediately (non-randomized) or to be randomized and receive 15 treatments over 3 months (at beginning of study or control group after 3 months)
- **ARC outcomes:** measured at 3 and 6 months
 - **headache:** number of days with headache per month
 - **back pain:** HFAQ
 - **osteoarthritis:** “change in WOMAC score”
 - **chronic neck pain:** “a validated neck pain and disability scale (NPAD)”
 - **dysmenorrhea:** “average pain intensity during the last menstruation before assessment measured on numeric rating scale



- **rhinitis:** Rhinitis Quality of Life Questionnaire
- **additional measures:** quality of life (QoL) (converted to ICER QALY) and cost-effectiveness relationship of routine care plus acupuncture using Short-Form-36 (SF)-36 and costs (“including direct [and indirect] healthcare-related costs” all at baseline and 3 months)
- **ARC Results:** expressed as percentages and shown on bar graph
 - **randomized arm of trial:** “*clinically relevant differences at 3 months between the groups receiving acupuncture plus usual care*” ($p < 0.001$)”
 - **non-randomized groups:** higher symptom severity at baseline; **no significant differences** compared with randomized group
 - **cost-effectiveness:** **treating (1) dysmenorrhea with acupuncture most cost-effective**, followed by **(2) low back pain and headache (similar results)**, then **(3) neck pain**, and lastly **(4) osteoarthritis**
- **(3) COMP**
 - **Study:** single comparative trial of acupuncture (8-15 acupuncture treatments over 12 weeks) vs metoprolol (100-200 mg daily for 12 weeks) for migraine; recruitment target 480 participants
 - **COMP outcomes:** number of migraine days reported in “standardized headache diary” at baseline (4 weeks prior to trial) and at weeks 9-12; responders: $\geq 50\%$ reduction in migraines
 - **COMP results:** low enrollment; study ended prematurely.
 - **similar results for acupuncture and metoprolol**
 - **number of migraine days:** decreased by **2.5 days in acupuncture group** vs 2.2 days in metoprolol group ($p = 0.721$)
 - **reduction of migraine attacks** by $\geq 50\%$ was **61% for acupuncture group** and 49% for metoprolol group
 - “fewer adverse effects in the acupuncture group”
- **(4) German Acupuncture Trials (GERAC)**
 - **Study participants and design:** four trials involving up to 1,000 participants at 122-340 practices in Germany; comparative trials with 3 equal parallel arms: acupuncture, sham (not minimal), standard care



- **GERAC migraine outcomes:** difference in migraine days at 4 weeks pre-study and at weeks 23-26; responders had at least 50% reduction in number of migraine days
- **GERAC migraine results**
 - **mean reduction of 2.3 migraine days in acupuncture group**, 1.5 days in minimal acupuncture group, and 2.1 days in standard care group (**p=0.09**); **acupuncture significant results when compared w/ baseline (p<0.0001)**
- **GERAC tension-type headache outcomes:** “>50% reduction in number of headache days” from 4 weeks prior to trial and at 6 months
- **GERAC tension-type headache results:**
 - half of responders w/ 50% reduction reported as non-responders “due to medication changes, co-interventions, protocol violations, or unblinding.”
 - **responders: 33% of acupuncture participants** and 27% of minimal acupuncture group (**p=0.18**)
 - **“Acupuncture was superior to minimal acupuncture for most secondary outcomes**, including headache days (1.8 fewer; p= 0.004)” and “>50% reduction in headache days: 66% vs 55%, risk difference 12%; p=0.024)
- **GERAC low back pain outcomes:** 33% or greater reduction in 3 pain scales on Von Korff Chronic Pain Grade Scale (CPGS) or 12% or greater improvement on Hanover Functional Ability Questionnaire (HFAQ)
- **GERAC low back pain results:** 6 month response rate 47.6% acupuncture group, 44.2% minimal acupuncture group, 27.4% conventional treatment group
 - acupuncture vs minimal acupuncture control 3.4% (p = 0.39)
 - **acupuncture vs conventional therapy 20.2% (p<0.001)**
 - **minimal acupuncture vs conventional therapy 16.8% (p<0.001)**
- **GERAC knee osteoarthritis outcomes:** at least 36% change in WOMAC scores at baseline, 13 weeks, 26 weeks
- **GERAC knee osteoarthritis results:** 51.3% success rate for acupuncture, 51.0% success rate for minimal acupuncture, 29.1% for conservative therapy
 - **relative risk (RR)** (RR = probability of event occurring d/t treatment) **acupuncture vs conservative therapy 17.5 (p<0.001)**



- **RR minimal acupuncture vs conservative therapy , 1.73 (p<0.001)**
- **no significant difference between acupuncture and minimal acupuncture control (p=0.48)**
- **Overall Results Summaries:**
 - **ART**
 - acupuncture vs waitlist: **significant short-term**
 - acupuncture vs minimal acupuncture: significant for **osteoarthritis**
 - persistence: **migraine/tension** (21-24 weeks), **low back pain and knee osteoarthritis** 52 weeks
 - **ARC**
 - ***“clinically relevant differences at 3 months between the groups receiving acupuncture plus usual care” (p<0.001)***
 - **most cost effective:** (1) dysmenorrhea, (2) low back pain/headache, (3) neck pain, (4) osteoarthritis.
 - **GERAC**
 - **acupuncture vs baseline:** significant for migraines: 2.3 migraine days vs baseline (p<0.0001)
 - **acupuncture vs usual care:** significant for low back pain and knee osteoarthritis (p<0.001); not significant for migraines (p=0.09) or tension headaches
 - **minimal acupuncture vs usual care:** significant for low back pain and knee osteoarthritis (p<0.001)
 - **acupuncture vs minimal acupuncture:** not significant for migraines (fewer headache days p= 0.004 and >50% reduction in headache days p=0.024), tension headaches (p=0.18), low back pain (p = 0.39), knee osteoarthritis (p=0.48)
- **Overall Pooled Results**
 - **Overall results:** acupuncture effective for a variety of conditions with “acceptable cost utility” (rate of €35 per session)
 - **sham acupuncture results statistically no different than medication for migraines** and performed **better than standard care for low back pain**
 - neither randomization or practitioner length of training time appeared to affect treatment outcomes
 - sham group knee osteoarthritis larger impact than sham for ART knee osteoarthritis
 - **Discussion:**



- *GERAC knee participants also received physiotherapy, possibly accounting for the larger impact*
 - “perhaps it is more important to be properly trained in performing sham acupuncture for RCTs than in therapeutic acupuncture.”
 - ARC study results most applicable to general population
 - recruitment enhanced by reimbursing patients for participating
- **Overall Conclusions:**
 - “Acupuncture appears to be **effective in a range of chronic conditions** and it seems to have **acceptable cost-effectiveness** in Western health economic terms.”
 - “**Sham acupuncture**, in the form of minimal off-point needling in a therapeutic context, is **unlikely to be an inactive placebo**.”
 - German health officials included acupuncture (April 2006) “into **routine reimbursement by social health insurance funds for chronic low back pain and chronic osteoarthritis of the knee**.”

MacPherson H, Vertosick E, Lewith G, et al. Influence of control group on effect size in trials of acupuncture for chronic pain: a secondary analysis of an individual patient data meta-analysis. *PLoS one*. 2014;9(4):e93739. ⁷

- **Background:** “In a recent individual patient data meta-analysis, acupuncture was found to be superior to both sham and non-sham controls in patients with chronic pain. In this paper we identify variations in types of sham and non-sham controls used and analyze their impact on the effect size of acupuncture.
- **Study:** Systematic review for “acupuncture trials involving patients with headache and migraine, osteoarthritis, and back, neck and shoulder pain;” meta-regression analysis of 29 trials involving 20 sham-controlled (non-needle, penetrating needle, non-penetrating needle) (n = 5,230) and 18 non-sham controlled (n = 14,597) trials.
- **Interventions:** acupuncture vs sham control
- **Results:** “Acupuncture was significantly superior to all categories of control group.”
 - **penetrating needle sham controls:** “**acupuncture had smaller effect sizes**” -0.45 (95% C.I. -0.78, -0.12; p = 0.007), or -0.19 (95% C.I. -0.39, 0.01; p = 0.058) “after exclusion of outlying studies showing very large effects of acupuncture.”
 - **non-sham controlled trials:** “**larger effect sizes associated with acupuncture vs. non-specified routine care** than vs. protocol-guided care” with large but non-significant (0.26) difference in effect size; wide confidence interval (95% C.I. -0.05, 0.57, p = 0.1).
- **Conclusion:** “*Acupuncture is significantly superior to control irrespective of the subtype of control.*” ... “*Findings can help inform study design in acupuncture, particularly with respect to sample size. Penetrating needles appear to have important physiologic activity.*”



We recommend that this type of sham be avoided.”

a. Acupuncture for Chronic Pain

(a). Acupuncture for Chronic Low Back Pain

Zhang K, Lin X, Liu Z, et al. Therapeutic effects of different acupuncture methods on chronic nonspecific low back pain: a network meta-analysis. *J Orthop Surg Res.* 2024; 19:615. doi: 10.1186/s13018-024-05118-8 ⁸

- **Design:** network meta-analysis
- **International Prospective Register of Systematic Reviews** (No. CRD42023425975; Registration Date, 23/01/2024)
- **Systematic Review:** lit review of 8 databases (PubMed, Embase, Cochrane Library, Web of Science, Sinomed, CNKI, Wanfang Data, VIP) from inception to January 21, 2024, for clinical randomized controlled trials (RCTs) involving acupuncture for treatment of chronic nonspecific low back pain (CNLBP). Articles were chosen according to PRISMA guidelines.
- **Risk of Bias:** Cochrane risk-of-bias tool 2.0 (RoB 2.0)
- **Meta-Analysis:** Stata 15.0 (Stata Corp, College Station, Texas, USA)
- **Evidence Quality:** GRADE guidelines
- **Results:**
 - 27 articles involving 2,579 patients met inclusion criteria
 - network meta-analysis ranking of treatment results:
 - top three treatments in general: “warm needle acupuncture, intensive silver needle therapy and meridian-sinew theory-based treatment.”
 - top three treatments for pain relief: “electrical warm needling, intensive silver needle therapy and warm needle acupuncture.”
 - top three treatments for improving mobility: “meridian-sinew theory-based treatment, routine acupuncture and electroacupuncture.”
- **Conclusion:** “For CNLBP patients, warm needle acupuncture, electrical warm needling and meridian-sinew theory-based treatment are mainly recommended. If patients have significant pain, electroacupuncture is strongly suggested. On the contrary, for patients with decreased joint mobility, meridian-sinew theory-based treatment is advocated.”

Mao X, He H, Ding J. Efficacy of laser acupuncture for treatment of chronic low back pain: a systematic review and meta-analysis. *Pain Manag Nurs.* 2024 Oct;25(5):529-537. doi: 10.1016/j.pmn.2024.05.001. Epub 2024 May 31. ⁹



- **Design:** systematic review and meta-analysis
- **Systematic Review:** Literature search of databases (PubMed, EMBASE, Scopus) for peer-reviewed randomized controlled trials involving laser acupuncture (LA) for chronic low back pain (LBP)
- **Treatment Groups:** acupuncture, placebo, sham, conventional therapy, or no treatment.
- **Primary Outcome:** pain intensity
- **Meta-Analysis/Stats:** “Pooled effect estimates were calculated using random-effects models and reported as weighted mean difference (WMD) with 95% confidence intervals (CI).”
- **Results:**
 - 20 studies met inclusion criteria
 - “Compared to the control group, patients who underwent LA experienced a significant reduction in reported pain scores immediately after completing the treatment” (WMD -1.14, 95% CI: -1.68 to -0.61)
 - **“High dose of LA was associated with a more significant decrease in the pain scores”** (WMD -1.40, 95% CI: -1.94 to -0.85; N = 15, I² = 81.0%).
 - “Reported pain scores of patients who received LA were statistically similar to those of the control group at short-term (4-8 weeks after the treatment) and long-term (12 months) follow-ups.”
- **Conclusions:** “In patients with chronic LBP, LA may help in alleviating pain immediately after the treatment. However, this effect does not appear to be sustained on later follow-up assessments. Consequently, patients should be informed about the potential limitations of the treatment in providing lasting pain relief.”

Wu M, Fan C, Liu H, et al. The effectiveness of acupuncture for low back pain: an umbrella review and meta-analysis. *Am J Chin Med.* 2024;52(4):905-923. doi:10.1142/S0192415X2450037X. Epub 2024 May 24. ¹⁰

- **Design:** umbrella review and meta-analysis
- **Literature Review:** search of PubMed, EMBASE, Web of Science, Cochrane Database of Systematic Reviews, Chinese National Knowledge Infrastructure (CNKI) databases for studies involving the effectiveness of acupuncture for low back pain
- **Results:**
 - “highly suggestive evidence in favor of the immediate and short-term analgesic effects of acupuncture, with suggestive evidence supporting intermediate-term analgesic effects.”
 - “effectiveness of acupuncture on disability improvement has demonstrated weak to suggestive evidence.”
 - Quality of life improvement: limited evidence
 - “Leave-one-out analysis corroborated the robustness of the meta-analysis, further confirming the credibility of the findings.”
- **Conclusion:** “This umbrella review indicated that the most significant advantage of acupuncture for LBP is its capacity to reduce pain.”



Hsieh D, Chen Y-C, Chang H-C, Wei C-C, Lee T-H. Efficacy of electroacupuncture compared to standard and manual needling therapy for nonspecific low back pain: a systematic review and meta-analysis. *Cureus*. 2024;16(10): e72577. doi: 10.7759/cureus.72577 ¹¹

- **Design:** systematic review and meta-analysis
- **Systematic Review:** Literature search of databases (PubMed, Cochrane Library, Embase) “up to December 1, 2023, for randomized controlled trials on electroacupuncture for nonspecific low back pain.”
- **Treatment Groups:** electroacupuncture, standard therapy, manual needling therapy
- **Outcomes:** Visual Analog Scale and Numerical Rating Scale
- **Risk of Bias:** Cochrane Risk of Bias 2.0 tool.
- **Meta-Analysis:** 10 studies pooled for quantitative analysis
- **Results:**
 - 10 reports met inclusion criteria (electroacupuncture + standard therapy vs standard therapy (6); electroacupuncture vs manual needling therapies (4))
 - “Compared to control groups, electroacupuncture with standard therapy resulted in a statistically significant large effect in reduction in pain” (standardized mean difference (SMD) -0.83, 95% CI -1.22; -0.43, $P < 0.0001$)
 - “Electroacupuncture did not produce a statistically significant result compared to manual needling therapies” (SMD 0, 95% CI -0.71; 0.71, $P = 1.0$)
 - long-term analgesic effect:
 - “Electroacupuncture with standard therapy versus standard therapy yielded a statistically significant large effect in reduction in pain at one month” (SMD -0.84, 95% CI -1.30 to -0.37, $P = 0.0004$)
 - electroacupuncture with standard therapy versus standard therapy yielded a statistically significant small effect at two months (SMD -0.40, 95% CI -0.65 to -0.16, $P = 0.001$)
 - Limitations: small number of included studies/participants, issues blinding participants, and clinical heterogeneity amongst studies
 - Evidence Certainty: very low
- **Conclusions:** “Compared to standard therapy alone, electroacupuncture used with standard therapy produced greater pain reduction for nonspecific low back pain in immediate effects and one month and two months after treatment completion. The findings suggest that electroacupuncture may provide sustained pain relief for nonspecific low back pain when combined with standard therapy.”

Li X, Zhai G, Zhang H, et al. Clinical efficacy of acupuncture therapy combined with core muscle exercises in treating patients with chronic nonspecific low back pain: a systematic review and meta-analysis of randomized controlled trials. *Front Med*. 2024;11:1372748. doi: 10.3389/fmed.2024.1372748 ¹²

- **Design:** systematic review and meta-analysis



- **Systematic Review:** literature search of databases (PubMed, Web of Science, Cochrane, Embase, China National Knowledge Infrastructure, Chinese Biomedical Literature, Wanfang) until November 2023 for randomized controlled trials involving acupuncture and core muscle exercises for chronic nonspecific low back pain.
- **Quality Control:** PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analysis) guidelines followed during article selection. “Two reviewers applied inclusion and exclusion criteria.”
- **Results:**
 - 11 randomized controlled trials involving 727 participants
 - “Compared with controls, clinical efficacy was significant, with improvements in pain scores (visual analog pain scale and numerical rating scale) and Oswestry Disability Index in the intervention group.”
- **Conclusion:** “*Acupuncture therapy combined with core muscle exercises improved pain and functional status in patients with chronic nonspecific low back pain, with favorable clinical outcomes compared with single-core muscle training. Multicenter large-sample trials are required to obtain more reliable conclusions.*”

Lin H, Wang X, Feng Y, et al. Acupuncture versus oral medications for acute/subacute non-specific low back pain: a systematic review and meta-analysis. *Curr Pain Headache Rep.* 2024;28:489–500. doi: 10.1007/s11916-023-01201-7¹³

- **Design:** systematic review and meta-analysis
- **Registration:** PROSPERO (<http://www.crd.york.ac.uk/prospero>) with registration number CRD42021278346
- **Systematic Review:** literature search of databases (PubMed, Web of Science, Embase, Cochrane Library, Scopus, Epistemonikos, CNKI, WanFang Database, VIP database, CBMLD, CSTJ, clinical trials, EUCTR, World WHO ICTRP, ChiCTR) from inception to April 23, 2022, “for randomized controlled trials, cross-over studies, and cohort studies” acupuncture versus oral medication for non-specific low back pain (NSLBP) according to PRISMA guidelines
- **Meta-Analysis:** RevMan V.5.3.5 software; fixed effects model for low statistical heterogeneity ($P \geq 0.1$, or $I^2 \leq 50\%$) and random-effect model for high heterogeneity ($P < 0.1$, or $I^2 > 50\%$); weighted mean difference (WMD) and 95% confidence interval (CI) for continuous data; standardized mean difference (SMD) for studies whose measured outcomes were different; risk ratio and 95% CI for dichotomous data; alpha value for statistical significance ($P \leq 0.05$).
- **Results:**
 - 14 studies involving 1,263 participants met inclusion criteria
 - “acupuncture therapy was slightly more effective than oral medication in improving pain” ($P < 0.00001$, $I^2 = 92\%$, MD = -1.17, 95% CI [-1.61, -0.72]).
 - “acupuncture therapy exhibited a significant advantage over oral medication with a substantial effect” ($P < 0.00001$, $I^2 = 90\%$, SMD = -1.42, 95% CI [-2.22, -0.62]).



- “acupuncture therapy was associated with a 12% improvement rate compared to oral medication in patients with acute/subacute NSLBP” (P<0.0001, I²=54%, RR=1.11, 95% CI [1.05, 1.18]).
- **Summary:** “Acupuncture is more effective and safer than oral medication in treating acute/subacute NSLBP. This systematic review is poised to offer valuable guidance to clinicians treating acute/subacute NSLBP and potentially benefit the afflicted patients.”

Shi L-J, Tian Z-Y, Wang W-Y, Liao X. [Scoping review of acupuncture-moxibustion treatment for non-specific low back pain]. *Zhongguo Zhong Yao Za Zhi*. 2023 Dec;48(23):6249-6256. doi: 10.19540/j.cnki.cjcm.20230915.502. ¹⁴

- **Design:** systematic (scoping) review
- **Systematic Review:** literature search of 8 Chinese- and English-language databases from inception to July 7, 2023, for randomized controlled trials (RCTs) involving “acupuncture-moxibustion treatment for non-specific low back pain”
- **Results:**
 - 50 studies (Chinese, n=23 studies; English, n=27) involving 15 different treatments (acupuncture was the most common)
 - chronic non-specific low back pain studies: 68.0%
 - sample size average: 50-100 cases
 - treatment duration: “did not exceed one month in 80.0% of the studies.”
 - minimal clinical important difference (MCID) used: 8.0% of studies
 - follow-up period of 3 months: 28.0% of the studies
 - “concluded that acupuncture-moxibustion was effective in the treatment of non-specific lower back pain” = 82.0% of studies
 - adverse events: “reported in 20.0% of the studies.”
 - risk of bias: “dominated by low risk of bias and uncertain risk of bias, with fewer studies focusing on high risks of bias.”
- **Conclusion:** In most of the studies, acupuncture-moxibustion was significantly more effective than the control group. The research on acupuncture-moxibustion treatment for non-specific low back pain is developing rapidly, but there are still insufficient studies on psychological state, safety, and other indicators, and there are still some studies with uncertain risks of bias, which is not conducive to the generalization and application of the findings. Therefore, future studies should improve and refine these shortcomings.”

Xiong Z-Y, Liu X-Y, Ma P-H, et al. Placebo response among different types of sham acupuncture for low back pain: a systematic review and meta-analysis of randomized controlled trials. *Chin J Integr Med*. 2023 Oct;29(10):941-950. doi:10.1007/s11655-023-3608-1. Epub 2023 Aug 15. ¹⁵

- **Design:** systematic review and meta-analysis
- **Systematic Review:** search of 4 databases (PubMed, EMBASE, MEDLINE, Cochrane Library) through April 15, 2023, for randomized controlled trials (RCTs) involving acupuncture and sham treatment of nonspecific low back pain (LBP)



- **Primary Outcomes:** placebo response in pain intensity, back-specific function, quality of life. “Placebo response was defined as the change in these outcome measures from baseline to the end of treatment.”
- **Meta-Analysis/Stats:** “Random-effects models were used to synthesize the results, standardized mean differences (SMDs, Hedges) were applied to estimate the effect size.”
- **Results:**
 - 18 RCTs involving 3,321 patients met inclusion criteria
 - “Sham acupuncture showed a noteworthy pooled placebo response in pain intensity in patients with LBP” [SMD -1.43, 95% confidence interval (CI) -1.95 to -0.91, $I^2=89%$].
 - “A significant placebo response was also shown in back-specific functional status” (SMD -0.49, 95% CI -0.70 to -0.29, $I^2=73%$)
 - No placebo response was shown for quality of life (SMD 0.34, 95% CI -0.20 to 0.88, $I^2=84%$)
 - “Trials in which the sham acupuncture penetrated the skin or performed with regular needles had a significantly higher placebo response in pain intensity reduction, but other factors such as the location of sham acupuncture did not have a significant impact on the placebo response.”
- **Conclusions:** “Sham acupuncture is associated with a large placebo response in pain intensity among patients with LBP. Researchers should also be aware that the types of *sham acupuncture applied may potentially impact the evaluation of the efficacy of acupuncture*. Nonetheless, considering the nature of placebo response, the effect of other contextual factors cannot be ruled out in this study.”

Li R, Chen L, Ren Y, et al. Efficacy and safety of acupuncture for pregnancy-related low back pain: a systematic review and meta-analysis. *Heliyon*. 2023;9:e18439. doi: 10.1016/j.heliyon.2023.e18439 ¹⁶

- **Design:** systematic review and meta-analysis
- **Systematic Review:** Literature search of databases (Cochrane Library, PubMed, EMBASE, Web of Science, the Chinese Biological Medicine Database, China National Knowledge Infrastructure, WanFang, VIP) from inception to January 31, 2022, for randomized controlled trials (RCTs) involving acupuncture treatment for pregnancy-related low back pain
- **Methodological Quality:** Cochrane’s risk of bias tool
- **Meta-analysis:** RevMan 5.3
- **Results:**
 - “12 randomized controlled trials involving 1302 patients were included”
 - “compared to the control group, the VAS score was significantly decreased after acupuncture treatment.”
 - “no significant difference was found in the preterm delivery rate” after receiving acupuncture (RR = 0.38, 95%CI: 0.24 to 0.61, P = 0.97)
 - “acupuncture or acupuncture plus other therapies revealed a significant increase in the effective rate” vs other therapies (OR: 6.92, 95%CI: 2.44 to 19.67, $I_2 = 0%$).



- adverse events: none serious
- **Conclusion:** “Acupuncture or acupuncture combined with other interventions was a safe and effective therapy for treating PLBP. However, the methodological quality of the RCTs was low. More rigorous and well-designed trials should be conducted.”

Giovanardi CM, Gonzalez-Lorenzo M, Poini A, et al. Acupuncture as an alternative or in addition to conventional treatment for chronic non-specific low back pain: a systematic review and meta-analysis. Integr Med Res. 2023;12:100972. doi:10.1016/j.imr.2023.100972

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- **Design:** systematic review and meta-analysis
- **Systematic Review:** Lit search of Medline, Cochrane Library, Embase up to May 2022 for randomised controlled trials (RCTs) involving acupuncture alone or acupuncture with conventional therapies (CTs) to CTs.
- **Risk of Bias:** original Cochrane tool
- **Evidence Certainty:** GRADE certainty of evidence
- **Results:**
 - 10 RCTs involving 2,122 participants met inclusion criteria
 - acupuncture vs NPH or PH: “no differences were found for pain and disability.”
 - acupuncture vs PH + NPH combined: “pain and disability were reduced” (SMD=-0.50, 95% CI -0.62 to -0.37; SMD=-0.71, 95% CI -1.17 to -0.24)
 - acupuncture + NPH vs NPH alone: “pain and disability were reduced” (SMD=-0.70, 95% CI -0.94 to -0.46; SMD=-0.95, 95% CI -1.36 to -0.54).
 - acupuncture + PH vs PH alone: “pain and disability were reduced” (MD=-0.21, 95% CI -433.28 to -10.42; MD=-3.1, 95% CI -4.87 to -1.83).
 - acupuncture + combined treatment vs combined treatment alone: “no differences were found in pain, while disability was reduced” (MD=-3.40 95% CI -5.17 to -1.63).
 - adverse events: not reported
 - evidence certainty: “moderate to very low”
- **Conclusions:** “We are uncertain whether acupuncture is more effective and safer than CT. In the comparisons without estimates’ imprecision, acupuncture showed promising results. *Acupuncture could be an option based on patients’ preferences.*”

Asano H, Plonka D, Weeger J. Effectiveness of acupuncture for nonspecific chronic low back pain: a systematic review and meta-analysis. Med Acupunct. 2022;34(2). doi:10.1089/acu.2021.0057¹⁸

- **Systematic Review:** literature search of PubMed and EBSCO databases (2000–2020) for randomized controlled trials involving “acupuncture treatment for nonspecific chronic lower back pain”
- **Outcomes Assessed:** pain intensity and disability
- **Methodological Quality:** Cochrane risk-of-bias criteria
- **Meta-Analysis:** 4 studies pooled for quantitative analysis



- **Results:**
 - 5 studies met inclusion criteria
 - “Acupuncture as an adjunct to standard therapy had clinically meaningful reduction in self-reported pain” when compared to standard care at the following time intervals:
 - post-treatment (mean difference = -1.04 [95% confidence interval (CI), -1.59 to -0.49], $P < 0.001$, $I^2 = 46.1\%$)
 - intermediate term (mean difference = -0.82 [95% CI, -1.13 to -0.50], $P < 0.001$, $I^2 = 0\%$)
 - “Levels of disability showed similar clinically meaningful reduction at post-treatment and intermediate term.”
- **Conclusion:** “Both the systematic review and meta-analysis demonstrate that acupuncture as an adjunct to standard therapy is a safe and effective method in reducing pain and disability among adults with NScLBP.”

Baroncini A, Maffulli N, Eschweiler J. Acupuncture in chronic aspecific low back pain: a Bayesian network meta-analysis. *J Orthop Surg Res.* 2022;17:319. doi: 10.1186/s13018-022-03212-3¹⁹

- **Design:** Bayesian network meta-analysis
- **Systematic Review:** lit search of PubMed, Google scholar, Embase, and Scopus in March 2022 for “RCTs comparing two or more acupuncture modalities for aspecific chronic LBP” in patients “with symptoms lasting a minimum of 1.5 months, or with at least three episodes in the previous 12 months” according to PRISMA standards
- **Methodological Quality Assessment:** Review Manager Software (The Nordic Cochrane Collaboration, Copenhagen)
- **Statistical Analysis:** The STATA Software/MP, Version 14.1 (StataCorporation, College Station, Texas, USA)
- **Network Meta-Analysis:** “STATA routine for Bayesian hierarchical random-effects model analysis”
- **Results:**
 - 44 RCTs capturing 8,338 treatments met inclusion criteria (women 56%, mean age 48 ± 10.6 years, mean BMI: 26.3 ± 2.2 kg/m²)
 - “Highest improvement of the RMQ:”
 - individual acupuncture group (95% confidence interval (CI) 2.02, 7.98)
 - standard combined with TENS (95% CI 2.03, 7.97)
 - “VAS score was lower in the standard [acupuncture] combined with TENS group” (95% CI 3.28, 4.56).
 - Standard acupuncture group: “different studies used similar protocols and acupuncture points and the results could thus be compared.”
- **Conclusion:** “Verum acupuncture is more effective than sham treatment for the non-pharmacological management of LBP. Among the verum protocols, individualized acupuncture and standard acupuncture with TENS were the protocols that resulted in the



highest improvement in pain and quality of life. Level of Evidence: Level I, Bayesian network meta-analysis of RCTs.”

Wu B, Yang L, Fu C, et al. Efficacy and safety of acupuncture in treating acute low back pain: a systematic review and Bayesian network meta-analysis. *Ann Palliat Med.* 2021 Jun;10(6):6156-6167. doi: 10.21037/apm-21-551. Epub 2021 May 24. ²⁰

- **Design:** systematic review and bayesian network meta-analysis
- **Systematic Review:** Literature search in databases (PubMed, Cochrane Library, Embase, Web of Science, China National Knowledge Infrastructure (CNKI), VIP Database, Wanfang Database, and Chinese Biomedical Database (CBM)) for randomized controlled trials (RCTs) vetting the efficacy and safety of acupuncture in treating acute low back pain (ALBP)
- **Outcomes:** visual analog scale (VAS) score, lumbar range of motion (ROM) score, adverse events.
- **Risk of Bias:** Cochrane risk-of-bias tool
- **Network Meta-Analysis:** WinBUGS 1.4
- **Results:**
 - 19 randomized controlled trials (RCTs) involving 1,427 participants met inclusion criteria
 - most effective for decreasing VAS score (compared to placebo):
 - motion style acupuncture (MSA) (SMD: -2.21; 95% CI, -3.33 to -1.08)
 - manual acupuncture (MA) (SMD: -1.14; 95% CI, -2.01 to -0.27)
 - electroacupuncture (EA) (SMD: -1.57; 95% CI, -2.98 to -0.15)
 - most effective in reducing ROM scores (compared with pharmacotherapy):
 - MSA (SMD: -1.00; 95% CI, -1.47 to -0.54)
 - MA (SMD: -0.60; 95% CI, -1.15 to -0.05)
 - SUCRA: “all acupuncture types were superior to placebo or pharmacotherapy in lowering VAS and ROM score. ... MSA was the most effective treatment.”
- **Conclusions:** “acupuncture therapy achieved good therapeutic effects in the treatment of ALBP, especially MSA therapy. Nevertheless, due to the low quality of the included trials, the credibility of our conclusions is low. Further well-designed RCTs with high quality and large samples are still needed to evaluate the efficacy and safety of acupuncture therapy for ALBP.”

Wang L, Yin Z, Zhang Y, Sun M, Yu Y, Lin Y, Zhao L. Optimal acupuncture methods for nonspecific low back pain: a systematic review and Bayesian network meta-analysis of randomized controlled trials. *J Pain Res.* 2021;14 1097–1112. DOI <https://doi.org/10.2147/JPR.S310385>. ²¹



- **Design:** systematic review and Bayesian network meta-analysis
- **Systematic Review:** search of databases (China National Knowledge Infrastructure, VIP Database for Chinese Technical Periodicals, WANFANG Database, Chinese biomedical literature service system, PubMed, Web of Science, Embase, Cochrane Library, plus as well as the registration platforms International Standard Randomised Controlled Trial Number Register (ISRCTN) and Chinese Clinical Trial Registry (ChiCTR)) until December 20, 2020, for randomized controlled trials involving acupuncture for low back pain
- **Statistics:** Pairwise meta-analysis and Bayesian network meta-analysis; standardized mean differences examined
- **Outcome Measures:** visual analog scale (VAS), Oswestry Disability Index (ODI) score; safety as “incidence of adverse events.”
- **Results:**
 - 30 trials analyzed, including 3,196 participants
 - VAS scores
 - Manual acupuncture was more efficacious than conventional medicines (2 RCTs; SMD 1.03, 95% CI 0.53 to 1.53; $I^2 = 0$, $p = 0.51$)
 - Manual acupuncture was more efficacious than routine care (3 RCTs; SMD 1.05, 95% CI 0.67 to 1.43; $I^2 = 0$, $p = 0.39$)
 - **Manual acupuncture had a lower effect than fire acupuncture plus manual acupuncture (2 RCTs; SMD -2.29 , 95% CI -2.64 to -1.94 ; $I^2 = 0$, $p = 0.92$).**
 - Moxibustion had a greater effect than conventional medicines (2 RCTs, SMD 0.98, 95% CI 0.37 to 1.60; $I^2 = 80$, $p = 0.03$)
 - Manual acupuncture and electroacupuncture, and placebo had no difference in VAS
 - Manual acupuncture plus conventional medicines had no difference in VAS
 - ODI scores
 - Routine care and manual acupuncture gave similar effects for ODI score
- **Conclusion:** The authors concluded that manual acupuncture and moxibustion were the best ways to reduce nonspecific low back pain and disability, and that acupuncture was safer than other interventions used in this study.

Li Y-X, Yuan S-E, Jiang J-O, Li H, Wang Y-J. Systematic review and meta-analysis of effects of acupuncture on pain and function in non-specific low back pain. *Acupunct Med.* 2020 Aug;38(4):235-243. doi: 10.1136/acupmed-2017-011622. Epub 2020 May 27.²²

- **Design:** systematic review and meta-analysis



- **Systematic Review:** Literature search of electronic databases from inception to February 2018 for randomized controlled trials involving acupuncture to treat non-specific low back pain (NSLBP)
- **Outcomes:** pain intensity and disability
- **Methodological Quality:** Cochrane risk-of-bias criteria and the Standards for Reporting Interventions in Controlled Trials of Acupuncture (STRICTA) checklist
- **Meta-Analysis:** 25 trials (n=7587 participants) pooled for quantitative analysis
- **Results:**
 - 25 trials (n=7,587 participants) met inclusion criteria
 - “acupuncture was more effective at inducing pain relief” compared with the following treatments:
 - no treatment (standardised mean difference (SMD) -0.69, 95% CI -0.99 to -0.38)
 - sham acupuncture in the immediate term (SMD -0.33, 95% CI -0.49 to -0.18)
 - short term (SMD -0.47, 95% CI -0.77 to -0.17)
 - intermediate term (SMD -0.17, 95% CI -0.28 to -0.05)
 - usual care in the short term (SMD -1.07, 95% CI -1.81 to -0.33)
 - intermediate term (SMD -0.43, 95% CI -0.77 to -0.10)
 - “adjunctive **acupuncture with usual care** was **more effective than usual care alone** at all time points studied.”
 - functional improvement: “analysis showed a significant difference between acupuncture and no treatment” (SMD -0.94, 95% CI -1.57 to -0.30)
- **Conclusion:** “We draw a cautious conclusion that acupuncture appears to be effective for NSLBP and that acupuncture may be an important supplement to usual care in the management of NSLBP.”

Mu J, Furlan AD, Lam WY, Hsu MY, Ning Z, Lao L. Acupuncture for chronic nonspecific low back pain. *Cochrane Database Syst Rev.* 2020;12. Art. No.: CD013814. DOI: 10.1002/14651858.CD013814. ²³

- **Methods:** “two experienced acupuncturists served as reviewers to conduct independent, blind assessments of acupuncture treatment in the included trials using 8 assessment items “developed from the previous Cochrane review and the updated STRICTA recommendations to assess adequacy of treatment”
- **Results**
 - 33 studies including 8,270 participants
 - **Treatments:** “needling acupuncture with manual stimulation, moxa, or e-stim compared with controls of “sham intervention, no treatment, usual care, or other therapies”
 - **Primary outcome measures:** 1) pain intensity: visual analogue scale (VAS), numeric rating scale (NRS), Chronic Pain Grade Classification-pain (CPGS-pain);



2) back-specific functional status: Roland Morris Disability Questionnaire (RMDQ), Oswestry Disability Index (ODI), Hannover Functional Ability Questionnaire (HFAQ); 3) Quality of life: 36- or 12-item Short Form Health Survey (SF-36, SF-12)

- **Secondary outcome measures:**] 1) Pain-related disability: pain disability index (PDI); 2) work- related: sick leave days, work status, absenteeism, presenteeism, productivity; 3) Global assessment of therapy effectiveness 4) Adverse events
- Follow-up timing: 1) Immediately: 0-7 days after treatments; 2) Short-term: 8 days - 3 months after treatments; 3) Intermediate: 4 months - 1 year after treatments
- **Conclusions:**
 - Acupuncture was not found to be more effective than sham for pain relief immediately after treatment or short-term quality of life.
 - Acupuncture not found to be more effective than sham for back function immediately after treatment
 - *“Acupuncture was more effective than no treatment in improving pain and function in the immediate term.”*
 - When comparing acupuncture to usual care, acupuncture *“may improve function immediately after sessions as well as physical but not mental quality of life in the short term.”*

Xiang Y, He JY, Tian HH, Cao BY, Li R. Evidence of efficacy of acupuncture in the management of low back pain: a systematic review and meta-analysis of randomized placebo- or sham-controlled trials. *Acupunct Med.* 2020. Internet ISSN:1759-9873. ²⁴

- **Study:** Systematic review involving fourteen trials (2,110 participants) and a meta-analysis involving 9 studies (753 participants) revealed that acupuncture produced *“statistically significant differences in pain reduction”* as compared with sham or placebo. A meta-analysis involving 4 studies (462 participants) showed *“no differences in function.”*
- **Results:** At follow-up, acupuncture produced significant differences in *pain reduction*, but *no differences in function*.
- **Conclusions:** Authors concluded that moderate-level evidence exists for the efficacy of acupuncture in reducing subacute and chronic non-specific low back pain and that the **benefits persist over time.**

Taylor-Swanson L, Stone JAM, Gale MK, Gaitaud A, Huson C, McPherson F, Martens J, Godwin J, Yule M. Systematic review of acupuncture for low back pain: efficacy and



clinically-meaningful change. *MJAOM*. 2018:18-39. ²⁵

- **Study:** systematic review of seven databases for randomized controlled trials (RCTs) involving acupuncture for low back pain. Meta-analysis of 16 studies. Studies graded as high quality were weighted more heavily.
- **Results:** overall low methodological quality and weak external validity
acupuncture vs sham for acute low back pain and function: inconsistent evidence
acupuncture vs no treatment of conventional intervention for chronic low back pain: consistent evidence for “short-term clinically relevant ... pain relief and functional improvement”
- **Conclusion:** Acupuncture alone or plus conventional care offers “short-term improvements in pain and function” for chronic low back pain. The authors note that systematic reviews and RCTs with better both “internal and external validity” are needed.

A Note on Acupuncture Mechanisms for Low Back Pain

Wen Q, Ma P, Dong X, et al. Neuroimaging studies of acupuncture on low back pain: a systematic review. *Front Neurosci*. 2021;15:730322. doi:10.3389/fnins.2021.730322. ²⁶

- **Design:** systematic review
- **Systematic Review:** Literature search of English databases (including PubMed) and 4 Chinese databases (including China National Knowledge Infrastructure (CNKI)) from inception to December 31, 2020, for neuroimaging studies on acupuncture for low back pain
- **Overall Quality:** “Study selection, data extraction, and assessment of risk of bias were performed independently by two investigators.”
- **Study Quality:** Cochrane’s risk of bias tools. Information on basic information, methodology, and brain imaging data were extracted.
- **Results:**
 - 19 articles included for analysis
 - Study foci:
 - 78.9% involved manual acupuncture
 - “89.5% evaluated functional changes elicited by acupuncture”
 - “68.4% ... used resting-state fMRI as imaging condition”
 - Acupuncture affected brain changes in low back pain patients the most in the following areas:
 - “prefrontal cortex, insula, cerebellum, primary somatosensory cortex, and anterior cingulate cortex”
 - Brain changes correlated significantly with “improved clinical outcomes”



- **Conclusions:** “The results suggested that improving abnormal structure and functional activities in the brain of the LBP patient is an important mechanism of acupuncture treatment for LBP. The brain regions involved in acupuncture analgesia for LBP were mainly located in the pain matrix, default mode network (DMN), salience network (SN), and descending pain modulatory system (DPMS). However, it was difficult to draw a generalized conclusion due to the heterogeneity of study designs. Further well-designed multimodal neuroimaging studies investigating the mechanism of acupuncture on LBP are warranted.”

(b). Acupuncture for Chronic Neck Pain

Yu B, Yang Y, Fang J, et al. Efficacy and safety of acupuncture treatment for stiff neck: a systematic review and meta-analysis. *Medicine*. 2024;103:45. doi:10.1097/MD.00000000000040415. ²⁷

- **Design:** systematic review and meta-analysis
- **Literature Search:** 8 Chinese- and English-language electronic medical databases (China Biology Medicine disc, VIP database, Wanfang Data, China National Knowledge Infrastructure, Web of Science, PubMed, Embase, Cochrane Library) up to May 13, 2024, for “clinical randomized controlled trials evaluating acupuncture treatment for stiff neck.”
- **Primary Outcome:** total effective rate and visual analog scale scores
- **Evidence Quality:** GRADEpro guidelines
- **Meta-Analysis:** assessed “results, with heterogeneity analysis, sensitivity analysis, subgroup analysis, trial sequential analysis, and publication bias analysis performed to verify the robustness of the combined results and explore potential sources of heterogeneity.”
- **Results:**
 - 10 clinical randomized controlled trials involving 754 patients met inclusion criteria; studies took place in China
 - acupuncture treatment group demonstrated statistically significant improved total effective rate vs conventional treatment control group (risk ratio = 1.12, 95% confidence interval [CI] [1.04, 1.21], P = .002)
 - acupuncture treatment group demonstrated statistically significant reduced visual analog scale scores vs conventional treatment control group (mean difference [MD] = -0.93, 95% CI [-1.29, -0.57], P < .001)
 - acupuncture treatment group demonstrated statistically significant reduced neck disability index scores vs conventional treatment control group (MD = -6.39, 95% CI [-6.79, -6.00], P < .001)



- acupuncture treatment group demonstrated statistically significant restoration of cervical range of motion vs conventional treatment control group (cervical lateral flexion: MD = 4.29, 95% CI [3.15, 5.43], P < .001; cervical rotation: MD = 6.08, 95% CI [4.46, 7.70], P < .001).
- **Conclusion:** “Acupuncture is an effective and safe method for treating stiff neck. However, to validate this conclusion, more rigorously designed and higher-quality studies are needed in the future.”

Zhao H, Wang C, Wang X, Ju J, Yan C, Shi B. Efficacy and safety of acupuncture in the treatment of radicular cervical spondylosis: a systematic review and meta-analysis. *Combinatorial Chemistry & High Throughput Screening*, 2024;27(19):2951-2962. ²⁸

- **Design:** systematic review and meta-analysis
- **Literature Search:** 8 databases (PubMed, EMBASE, The Cochrane Library, Web of Science, China National Knowledge Infrastructure, China Biology Medicine Disc (CBMdisc), Wanfang, China Science and Technology Journal Database (VIP)) between 2000-2020 for randomized controlled studies involving acupuncture for radicular cervical spondylosis (CSR)
- **Methodological Quality Assessment:** Cochrane Collaboration's Risk of Bias Assessment Tool
- **Meta-Analysis:** RevMan 5.4 software used to run statistics on 27 studies involving 3,124 patients
- **Quality Control:** “Study screening, data extraction and statistics, and assessment of the risk of bias of the included studies were performed independently by two reviewers.”
- **Result:**
 - 27 studies involving 3,124 patients met inclusion criteria
 - total efficiency index for acupuncture [RR = 1.14, 95% CI (1.09, 1.19)]
 - PPI index [MD = -0.35, 95% CI (-0.61, -0.09)]
 - “total effective rate, VAS score, PRI(A) score, PRI(S) score and PRI(T) score showed heterogeneity in the studies included for each outcome index”
 - “the treatment group was significantly more effective than the control group and more effective in lowering the nerves to reduce the pain index in patients with CSR, with a statistically significant difference” (P<0.05).
- **Conclusion:** “Acupuncture is significantly more effective than traction therapy in the treatment of cervical spondylosis and can reduce the pain index of patients with CSR.”

Fang J, Shi H, Wang W, et al. Durable Effect of acupuncture for chronic neck pain: a systematic review and meta-analysis. *Curr Pain Headache Rep*. 2024 Sep;28(9):957-969. doi: 10.1007/s11916-024-01267-x. Epub 2024 Jun 10. ²⁹



- **Design:** systematic review and meta-analysis
- **Prospective Register of Systematic Reviews (PROSPERO):** ID No. CRD42023403434.
- **Literature Search:** 6 English and Chinese language databases up to March 2024 (PubMed, Embase, Cochrane Library) for studies evaluating “the durable effects of acupuncture on chronic neck pain.” Article selection based on Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines
- **Primary Outcomes:** pain severity, functional disability, quality of life, “assessed at least 3 months post-acupuncture treatment”
- **Risk of Bias:** Cochrane Risk of Bias 2.0 tool
- **Meta-Analysis:** 18 studies were involved in quantitative analysis
- **Results:**
 - 18 randomized controlled trials met inclusion criteria
 - acupuncture offered “sustained pain relief at three months post-treatment” (SMD:−0.79; 95% CI−1.13 to−0.46; $p<0.01$) and six (MD:−18.13; 95% CI−30.18 to−6.07; $p<0.01$)
 - acupuncture vs sham “did not show a statistically significant difference in pain alleviation” (MD:−0.12; 95% CI−0.06 to 0.36; $p=0.63$).
 - acupuncture “significantly improved functional outcomes as evidenced by Northwick Park Neck Pain Questionnaire scores 3 months post-treatment” (MD:−6.06;95% CI−8.20 to−3.92; $p<0.01$).
 - Adverse Events: 9 studies reported “mild and transitory adverse events” – an 8.5%–13.8% probability rate
- **Conclusion:** “Acupuncture as an adjunct therapy may provide post-treatment pain relief lasting at least 3 months for patients with chronic neck pain, although it is not superior to sham acupuncture, shows sustained efficacy in improving functional impairment for over 3 months, with a good safety profile.”

Li C, Pei Q, Chen Y, et al. The response-time relationship and covariate effects of acupuncture for chronic pain: a systematic review and model-based longitudinal meta-analysis. *Eur J Pain*. 2020 Oct;24(9):1653-1665. doi: 10.1002/ejp.1617. Epub 2020 Jul 31. ³⁰

- **Design:** systematic review and model-based longitudinal meta-analysis
- **Literature Search:** PubMed and EMBASE up to December 2018 for randomized controlled trials involving “sham acupuncture, true acupuncture and conventional therapy”
- **Meta-Analysis:** “model-based longitudinal meta-analysis to characterize the response-time profile of these treatments”



- **Results:**
 - 77 randomized clinical trials of acupuncture for “chronic shoulder, neck, knee and low back pain” met inclusion criteria
 - response-time analysis: “treatment duration of acupuncture will be 5 weeks or more to achieve 80% of maximum analgesic effect.”
 - “a lower baseline pain intensity and the location of low back pain resulted in a lower pain relief of acupuncture intervention.”
 - “the absolute maximum analgesic effects of sham acupuncture and conventional therapy were 22.6 and 15.8 points at a 0-100 NRS scale.”
 - absolute effect of acupuncture for “patients with a baseline pain intensity of 60 points” were:
 - low back pain: 26.1 points (relative effect of 3.5 and 9.4 points to sham and conventional therapy)
 - other pain body locations: 34.9 points (relative effect of 12.3 and 19.1 points to sham and conventional therapy)
- **Conclusion:** “The treatment duration of acupuncture will not be less than 5 weeks to achieve 80% maximum analgesic effect. Higher analgesic effect was related to higher baseline pain intensity and pain location of neck, shoulder and knee.”

Seo SY, Lee K-B, Shin J-S, Lee J, Kim M-R, Ha I-H, Ko Y, Lee YJ. Effectiveness of acupuncture and electroacupuncture for chronic neck pain: a systematic review and meta-analysis. *Am J Chin Med.* 2017;45(8):1573-1595. doi: 10.1142/S0192415X17500859. Epub 2017 Nov 9.³¹

- **Study:** 16 randomized controlled trials involving 744 participants were included for meta-analysis; of these, 14 included for qualitative analysis.
- **Results:** No significant differences in pain, disability, or quality of life (QoL) between acupuncture group versus active control.
- Acupuncture plus control group showed “**significantly higher relief of pain** in studies with unclear allocation concealment [a technique used to reduce selection bias]..., but did not show significant relief of pain in studies with good allocation concealment...”
- **Electroacupuncture yielded significant pain relief** compared to the control and electroacupuncture plus control.
- No serious adverse events.
- **Conclusions:** Acupuncture had “**similar effectiveness on pain and disability**” compared with conventional medicine; acupuncture plus conventional medicine provided even greater pain relief.

Trinh KV, Graham N, Gross AR, Goldsmith CH, Wang E, Cameron ID, Kay T.



Acupuncture for neck disorders. *Cochrane Database Syst Rev.* May 4 2006;(5):CD004870. doi: 10.1002/14651858.CD004870.pub4.³²

- **Study:** 10 randomized (RCT) or quasi-randomized (quasi-RCT) involving 9,912 participants receiving acupuncture treatment for chronic neck pain pooled for meta-analysis
- **Results:**
 - acupuncture vs sham for chronic mechanical neck disorders and pain
 - **acupuncture more effective than some sham controls** (post-treatment): moderate evidence
 - **acupuncture more effective than sham controls** (post-treatment and short-term follow-up) (pooled standardized mean difference (SMD) -0.37, 95% confidence interval (CI) -0.61 to -0.12): moderate evidence
 - **acupuncture more effective than massage** (short-term follow-up): limited evidence
 - chronic neck disorders with radiculopathy
 - **acupuncture more effective than wait-list control** (short-term follow-up): moderate evidence
 - **adverse events**
 - acupuncture: 29 of 174 (17%) participants vs. sham acupuncture: 12 of 103 participants (12%; odds ratio (OR) 1.3; 95% CI 0.60 to 2.7; low quality evidence)
- **Conclusions:** Authors report **moderate evidence that acupuncture relieves chronic neck pain better than some sham treatments**, moderate evidence that acupuncture relieves pain better at short-term follow-up than waitlist control, and moderate evidence that acupuncture is better than inert sham controls for eliminating pain post-treatment and at short-term follow-up.

(c). Acupuncture for Migraine and Tension-Type Headaches

Pi C, Liu Y, Li L, et al. Effects on neuromodulation, acupuncture, and aerobic exercises on migraine and tension-type headache outcomes: a systematic review and meta-analysis. *Medicine.* 2022;101:45. doi:10.1097/MD.00000000000030530³³

- **Design:** systematic review and meta-analysis
- **Systematic Review:** Literature search of electronic databases (PubMed, Cochrane Library, Embase, China National Knowledge Infrastructure, WANFANG MEDICINE)



ONLINE, and Chinese Medical Journal) for _ involving neuromodulation, acupuncture, and aerobic exercise to treat migraine and tension-type headache (TTH)

- **Outcomes:** monthly headache days, headache intensity, headache duration, days per month of acute medication use, Medical Outcomes Study 36-Item Short-Form Health Survey
- **Meta-Analysis:** 27 studies pooled data analyzed w/ Stata/SE 14.0 for weighted mean differences (WMDs)
- **Results:**
 - 27 studies met inclusion criteria
 - The following parameters demonstrated neuromodulation:
 - reduced migraine headache days (WMD: -1.274 , 95% CI $[-1.914, -0.634]$, $P < .001$)
 - duration (WMD: -2.2 , 95% CI $[-3.32, -0.107]$, $P < .001$)
 - medication consumption (WMD: -1.808 , 95% CI $[-2.546, -1.071]$, $P < .001$)
 - “Acupuncture was associated with the alleviation of” the following:
 - headache days (WMD: -0.677 , 95% CI $[-0.932, -0.422]$, $P < .001$)
 - headache intensity (WMD: -0.893 , 95% CI $[-1.573, -0.212]$, $P = .01$)
 - Acupuncture associated with acute medication use for tension-type headaches (WMD: -3.29 , 95% CI $[-4.86, -1.72]$, $P < .001$)
 - “Aerobic exercise was associated with reduced headache duration” for tension-type headache (WMD: -5.1 , 95% CI $[-8.97, -1.22]$, $P = .01$)
 - Risk of Bias: moderate
- **Conclusions:** “There is low- and moderate-quality evidence that neuromodulation, acupuncture, and aerobic exercises are associated with attenuated headache symptoms.”

Cummings M. Modellvorhaben Akupunktur—a summary of the ART, ARC and GERAC trials. *Acupunct Med.* 2009;27(1):26-30. ⁶

- **Study:** German Federal Committee of Physicians and Health Insurers October 2000 recommendation to implement Model Projects on Acupuncture ("Modellvorhaben Akupunktur") study “to determine the evidence-based role of acupuncture in the treatment of certain illnesses.”
 - 51,666 participants in ART, ARC, GERAC combined; COMP participant numbers not reported (recruitment goal 480)
 - “Largest clinical studies on acupuncture ever performed.”
- **(1) Acupuncture Randomized Trials (ART)**
 - **Study:** 4 RCT’s involving 300 participants at 18-30 outpatient centers in Germany; acupuncture for treatment of migraine, tension-type headache, chronic low back pain, and knee osteoarthritis



- **Design:** 3 parallel randomized controlled arms with 2:1:1 subject distribution (acupuncture group (n=~150); sham/minimal acupuncture group (n=~75); waitlist control (n=~75)); 12 acupuncture treatments over 8 weeks
- **Migraine and tension-type headache outcomes:** number of days with moderate-severe intensity headache assessed at baseline (4 weeks prior to treatment), 8 weeks, 26 weeks, and 52 weeks; “responders” defined after study: “those with a 50% reduction or greater in days with moderate or severe pain (headache).”
- **Low back pain outcomes:** change in low back pain intensity from baseline to week 8 as assessed by Visual Analogue Scale (VAS); “responders” defined after study as those with “at least 50% reduction in pain intensity”
- **Knee osteoarthritis outcomes:** change in Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) at baseline and 8 weeks; “responders” defined after study as those with “a decrease of at least 50% in WOMAC index score”
- **Overall ART Results:**
 - acupuncture vs waitlist: significant short-term differences
 - acupuncture vs minimal acupuncture: significant difference in osteoarthritis group
 - treatment effects maintained at 21-24 weeks for migraine and tension headache, and at 52 weeks for low back pain and knee osteoarthritis
- **(2) Acupuncture in Routine Care (ARC)**
 - **Study:** series of large pragmatic (test treatments in real-world clinical settings) randomized controlled trials (RCT’s) with non-randomized cohorts selected from a “social health insurance fund” in Germany to test acupuncture clinical- and cost-effectiveness to treat 7 conditions
 - **Participant Numbers and Conditions Studied:** acupuncture to treat knee/hip osteoarthritis (n=3,633), chronic neck pain (n=14,161), chronic low back pain (n=11,630), chronic headache (n=15,056), dysmenorrhea (n=649), allergic rhinitis (n=5,237), and asthma (awaiting publication)
 - **Note:** participants allowed to choose to receive acupuncture immediately (non-randomized) or to be randomized and receive 15 treatments over 3 months (at beginning of study or control group after 3 months)
- **ARC outcomes:** measured at 3 and 6 months



- **headache:** number of days with headache per month
- **back pain:** HFAQ
- **osteoarthritis:** “change in WOMAC score”
- **chronic neck pain:** “a validated neck pain and disability scale (NPAD)”
- **dysmenorrhea:** “average pain intensity during the last menstruation before assessment measured on numeric rating scale
- **rhinitis:** Rhinitis Quality of Life Questionnaire
- **additional measures:** quality of life (QoL) (converted to ICER QALY) and cost-effectiveness relationship of routine care plus acupuncture using Short-Form-36 (SF)-36 and costs (“including direct [and indirect] healthcare-related costs” all at baseline and 3 months)
- **ARC Results:** expressed as percentages and shown on bar graph
 - **randomized arm of trial:** “*clinically relevant differences at 3 months between the groups receiving acupuncture plus usual care*” ($p < 0.001$)”
 - **non-randomized groups:** higher symptom severity at baseline; **no significant differences** compared with randomized group
 - **cost-effectiveness:** **treating (1) dysmenorrhea with acupuncture most cost-effective**, followed by **(2) low back pain and headache (similar results)**, then **(3) neck pain**, and lastly **(4) osteoarthritis**
- **(3) COMP**
 - **Study:** single comparative trial of acupuncture (8-15 acupuncture treatments over 12 weeks) vs metoprolol (100-200 mg daily for 12 weeks) for migraine; recruitment target 480 participants
 - **COMP outcomes:** number of migraine days reported in “standardized headache diary” at baseline (4 weeks prior to trial) and at weeks 9-12; responders: $\geq 50\%$ reduction in migraines
 - **COMP results:** low enrollment; study ended prematurely.
 - **similar results for acupuncture and metoprolol**
 - **number of migraine days:** decreased by **2.5 days in acupuncture group** vs 2.2 days in metoprolol group ($p = 0.721$)



- **reduction of migraine attacks** by $\geq 50\%$ was **61% for acupuncture** group and 49% for metoprolol group
- “fewer adverse effects in the acupuncture group”
- **(4) German Acupuncture Trials (GERAC)**
 - **Study participants and design:** four trials involving up to 1,000 participants at 122-340 practices in Germany; comparative trials with 3 equal parallel arms: acupuncture, sham (not minimal), standard care
 - **GERAC migraine outcomes:** difference in migraine days at 4 weeks pre-study and at weeks 23-26; responders had at least 50% reduction in number of migraine days
 - **GERAC migraine results**
 - **mean reduction of 2.3 migraine days in acupuncture group**, 1.5 days in minimal acupuncture group, and 2.1 days in standard care group (**p=0.09**); **acupuncture significant results when compared w/ baseline (p<0.0001)**
 - **GERAC tension-type headache outcomes:** “>50% reduction in number of headache days” from 4 weeks prior to trial and at 6 months
 - **GERAC tension-type headache results:**
 - half of responders w/ 50% reduction reported as non-responders “due to medication changes, co-interventions, protocol violations, or unblinding.”
 - **responders: 33% of acupuncture participants** and 27% of minimal acupuncture group (**p=0.18**)
 - “**Acupuncture was superior to minimal acupuncture for most secondary outcomes**, including headache days (1.8 fewer; p= 0.004)” and “>50% reduction in headache days: 66% vs 55%, risk difference 12%; p=0.024)
 - **GERAC low back pain outcomes:** 33% or greater reduction in 3 pain scales on Von Korff Chronic Pain Grade Scale (CPGS) or 12% or greater improvement on Hanover Functional Ability Questionnaire (HFAQ)
 - **GERAC low back pain results:** 6 month response rate 47.6% acupuncture group, 44.2% minimal acupuncture group, 27.4% conventional treatment group
 - acupuncture vs minimal acupuncture control 3.4% (p = 0.39)
 - **acupuncture vs conventional therapy 20.2% (p<0.001)**



- **minimal acupuncture vs conventional therapy 16.8% (p<0.001)**
- **GERAC knee osteoarthritis outcomes:** at least 36% change in WOMAC scores at baseline, 13 weeks, 26 weeks
- **GERAC knee osteoarthritis results:** 51.3% success rate for acupuncture, 51.0% success rate for minimal acupuncture, 29.1% for conservative therapy
 - **relative risk (RR)** (RR = probability of event occurring d/t treatment) **acupuncture vs conservative therapy 17.5 (p<0.001)**
 - **RR minimal acupuncture vs conservative therapy , 1.73 (p<0.001)**
 - **no significant difference between acupuncture and minimal acupuncture control (p=0.48)**
- **Overall Results Summaries:**
 - **ART**
 - acupuncture vs waitlist: **significant short-term**
 - acupuncture vs minimal acupuncture: significant for **osteoarthritis**
 - persistence: **migraine/tension** (21-24 weeks), **low back pain and knee osteoarthritis** 52 weeks
 - **ARC**
 - ***“clinically relevant differences at 3 months between the groups receiving acupuncture plus usual care” (p<0.001)***
 - **most cost effective:** (1) dysmenorrhea, (2) low back pain/headache, (3) neck pain, (4) osteoarthritis.
 - **GERAC**
 - **acupuncture vs baseline:** significant for migraines: 2.3 migraine days vs baseline (p<0.0001)
 - **acupuncture vs usual care:** significant for low back pain and knee osteoarthritis (p<0.001); not significant for migraines (p=0.09) or tension headaches
 - **minimal acupuncture vs usual care:** significant for low back pain and knee osteoarthritis (p<0.001)
 - **acupuncture vs minimal acupuncture:** not significant for migraines (fewer headache days p= 0.004 and >50% reduction in headache days p=0.024), tension headaches (p=0.18), low back pain (p = 0.39), knee osteoarthritis (p=0.48)
- **Overall Pooled Results**
 - **Overall results:** acupuncture effective for a variety of conditions with “acceptable cost utility” (rate of €35 per session)



- **sham acupuncture results statistically no different than medication for migraines** and performed **better than standard care for low back pain**
- neither randomization or practitioner length of training time appeared to affect treatment outcomes
- sham group knee osteoarthritis larger impact than sham for ART knee osteoarthritis
- **Discussion:**
 - *GERAC knee participants also received physiotherapy, possibly accounting for the larger impact*
 - “perhaps it is more important to be properly trained in performing sham acupuncture for RCTs than in therapeutic acupuncture.”
 - ARC study results most applicable to general population
 - recruitment enhanced by reimbursing patients for participating
- **Overall Conclusions:**
 - “Acupuncture appears to be **effective in a range of chronic conditions** and it seems to have **acceptable cost-effectiveness** in Western health economic terms.”
 - “**Sham acupuncture**, in the form of minimal off-point needling in a therapeutic context, is **unlikely to be an inactive placebo.**”
 - German health officials included acupuncture (April 2006) “into **routine reimbursement by social health insurance funds for chronic low back pain and chronic osteoarthritis of the knee.**”

i. Acupuncture for Episodic Migraine Pain

Liu Y, Wang Y, Mi C, et al. Efficacy of acupuncture-related therapy for migraine: a systematic review and network meta-analysis. *J Pain Res.* 2024;17 1107–1132. ³⁴

- **Design:** systematic review and network meta-analysis
- **Systematic Review:** Literature search of 9 databases (PubMed, EMBASE, Web of Science, Scopus, the Cochrane Library, CBM, CNKI, WANFANG, VIP) for the randomized controlled trials involving acupuncture for migraines
- **Outcomes:** Visual Analog Scale (VAS) scores, migraine attack frequency, duration, days of attack and adverse effects



- **Statistics:** Stata 17.0 software; continuous variables: mean difference (MD) and 95% confidence interval (95% CI); heterogeneity: I2 test; Sensitivity analyses; node splitting; SUCRA; funnel plots
- **Results:**
 - 34 studies involving 3,365 patients with migraines
 - “Acupuncture therapy reduced VAS scores of migraine patients better compared to medication” (MD=-1.29, 95% CI=[-1.67,-0.92])
 - Acupuncture “exhibited greater efficacy in reducing” the following:
 - frequency of migraines (MD=-1.95, 95% CI=[-3.06,-0.85])
 - duration of migraine (MD=-3.29, 95% CI=[-4.65,-1.93])
 - days of migraine (MD=-1.02, 95% CI=[-1.58,-0.47])
 - Heterogeneity: “significant” - indicating “different acupuncture therapies had varying effects, and that the efficacy of the same therapy may also vary in different migraine types.”
 - SUCRA results for acupuncture to reduce VAS scores in order of most to least effective:
 - special acupuncture method (98.3%)
 - acupuncture plus medicine (71.9%),
 - acupuncture (54.5%)
 - Lowering frequency: “Blood-letting and cupping was the most effective treatment”
 - Shortening the duration of migraine: acupuncture plus medication (81.2%) was most effective
 - Decreasing number of days of migraine: acupuncture (80.3%) most effective
 - Adverse events: reported in 14 studies; “4 studies had no adverse effects in the test group.”
- **Conclusion:** “Initial findings indicate that acupuncture-related therapy exhibits superior effectiveness in the treatment of migraine and clinical decision-making should be patient-specific.”
- **Note:** In a response letter to this article, Guo and Ouyang (2024) provide critique that this article states inconsistent systematic review results and that “insertion depth, needle retention time, and needle frequency” were not included.

Yang C, Wu M, Luo Q, et al. Acupuncture for migraine: a systematic review and meta-regression of randomized controlled trials. *Complement Ther Med.* 2024;86:103076. doi:10.1016/j.ctim.2024.103076 ³⁵

- **Design:** systematic review and meta-regression
- **PROSPERO Registration Number:** CRD42023400493



- **Systematic Review:** Literature search of 8 English- and Chinese-language databases from inception to June 20, 2024, for randomized controlled trials (RCTs) involving manual acupuncture for migraine based on STRICTA guidelines
- **Outcomes:** “dose-response association between acupuncture sessions, acupuncture frequency, and acupuncture duration and the frequency of migraine attacks”
- **Meta-Analysis:** all 32 included studies pooled for analysis; robust-error meta-regression (REMR), non-linear meta-regression with restricted cubic spline (RCS); potential nonlinear relationship “tested by restricting the regression coefficient to zero and a P value<0.1;” mean difference; heterogeneity: IR²
- **Statistics:** Stata 17.0; restricted cubic spline (RCS) function and multivariate meta-analysis; restricted regression coefficient to zero and P-value<0.1;
- **Risk of Bias:** “independently assessed by two reviewers using the Cochrane tool.”
- **Results:**
 - 32 RCTs involving 1,562 participants met inclusion criteria
 - “J-shaped dose-response association between acupuncture sessions, acupuncture frequency, and acupuncture duration and migraine attack frequency”
 - Change in Frequency:
 - 3.95 after 16 acupuncture treatments (95 %CI: 3.13 to 4.77)
 - “significant decrease” of 4.04 with 3 acupuncture treatments/week (95 % CI: 2.49 to 5.58)
 - significant decrease of 4.05 after two months of acupuncture treatment (95 % CI: 3.61 to 4.49)
 - “the improvement trend gradually flattened, yielding diminishing benefits to patients” after 2 months.
 - Risk of Bias: 7 studies “low risk,” 2 studies “high risk,” others: “unclear risk”
 - Reporting Quality: “suboptimal”
- **Conclusions:** “A non-linear **dose-response relationship** was found between acupuncture sessions, acupuncture frequency, and acupuncture duration and migraine attack frequency. The results of our study recommend **16 sessions of acupuncture with a frequency of 3 sessions/week and a treatment duration of 1.5 to 2 months.**”
 - NOTE: “*The number of acupuncture sessions, acupuncture frequency, and acupuncture duration varied significantly among clinical studies, such as 12, 16, 20, or 32 sessions of acupuncture, with a frequency of 1 sessions/week, 3 sessions/week, or 4 sessions/week, and a treatment duration of 1 month, 2 months or 3 months.*”

Shi H, Miao R, Gao S, et al. The durable effect of acupuncture for episodic migraine: a systematic review and meta-analysis. *Front Neurosci.* 2023;17:1211438. doi: 10.3389/fnins.2023.1211438 ³⁶



- **Design:** systematic review and meta-analysis
- **Systematic Review:** Lit review of 7 English and Chinese databases (“Medline, Embase, PubMed, etc.”) from inception to 23 November 2022 for randomized controlled trials (RCTs) involving acupuncture treatment for episodic migraine
- **Overall Quality:** “Two independent reviewers screened the retrieved studies and extracted the data.”
- **Primary Outcomes:** monthly migraine days, monthly migraine attacks, and VAS score at 3 months post-treatment.
- **Risk of Bias:** Cochrane Risk of Bias 2.0 tool
- **Meta-Analysis:** “conducted where applicable”
- **Results:**
 - 15 studies met inclusion criteria
 - Acupuncture reduced the following more than sham acupuncture at 3-months post-treatment:
 - number of migraine attacks (MD -0.68; 95% CI -0.93, -0.43; $p < 0.001$)
 - number of days with migraine (MD -0.86; 95% CI -1.18, -0.55; $p < 0.001$)
 - VAS score (MD -1.01; 95% CI -1.30, -0.72; $p < 0.001$)
 - “Significant differences in reducing pain intensity of migraine in favor of acupuncture compared with waitlist (MD -1.84; 95% CI -2.31, -1.37; $p < 0.001$) or flunarizine (MD -2.00; 95% CI -2.35, -1.65; $p < 0.001$) at 3 months after treatment were found, and the differences reached the minimal clinically important difference (MCID).”
- **Conclusion:** “This review found that the durable effect of acupuncture for episodic migraine lasted at least 3 months after treatment. More high-quality studies with longer follow-up periods in the future are needed to confirm the findings.”

Sun C, Xiong Z, Sun C, et al. Placebo response in sham-acupuncture-controlled trials for migraine: a systematic review and meta-analysis. *Complement Ther Clin Pract.* 2023 Nov;53:101800. doi:10.1016/j.ctcp.2023.101800. Epub 2023 Sep 28. ³⁷

- **Design:** systematic review and meta-analysis
- **Systematic Review:** Literature review of 4 English-language databases from inception to September 1, 2022, for randomized controlled trials involving acupuncture and sham acupuncture for migraines
- **Primary Outcome:** placebo response
- **Secondary Outcomes:** migraine symptoms, emotional condition, quality of life
- **Meta-Analysis:** risk difference (RD) or standardized mean difference (SMD) and 95% confidence interval (CI) with random effects model



- **Results:**
 - “21 studies involving 1,177 patients” met inclusion criteria
 - pooled response rate of sham acupuncture was 0.34 (RD, 95% CI 0.23-0.45, I² 89.8%)
 - “The results (SMD [95% CI]) showed significant improvements in migraine symptoms” for the following:
 - pain intensity -0.56 [-0.73 to -0.38],
 - episode conditions -0.55 [-0.75 to -0.35])
 - emotional condition (anxiety scale -0.49 [-0.90 to -0.08]
 - depression scale -0.21 [-0.40 to -0.03])
 - quality of life on the Migraine-Specific Quality-of-Life Questionnaire (restrictive 0.78 [0.61-0.95] preventive 0.52 [0.35-0.68] emotional 0.45 [0.28-0.62])
 - Medical Outcomes Study Short-Form (physical 0.48 [0.34-0.62] mental 0.21 [0.02-0.41])
 - “Only acupuncture treatment frequency had a significant impact on the placebo response rate” (RD 0.49 vs. 0.14; p = 0.00).
- **Conclusions:** “The effect sizes for placebo response of sham acupuncture varied across migraine treatment trials. Further studies should routinely consider adjusting for a more complete set of treatment factors.”

Fernández-Hernando D, Fernández-de-las-Peñas C, Pareja-Grande JA, et al. Management of auricular transcutaneous neuromodulation and electro-acupuncture of the vagus nerve for chronic migraine: a systematic review. *Front Neurosci.* 2023;17:1151892. doi: 10.3389/fnins.2023.1151892. ³⁸

- **Design:** systematic review
- **Systematic review registration:** PROSPERO database (registration number: CRD42021265126)
- **Systematic Review:** Literature search of 6 databases from inception June 15, 2022, “for clinical trials in which at least one group received any form of non-invasive neuromodulation of the vagus nerve for managing migraine”
- **Outcomes:** pain intensity and related disability
- **Overall Quality:** Data, including participants, interventions, blinding strategy, outcomes, and results, were extracted by two reviewers
- **Methodological Quality:** PEDro scale, ROB, and Oxford scale.
- **Results:**
 - 9 studies met inclusion criteria
 - Methodological quality scores: 6 to 8 (mean: 7.3, SD: 0.8)
 - “some positive clinical effects for the treatment of chronic migraine with 1 Hz with at-VNS and ear-electro-acupuncture compared with the control group at post-treatment.” (low-quality evidence)



- “possible positive effect as a treatment with at-VNS and the neurophysiological effects using fMRI” for chronic migraine shown in some studies
- “relationship between chronic migraine and a possible positive effect as a treatment with at-VNS and the neurophysiological effects” according to 6 studies and evidence via fMRI
- all included studies: “Oxford scale level of evidence: level 1 (11.17%), six studies were graded as level 2 (66.66%), and two studies were graded as level 3 (22.2%).”
- PEDro score: 5 studies: <5 “low methodological score;” 4 studies: >5 “high methodological quality”
- ROB: most studies were high risk of bias
- Positive results post-treatment in 3 studies for “pain intensity, migraine attacks, frequency, and duration”
- Adverse events: “only 7% reported adverse events using at-VNS”
- “All studies with fMRI provided strong evidence of the relationship between the Locus Coeruleus, Frontal Cortex, and other superior brain areas with the auricular branch of the Vagus nerve with at-VNS.”
- **Conclusion:** “Some positive effects regarding the effect of non-invasive neuromodulation, auricular transcutaneous vagus nerve stimulation (at-VNS), and electro-ear acupuncture of the vagus nerve on migraine is reported in the current literature, but there are not enough data to obtain strong conclusions.”

Song Z-W, Liu Y-P, Cui S, et al. Effectiveness of acupuncture for prophylactic treatment of migraine: a systematic review and Bayesian network meta-analysis. *Adv Biol (Weinh)*. 2023 Oct;7(10):e2300134. doi:10.1002/adbi.202300134. Epub 2023 Jul 6. ³⁹

- **Design:** systematic review and Bayesian network meta-analysis
- **Systematic Review:** literature search of 14 databases from inception to April 2022 for randomized controlled trials (RCTs) involving “acupuncture as a prophylactic treatment for migraines”
- **Pairwise Meta-Analysis:** TATA software V14.0
- **Bayesian Network Meta-analysis (NMA):** Windows Bayesian Inference Using Gibbs Sampling (WinBUGS V.1.4.3); Markov chain Monte Carlo algorithm
- **Results:**
 - 40 RCTs with 4,405 participants met inclusion criteria
 - “Acupuncture outperformed prophylactic drugs” during treatment and at 12-week follow-up for the following parameters:
 - diminishing visual analog scale (VAS) score
 - migraine attack frequency
 - migraine attack days
 - Effectiveness at 12-week follow-up ranking:



- reducing VAS scores: manual acupuncture (MA) > electroacupuncture (EA) > calcium antagonists (CA)
- reducing migraine attack frequency: MA > EA > CA
- reducing headache attack days: MA > EA > β -receptor blocker and CA
- **Conclusions:** “Acupuncture is a promising treatment for migraine prevention. The best option of acupuncture for improving various migraine outcomes has changed over time. However, the quality of included trials and NMA inconsistency limited the credibility of the conclusion.”

Kim C-Y, Hwang E-H, Heo I, et al. Effectiveness and safety of scalp acupuncture for treating migraine: a systematic review and meta-analysis. *Complement Ther Med.* 2023;78:102991. doi:10.1016/j.ctim.2023.102991. ⁴⁰

- **Design:** systematic review and meta-analysis
- **PROSPERO registration number:** CRD42022348879
- **Systematic Review:** literature search of all-language databases (PubMed, EMBASE, CENTRAL, Oriental Medicine Advanced Searching Integrated System, Korean Studies Information Service System, Korean Medical Database, NDSL, Citation Information by NII, China National Knowledge Infrastructure) from inception to September 2022 for randomised controlled trials (RCTs) involving scalp acupuncture for migranes
- **Overall Quality:** “Data were collected and analysed independently by two reviewers.”
- **Evidence Quality:** GRADE
- **Risk of Bias:** RoB 2.0 tool
- **Meta-Analysis:** 8 studies pooled for analysis w/ RevMan software (V5.4).
- **Results:**
 - 8 RCTs involving 874 patients met inclusion criteria
 - “Scalp acupuncture had a higher total effective rate” vs regular acupuncture (relative risk [RR]:1.24; 95% confidence interval [CI]:1.08–1.43; P < 0.01)
 - **scalp acupuncture vs medications:**
 - “headache index decreased significantly” (standardised mean differences [SMD]:– 1.27; 95% CI:– 2.06 to – 0.48; P < 0.01)
 - “total effective rate was higher” (RR:1.20; 95% CI:1.06–1.37; P < 0.01)
 - Evidence Level: “not robust”
 - “No adverse events were reported.”
- **Conclusion:** “Scalp acupuncture appears to be more effective than other treatments for migraines. However, their safety remains uncertain.” *Note: the authors stated uncertainty regarding safety even though no adverse events were reported.*

Wang Y, Du R, Cui H, et al. Acupuncture for acute migraine attacks in adults: a systematic review and meta-analysis. *BMJ Evid Based Med.* 2023 Aug;28(4):228-240. doi:10.1136/bmjebm-2022-112135. Epub 2023 Jul 7. ⁴¹

- **Design:** systematic review and meta-analysis
- **Prospero registration number:** CRD42014013352



- **Systematic Review:** Literature search of Chinese- and English-language databases (PubMed, MEDLINE(OVID), Chinese Biomedical Literature Database, China National Knowledge Infrastructure, Chinese Science and Technology Periodical Database, Wanfang) from inception to July 15, 2022, for randomised controlled trials (RCTs) involving acupuncture for acute migraine attacks in adults
- **Treatment Groups:** acupuncture alone vs sham acupuncture/placebo/no treatment/pharmacological therapy or acupuncture + pharmacological therapy vs pharmacological therapy
- **Statistics:** dichotomous outcomes: risk ratios (RRs); continuous outcomes: mean differences (MDs) with 95% CIs.
- **Risk of Bias:** Cochrane tool
- **Evidence Certainty:** GRADE.
- **Main Outcome Measures:**
 - a) rate of headache freedom (pain score=0) 2h after treatment
 - b) rate of headache relief (at least 50% reduction of pain score)
 - c) headache intensity 2h after treatment (data from scales measuring pain intensity: visual analogue scale, numerical rating scale)
 - d) improvement of headache intensity 2h after treatment
 - e) improvement values of migraine-associated symptoms
 - f) adverse events
- **Results:**
 - 21 RCTs involving 1,926 participants met inclusion criteria
 - Acupuncture compared with sham/placebo acupuncture may improve the following at 2 hours after treatment:
 - headache freedom (RR 6.03, 95% CI 1.62 to 22.41, 180 participants, 2 studies, $I^2=0\%$, low CoE)
 - headache intensity (MD 0.51, 95% CI 0.16 to 0.85, 375 participants, 5 studies, $I^2=13\%$, moderate CoE)
 - headache relief (RR 2.29, 95% CI 1.16 to 4.49, 179 participants, 3 studies, $I^2=74\%$, very low CoE) (very uncertain evidence)
 - migraine-associated symptoms (MD 0.97, 95% CI 0.33 to 1.61, 90 participants, 2 studies, $I^2=0\%$, very low CoE) (very uncertain evidence)
 - acupuncture and sham acupuncture have equivalent adverse events (RR 1.53, 95% CI 0.82 to 2.87, 884 participants, 10 studies, $I^2=0\%$, moderate CoE)
 - “acupuncture plus pharmacological therapy may result in little to no difference” of the following parameters:
 - rate of headache freedom at 2-hours post-treatment (RR 1.55, 95% CI 0.99 to 2.42, 94 participants, 2 studies, $I^2=0\%$, low CoE)
 - rate of headache relief at 2 hours post-treatment (RR 1.20, 95% CI 0.91 to 1.57, 94 participants, 2 studies, $I^2=0\%$, low CoE)
 - adverse events (RR 1.48, 95% CI 0.25 to 8.92, 94 participants, 2 studies, $I^2=0\%$, low CoE)
 - **acupuncture + pharmacological intervention** vs pharmacological intervention 2 hours post-treatment:



- “may result in a reduction in headache intensity” (MD -1.05, 95% CI -1.49 to -0.62, 129 participants, 2 studies, $I^2=0\%$, low CoE)
- may offer an “increase in the improvement of headache intensity” (MD 1.18, 95% CI 0.41 to 1.95, 94 participants, 2 studies, $I^2=0\%$, low CoE)
- acupuncture vs pharmacological intervention “may result in little to no difference in the” following:
 - rate of headache freedom at 2 hours post-treatment (RR 0.95, 95% CI 0.59 to 1.52, 294 participants, 4 studies, $I^2=22\%$, low CoE)
 - rate of headache relief at 2 hours post-treatment (RR 0.95, 95% CI 0.80 to 1.14, 206 participants, 3 studies, $I^2=0\%$, low CoE)
 - adverse events (RR 0.65, 95% CI 0.35 to 1.22, 294 participants, 4 studies, $I^2=0\%$, low CoE) after treatment
- acupuncture vs pharmacological intervention effects on headache intensity at 2 hours post-treatment (MD -0.07, 95% CI -1.11 to 0.98, 641 participants, 5 studies, $I^2=98\%$, very low CoE) ((very uncertain evidence)
- acupuncture vs pharmacological intervention effects on improvement of headache intensity at 2 hours post-treatment (MD -0.32, 95% CI -1.07 to 0.42, 95 participants, 2 studies, $I^2=0\%$, very low CoE) (very uncertain evidence)
- **Conclusion:** “The body of evidence suggests that acupuncture may be more effective than sham acupuncture in the treatment of migraine. Acupuncture may also be as effective as pharmacological therapy. However, the certainty evidence across outcomes was low to very low and new high-quality studies can provide more clarity.”

Naguit N, Laeeq S, Jakkoju R, et al. Is acupuncture safe and effective treatment for migraine? A systematic review of randomized controlled trials. *Cureus*. 2022;14(1):e20888. doi:10.7759/cureus.20888. ⁴²

- **Design:** systematic review of randomized controlled trials (RCT)
- **Systematic Review:** literature search of PubMed, Google Scholar, Science Direct, Cochrane library “using keywords: migraines, migraine with aura, migraine without aura, headache, acupuncture, and needling therapy” for randomized controlled trials (RCT) involving acupuncture treatment for migraine
- **Overall Quality:** “Two independent reviewers participated in data extraction and assessment.”
- **Results:**
 - 15 randomized controlled trials involving 2,056 participants met inclusion criteria
 - 7/10 trials comparing acupuncture with sham acupuncture “showed a more significant reduction in the frequency of migraine attacks and headache intensity”
 - “Four studies revealed acupuncture is **just as effective** and has **fewer side effects** than any western medicine.”
- **Conclusions:** “Acupuncture can be recommended as an alternative or adjunct to drug treatment for patients suffering migraines. However, further clinical trials that utilized the Standards for Reporting Interventions in Clinical Trials of Acupuncture (STRICTA) recommendation are still needed to strongly present an evidence-based strategy.”



Song Y, Li T, Ma C, et al. Comparative efficacy of acupuncture-related therapy for migraine: a systematic review and network meta-analysis. *Front Neurol.* 2022;13:1010410. doi: 10.3389/fneur.2022.1010410. ⁴³

- **Design:** systematic review and network meta-analysis
- **Systematic review registration:** <https://inplasy.com/>, identifier: INPLASY202110035
- **Systematic Review:** Literature search of databases (PubMed, Embase, Cochrane Library, Web of Science, China National Knowledge Infrastructure (CNKI), VIP Database, Wanfang Database, and Chinese Biomedical Database (CBM)) from inception to March 31, 2022, for randomized controlled trials (RCTs) involving acupuncture for migraine
- **Primary Endpoints:** visual analog scale (VAS) scores
- **Secondary Endpoints:** number of migraine days, duration of migraine, frequency of migraine attacks
- **Risk of Bias/Evidence Quality:** Cochrane risk of bias
- **Results:**
 - 39 studies “involving 4,379 patients with 13 different acupuncture-related methods” met inclusion criteria
 - SUCRA for VAS scores ranked highest to lowest:
 - acupoint injection (98.0%)
 - acupoint implantation (79.0%)
 - SUCRA for number of migraine days ranked highest to lowest:
 - electroacupuncture (82.4%)
 - embedding needle therapy (73.1%)
 - SUCRA for duration of migraine ranked highest to lowest:
 - embedding needle therapy (99.9%)
 - acupoint injection (77.4%)
 - SUCRA for frequency of migraine attacks ranked highest to lowest:
 - acupoint injection (99.3%)
 - conventional acupuncture plus massage (73.8%)
- **Conclusion:** “These results provide preliminary evidence that acupuncture-related therapy could be recommended as one of the effective treatments for migraine. Conventional acupuncture has significant effects on improving VAS scores, the number of migraine days, duration of migraine, and frequency of migraine attacks. However, more high-quality studies should be carried out to verify this finding.”

Yang M, Du T, Long H, et al. Acupuncture for menstrual migraine: a systematic review. *BMJ Support Palliat Care.* 2022;12:e882–e892. doi:10.1136/bmjspcare-2019-002024. ⁴⁴

- **Design:** systematic review
- **Trial registration number:** CRD42019119337
- **Systematic Review:** literature search of PubMed, Cochrane Library, China National Knowledge Infrastructure (CNKI) and two Chinese databases from inception to May 1, 2019, for randomised controlled trials involving acupuncture to treat migraine in menstruating women



- **Overall Quality:** “Two reviewers independently completed study selection, data extraction and risk of bias assessment.”
- **Meta-Analysis:** 9 studies pooled for fixed-effect model analysis in RevMan.
- **Clinical Outcomes:** migraine frequency and duration, headache intensity, and adverse events
- **Results:**
 - 13 studies involving 826 subjects met inclusion criteria
 - “acupuncture was not superior to sham acupuncture” for the following measures: reducing monthly migraine frequency and duration
 - average headache
 - intensity
 - analgesic use at completion of treatment or follow-up
 - acupuncture group vs drugs: “significant improvement in mean headache intensity”
 - “all studies were underpowered and associated with moderate to high risk of bias.”
 - Adverse Events: no serious acupuncture-related events
- **Conclusions:** “There is no convincing evidence to support the use of acupuncture in treating menstrual migraine. Acupuncture cannot yet be recommended to patients with menstrual migraine until more solid evidence is produced.”

Ou M-Q, Fan W-H, Sun F-R, et al. A systematic review and meta-analysis of the therapeutic effect of acupuncture on migraine. *Front Neurol.* 2020;11:596. doi: 10.3389/fneur.2020.00596. ⁴⁵

- **Design:** systematic review and meta-analysis
Systematic Review: Literature search of “reports, conference, and academic papers published before March 15, 2019 in databases including PubMed, Cochrane library, Embase, China National Knowledge Infrastructure, WANFANG Database, Chinese journal of Science and Technology, and China Biomedical” for “randomized controlled trials (RCTs) involving acupuncture, sham acupuncture, and medication in migraine”
- **Meta-Analysis and Risk Analysis:** RevMan 5.3, Cochrane Collaboration software
- **Results:**
 - 28 RCTs involving 2,874 patients met inclusion criteria (15 studies medication only, 10 studies sham acu only, 3 studies medication and sham)
 - 3 treatment groups: acupuncture treatment group (n = 1396), medication control group (n = 865), and sham acupuncture control group (n = 613)
 - Acupuncture treatment more effective than:
 - sham acupuncture group (MD = 1.88, 95% CI [1.61, 2.20], P < 0.00001)
 - medication group (MD = 1.16, 95% CI [1.12, 1.21], P < 0.00001)
 - Acupuncture showed improved visual analog scale (VAS) scores compared to sham acupuncture group (MD = -1.00, 95% CI [-1.27, -0.46], P < 0.00001; MD = -0.59, 95% CI [-0.81, -0.38], P < 0.00001)



- Acupuncture and sham “adverse reaction rate was lower than that of the medication group” (RR = 0.16, 95% CI [0.05, 0.52], P = 0.002).
- Acupuncture improved intracranial blood flow velocity better than medication (heterogeneous results = unreliable)
- **Conclusions:** “Acupuncture reduced the frequency of migraine attacks, lowered VAS scores, and increased therapeutic efficiency compared with sham acupuncture.”

Min J, Yun-Ling Z, Yan Lu, et al. [Systematic review and meta-analysis on randomized controlled trial of efficacy and safety for acupuncture versus flunarizine in treatment of migraine]. *Zhongguo Zhong Yao Za Zhi*. 2020 Nov;45(21):5083-5092. doi:10.19540/j.cnki.cjcmm.20200521.502. ⁴⁶

- **Design:** systematic review and meta-analysis
- **Systematic Review:** Literature search of 4 Chinese databases (CNKI, VIP, WanFang, CBM), 3 English databases (Cochrane Library, EMBASE, Medline) and ClinicalTrail.gov from inception to January 8, 2020, for randomized controlled trials (RCT) involving acupuncture versus flunarizine medication for migraine treatment
- **Meta-Analysis:** RevMan 5.3
- **Evidence Quality:** GRADE
- **Results:**
 - 23 studies including 1,548 participants (“except for 4 multiarm tests”) met inclusion criteria (n=785 acupuncture group; n=763 flunarizine group)
 - Overall Study Quality: “not high”
 - “acupuncture group was superior to the Flunarizine group” for the following measures:
 - reduction of headache frequency (SMD=-1.00, 95%CI[-1.45,-0.54], P<0.000 1)
 - reduction of headache intensity (SMD=-1.05, 95%CI[-1.41,-0.68], P<0.000 01)
 - reduction of headache duration (SMD=-1.42, 95%CI[-1.83,-1.02], P<0.000 1)
 - reduction of the frequency of painkiller consumption (MD=-0.17, 95%CI[-0.21,-0.13], P<0.000 01)
 - relief of paroxysmal symptoms (nausea, vomiting) (SMD=-0.94, 95%CI[-1.35,-0.52], P<0.000 1)
 - GRADE evidence level and strength of recommendation: “extremely low” and “low”
 - Adverse reactions: for acupuncture “all mild adverse reactions, like drowsiness, subcutaneous bleeding, local pain, subcutaneous hematoma and dizziness needle.”
- **Conclusion:** “The available evidence showed that acupuncture has a better efficacy than Flunarizine hydrochloride in the treatment of migraine in adult patients. However, due to the high bias risk in the included studies, the conclusions of this study shall be adopted with caution, and more high-quality studies shall be carried out for verification in the future.”



Zhang N, Houle T, Hindiyeh N, Aurora SK. Systematic review: acupuncture vs standard pharmacological therapy for migraine prevention. *Headache*. 2020 Feb;60(2):309-317. doi: 10.1111/head.13723. Epub 2019 Dec 24. ⁴⁷

- **Design:** systematic review
- **Registry:** unregistered
- **Systematic Review:** Literature search of English language databases, including Pubmed (includes MEDLINE), Scopus (includes EMBASE) from inception through search time period for randomized trials and randomized controlled trials involving acupuncture vs pharmacology treatment for migraines with or without aura in adult patients
- **Overall Quality:** “Two reviewers checked eligibility; extracted information on patients, interventions, methods, and results; and assessed the quality of the acupuncture intervention based on the American Academy of Neurology Classification of evidence matrix for therapeutic trials.”
- **Results:**
 - “7 clinical trials, with a total of 1430 participants, met inclusion criteria”
 - “Several of the studies showed acupuncture to be more effective than standard pharmacological treatments for migraine prevention”
 - “Methodological heterogeneity precluded aggregation of these data”
- **Conclusions:** “There is growing evidence that acupuncture is just as effective and has fewer side effects than many of the standard pharmaceutical agents that are currently used. However, the heterogeneity of the existing studies limits the effective comparison and analysis.”

(i.) Cupping Treatment for Migraine Headaches

Mohandes B, Bayoumi FEA, Diwaya AAA, et al. Cupping therapy for the treatment of migraine headache: a systematic review and meta-analysis of clinical trials. *JoP*. 2024;27(3):177-189. doi:10.3831/KPI.2024.27.3.177. ⁴⁸

- **Design:** systematic review and meta-analysis of clinical trials
- **PROSPERO:** CRD42024514509
- **Systematic Review:** Literature search of 7 databases (PubMed/MEDLINE, Clinicaltrials.gov, Cochrane CENTRAL, ScienceDirect, ProQuest, SinoMed, National Science and Technology Library) for clinical trials involving cupping treatment of migraine
- **Primary endpoints:** treatment success and pain intensity reduction
- **Secondary endpoints:** adverse events (AEs) risk and improvement in quality of life (QoL), based on Migraine Disability Scale (MIDAS)
- **Subgroup analyses:** “cupping techniques (wet and dry cupping) and adjunctive complementary treatments (i.e. acupuncture and/or collateral pricking)”
- **Results:**
 - 18 trials involving data from 1,446 participants (cupping, n =797)



- “Treatment success was significantly higher among those with cupping therapy” (risk ratio [RR] [95% CI] = 1.83 [1.52-2.21])
- “Significant improvement observed only with wet cupping” (RR [95% CI] = 1.88 [1.53-2.30]). adjunctive therapies did not perform better than cupping alone
- “Cupping therapy showed significant pain reduction compared to baseline” (standardized mean difference [SMD] [95% CI] = 0.55 [0.39-0.70])
- Cupping therapy had fewer risks of AEs (RR [95% CI] = 1.88 [1.53-2.30])
- “Cupping did not improve the overall QoL” (MIDAS SMD [95% CI] = -0.79 [-3.55-1.98]).
- **Conclusion:** “Cupping therapy was an effective complementary modality to treat migraine headaches. However, it did not demonstrate improvement in QoL”

Seo J, Chu H, Kim C-H, et al. Cupping therapy for migraine: a PRISMA-compliant systematic review and meta-analysis of randomized controlled trials. *ECAM*. 2021; Article ID 7582581:9 pages. doi: 10.1155/2021/7582581. ⁴⁹

- **Design:** systematic review and meta-analysis of randomized controlled trials
- **Systematic review registration:** PROSPERO registration number is CRD42017054979
- **Systematic Review:** Literature search using keywords such as “migraine” and “cupping therapy” of 8 databases (including PubMed, Cochrane, MEDLINE, EMBASE, CENTRAL) from inception to May 2019 for randomized controlled trials (RCTs) involving cupping therapy for migraine
- **Overall Quality:** “selection process and the quality assessment were performed by 2 authors independently.”
- **Meta-Analysis + Qualitative Analysis:** both were performed
- **Results:**
 - 6 RCTs met inclusion criteria
 - Quantitative Analysis:
 - wet cupping vs pharmaceuticals “showed a higher total effective rate (TER).”
 - dry cupping + acupuncture vs acupuncture alone improved total effective rate, but was not a statistically significant difference (TER) (RR 1.05, 95% CI 0.99 to 1.12, P = 0.13)
 - Qualitative Analysis:
 - wet cupping + drugs “quickly relieve[d] pain and significantly improve[d] patients’ quality of life”
 - wet cupping reduced headache pain.
- **Conclusion:** “Cupping therapy could be effective for the treatment of migraine. However, the qualities of the evidence were low, so well-designed RCTs are needed to confirm the effectiveness of cupping.”

Giovanardi CM, Cinquini M, Aguggia M, Allais G, Campesato M, Cevoli S, Gentili F, Matra A, Minozzi S. Acupuncture vs. pharmacological prophylaxis of migraine: a



systematic review of randomized controlled trials. *Front Neurol.* 2020 Dec 15;11:576272. doi: 10.3389/fneur.2020.576272. eCollection 2020. ⁵⁰

- **Study:** 9 randomized trials involving 1,484 patients pooled for meta-analysis
- **Results:** Acupuncture reduced the number of days per month with migraine, migraine response rate, moderately reduced migraine pain intensity, and greatly reduced dropout rate due to any reason and dropout rate due to adverse events.
- **Quality of evidence:** moderate for all outcomes.
- **Persistence of effects:** treatment effects still present at longest follow-up
- **Conclusions:** Acupuncture appears to be “mildly more effective and much safer than medication for the prophylaxis of migraine.”

(ii.) Acupuncture Mechanisms for Migraine Headache Relief

Li M, Huang H, Yao L, et al. Effect of acupuncture on the modulation of functional brain regions in migraine: a meta-analysis of fMRI studies. *Front Neurol.* 2023;14:1036413. doi:10.3389/fneur.2023.1036413. ⁵¹

- **Design:** systematic review and meta-analysis
- **Systematic Review:** Literature search 3 English databases (PubMed, Embase and Cochrane) and 4 Chinese databases (China national knowledge infrastructure, CNKI; Chinese Biomedical Literature database, CBM; the Chongqing VIP database, VIP; Wanfang database, WF) up to May 2022 for studies involving neuroimaging of brain regions during acupuncture for migraines
- **Meta-Analysis:** ALFF, ReHo; Seed-based d Mapping with Permutation of Subject Images (SDM-PSI) software; subgroup analyses: to “compare differences in brain regions between acupuncture and other groups.” meta-regression: “to explore the effect of demographic information and migraine alterations on brain imaging outcomes.” Linear models: MATLAB 2018a; visual graphs: R and RStudio software
- **Results:**
 - 7 studies involving 409 participants (treatment n=236 patients; control n=173)
 - “Acupuncture treatment helps to improve pain symptoms in patients with migraine.”
 - Brain areas activated during acupuncture treatment for migraine:
 - left angular gyrus - hyperactivated
 - left superior frontal gyrus - hypoactivated
 - right superior frontal gyrus - hypoactivated
 - “The migraine group showed hyperactivation in the corpus callosum compared to healthy controls.”



- **Conclusion:** “Acupuncture can *significantly regulate changes in brain regions in migraine patients*. However, due to the experimental design of neuroimaging standards are not uniform, the results also have some bias. Therefore, to better understand the potential mechanism of acupuncture on migraine, a large sample, multicenter controlled trial is needed for further study. In addition, the application of machine learning methods in neuroimaging studies could help predict the efficacy of acupuncture and screen migraine patients suitable for acupuncture treatment.”

(iii.) A Note on Sham vs Verum Acupuncture for Migraine Treatment

Lee B, Kwon C-Y, Lee HW, et al. Does the outcome of acupuncture differ according to the location of sham needling points in acupuncture trials for migraine? A systematic review and network meta-analysis. *Front Med.* 2024 Dec 20. doi: 10.1007/s11684-024-1109-z. Online ahead of print. ⁵²

- **Background:** Conclusions on clinical effectiveness of acupuncture for migraines drawn “remain controversial” in studies with acupuncture compared to sham, which is “sometimes performed at the same acupuncture points used for verum acupuncture despite the evidence on acupuncture point specificity.”
- **Design:** systematic review and network meta-analysis
- **Systematic Review:** Literature search of 4 databases on December 25, 2023, “for sham acupuncture or waiting list-controlled acupuncture trials for migraine”
- **Treatment Groups:** verum acupuncture; SATV = sham performed at same sites as verum acupuncture; SATS = sham performed at different sites as verum acupuncture
- **Outcomes:** headache pain intensity and response rate
- **Network Meta-Analysis:** frequentist framework; “18 studies involving 1,936 participants were analyzed.”
- **Results:**
 - “18 studies involving 1,936 participants” met inclusion criteria
 - “Headache pain intensity and response rate were significantly improved in verum acupuncture compared with SATS” (needling at different sites).
 - “There was no significant difference between SATV [needles at same sites] and verum acupuncture.”
 - SATS vs SATV: “no significant difference in headache pain intensity and response rate,” yet “results were in favor of SATV.”
 - Evidence certainty. Risk of Bias: low
- **Conclusion:** “SATV should not be misused as a placebo control to evaluate the efficacy of acupuncture.”

ii. Acupuncture for Tension Headache Pain



Qin L, Song P, Li X, et al. Tension-type headache management: a systematic review and network meta-analysis of complementary and alternative medicine. *Pain Ther.* 2024;13:691–717. doi:10.1007/s40122-024-00600-x.⁵³

- **Design:** a systematic review and network meta-analysis
- **PROSPERO Registration Number:** CRD42021252073
- **Methods:** Literature search of databases (PubMed, Embase, Web of Science, Cochrane Library, OVID, CNKI, Wanfang, VIP, CBM) for randomized controlled trials on complementary and alternative medicine (CAM) for tension-type headache (TTH) treatment
- **Primary Outcomes:** headache frequency and intensity
- **Methodological Quality:** Cochrane risk of bias tool
- **Evidence Quality:** GRADE
- **Pairwise Bayesian Network Meta-Analysis:** Review Manager 5.3 and R 3.6.3 software to analyze pooled data from 32 studies
- **Statistics:** random-effects model, Bayesian random-effects model w/ Markov-chain Monte Carlo method (MCMC); continuous data: mean difference (MD) w/ 95% credible intervals (CI); SUCRA: percentages of the surface under the cumulative ranking curve; heterogeneity: I² statistics; model convergence: Gelman and Rubin diagnostic tests; goodness of fit: consistency model/inconsistency model; alpha value 0.05; funnel plot
- **Results:**
 - 32 randomized controlled trials (RCTs) involving 2,405 participants met inclusion criteria
 - The following therapies were all found to be “superior to Western medicine (WM)” for headache intensity reduction:
 - acupuncture therapy + traditional Chinese medicine (AT_TCM)
 - manual therapy (MT)
 - psychological treatment (PT)
 - traditional Chinese medicine + acupuncture and manual therapy (TCM_AT_MT)
 - SUCRA curve: “TCM_AT_MT is the best for reducing headache frequency (HF).”
- **Conclusions:** “This review, assessed as low-quality evidence by GRADE, cautiously suggests potential benefits of PT over other CAM interventions for TTH and indicates TCM_AT_MT might better reduce HF. It proposes that combining CAM interventions could enhance outcomes. Due to the preliminary nature of these findings, further high-quality RCTs are essential to confirm these suggestions and provide clearer clinical guidance.”



Wang Y, Lu W, Wang Y, Chen W, Zhao H. Efficacy of different acupuncture-related therapies for tension-type headache: a systematic review and network meta-analysis. *Front Neurol.* 2024;15:1481715. doi:10.3389/fneur.2024.1481715. ⁵⁴

- **Design:** systematic review and network meta-analysis
- **PROSPERO Registration Number:** CRD42024537187
- **Systematic Review:** Literature review of 4 English-language databases (PubMed, Embase, Cochrane Library, and Web of Science) and 4 Chinese-language databases (Wanfang, VIP, CNKI, and SinoMed plus gray literature), up to April 19, 2024, for randomized controlled trials (RCTs) involving acupuncture for tension-type headaches
- **Outcomes:** headache frequency, duration, pain intensity, and responder rate
- **Bayesian Network Meta-Analysis:** Stata 17.0 used to analyze pooled data from 19 studies
- **Statisticals:** network evidence diagram; global inconsistency test w/ alpha 0.05; p-value <0.05 suggests inconsistency → need for sensitivity analysis; if (p > 0.05) → consistency model + forest plot; node-splitting method w/ p-value <0.05 suggests inconsistency; model comparison using the deviance information criterion (DIC) to determine use of random or fixed-effects model; continuous variables: mean difference (MD) or standardized mean difference (SMD); odds ratio (OR) with 95% CI; SUCRA; funnel plot
- **Results:**
 - 42 RCTs involving 4,103 participants and 21 different treatment therapies met inclusion criteria
 - (1) responder rate
 - The following “acupuncture or combined acupuncture and medication approaches ... were significantly more effective than western medicine (WM) alone:”
 - electroacupuncture (EA) + cupping therapy (CT) [odds ratio (OR) = 28.66, 95% CI: 1.68 to 487.35]
 - manual acupuncture (MA) + bloodletting therapy (BT) (OR = 6.07, 95% CI: 1.81 to 20.29)
 - plum blossom needle tapping (PBNT) (OR = 3.76, 95% CI: 1.04 to 13.65)
 - scalp acupuncture (SPA) (OR = 3.65, 95% CI: 2.29 to 5.83)
 - EA + CT (92.1%) was most effective.
 - (2) headache frequency
 - “EA (85.9%) was the most effective, followed by MA + PBNT (80.9%) and MA + WM (78.4%).”



- Both MA + PBNT produced statistically significant reduced headache frequency vs Western Medicine (WM) (SMD = -1.76, 95% CI: -3.31 to -0.22) and EA (SMD = -1.75, 95% CI: -3.30 to -0.20)
- (3) shortening headache duration
 - “EA (83.9%) emerged as the most effective treatment, followed by MA + WM (73.5%) and laser acupuncture (LA) (68.5%).”
- (4) pain intensity reduction in order of effectiveness:
 - MA + WM combination (89.4%)
 - SPA + WM (77.7%)
 - “Compared to herbal medicine (HM), both MA + WM (SMD = -2.37, 95% CI: -4.20 to -0.55) and MA alone (SMD = -1.00, 95% CI: -1.75 to -0.24) significantly alleviated pain intensity.”
- **Conclusion:** “This comprehensive analysis of 21 acupuncture and related therapies demonstrates that EA is the most effective in reducing headache frequency and shortening headache duration, while EA + CT and MA + WM are the optimal therapies for enhancing responder rate and reducing pain intensity, respectively. However, clinical decisions should be individualized based on the specific needs of each patient.”

Chen H, Shi H, Gao S, et al. Durable effects of acupuncture for tension-type headache: a systematic review and meta-analysis. *Heliyon*. 2024;10:e32174. doi:10.1016/j.heliyon.2024.e32174. ⁵⁵

- **Design:** systematic review and meta-analysis
- **PROSPERO Registration Number:** CRD42023467192
- **Systematic Review:** Lit review of databases + references from prior reviews f’or randomized controlled trials (RCTs) which investigated the effectiveness of acupuncture for [tension-type headache] (TTH).
- **Methodological Quality:** Cochrane Risk of Bias 2.0 (RoB 2) tool
- **Primary Outcome:** response rate (proportion of participants reporting at least a 50% post-treatment reduction in monthly headache days from baseline)
- **Secondary Outcomes:** headache days, headache intensity, analgesic use, safety
- **Meta-Analysis/Stats:** R software 4.1.1; “results illustrated using forest plots;” using risk ratio (RR); odds ratio (OR); mean differences (MD) or standardized mean differences (SMD) w/ 95% CI; heterogeneity: Chi2 test and I2 statistic; fixed-effects estimates for If I2<50% (low-mod heterogeneity); random-effects estimates where there was high heterogeneity
- **Results:**
 - 7 RCTs involving 3,221 participants met inclusion criteria



- “Individuals receiving acupuncture reported a significantly higher response rate versus sham acupuncture (SA) immediately and at 1–6 months after completion of treatment ($P < 0.05$).”
- “Compared with SA, post-treatment results of headache days and headache intensity appeared consistent on the whole, showing associations favoring acupuncture.”
- “No significant reduction in analgesic use was found post-treatment.”
- “Acupuncture showed no superiority over physical training or relaxation training in headache days and headache intensity.”
- Adverse events: no serious reports related to acupuncture
- **Conclusion:** “Limited evidence suggested that acupuncture might provide durable post-treatment effects in the management of frequent episodic and chronic TTH for up to 6 months compared with SA, with no severe treatment-related adverse events reported.”

Huang Y-B, Yuan L, Shi Y-Z, et al. Acupuncture versus tricyclic antidepressants in the prophylactic treatment of tension-type headaches: an indirect treatment comparison meta-analysis. *J Headache Pain*. 2024;25:67. doi:10.1186/s10194-024-01776-5. ⁵⁶

- **Design:** indirect treatment comparison meta-analysis
- **Systematic Review:** Lit review of databases (Ovid Medline, Embase, Cochrane Library) from inception until April 13, 2023, for randomized controlled trials (RCTs) involving acupuncture or tricyclic antidepressants (TCAs) for preventing of tension-type headaches (TTH) in adults according to PRISMA guidelines
- **Overall Quality:** “two reviewers (YB-H and LY) independently extracted the relevant data by standardized extraction forms”
- **Risk of Bias:** Cochrane risk-of-bias tool (version 2)
- **Evidence Confidence/Certainty:** GRADE approach
- **Primary Outcome:** headache frequency
- **Secondary Outcomes:** headache intensity, responder rate, adverse event rate
- **Bayesian Random-Effect Models Meta-Analysis/Stats:** “arm-based network meta-analysis (NMA)” R 4.3.1, multinma package version 0.5.1; Bayesian framework Stan; treatment effects and study-specific intercepts: $N(0, 100^2)$ prior distributions; heterogeneity standard deviation of the random-effect (RE) model: half- $N(5^2)$ prior; posterior total residual deviance, unconstrained data points, and deviance information criteria (DIC) for random-effect (RE) and fixed-effect (FE) models; global inconsistency: dev-dev plots; pairwise comparison analyses: mean difference (MD) for continuous data and odds ratio (OR) for binary data w/ 95% confidence intervals (CIs); tau-squared > 0.36 = significant heterogeneity; surface under the cumulative rank curve (SUCRA); sensitivity + subgroup analyses



- **Results:**
 - “34 trials involving 4,426 participants” met inclusion criteria
 - “Acupuncture had similar effect with TCAs in decreasing TTH frequency” (amitriptyline: mean difference [MD] -1.29, 95% CI -5.28 to 3.02; amitriptylinoxide: MD -0.05, 95% CI -6.86 to 7.06)
 - Acupuncture offered similar effects to TCAs in “reducing TTH intensity” (amitriptyline: MD 2.35, 95% CI -1.20 to 5.78; clomipramine: MD 1.83, 95% CI -4.23 to 8.20).
 - “Amitriptyline had a higher rate of adverse events than acupuncture” (OR 4.73, 95% CI 1.42 to 14.23).
- **Conclusion:** “Acupuncture had **similar effect as TCAs** in reducing headache frequency of TTH, and acupuncture had a **lower adverse events rate** than amitriptyline, as shown by very low certainty of evidence.”
- **Highlights:** “Acupuncture showed better improvement than sham acupuncture in reducing headache frequency of tension-type headache (TTH), but the lack of comparisons between acupuncture and first-line drugs impedes recommendation of acupuncture for TTH.”

Tao Q-F, Wang X-Y, Feng S-J, et al. Efficacy of acupuncture for tension-type headache prophylaxis: systematic review and meta-analysis with trial sequential analysis. *J Neurol.* 2023 Jul;270(7):3402-3412. doi: 10.1007/s00415-023-11695-1. Epub 2023 Apr 5. ⁵⁷

- **Design:** systematic review and meta-analysis w/ trial sequential analysis (TSA)
- **Systematic Review:** Literature search of databases (Ovid Medline, Embase, Cochrane Library) until September 29, 2022, for randomized controlled trials involving acupuncture treatment for tension-type headache (TTH)
- **Treatment Groups:** acupuncture vs sham acupuncture, no acupuncture, or other active therapies
- **Primary Outcome:** TTH frequency
- **Secondary Outcomes:** responder rate and adverse events
- **Results:**
 - 14 studies involving 2,795 participants met inclusion criteria
 - “Acupuncture had more reduction than sham acupuncture in TTH frequency” for the following time periods:
 - after treatment (standardized mean difference [SMD] - 0.80, 95% CI - 1.36 to - 0.24, P = 0.005)
 - at follow-up (SMD - 1.33, 95% CI - 2.18 to - 0.49, P = 0.002)
 - “TSA showed the included sample size did not exceed required information size (RIS)”
 - “Acupuncture was superior over no acupuncture after treatment” (SMD - 0.52, 95% CI - 0.63 to - 0.41, P < 0.001)
 - “cumulative sample size reached RIS”



- “Acupuncture had a higher responder rate compared with sham acupuncture” for the following time periods (although sample size deemed too small)
 - after treatment (relative ratio [RR] 1.28, 95% CI 1.12 to 1.46, P = 0.0003)
 - at follow-up (RR 1.37, 95% CI 1.19 to 1.58, P < 0.0001)
- **Conclusion:** “Acupuncture is an efficacious and safe treatment for TTH prevention, but this conclusion might be limited by the generally very low to low quality evidence. TSA suggested that high-quality trials are needed to verify the efficacy and safety of acupuncture compared to sham acupuncture.”

Hu J, Wang X, Jia S, et al. Acupuncture and related therapies for tension-type headache: a systematic review and network meta-analysis. *Front Neurol.* 2023;14:1194441. doi: 10.3389/fneur.2023.1194441. ⁵⁸

- **Design:** systematic review and network meta-analysis
- **Registration:** <https://www.crd.york.ac.uk/prospero/>, PROSPERO [CRD42022368749]
- **Systematic Review:** Literature search of 9 databases up to December 1, 2022 for randomized controlled trials (RCTs) involving acupuncture treatment for tension-type headache (TTH)
- **Outcomes:** total effective rate, visual analog scale (VAS), headache frequency, safety
- **Meta-Analysis:** 30 studies involving 2,722 participants pooled for analysis; Review Manager 5.4; Stata 15.0 and RStudio “gemtc” and “JAGs-4.3.1” packages; “mvmeta” package for network evidence plot
- **Statistics:** binary variables: odds ratio (OR) and 95% Confidence Interval (CI) w/ alpha 0.05; continuous variables: mean difference (MD) w/ alpha 0.05; heterogeneity: Cochran’s I-square (I²) and fixed- or random-effects models; node splitting method; consistency model: Markov chain-Monte Carlo method (MCMC) framework when p > 0.05; convergence effect: potential scale reduction factor (PSRF); SUCRA; histograms of ranking probabilities; funnel plots
- **Results:**
 - 30 RCTs involving 2,722 participants met inclusion criteria
 - Most studies did not report consistent details = “unclear risk”
 - Two studies = high risk: “did not report on all pre-specified outcome indicators or had incomplete data on outcome indicators.”
 - **Total effective rate:** “**bloodletting therapy** had the most considerable SUCRA value” (0.93156136)
 - **VAS:** “**head acupuncture combined with Western medicine ranked first**” (SUCRA= 0.89523571) “acupuncture combined with herbal medicine was the most effective in improving headache frequency” (p > 0.05)
- **Conclusion:** “Acupuncture can be used as one of the complementary or alternative therapies for TTH; bloodletting therapy better improves the overall symptoms of TTH, head **acupuncture combined with Western medicine is more effective** in reducing VAS scores, and acupuncture combined with herbal medicine seems to reduce headache frequency, but the difference is not statistically significant. Overall, acupuncture for TTH is effective with *mild side effects*, but future high-quality studies are still necessary.”



Zheng H, Gao T, Zheng Q-H, et al. Acupuncture for patients with chronic tension-type headache: a randomized controlled trial. *Neurol.* 2022;99(14).⁵⁹

- **Design:** randomized controlled trial
- **Trial Registration:** ClinicalTrials.gov: NCT03133884 (clinicaltrials.gov/ct2/show/NCT03133884)
- **Participants:** 218 patients diagnosed chronic tension-type headache (CTTH)
- **Recruitment:** June 2017 - September 2020
- **Treatments:** acupuncture group: 20 standardized 30-minute treatments of true acupuncture (TA) achieving de qi or control sham acupuncture (SA) avoiding de qi over 8 weeks
- **Primary Outcome:** responder rate at 16 weeks and follow-up at week 32. “Responder was defined as a participant who reported at least a 50% reduction in the monthly number of headache days (MHDs).”
- **Results:**
 - 218 participants (mean age: 43.1 years, mean disease duration: 130 months, monthly number of headache days: 21.5 days)
 - responder rate:
 - “68.2% in the TA group (n = 110) vs 48.1% in the SA group (n = 108) at week 16” (OR, 2.65; 95% CI, 1.5 to 4.77; p < 0.001)
 - “68.2% in the TA group vs 50% in the SA group at week 32” (OR, 2.4; 95%CI, 1.36 to 4.3; p < 0.001)
 - reduction in MHDs:
 - “13.1 ± 9.8 days in the TA group vs 8.8 ± 9.6 days in the SA group at week 16” (mean difference, 4.3 days; 95%CI, 2.0 to 6.5; p < 0.001)
 - “14 ± 10.5 days in the TA group vs 9.5 ± 9.3 days in the SA group at week 32” (mean difference, 4.5 days; 95%CI, 2.1 to 6.8; p < 0.001)
 - Adverse Events: “Four mild adverse events were reported; 3 in the TA group vs 1 in the SA group.”
- **Discussion:** “The 8-week TA treatment was effective for the prophylaxis of CTTH. Further studies might focus on the cost-effectiveness of the treatment.”

Kolokotsios S, Stamouli A, Koukoulithras I, Plexousakis M, Drousia G. The effectiveness of acupuncture on headache intensity and frequency in patients with tension-type headache: a systematic review and meta-analysis. *Cureus.* 2021;13(4):e14237. doi:10.7759/cureus.14237.

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- **Design:** systematic review and meta-analysis
- **Systematic Review:** Lit search of databases (PubMed, PEDro database, Cochrane Library, Google Scholar, plus references lists of included articles) from January 2000 until February 2021, for randomized controlled trials and clinical trials involving various types of acupuncture to treat tension-type headache (TTH) according to PRISMA guidelines



- **Outcomes:** short-term (after the last treatment) and long-term pain intensity and headache frequency
- **Meta-Analyses:** pooled analysis of data from 4 studies involving 557 participants with Review Manager 5.4 software; I^2 index and χ^2 test for heterogeneity; random-effects meta-analysis
- **Results:**
 - 15 studies involving 1,272 participants met inclusion criteria
 - headache' frequency
 - (short-term, after last treatment): “not significantly lower in the acupuncture group than in the placebo/sham group” (mean difference: -1.53 [CI: -4.73, 1.67])
 - long-term: ”acupuncture seems to improve the frequency of headaches in the long term, although the results were not statistically significant $p=0.06$.”
 - “reduction of 1.55 days per month [not statistically significant] of headaches in the acupuncture group versus placebo” (mean difference: -1.55 [CI: -3.19, 0.09])
 - visual analog scale (VAS) score:
 - short-term results: acupuncture group had “slightly reduced (-0.29) [scores] compared with the control group after the last treatment” but results were “not statistically significant $p=0.53$ ” (mean difference: -0.29 [CI: -1.21, 0.62])
 - long term results: “acupuncture demonstrated a statistical ($p=0.009$) and clinical benefit compared with placebo/sham.”
 - “statistical analyses between the two groups showed a reduction of 0.41 in the VAS scale at the acupuncture group” (mean difference: -0.41 [CI: -0.72, -0.10]).”
- **Conclusion:** “Overall, after the meta-analysis of articles with high methodological quality, acupuncture's effectiveness compared to sham seems to be statistically non-significant on headache intensity and frequency in patients with TTH after the treatment. Both headache intensity and frequency were reduced in the long term, although only in the pain intensity, the results were statistically significant. Therefore, more studies on this topic should be conducted to examine its effectiveness in headache frequency and intensity.”

Turkistani A, Shah A, Jose AM, Melo JP, Luenam K, Ananias P, Yaqub S, Mohammed L. Effectiveness of manual therapy and acupuncture in tension-type headache: a systematic review. *Cureus*. 2021;13(8):e17601. doi: 10.7759/cureus.17601. eCollection 2021 Aug. ⁶¹

- **Design:** Systematic Review and Meta-Analysis
- **Meta-Analysis:** 8 articles involving 3,846 participants included for meta-analysis
- **Results:**
 - Acupuncture and manual therapy demonstrated effectiveness at treating tension-type headaches.



- Two large studies demonstrated moderate quality evidence that **acupuncture plus routine care reduced headache frequency** by an average of 50% compared with routine care alone.
- Trial 1: relative risk reduction (RRR) of 2.5; trial 2: RRR of 11.
- “Acupuncture was not found to be superior to physiotherapy, exercise, and massage therapy.”
- Manual therapy significantly decreased headache intensity.
- **Manual therapy was equivalent to prophylactic medication and tricyclic antidepressants for tension headaches**
- **Conclusions:** The available data suggests that both acupuncture and manual therapy have beneficial effects on treating symptoms of tension-type headache.

Linde K, Allais G, Brinkhaus B, et al. Acupuncture for the prevention of tension-type headache. *Cochrane Database Syst Rev.* 2016;(4):CD007587. ⁶²

- **Study:** 12 studies with publication dates through January 2016 involving 2,349 adult patients, plus one additional new trial, were pooled and analyzed.
- **Results: Acupuncture plus usual care** for acute migraine yielded 48/100 participants with a 50% or greater reduction in headache frequency versus 17/100 for usual care.
- **Acupuncture compared with sham acupuncture** resulted in 52/100 participants with a 50% or greater reduction in headache frequency versus 43/100 for sham acupuncture. The results from true acupuncture were long-lasting, up to 6 months after treatments.
- “No trial found a significant superiority of acupuncture and for some outcomes the results slightly [favored] the comparison therapy.”

(d). Acupuncture for Osteoarthritis Pain

Manheimer E, Cheng K, Linde K, et al. Acupuncture for peripheral joint osteoarthritis. *Cochrane Database Syst Rev.* 2010;(1):C0001977. ⁶³

- Study: sixteen trials (12 knee O A; 3 hip OA; 1 hip and knee OA) involving 3,498 participants
- **Results: Acupuncture versus sham yielded statistically significant “short-term improvements in osteoarthritis pain.”**
- Acupuncture versus sham yielded **statistically significant improvements in function.**
- Neither of these results met the authors’ “predefined thresholds for clinical relevance.”
- **At 6 month follow-up** acupuncture showed “borderline” statistical significance and “clinically irrelevant improvements” for *osteoarthritis pain and function* as compared to sham.
- **Acupuncture versus waitlist control showed statistically significant and**



clinically meaningful results for *osteoarthritis pain and function*.

- **Acupuncture versus ‘supervised osteoarthritis education’ and ‘physician consultation’** control groups showed “clinically relevant short- and long-term improvements in pain and function.”
- **Acupuncture versus ‘home exercises/advice leaflet’ and ‘supervised exercise’** had similar outcomes as controls.
- **Acupuncture plus “exercise based physiotherapy program”** had similar outcomes as the exercise program without acupuncture.
- **Conclusions:** Acupuncture produced statistically significant improvements in osteoarthritis pain and function when compared with both sham and waitlist controls, and performed better than ‘supervised osteoarthritis education’ and ‘physician consultation, ‘home exercises/advice leaflet’ and ‘supervised exercise.’ Authors postulated that inclusion of sham acupuncture affected results.

Yuan S-G, Chen J, Chen M-X, Zheng N-S, Zhang Z-W, Wang H-J, Li J, Li L, Gao Y-P. High-intensity electroacupuncture is superior to low-intensity electroacupuncture for knee osteoarthritis: a meta-analysis of randomized controlled trials. *Acupunct Med.* 2024 Dec;42(6):303-310. doi: 10.1177/09645284241298718. Epub 2024 Nov 23. ⁶⁴

- **Design:** systematic review and meta-analysis
- **Systematic Review:** literature search of databases (PubMed, EMBASE, Cochrane Library, China National Knowledge Infrastructure (CNKI), China Science Journal Citation Report (VIP), Wanfang, and ClinicalTrials.gov) from inception until April 2022 for randomized controlled trials (RCTs) electroacupuncture (EA) for knee osteoarthritis (KOA)
- **Study Quality:** Cochrane risk of bias (RoB)2 tool.
- **Meta-Analysis:** data from 3 studies involving 472 participants pooled for analysis using Review Manager 5.3
- **Results:**
 - 3 studies involving 472 individuals met inclusion criteria
 - “Pain intensity reductions were significantly different between the high-intensity EA group and low-intensity EA group” (mean difference (MD) = -0.22, 95% confidence interval (CI) = -0.26 to -0.18, $p < 0.00001$)
 - “No significant difference between the two groups in the Western Ontario and McMaster Universities Osteoarthritis Index” (WOMAC) scores (MD = -3.62, 95% CI = -12.22 to 4.98, $p = 0.41$)
 - “High-intensity EA significantly improved emotional scale (ES) scores compared to low-intensity EA” (MD = -0.72, 95% CI = -0.76 to -0.67, $p < 0.00001$).
- **Conclusion:** “The findings of this systematic review and meta-analysis indicated that high-intensity EA provides superior pain relief and has a bigger impact on emotional scale scores in patients with KOA.”



Han R, Guo C, Lau K, et al. Efficacy of knee osteoarthritis by use of laser acupuncture: a systematic review and meta-analysis. *Medicine*. 2024;103:25. doi: 10.1097/MD.00000000000038325. ⁶⁵

- **Design:** systematic review and meta-analysis
- **PROSPERO Registration ID:** CRD42022354798, https://www.crd.york.ac.uk/prosperto/display_record.php?ID=CRD42022354798
- **Systematic Review:** Literature search of electronic databases were searched from inception to March 2022 for studies involving laser acupuncture for osteoarthritis (OA) treatment
- **Quality Control:** “a premade data extraction table was used independently by 2 reviewers;” PRISMA guidelines used to assess studies
- **Primary Outcomes:** “WOMAC total score,” “WOMAC stiffness score,” “WOMAC pain score,” “WOMAC physical function score,” and “VAS score”
- **Meta-Analysis:** data from 25 randomized controlled clinical trials involving 2,075 participants pooled for analysis using RevMan V.5.0
- **Statistics:** ANOVA 95% confidence (alpha value 0.05); dichotomous data: risk difference and risk ratio analyses; continuous data: mean difference w/ standard deviation (SD); Der Simonian-Laird method for random effects; I² proportion of heterogeneity; intention-to-treat analysis; funnel plot for 10 or more pooled studies per analysis
- **Results:**
 - 25 randomized controlled clinical trials involving 2,075 participants met inclusion criteria
 - Comparisons involved:
 - Laser Acupuncture (LA) versus Sham LA (efficacy)
 - LA versus A (Acupuncture) (comparative effectiveness)
 - LA combined with A versus A (effectiveness as an adjunct)
 - “Laser irradiation is effective in patients with Knee OA.”
 - LA treatment is almost equivalent to laser irradiation outcomes.
 - LA treatment outcomes are similar to manual acupuncture
- **Conclusion:** The authors found laser acupuncture “more or less” effective for treating OA.” They stated that “better efficacy will be achieved under appropriate laser parameters (810 nm, 785 nm) in the LA versus Sham LA group. Many studies have diverse results, possibly due to unstaged analysis of patients’ disease, inappropriate selection of acupoints, lack of remote combined acupoints, and unreasonable laser parameters.” Of note, “a combination of acupoints was found to be more effective which aligns with the combined-acupoints application of traditional Chinese medicine.”

Chen H, Shi H, Gao S, et al. Durable effects of acupuncture for knee osteoarthritis: a systematic review and meta-analysis. *Curr Pain Headache Rep*. 2024;28:709–722. doi: 10.1007/s11916-024-01242-6. ⁶⁶

- **Design:** systematic review and meta-analysis
- **PROSPERO Registry ID:** CRD42023446663



- **Systematic Review:** Literature searches of databases (PubMed, EMBASE, Web of Science, Cochrane Central Register of Controlled Trials) from inception to November 4, 2023, for randomized controlled trials (RCTs) regarding acupuncture treatment for knee osteoarthritis (KOA)
- **Quality Control:** “Two researchers independently evaluated the risk of bias of the RCTs using the revised Cochrane risk of bias, version 2 (RoB 2) tool”
- **Primary Outcome:** Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) pain and function subscales
- **Secondary Outcomes:** response rate, overall pain, WOMAC stiffness subscale, total WOMAC index, physical and mental health components of 12/36-item Short-Form Health Survey
- **Statistics:** means differences and standard deviations; standard error (SE) of mean or 95% confidence intervals (CIs); continuous data: standardized mean differences (SMDs) with 95% CIs; dichotomous data: risk ratios (RR) with 95% CIs; safety: odds ratio (OR); data synthesis: random effects model; heterogeneity: I^2 statistics
- **Results:**
 - 10 randomized controlled trials (RCTs) involving 3,221 participants met inclusion criteria
 - “acupuncture may offer potential improvements in function and overall pain for **4.5 months post-treatment** versus sham acupuncture (SA).”
 - “acupuncture may provide durable clinically important pain relief and functional improvement up to 5 months post-treatment versus usual care, and up to 6 months post-treatment versus diclofenac.”
 - acupuncture vs no treatment:
 - “one trial with large sample size indicated that improvements in pain and function persisted for 3 months post-treatment”
 - “the other trial reported that significant pain reduction and functional improvement were only observed at the end of the treatment, not at 9 months post-treatment.”
 - “acupuncture as adjunct to exercise-based physical therapy (EPT) showed no superiority to SA as an adjunct to EPT or EPT alone up to 11.25 months after completion of treatment.”
- **Summary:** “Acupuncture may provide pain alleviation and functional improvements in KOA patients for 3 to 6 months after completion of treatment with a good safety profile.”

Liu C-Y, Duan Y-S, Zhou H, et al. Clinical effect and contributing factors of acupuncture for knee osteoarthritis: a systematic review and pairwise and exploratory network meta-analysis. *BMJ EBM*. 2024;0(0). doi: 10.1136/bmjebm-2023-112626.⁶⁷



- **Design:** systematic review and pairwise and exploratory network meta-analysis
- **PROSPERO Registration Number:** CRD42021232177
- **Systematic Review:** literature search of databases (PubMed, Embase, Cochrane Central Register of Controlled Trials, Web of Science, China National Knowledge Infrastructure, Chinese Biomedical Literature Database, VIP Database for Chinese Technical Periodicals, Wanfang) from inception to November 13, 2023, for randomized controlled trials involving acupuncture treatment of knee osteoarthritis (KOA)
- **Evidence Quality:** GRADE
- **Treatment Groups:** manual acupuncture (MA) and electroacupuncture (EA), sham acupuncture, non-steroidal anti-inflammatory drugs (NSAIDs), usual care, wait list groups, intra-articular (IA) injection and blank groups
- **Primary Outcome:** pain intensity post-treatment
- **Meta-Analysis:** 80 trials involving 9,933 participants pooled for analysis by Review Manager (Revman V.5.3)
- **Statistics:** Stata V.12.0 and V.16.0; alpha-value 0.05; SUCRA; sensitivity analysis; standardised mean difference (SMD) or mean difference (MD) with 95% confidence interval (CI); random effects model; statistical heterogeneity: χ^2 test reported as I²
- **Results:**
 - 80 trials involving 9,933 participants met inclusion criteria
 - “Very low certainty evidence suggested that **acupuncture may reduce pain intensity compared with**” the following interventions:
 - sham acupuncture” (standardised mean difference, SMD -0.74 , 95% CI -1.08 to -0.39 , corresponded to a difference in Visual Analogue Scale of -18.50 mm, -27.00 to -9.75)
 - NSAIDs (SMD -0.86 -1.26 to -0.46 , corresponded to -21.50 mm, -31.50 to -11.50)
 - usual care or waiting list groups (SMD -1.01 , -1.47 to -0.54 , corresponded to -25.25 mm, -36.75 to -13.50)
 - blank groups (SMD -1.65 , -1.99 to -1.32 , corresponded to -41.25 mm, -49.75 to -33.00)
 - acupuncture did not reduce pain intensity compared to IA injection
 - Subgroup Analysis: “acupuncture type, acupuncture dose and follow-up time did not show a significant relative effect.”
 - “**Only when compared with NSAIDs, a higher dose of acupuncture may provide greater pain relief (interaction $p < 0.001$).**”
 - “The network meta-analysis revealed that electroacupuncture (SMD -0.75 , 95% CI -1.34 to -0.17) had a greater effect on pain relief in patients with KOA compared with manual acupuncture.”
- **Conclusions:** “The findings suggest that acupuncture may provide clinically important effects in reducing pain and improving physical function in patients with KOA, but the certainty of evidence was very low. Electroacupuncture and **higher dose** of acupuncture probably are two potential contributing factors.”



Li P, Zhang Y, Li F, Cai F, Xiao B, Yang H. The efficacy of electroacupuncture in the treatment of knee osteoarthritis: a systematic review and meta-analysis. *Adv Biol (Weinh)*. 2023 Oct;7(10):e2200304. doi: 10.1002/adbi.202200304. Epub 2023 Feb 20. ⁶⁸

- **Design:** systematic review and meta-analysis
- **Systematic Review:** literature search of electronic databases from January 2012 to December 2021 for randomized controlled trials (RCTs) involving electroacupuncture (EA) and analgesics to treat knee osteoarthritis (KOA)
- **Risk of Bias:** Cochrane risk of bias tool for randomized trials
- **Evidence Quality:** Grading of Recommendations, Assessment, Development and Evaluation (GRADE)
- **Meta-Analysis/Statistics:** Review Manager V5.4.
- **Results:**
 - 20 studies involving 1,616 patients (treatment n=849; control n=767 patients)
 - “effective rate in the treatment group is significantly higher than in the control group” ($p < 0.00001$)
 - “Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) stiffness scores are significantly improved as compared to the control group” ($p < 0.0001$).
 - “EA is similar to analgesics in improving visual analog scale scores and WOMAC subitems such as pain and joint function.”
- **Conclusions:** “EA is effective in treating KOA because it can significantly improve clinical symptoms and quality of life in KOA patients.”

Kwak SG, Kwon JB, Seo YW, Choi W-K, The effectiveness of acupuncture as an adjunctive therapy to oral pharmacological medication in patients with knee osteoarthritis: a systematic review and meta-analysis. *Medicine*. 2023;102:11. doi: 10.1097/MD.00000000000033262. ⁶⁹

- **Design:** systematic review and meta-analysis
- **Systematic Review:** Literature review of databases (PubMed, Cochrane, Embase) from January 1, 1992, through August 31, 2022, for randomized controlled studies involving acupuncture (non-sham) for knee osteoarthritis
- **Quality Control:** independent review by two researchers
- **Interventions:** acupuncture (non-sham acupuncture) + oral medication (analgesic or non-steroidal anti-inflammatory drugs, oral medication (analgesic or non-steroidal anti-inflammatory drugs)
- **Primary Outcomes:** visual analog scale (VAS) or Western Ontario and McMaster University (WOMAC) osteoarthritis index
- **Meta-Analysis:** 6 studies pooled for analysis by RevMan v.5.3 software
- **Statistics:** alpha value 0.05; random-effects model for $p\text{-value} \leq 0.05$; heterogeneity w/ I² statistic; fixed effects model for $p\text{-value} \geq 0.05$; mean difference plus 95% confidence interval (CI); publication bias: funnel plot and the Egger test; sensitivity analysis: root mean square error (RMSE)



- **Results:**
 - 6 studies met inclusion criteria
 - oral medication + adjuvant acupuncture: “statistically significant improvement in VAS and WOMAC scores at the end of acupuncture treatment and short-term follow-up time (between 4 and 6 weeks after acupuncture).”
 - post-treatment and short-term follow-up “degree of improvement of VAS and WOMAC index showed effects beyond minimal clinically important differences” in contrast to pretreatment
- **Conclusion:** “The existing evidence suggests that adjuvant acupuncture may play a role in the treatment of knee osteoarthritis. However, physicians should be aware of adverse effects such as hematoma in adjuvant acupuncture treatment.”

Chen J, Guo H, Pan J, et al. Efficacy of acupuncture combined with active exercise training in improving pain and function of knee osteoarthritis individuals: a systematic review and meta-analysis. *J Orthop Surg Res.* 2023;18:921. doi: 10.1186/s13018-023-04403-2. ⁷⁰

- **Design:** systematic review and meta-analysis
- **Systematic Review Registration:** [PROSPERO], identifier [No. CRD42023425823]
- **Systematic Review:** lit review of databases (PubMed, EMBASE, The Cochrane Library, Web of Science, China National Knowledge Infrastructure, Wan Fang Data, Technology Periodical Database, China Biology Medicine) from inception to April 5, 2023, for trials involving acupuncture + active exercise training for knee osteoarthritis (KOA)
- **Quality Control:** “Study selection, data extraction, risk of bias and quality assessment were independently performed by two reviewers.
- **Outcomes:** total efficiency rate, visual analogue scale (VAS), the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), the Lysholm Knee Scale (LKS) and range of motion (ROM)
- **Meta-Analysis/Stats:** 11 studies’ data pooled for analysis with Review Manager 5.3 and Stata/MP 14.0. trial sequence analysis (TSA); continuous data: mean differences (MD) and 95% confidence intervals (CI); $I^2 < 50\%$ and $p > 0.05$ fixed effects model; $I^2 > 50\%$ and $p < 0.05$, sensitivity analysis + subgroup analysis using random effects model for heterogeneity; publication bias: funnel plot and Egger’s test w/ Stata/MP 14.0 to verify used funnel plot to explore publication
- **Results:**
 - 11 high-quality studies ($Jadad \geq 4$) involving 774 participants met inclusion criteria “**acupuncture combined with active exercise training** (combined group) was **superior to the acupuncture group**” for the following parameters
 - improved total effective rate [RR=1.13, 95%CI (1.05, 1.22), $I^2=0\%$, $P=0.70$]
 - reduced pain level (VAS) [MD=-0.74, 95%CI (-1.04, -0.43), $I^2=68\%$, $P<0.05$]
 - improved knee joint function (WOMAC) [MD= -6.97, 95%CI (-10.74,-3.19), $I^2=76\%$, $P<0.05$]
 - improved joint range of motion (ROM) [MD=6.25, 95%CI (2.37, 10.04), $I^2=0\%$, $P=0.71$].



- **acupuncture + active exercise training group “showed significant improvements”** in the following parameters when compared to non-acupuncture group:
 - total effective rate [RR=1.31, 95% CI (1.18, 1.47), I2=48%, P=0.10]
 - pain (VAS) [MD=1.42, 95% CI (-1.85, -1.00), I2=65%, P=0.02]
 - knee function (WOMAC) [MD=7.05, 95% CI (-11.43, -2.66), I2=86%, P<0.05]
- **Conclusion:** “The combined effect of all studies showed **significant benefits of acupuncture combined with active exercise training** in improving the total effective rate, reducing pain, promoting recovery of knee function and expanding range of motion. However, some evaluation indicators are highly subjective and need to be further confirmed by more objective and evidence-based high-quality RCTs in future.”

Xin S, Liu J, Yang Z, Li C. Comparative effectiveness of moxibustion and acupuncture for the management of osteoarthritis knee: a systematic review and meta-analysis. Heliyon. 2023;9:e17805. doi: 10.1016/j.heliyon.2023.e17805. ⁷¹

- **Design:** systematic review and meta-analysis
- **Systematic Review:** literature search of databases (PubMed Central, EMBASE, MEDLINE, the Chinese Biomedical Literature Database (CBM), China National Knowledge Infrastructure (CNKI), Cochrane Library) from January 1964 until April 2022, for randomized controlled trials involving moxibustion and acupuncture to treat knee osteoarthritis according to PRISMA guidelines
- **Overall Quality:** “researchers manually extracted the required data using a preconceived semi-structured data collection form.”
- **Risk of Bias:** Cochrane Risk of Bias Tool for Randomized Controlled Trials (RoB 2)
- **Evidence Quality:** GRADE
- **Meta-Analysis:** STATA 14.2; weighted mean difference (WMD) or standardized mean difference (SMD) plus 95% confidence interval (CI); random-effects model, pooled standardized mean difference (SMD) and risk ratio (RR) w/ 95% confidence intervals (CIs); sensitivity analysis using sequential exclusion; publication bias: funnel plot (Egger’s Test)
- **Results:**
 - 21 studies met inclusion criteria (all studies done in China)
 - 50% “identified as having high risk of bias”
 - pooled SMD (pain score): - 0.53 (95% CI: - 0.91 to - 0.15)
 - types of moxibustion most effective:
 - “fire needle moxibustion was more effective in pain reduction” (SMD = - 0.56; 95% CI: - 1.10 to - 0.01)
 - alternative moxibustion methods were less effective than fire needle moxibustion (SMD = - 0.47; 95% CI: - 0.80 to - 0.13).
 - pooled RR (success rate): 1.39 (95% CI: 1.19 to 1.62)
 - Subgroup analysis verified that fire needle moxa was more effective than other types of moxa:



- fire needle moxibustion (RR = 1.43; 95% CI: 1.19 to 1.72)
- other types of moxibustion (RR = 1.33; 95% CI: 1.02 to 1.74).
- **Conclusion:** “Moxibustion, specifically fire needle moxibustion, demonstrated superior effectiveness in managing knee osteoarthritis compared to acupuncture.”

Wang Z, Wang Y, Wang C, et al. Systematic review and network meta-analysis of acupuncture combined with massage in treating knee osteoarthritis. *Biomed Res Int.* 2022; 13:2022:4048550. doi: 10.1155/2022/4048550. ⁷²

- **Design:** systematic review and network meta-analysis
- **Systematic Review:** lit review of databases (PubMed, Cochrane Library, Web of Science, Embase, Chinese Knowledge Infrastructure (CNKI), Chinese Biomedical Literature Database (CBM), VIP, and Wanfang) for randomized controlled trials involving acupuncture plus massage to treat knee osteoarthritis
- **Overall Method:** “researchers independently screened the literature, extracted data, and evaluated quality” and used meta-analysis software
- **Risk of Bias:** Cochrane Risk of Bias Tool
- **Evidence Quality:** Grades of Recommendations Assessment, Development and Evaluation (GRADE)
- **Network Meta-Analysis:** Review Manager 5.4 software used to analyze pooled data from all 49 included studies
- **Statistics:** Stata16.0 software; random-effects model; continuous variables: standardized mean difference (SMD); binary variables, odds ratio (OR); 95% confidence interval (CI); network relationship diagram; SUCRA as percentage (100%=absolutely effective); inconsistency test
- **Results:**
 - 49 studies involving 10 acupuncture/massage methods and 4,458 participants (treatment n=2,182; control n=2,276) met inclusion criteria
 - top 3 best treatments for improved effective rate:
 - floating needle+massage
 - needle knife+massage
 - silver needle+massage
 - top 3 best treatments for reducing VAS score:
 - common acupuncture+massage
 - needle knife+massage
 - warm needle+massage
 - top 3 best treatments for improving total Lysholm index score:
 - silver needle+massage
 - electroacupuncture+massage
 - needle knife+massage
 - top 3 best treatments for reducing total WOMAC score:
 - silver needle+massage
 - electrothermal needle+massage
 - common acupuncture+massage



- top 3 best treatments for reducing WOMAC stiffness score:
 - warm needle+massage
 - silver needle+massage
 - common acupuncture+massage
- top 3 best treatments for reducing WOMAC joint function score:
 - silver needle+massage
 - warm needle+massage
 - common acupuncture+massage
- **Conclusion:** “The results showed that acupuncture combined with massage could improve the clinical therapeutic effect of patients with knee osteoarthritis. Limited by the quality of the included studies, the conclusions obtained still need to be further validated.”

Lin X, Li F, Lu H, et al. Acupuncturing of myofascial pain trigger points for the treatment of knee osteoarthritis: a systematic review and meta-analysis. *Medicine*. 2022;101:8. doi:10.1097/MD.00000000000028838. ⁷³

- **Design:** systematic review and meta-analysis
- **Systematic Review:** lit search of databases (PubMed, The Cochrane Library, China journal full-text database (CNKI), Chinese biomedical literature database (CBM), China academic journal database (Wanfang Data)) via computer from inception to December 2021 for randomized controlled trials (RCTs) involving acupuncture trigger points for treatment of knee osteoarthritis
- **Meta-Analysis:** Reman 5.3 software
- **Statistics:** χ^2 test and I² for heterogeneity; fixed-effect model: $P < .05$, $I^2 > 50\%$; random effects model $P > .05$, $I^2 < 50\%$; dichotomous variables: relative risk, 95% confidence interval (95% CI); continuous variables: mean difference or standardized mean difference and their 95% CI; subgroup and sensitivity analysis
- **Results:**
 - 9 studies involving 724 patients met inclusion criteria
 - “acupuncture myofascial pain trigger point group was better than the control group” for the following outcomes:
 - total effective rate
 - cure rate
 - VAS score
 - Lysholm score
 - WOMAC score
- **Conclusion:** “The efficacy and safety of acupuncturing myofascial pain trigger points in the treatment of knee osteoarthritis is positive, but due to the limited number of literature included in this study and the low quality of the included literature, there is still a need for high-quality and large sample size RCTs for the analysis of this treatment option.”



Jin S, Guan X. A systematic review and meta-analysis of the comparative curative effects of warm acupuncture and other traditional Chinese medicines in the treatment of knee osteoarthritis. *Ann Palliat Med.* 2022 Feb;11(2):708-716. doi: 10.21037/apm-21-3972. ⁷⁴

- **Design:** systematic review and network meta-analysis
- **Systematic Review:** literature search of English- and Chinese-language databases from inception until October 2021 for studies involving warming needle acupuncture (WNA) and/or TCM treatment of knee osteoarthritis (KOA)
- **Risk of Bias:** Cochrane risk of bias tool
- **Network Meta-Analysis:** RevMan 5.20.
- **Results:**
 - 8 articles [warm needle acupuncture (WNA) treatment n=399; other TCM (TCM) n=396] patients met the inclusion criteria
 - statistically significant:
 - effective rate for TCM group [relative risk (RR)] was 1.18, 95% confidence interval (CI): 1.06 to 1.33
 - the last follow-up osteoarthritis index [mean difference (MD)] was -6.93, 95% CI: -12.14 to -1.72
 - last follow-up knee pain visual analogue scale (VAS) MD was -1.06, 95% CI: -1.61 to -0.51
 - not significant: “difference in daily activities” (MD: -4.31, 95% CI: -10.90 to 2.28)
- **Discussion:** “Compared with other TCM treatments for KOA, WNA has better overall patient efficacy. However, further randomized controlled studies are needed to compare WNA and other TCM treatments individually to confirm the efficacy of WNA.”

Yang F, Chen Y, Lu Z, et al. Treatment of knee osteoarthritis with acupuncture combined with Chinese herbal medicine: a systematic review and meta-analysis. *Ann Palliat Med.* 2021 Nov;10(11):11430-11444. doi: 10.21037/apm-21-2565. ⁷⁵

- **Design:** systematic review and meta-analysis
- **Systematic Review:** lit search of databases (CNKI, Wanfang, VIP, PubMed, EMBASE, and Cochrane library) from inception to May 2021 for randomized controlled trials relating to acupuncture and/or Chinese herbal medicine (CHM) to treat knee osteoarthritis (KOA)
- **Overall Quality Control:** “Three researchers independently searched, screened, extracted, and included articles that met the inclusion standards.”
- **Literature Quality:** modified Jadad scale
- **Primary Outcome:** overall response rate (ORR)
- **Secondary Outcomes:** Visual Analogue Scale (VAS) score, Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) score, and Lysholm score
- **Meta-Analysis/Stats:** RevMan 5.3 software (Cochrane Collaboration)
- **Results:**
 - 33 randomized controlled trials involving 3,954 patients met inclusion criteria



- acupuncture + CHM group “significantly superior to those in the control group” for the following measures:
 - ORR [odds ratio (OR) =5.41; 95% confidence interval (CI): (4.38, 6.68); P<0.00001]
 - VAS score [mean difference (MD) =-1.86; 95% CI: (-2.44, -1.29); P<0.00001]
 - WOMAC score [MD =-13.05; 95% CI: (-21.70, -4.41); P=0.003]
 - Lysholm score [MD =10.47; 95% CI: (5.21, 15.72); P<0.0001]
- **Discussion:** “Compared with acupuncture alone or CHM/Western drug alone, acupuncture combined with CHM can effectively alleviate knee pain, improve knee function, and increase the quality of life. Thus, this combination can be used as a conservative treatment for KOA. However, due to the small number of high-quality articles and possible biases in our analysis, our conclusions need to be further verified in more and higher-quality studies.”

Shi W, Yu W, Zhang W, et al. A comparison of the effects of electroacupuncture versus transcutaneous electrical nerve stimulation for pain control in knee osteoarthritis. *Acupunct Med.* 2021 Jun;39(3):163-174. doi: 10.1177/0964528420921193. Epub 2020 Jun 20. ⁷⁶

- **Design:** systematic review and meta-analysis
- **Systematic Review:** Lit review of 4 English databases (MEDLINE, EMBASE, Cochrane Library and Web of Science) and 3 Chinese databases (China Science Journal Citation Report (VIP), Wanfang and China National Knowledge Infrastructure (CNKI)) randomized controlled trials (RCTs) involving electroacupuncture (EA) and/or transcutaneous electrical nerve stimulation (TENS) for pain control in knee osteoarthritis (KOA)
- **Treatments:** electroacupuncture (EA), transcutaneous electrical nerve stimulation (TENS), medication, sham/placebo controls
- **Primary Outcome:** *pain intensity* per visual analogue scale (VAS), numeric-rating scale (NRS) or Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) scale
- **Classic Pairwise and Bayesian Network Meta-Analysis:** pooled data quantitatively analyzed
- **Results:**
 - 13 studies met inclusion criteria
 - direct meta-analyses revealed “no statistically significant overall effect of EA” (mean difference (MD) -4.77, 95% confidence interval (CI) -12.51 to 2.96)
 - statistically significant outcomes for the following:
 - high-frequency transcutaneous electrical nerve stimulation (H-TENS) (MD -16.63, 95% CI -24.57 to -8.69)
 - medication (MD -7.12, 95% CI -12.07 to -2.17)
 - “relative effect of the EA and H-TENS groups” for pain control showed no statistical differences (MD 5.07, 95% CI -11.33 to 21.93)



- **“H-TENS demonstrated the highest probability of being the first best treatment, and EA had the second highest probability.”**
- **Conclusion:** “Both EA and TENS exert significant pain relieving effects in KOA. Among the four treatments, H-TENS was found to be the optimal treatment choice for the management of KOA pain in the short-term, and EA the second best treatment option. Given that the application of TENS is recommended by various international guidelines for the treatment of KOA, EA may also represent a potentially effective non-pharmacologic therapy.”

Lin L-L, Tu J-F, Wang L-Q, Yang J-W, Shi G-X, Li J-L, Zhang N, Shao J-K, Zou X, Liu C-Z. Acupuncture of different treatment frequencies in knee osteoarthritis: a pilot randomised controlled trial. *Pain.* 2020;161(11):2532-2538. doi: 10.1097/j.pain.0000000000001940. ⁷⁷

- **Study:** Sixty participants with knee osteoarthritis randomized to three sessions per week of acupuncture (TSWA) or one session per week of acupuncture (OSWA) groups in a 1:1 ratio
- **Results: Week 8:** no significant differences in response rate between the TSWA and OSWA treatment groups ($P = 0.435$)
- **Weeks 4 and 16:** *TSWA had significant differences in response rate compared to OSWA (week 4: difference, 44.7 percentage points; $P = 0.001$) and (week 16: difference, 46.0 percentage points; $P < 0.001$).*
- *The TSWA group had statistically significant improvements in numerical rating scale (NRS), Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) function, and Patient Global Assessment than the OSWA group. No significant between-group differences were found for WOMAC and Short Form Health Survey (SF-12).*
- **An acupuncture dose-response relationship exists for knee osteoarthritis pain and function clinical outcomes.**
- **“The benefit of TSWA persist[ed] throughout follow-up.”**

Sun N, Tu JF, Lin LL, et al. Correlation between acupuncture dose and effectiveness in the treatment of knee osteoarthritis: a systematic review. *Acupunct Med.* 2019;37(5):261-267. doi:10.1136/acupmed-2017-011608. ⁷⁸

- **Study:** Eight studies (1 LD, 1 MD, and 6 HD) involving 2,106 participants with knee osteoarthritis included for analysis
- **Conclusions:** *“strong evidence” of a “positive correlation between HD [high dose]*



acupuncture treatment and positive outcome.”

Li S, Xie P, Liang Z, Huang W, Huang Z, Ou J, Lin Z, Chai S. Efficacy comparison of five different acupuncture methods on pain, stiffness, and function in osteoarthritis of the knee: a network meta-analysis. *ECAM*. 2018;1:2018:1638904. ⁷⁹

- **Study:** Systematic review through January 2018 and pairwise meta-analysis (with Bayesian framework) of 16 randomized controlled trials (RCTs) involving 2,065 participants receiving various acupuncture methods for knee osteoarthritis pain, stiffness, and physical function using R 3.4.1, Stata 14.0, and RevMan 5.3.
- **Outcomes:** Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) pain scale
- **Results:**
 - fire needle acupuncture and electro-acupuncture resulted in a statistically significant decrease in WOMAC pain and physical function scores versus other treatments
 - “no significant difference in stiffness calculations”
- **Conclusions:**
 - Acupuncture with heat or electrostimulation are the top methods for treating knee osteoarthritis.

Chen N, Wang J, Mucelli A, et al. Electro-acupuncture is beneficial for knee osteoarthritis: the evidence from meta-analysis of randomized controlled trials. *Am J Chin Med*. 2017;45(5):965-985. ⁸⁰

- **Study:** Eleven randomized controlled trials including 695 participants with knee osteoarthritis were included in the analysis to assess the safety and effectiveness of electroacupuncture (EA) for knee osteoarthritis.
 - **Results: EA was statistically more effective:**
 - than pharmacological interventions (P = 0.03) and manual acupuncture (P = 0.02)
 - at reducing pain intensity (P<0.00001), improving physical function WOMAC scores (P<0.00001), and improving Lysholm knee score (LKSS) (P<0.00001).
- **Conclusions:** Electroacupuncture had **significant clinical outcomes for improved pain and physical function** compared to pharmacological interventions and manual acupuncture; EA has “**low risk of adverse reaction.**”

Lin X, Huang K, Zhu G, Huang Z, Qin A, Fan S. The effects of acupuncture on chronic knee pain due to osteoarthritis: a meta-analysis. *J Bone J Surg*. 2016;98:1578–1585. ⁸¹



- **Study:** Systematic review of PubMed, Embase, and Cochrane Central Register of Controlled Trials databases through March 2015; meta-analysis of 10 randomized controlled trials (RCTs) involving 2,007 participants with chronic osteoarthritis knee pain receiving acupuncture, sham acupuncture, usual care, or no intervention
- **Results:**
 - acupuncture groups demonstrated statistically reduced short term (up to 13 weeks) pain ($p < 0.001$; WMD = -1.24 [95% CI, -1.92 to -0.56]; $I(2) > 50\%$)
 - acupuncture groups demonstrated statistically improved short term (up to 13 weeks) physical function ($p < 0.001$; WMD = 4.61 [95% CI, 2.24 to 6.97]; $I(2) > 50\%$)
 - acupuncture groups demonstrated statistically improved long term (up to 256 weeks) physical function ($p = 0.016$; WMD = 2.73 [95% CI, 0.51 to 4.94]; $I(2) > 50\%$)
 - acupuncture groups did not demonstrate long term (up to 26 weeks) pain improvement ($p = 0.199$; WMD = -0.55 [95% CI, -1.39 to 0.29]; $I(2) > 50\%$)
 - “Subgroup analysis revealed that the acupuncture groups tended to have better outcomes compared with the controls.”
 - No publication bias found ($p > 0.05$); high study heterogeneity.
- **Conclusions:** “acupuncture can improve short and long-term physical function, but it appears to provide only short-term pain relief in patients with chronic knee pain due to osteoarthritis.”
- **Evidence level:** Therapeutic Level I (highest level of evidence)

(e). Acupuncture for Shoulder Pain

i. Acupuncture for Shoulder Impingement Syndrome

An S-J, Shin W-C, Joo S, Cho J-H, Chung W-S, Song M-Y, Kim H. Effects of acupuncture on shoulder impingement syndrome: a systematic review and meta-analysis. *Medicine*. 2024;103:37. doi: 10.1097/MD.00000000000039696. ⁸²

- **Methods:** Literature search of databases (PubMed, Cochrane Central, Embase, China National Knowledge Infrastructure, ScienceON, Oriental Medicine Advanced Searching Integrated System, KoreaMed, Korean Studies Information Service System, and KMBASE)
- **Study Quality:** Cochrane Assessment Tool for Risk of Bias Version 2
- **Primary Outcome:** pain scale score
- **Secondary Outcomes:** shoulder function and disability



- **Results:**
 - 5 randomized controlled trials met inclusion criteria
 - Pain scale scores showed:
 - “significantly reduced pain” (standardized mean difference [SMD] = -0.50 , 95% confidence interval [CI] = -0.74 to -0.27)
 - “improvements in shoulder function and disability” (SMD = -0.57 , 95% CI = -0.96 to -0.19).
 - subgroup analysis: “short-term acupuncture treatment (≤ 4 weeks) exhibited a high level of confidence with low heterogeneity” (SMD = -0.37 , 95% CI = -0.73 to -0.02).
- **Conclusion:** “Manual acupuncture is effective for relieving pain and improving shoulder function and disability in patients with SIS. However, further research is necessary to validate these findings owing to the limited number of patients and heterogeneity among the studies reviewed.”

ii. Acupuncture for Frozen Shoulder

Heo J-W, Jo J-H, Lee J-J, et al. Electroacupuncture for the treatment of frozen shoulder: a systematic review and meta-analysis. *Front. Med.* 17 August 2022;9 doi: 10.3389/fmed.2022.928823. ⁸³

- **Systematic review registration:** [http://www.crd.york.ac.uk/PROSPERO/display_record.php?ID=CRD42021247090], identifier [CRD42021247090]
- **Design:** systematic review and meta-analysis
- **Methods:** Literature search of 11 databases (EMBASE, the Cochrane Library, PubMed, AMED, one Chinese medical database, and six Korean medical databases) from inception for prospective RCTs involving electroacupuncture (EA) for frozen shoulder (FS)
- **Quality Control:** “Two researchers independently performed the study selection, data extraction, and assessment.”
- **Risk of Bias:** Cochrane Risk-of-Bias tool
- **Meta-Analysis:** 13 studies involving 936 patients
- **Results:**
 - 14 studies met inclusion criteria
 - Electroacupuncture (EA) compared to manual acupuncture (MA):
 - Improved frozen shoulder pain (MD -1.11 , 95% CI -1.61 to -0.61 , $p < 0.0001$, $I^2 = 97\%$)
 - Improved frozen shoulder function (SMD 2.02 , 95% CI 0.36 – 3.69 , $p < 0.00001$, $I^2 = 97\%$)



- Improved frozen shoulder response rates (RR 1.16, 95% CI 1.07–1.25; $p = 0.0002$; $I^2 = 0\%$)
- Improved frozen shoulder pain as an adjunct treatment vs control (SMD -1.12 , 95% CI -1.52 to -0.71 , $P < 0.00001$, $I^2 = 0$)
- **Adverse effects:** none reported
- **Conclusion:** “EA is reported to improve FS pain and function compared with control treatments. Additionally, EA can be used as an adjunct therapy for FS pain. EA could emerge as a potent intervention against FS.”

Ben-Arie E, Kao P-Y, Lee Y-C, Ho W-C, Chou L-W, Liu H-P. The effectiveness of acupuncture in the treatment of frozen shoulder: a systematic review and meta-analysis. *ECAM*. 2020; Article ID 9790470:14 pages. doi: 10.1155/2020/9790470. ⁸⁴

- **Methods:** Literature search of databases (PubMed, Cochrane Library, Embase, Web of Science) for studies involving acupuncture for frozen shoulder
- **Meta-Analysis:** “Only studies comparing acupuncture to other interventions were included” for quantitative analysis with Review Manager version 5.3
- **Outcomes:** visual analogue scale (VAS) for pain, Constant-Murley Shoulder Outcome Score (CMS) for shoulder function, and active shoulder ROM including flexion, abduction, and external rotation
- **Risk of Bias:** Cochrane Risk of Bias tool
- **Evidence and Study Quality:** GRADE recommendations and STRICTA 2010
- **Results:**
 - 13 clinical controlled trials involving 1,013 patients met inclusion criteria
 - “VAS pain score showed significant pain reduction, restoring CMS shoulder function, and flexion ROM in favor of acupuncture versus the control.”
 - No significant results found for “external rotation and abduction ROM”
 - Most common acupuncture points: Jian Yu (LI-15) and Jian Liao (TB-14)
- **Conclusions:** “acupuncture could be safe and effective for pain reduction, restoring shoulder function, and restoring flexion ROM for FS patients in the short term and midterm. However, the level of evidence was very low. More high-quality and longer studies are needed in order to robust the evidence.”

iii. Acupuncture for Post-Stroke Shoulder Pain



Zhan J, Luo Y, Mao W, Zhu L, Xu F, Wang Y, Chen H, Zhan L. Efficacy of acupuncture versus rehabilitation therapy on post-stroke shoulder pain: a systematic review and meta-analysis of randomized controlled trials. *Medicine*. 2023;102:29. .doi: 10.1097/MD.00000000000034266. ⁸⁵

- **Design:** systematic review and meta-analysis of randomized controlled trials
- **Methods:** Literature search of 6 databases (PubMed, Cochrane Library, China National Knowledge Infrastructure, Chinese biological medicine database, Chinese Scientific Journal Database, WAN FANG) for randomized controlled trials comparing acupuncture with rehabilitation therapy (RT) on post-stroke shoulder pain (PSSP) from inception to March 2022.
- **Primary Outcome:** shoulder pain
- **Secondary Outcomes:** upper limb motor function, activities of daily living (ADL), and adverse events (AEs).
- **Meta-Analysis:** RevMan Version 5.3, random effects model.
- **Study Methodological Quality:** “assessed by 2 independent reviewers using the risk of bias (ROB) assessment tool.”
- **Publication Bias:** Egger test and funnel plots
- **Meta-Analysis:** 15 studies (83%) involving 978 participants
- **Qualitative Analysis:** 18 studies included
- **Results:**
 - 18 studies met inclusion criteria
 - 50% of studies “moderate to high quality”
 - **acupuncture effectiveness similar to RT** for the following:
 - shoulder pain alleviation (standardized mean difference [SMD]: -0.41, 95% confidence interval [CI]: -0.91 to 0.08, P = .10)
 - upper limb motor function (weighted mean difference [WMD]: 0.80, 95% CI: -1.19 to 2.79, P = .43)
 - ADLs (WMD: -0.83, 95% CI: -3.17 to 1.51, P = .49).
 - Adverse Events: “Two (11%) studies reported no acupuncture-related AEs, and fourteen (78%) studies did not mention AEs resulting from acupuncture.”
- **Conclusions:** “Acupuncture is similar to RT in relieving shoulder pain, improving upper limb motor function and ADL in patients with PSSP. Either acupuncture or RT might be the optimal treatment of PSSP. More well-designed RCTs of this topic are needed in the future.”

Huang T, Yao H, Huang J, Wang N, Zhou C, Huang X, Tan X, Li Y, Jie Y, Wang X, Yang Y, Liang Y, Yue S, Mao Y, Lai S, Zheng J, He Y. Effectiveness of acupuncture for pain relief in



shoulder-hand syndrome after stroke: a systematic evaluation and Bayesian network meta-analysis. *Front Neurol.* 2023;14:1268626. doi: 10.3389/fneur.2023.1268626. ⁸⁶

- **Design:** systematic evaluation and Bayesian network meta-analysis
- **Systematic Review Registration:** <https://www.crd.york.ac.uk/prospero/>, CRD42023410957.
- **Methods:** Literature search of databases (PubMed, Embase, Cochrane, and Web of Science) until March 9, 2023, for randomized controlled trials (RCTs) involving acupuncture for post-stroke shoulder-hand syndrome (SHS)
- **Risk of Bias:** Cochrane Bias Risk Assessment Tool
- **Results:**
 - 50 RCTs involving 3,999 participants and including 19 different acupuncture interventions met inclusion criteria
 - “Compared to single rehabilitation training, the top three interventions for VAS improvement were” the following:
 - floating needle [VAS = -2.54 (95% CI: -4.37 to -0.69)]
 - rehabilitation + catgut embedding [VAS = -2.51 (95% CI: -4.33 to -0.68)]
 - other multi-needle acupuncture combinations [VAS = -2.32 (95% CI: -3.68 to -0.94)]
 - “top three interventions for improving the Fugl–Meyer score were” the following:
 - eye acupuncture [Meyer = 15.73 (95% CI: 3.4627.95)]
 - other multi-needle acupuncture combinations [Meyer = 12.22 (95% CI: 5.1919.34)]
 - **traditional western medicine + acupuncture + traditional Chinese medicine** [Meyer = 11.96 (95% CI: -0.59 to 24.63)].
- **Conclusion:** “Multiple acupuncture methods are significantly effective in improving pain and upper limb motor function in post-stroke SHS, with relatively few adverse events; thus, acupuncture can be promoted.”

Zhan J, Wei X, Tao C, Yan X, Zhang P, Chen R, Dong Y, Chen H, Liu J, Lu L. Effectiveness of acupuncture combined with rehabilitation training vs. rehabilitation training alone for post-stroke shoulder pain: a systematic review and meta-analysis of randomized controlled trials. *Front Med.* 2022; 9:947285. doi: 10.3389/fmed.2022.947285. ⁸⁷

- **Design:** systematic review and meta-analysis
- **Systematic review registration:** [www.crd.york.ac.uk], identifier [CRD42022326763].
- **Methods:** Literature search of databases (PubMed, Cochrane Library, Chinese Biological Medicine Database (CBM), Chinese Scientific Journal Database (VIP), China National



Knowledge Infrastructure (CNKI), WAN FANG) for randomized controlled trials (RCTs) involving **acupuncture + rehabilitation training (AR)** vs **rehabilitation training (RT)** alone for post-stroke shoulder pain (PSSP) from inception to February 2022.

Primary Outcome: shoulder pain

- **Secondary Outcomes:** upper limb motor function, activities of daily living (ADL), shoulder range of motion (ROM), and adverse events (AEs).
- **Quality Assessment:** Cochrane risk of bias (ROB) criteria “When more than four items in a study were judged as low ROB, the overall quality of this study was considered low risk.”
- **Meta-Analysis:** 35 (87.5%) studies involving 2,554 patients
- **Qualitative Analysis:** 40 studies included
- **Results:**
 - 40 studies met inclusion criteria
 - “14 (35.0%) were of moderate-to-high quality”
 - **“AR is better than RT alone”** for the following parameters:
 - reducing shoulder pain” (MD -1.32 , 95% CI -1.58 to -1.07)
 - improving upper limb motor function (MD 6.81 , 95% CI 4.95 – 8.67)
 - ADL (MD 11.17 , 95% CI 9.44 – 12.91)
 - shoulder ROM (internal rotation: MD 10.48 , 95% CI 8.14 – 12.83)
 - backward extension: MD 7.82 , 95% CI 6.00 – 9.64
 - anteflexion: MD 12.88 , 95% CI 5.47 – 20.29 ;
 - external rotation: MD 11.40 , 95% CI 6.17 – 16.64
 - abduction: MD 16.96 , 95% CI 8.61 – 25.31)
 - **Adverse Events:** none obvious
- **Conclusion:** “AR may be better than RT alone for the improvement of shoulder pain, upper limb motor function, ADL, and shoulder ROM, without obvious AEs in patients with PSSP. However, considering the clinical and statistical heterogeneity, our findings need to be interpreted with caution. More rigorous RCTs in this area should be conducted in the future.”

(f). Acupuncture for Temporomandibular Joint (TMJ) Pain

da Silva Mira PC, Biagini ACSCF, Gomes MG, Galo R, Corona SAM, Borsatto MC. Laser acupuncture to reduce temporomandibular disorder (TMD) symptoms: systematic review and meta-analysis. *Lasers Med Sci.* 2024 Feb 20;39(1):66. doi:10.1007/s10103-024-03999-z.⁸⁸

- **Design:** systematic review and meta-analysis
- **Methods:** Literature search of 9 databases (BVS, PubMed, Scopus, Embase, Web of Science, ScienceDirect, Cochrane Library, Latin American and Caribbean Health Sciences Literature (LILACS), Google Scholar) plus gray literature) up to April 26, 2023,



for studies involving “application of low-level laser therapy (LLLT) to acupuncture points” for treatment of temporomandibular disorders (TMD)

- **Quality Control:** Cochrane Collaboration guidelines
- **Risk of Bias:** “assessed using two tools: risk-of-bias (RoB) 2 and Risk Of Bias In Non-randomised Studies-of Interventions (ROBINS-I)”
- **Meta-analysis:** “extraction of mean and standard deviation values”
- **Primary Outcomes:** spontaneous pain and mouth opening levels
- **Results:**
 - 7 studies involving LLLT (690 to 810 nm wavelengths) met inclusion criteria
 - “LLLT demonstrated a significant reduction in instantaneous pain levels” (standard mean difference [SMD] = 3.85; 95% confidence interval [CI] = 2.09, 5.62; $p < 0.003$)
 - LLLT resulted in “an improvement in instantaneous mouth opening ability” (mean difference [SMD] = -7.15; 95% CI = -11.73, -2.58; $p < 0.002$) – low certainty evidence
- **Conclusion:** “LLLT may alleviate symptoms in patients with TMD; however, caution should be exercised when interpreting the results because of protocol variations among studies and the limited number of studies included in the meta-analysis.”

Mohamad N, Sobral de Oliveira-Souza AI, Moreira de Castro-Carletti E, Muggenborg F, Dennett L, McNeely ML, Armijo-Olivo S. The effectiveness of different types of acupuncture to reduce symptoms and disability for patients with orofacial pain: a systematic review and meta-analysis. *Disabil Rehabil.* 2024 Dec;46(24):5700-5716. doi: 10.1080/09638288.2024.2310766. Epub 2024 Feb 15.⁸⁹

- **Design:** systematic review and meta-analysis
- **Methods:** literature search of 6 databases until 15 June 2023 for studies involving acupuncture treatment for adults with orofacial pain
- **Outcomes:** pain, mouth opening, jaw function
- **Evidence Quality Control:** Cochrane risk of bias tool
- **Risk of Bias:** GRADE
- **Results:**
 - 52 studies included; “86.5% ($n = 45$) exhibited high risk of bias”
 - Most commonly used acupuncture points: Hegu LI 4, Jiache ST 6, Xiaguan ST 7
 - Acupuncture significantly reduced pain intensity in individuals with myogenous TMD” (MD = 26.02 mm, $I^2=89%$, $p = 0.05$)
 - Acupuncture significantly “reduced tenderness in the medial pterygoid muscle” (standardised mean differences [SMD] = 1.72, $I^2 = 0%$, $p < 0.00001$)
 - Acupuncture significantly reduced jaw dysfunction “in mixed TMD when compared to sham/no treatment” (SMD = 1.62, $I^2 = 88%$, $p = 0.010$).
 - Overall Evidence Certainty: very low
- **Conclusion:** “The overall results in this review should be interpreted with caution as there was a high risk of bias across the majority of randomized controlled trial (RCTs), and the overall certainty of the evidence was very low. Therefore, future studies with



high-quality RCTs are warranted evaluating the use of acupuncture in patients with orofacial pain.”

Tardelli JDC, Gubitoso B, Botelho AL, da Costa Valente ML, Candido dos Reis A. Efficacy of acupuncture on craniomandibular myofascial pain in temporomandibular disorder patients: a systematic review. *Heliyon*. 2024;10:e32075. doi: 10.1016/j.heliyon.2024.e32075.

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- **Design:** systematic review
- **Clinical trial registry name:** PROSPERO (CRD42021271505)
- **Methods:** literature search of databases (Scopus, PubMed, Embase, Science Direct) “on September 22nd, 2020, with no time restriction” for randomized clinical articles involving patients treated by acupuncture for myofascial pain
- **Quality Control:** PRISMA guidelines
- **Qualitative Analysis:** 10 articles
- **Results:**
 - 10 studies met full inclusion criteria
 - Acupuncture vs placebo “effective for subjective pain relief and palpation of orofacial structures with immediate results”
- **Conclusions:** “Future studies are suggested by the current literature gap that prevents the determination of clinical guidelines for effective acupuncture treatment in TMD patients with myofascial pain.”
- **Practical implications:** “Laser and needle puncture acupuncture treatment and laser and needle puncture auriculotherapy have shown favorable results in short-term myofascial pain relief. The need for long-term studies to assess benefits and reduce possible biases is highlighted.”

Di Francesco F, Minervini G, Siurkel Y, Ciccì M, Lanza A. Efficacy of acupuncture and laser acupuncture in temporomandibular disorders: a systematic review and meta-analysis of randomized controlled trials. *BMC Oral Health*. 2024;24:174. doi: 10.1186/s12903-023-03806-1.⁹¹

- **Design:** systematic review and meta-analysis
- **Methods:** Literature search of 3 electronic databases (PubMed, EMBASE, SCOPUS) up to July 2023 for “randomized clinical trials (RCTs) of acupuncture and laser acupuncture as a treatment for TMD [temporomandibular disorder]”
- **Evidence Quality:** Cochrane risk of bias tool (RoB 2) tool
- **Meta-Analysis:**
- **Results:**
 - 11 RCTs involving 152 participants included



- Acupuncture provided short-term reduction of muscular TMD pain
- “Acupuncture group and Laser Acupuncture group had a higher efficacy rate than the Placebo control group”
- **Conclusions:** “the evidence for acupuncture as a symptomatic treatment of TMD is limited. Further rigorous studies are, however, required to establish beyond doubt whether acupuncture has therapeutic value for this indication. However[,] high efficacy of Laser Acupuncture in the treatment of temporomandibular disorders was reported.”

Mota MML, Hudson I, Aguiar AE, Silva de Lima A, de Oliveira Net OB, Lopes P, da Silva P, Moretti EC, Lemos GA. Effectiveness of laser acupuncture for reducing pain and increasing mouth opening range in individuals with temporomandibular disorder: a systematic review and network meta-analysis. *Curr Pain Headache Rep.* 2024 Jul;28(7):723-742. doi: 10.1007/s11916-024-01251-5. Epub 2024 Apr 22.⁹²

- **Methods:** literature search of 11 electronic databases plus “references of included studies” for randomized clinical trials (RCTs) involving laser acupuncture (LA) for treatment of temporomandibular disorder (TMD)
- **Outcomes:** pain intensity, maximum mouth opening range (MMO)
- **Risk of Bias:** RoB 2 tool
- **Network Meta-Analysis:** MetaInsight platform, considering the pain intensity and counseling (C) as the outcome of reference.
- **Evidence Certainty:** GRADE system
- **Results:**
 - 5 studies included
 - Laser parameters: 690-810 nm, 40-150 mW, and 7.5-112.5 J/cm²
 - Occlusal splint (OS) [- 2.47; CI 95% - 3.64, - 1.30] and Physiotherapy (PT) [-2.64; CI 95% - 3.94, - 1.34] reduced pain intensity compared to control
 - “The ranking of treatments in order of effectiveness was PT > OS > LA > C > CR (craniopuncture).”
- Evidence Certainty: “very low or low”
- **Conclusions:** “The data do not support the indication of LA for the treatment of TMDs and new placebo-controlled RCTs must be conducted to demonstrate its effectiveness more precisely.”

Peixoto KO, Abranes PS, Gurgel de Carvalho IH, Oliveira De Almeida E, Barros GAS. Temporomandibular disorders and the use of traditional and laser acupuncture: a systematic review. *Cranio.* 2023 Nov;41(6):501-507. doi:10.1080/08869634.2021.1873605. Epub 2021 Jan 12.⁹³

- **Design:** systematic review
- **Methods:** Literature search of databases (PubMed, Cochrane, Scopus, Web of Science) for clinical, controlled, and randomized English-language trials involving traditional and



laser acupuncture for temporomandibular disorders (TMD) according to Research Diagnostic Criteria (RDC/TMD) or Diagnostic Criteria (DC/TMD).

- **Results:**
 - 6 studies met inclusion criteria
 - all results demonstrated acupuncture, occlusal splint, and placebo acupuncture demonstrated effectiveness for reducing intensity of pain and increasing the level of mouth opening
 - one study involving laser acupuncture “showed a higher proportion of patients with remission of symptoms in the experimental group.”
- **Conclusion:** “The traditional acupuncture seems to relieve the signs and symptoms of TMD, as well as laser acupuncture when associated with occlusal splint. However, more rigorous and high-quality clinical trials are needed.”

Park EY, Cho J-H, Lee S-H, Kim K-W, Ha I-H, Lee YJ. Is acupuncture an effective treatment for temporomandibular disorder? A systematic review and meta-analysis of randomized controlled trials. *Medicine (Baltimore)*. 2023 Sep 22;102(38):e34950. ⁹⁴

- **Design:** systematic review and meta-analysis
- **Methods:** Literature search of 11 Korean/global databases for randomized clinical trials involving acupuncture for adults with temporomandibular disorder (TMD)
- **Risk of Bias:** Cochrane risk of bias assessment
- **Evidence Quality:** Grading of Recommendations, Assessment, Development and Evaluation methodology (GRADE)
- **Meta-Analysis:** 22 studies (471 participants)
- **Qualitative Analysis:** 32 studies
- **Results:**
 - 32 studies met inclusion criteria
 - acupuncture significantly improved the outcomes
 - (effect rate, relative risk [RR]: 7.00, 95% confidence interval [CI]: 1.91, 25, 62,
 - visual analog scale, standardized mean difference: 0.49, 95% CI: 0.24, 0.73)
 - compared to active controls (effect rate, RR: 1.19; 95% CI: 1.12, 1.27)
 - “acupuncture significantly improved the effect rate and pain intensity” (effect rate, RR: 1.36; 95% CI: 1.04, 1.77; visual analog scale, mean difference: -1.23; 95% CI -1.79, -0.67)
 - Quality of Evidence: “low to very low.”
- **Conclusion:** “Acupuncture in TMD significantly improved outcomes versus active controls and when add-on treatments were applied. However, as the quality of evidence



was determined to be low, well-designed clinical trials should be conducted in the future.”

Argueta-Figueroa L, Flores-Mejía LA, Ávila-Curiel BX, Flores-Ferreira BI, Torres-Rosas R. Nonpharmacological interventions for pain in patients with temporomandibular joint disorders. *Eur J Dent.* 2022 Jul;16(3):500-513. doi: 10.1055/s-0041-1740220. Epub 2022 Mar 8.⁹⁵

- **Design:** systematic review
- **Protocol Registry:** International Prospective Register of Systematic Reviews (PROSPERO) database (CRD42020171364)
- **Methods:** Literature search of electronic databases (PubMed, Google Scholar, Clinical Trials, Web of Science) for randomized controlled trials involving treatment of “patients diagnosed with painful temporomandibular joint disorders” with conventional and “nonpharmacological therapies such as acupuncture, physiotherapy, low-level laser, and massage.”
- **Results:**
 - 14 articles met inclusion criteria
 - Overall Bias: 71.42% concerning and 28.57% “high risk”
 - “The efficacy of nonpharmacological interventions was found to be moderate in the short term and variable in the long term for pain reduction in patients with temporomandibular joint disorders.”
- **Conclusion:** “acupuncture, laser therapy, and physiotherapy are potentially useful interventions for pain relief in patients with temporomandibular joint disorders. However, there is a lack of consistency and short-term follow-up in the studies to determine the lasting of such effect.”

Sung S-H, Kim D, Park M, Hwang S-I, Yoon Y-J, Park J-K, Sung H-K. Electroacupuncture for temporomandibular disorders: a systematic review of randomized controlled trials. *Healthcare.* 2021;9:1497. doi: 10.3390/healthcare9111497.⁹⁶

- **Design:** systematic review
- **Methods:** literature search of 14 databases until April 2021 for randomized controlled trials (RCTs) studying electroacupuncture (EA) for temporomandibular disorder (TMD)
- **Results:**
 - 11 RCTs reporting on the use of three acupuncture points (ST6, ST7, and LI4) on a total of 667 patients met inclusion criteria
 - total effectiveness rate (TER)
 - “Two RCTs reported **significant effects of EA plus microwave treatment** compared with EA treatment alone”
 - total effectiveness rate (TER) and visual analog scale.



- “two studies reported that compared with ultrashort wave alone, **EA plus ultrashort wave had a significant effect**”
 - Adverse Events: none reported
- **Conclusions:** “Our findings demonstrated the positive potential of EA in TMD management. However, there was weak evidence regarding EA use for TMD management given the poor quality and small sample sizes of the included studies.”

Liu G-F, Gao Z, Liu Z-N, Yang M, Zhang S, Tan T-P. Effects of warm needle acupuncture on temporomandibular joint disorders: a systematic review and meta-analysis of randomized controlled trials. *ECAM*. 2021; Article ID 6868625:10 pages. doi: 10.1155/2021/6868625. ⁹⁷

- **Design:** systematic review and meta-analysis
- **Protocol Registry Number:** INPLASY202160030
- **Methods:** literature search of 9 electronic databases “including 5 English databases (PubMed, EMBASE, Cochrane Library, Web of Science, and MEDLINE) and 4 Chinese databases (Chinese National Knowledge Infrastructure (CNKI), Chinese VIP Information, Wanfang Database, and Chinese Biomedical Literature Database (CBM))” from inception to May 2021 for randomized controlled trials (RCTs) involving warm needle acupuncture (WNA) treatment for temporomandibular joint disorder (TMD)
- **Treatment Groups:** warming needle acupuncture (WNA), electroacupuncture, pharmacological therapy, other therapies.
- **Outcomes:** total effective rate, cure rate
- **Meta-Analyses:** 10 studies involving 670 participants analyzed using RevMan software V5.3 and Stata16.
- **Results:**
 - 10 studies involving 670 patients (treatment n=340; control n=330) met inclusion criteria
 - “**WNA is superior to treatments such as acupuncture alone, acupuncture therapy combined with TDP, drug therapy, and ultrasonic therapy in terms of effective rate**” (RR = 1.20; 95% CI, 1.06 to 1.35; and P = 0.003) and cure rate (RR = 1.82; 95% CI, 1.46 to 2.28; and P < 0.00001)
- **Conclusions:** This “systematic review and meta-analysis provides new evidence for the effectiveness of WNA for the treatment of TMD. However, the above conclusions need to be further verified by multicenter prospective studies of larger samples and higher-quality RCTs.”

(g). Acupuncture for Cancer Pain



Yang J, Wahner-Roedler DL, Zhou X, Johnson LA, Do A, Pachman DR, Chon TY, Salinas M, Millstine D, Bauer BA. Acupuncture for palliative cancer pain management: systematic review. *BMJ Support Palliat Care*. 2021 Sep;11(3):264-270. doi: 10.1136/bmjspcare-2020-002638. Epub 2021 Jan 13. ⁹⁸

- **Study:** 5 studies involving 189 patients pooled for meta-analysis
- **Results:** acupuncture demonstrated “**favourable effect of acupuncture on pain relief in palliative care for patients with cancer**”
- **Evidence Levels:** Oxford Centre for Evidence-Based Medicine (OCEBM) evidence levels showed 40% at level 4, 30% at level 3, and 20% at level 2
- **Conclusions:** “Acupuncture may be an **effective and safe treatment** associated with pain reduction in the palliative care of patients with cancer.”

Mao M, Liou KT, Baser RE, Bao T, Panageas KS, Romero SD, Li S, Gallagher RM, Kantoff PW. Effectiveness of electroacupuncture or auricular acupuncture vs usual care for chronic musculoskeletal pain among cancer survivors: the PEACE randomized clinical trial. *JAMA Oncol*. 2021 May 1;7(5):720-727. doi: 10.1001/jamaoncol.2021.0310. ⁹⁹

- **Study:** Randomized clinical trial (Personalized Electroacupuncture vs Auricular Acupuncture Comparative Effectiveness - PEACE) conducted from March 2017 to April 2020
- **Participants:** 360 cancer survivors (mean age 62.1) chronic musculoskeletal pain and no current detectable cancer participated from urban and suburban sites in New York and New Jersey
- **Outcome assessment:** Brief Pain Inventory (BPI) rating scale 0-10
- **Treatment groups:** electroacupuncture (N = 145), auricular acupuncture (N = 143), usual care (N = 72)
- **Number of treatments:** 10 acupuncture treatments (1 session/week for 10 weeks plus follow-up)
- **Results:** *Pain severity lowered by 1.9 points in the **electroacupuncture group vs usual care group** from initial assessment to week 12 (97.5% CI, 1.4-2.4 points; P < .001)*
- *Pain severity lowered by 1.6 points in the **auricular acupuncture group vs usual care** from initial assessment to week 12 (97.5% CI, 1.0-2.1 points; P < .001)*
- **Mild adverse effects** for 15/143 (10.5%) of auricular participants and 1/145 (0.7%) of electroacupuncture participants, who dropped out of the study as a result (P < .001)
- **Conclusions:** “Electroacupuncture and auricular acupuncture produced greater pain reduction than usual care” in treating cancer survivors’ chronic musculoskeletal pain.



He Y, Guo X, May BH, Zhang AL, Liu Y, Lu C, Mao JJ, Xue CC, Zhang H. Clinical evidence for association of acupuncture and acupressure with improved cancer pain: a systematic review and meta-analysis. *JAMA Oncol.* 2020 Feb 1;6(2):271-278. doi: 10.1001/jamaoncol.2019.5233. ¹⁰⁰

- **Study:** 14 randomized controlled trials (RCTs) in English and Chinese involving 920 cancer pain patients pooled for meta-analysis
- **Comparisons:** acupuncture and acupressure vs sham acupuncture, analgesic therapy, and standard care
- **Primary outcomes:** pain levels measured by the Brief Pain Inventory, Numerical Rating Scale, Visual Analog Scale, Verbal Rating Scale.
- **Results:** 7 sham-controlled RCTs demonstrated that **acupuncture compared to sham was superior for reducing cancer pain** (mean difference [MD], -1.38 points; 95% CI, -2.13 to -0.64 points; I² = 81%)
 - these 7 studies considered high quality with low bias risk
- 6 RCTs with treatments combining **acupuncture and acupressure with analgesic therapy showed a “favorable association” with pain reduction** (MD, -1.44 points; 95% CI, -1.98 to -0.89; I² = 92%)
 - moderate evidence grade (study heterogeneity)
- 2 RCTs with treatments combining **acupuncture and acupressure with analgesic therapy showed a “favorable association” with opioid dosage reduction** (MD, -30.00 mg morphine equivalent daily dose; 95% CI, -37.5 mg to -22.5 mg)
 - moderate evidence grade (study heterogeneity)
- **Conclusions:** “*acupuncture and/or acupressure was significantly associated with reduced cancer pain and decreased use of analgesics.*”

Chiu HY, Hsieh YJ, Tsai PS. Systematic review and meta-analysis of acupuncture to reduce cancer-related pain. *Eur J Cancer Care.* February 2016. doi:10.1111/ecc.12457. ¹⁰¹

- **Study:** systematic review of 9 English and Chinese databases through June 2014; meta-analysis of 29 randomized controlled trials (RCTs) involving acupuncture for pain due to malignancy, chemotherapy (CT), radiation therapy (RT), surgery, or hormone therapy (HT).
- **Results:**
 - 36 effect sizes were found
 - “overall effect of acupuncture on cancer-related pain:” -0.45 [95% confidence interval (CI) = -0.63 to -0.26]
 - acupuncture relieved pain from malignancy and surgery [effect size (g) = -0.71, and -0.40; 95% CI = -0.94 to -0.48, and -0.69 to -0.10]



- acupuncture did not relieve pain from chemotherapy (CT), radiation therapy (RT), or hormone therapy (HT) ($g = -0.05$, and -0.64 , 95% CI = -0.33 to 0.24 , and -1.55 to 0.27).
- **Conclusions:** *Acupuncture relieves cancer-related pain, “particularly malignancy-related and surgery-induced pain. ... Acupuncture can be adopted as part of a multimodal approach for reducing cancer-related pain.”*

Paley CA, Johnson MI, Tashani OA, Bagnall AM. Acupuncture for cancer pain in adults. *Cochrane Database Syst Rev.* 2011;1(10).¹⁰²

- **Study:** Systematic review of 6 databases through July 2015 for randomized controlled trials (RCTs) involving acupuncture treatment for cancer-related pain. Data was not pooled due to study heterogeneity, but data from 5 studies involving 285 participants was independently extracted and compared.
- **Results:** Study authors reported the following results:
 - pancreatic cancer pain: acupuncture helped manage the pain
 - ovarian cancer pain: “no difference between real and sham electroacupuncture”
 - late stage unspecified cancer: acupuncture demonstrated greater benefits than conventional pharmaceuticals
 - chronic neuropathic cancer pain: auricular acupuncture demonstrated benefits over placebo acupuncture
 - stomach carcinoma: “no differences between conventional analgesia and acupuncture within the first 10 days of treatment”
 - Risk of bias
 - “high risk of bias from inadequate sample size”
 - “low risk of bias associated with random sequence generation”
 - 3 studies: “low risk of bias associated with incomplete outcome data”
 - 2 studies: “low risk of bias associated with allocation concealment”
 - 1 study: low risk of bias associated with inadequate blinding”
 - High variation in methodology, types of cancer populations, and treatments used made it impossible to pool data and perform meta-analysis
 - “Studies either reported that there were no adverse events as a result of treatment, or did not report adverse events at all.”
- **Conclusions:** As of 2011, *“There [was] insufficient evidence to judge whether acupuncture is effective in treating cancer pain in adults.”*

vi. Acupuncture for Disease-Related Pain

Xiang A, Cheng K, Xu P, Liu S. The immediate analgesic effect of acupuncture for pain: a



systematic review and meta-analysis. *ECAM*. 2017;2017:3837194. doi: 10.1155/2017/3837194. Epub 2017 Oct 25. ¹⁰³

- **Study:** systematic review of PubMed, Cochrane Central Register, and three Chinese databases through November 2016; meta-analysis of 13 randomized controlled trials (RCTs) involving 1,077 participants (mean age 32 years (range 20-78 years) who received acupuncture for disease-related pain
- **Outcome:** pain relief from baseline to within 30 minutes of acupuncture treatment.
- **Results:** *Acupuncture showed significant pain relief vs sham acupuncture (SMD, -0.56; 95% confidence interval [CI], -1.00 to -0.12; 9 RCTs) and analgesic injection (SMD, -1.33; 95% CI, -1.94 to -0.72; 3 RCTs). “No serious adverse events were documented.”*
- **Conclusions:** *“Acupuncture was associated with a greater immediate pain relief effect compared to sham acupuncture and analgesic injections.”*

(h). Acupuncture for Plantar Fasciitis/Foot/Ankle Pain

Trinh K, Belski N, Zhou F, Kuhad A, Luk D, Youn E. The efficacy of acupuncture on foot and ankle for pain intensity, functional status, and general quality of life in adults: a systematic review. *Med Acupunct*. 2021 Dec 1;33(6):386-395. doi: 10.1089/acu.2021.0006. Epub 2021 Dec 16. ¹⁰⁴

- **Study:** systematic review of 6 English databases plus Google Scholar for randomized controlled trials (RCTs) involving acupuncture for foot and ankle pain
 - qualitative analysis of 4 trials involving 211 participants
 - no quantitative analysis due to study heterogeneity
- **Outcomes:** pain intensity, functional status, quality of life, and incidence of adverse events
- **Results:** *“Grades of Recommendation, Assessment, Development and Evaluation rated all outcomes to have either low or very low quality of evidence.”*
 - acupuncture efficacy for plantar fasciitis pain relief and function “at short- and intermediate-term follow-ups”
 - acupuncture efficacy for Achilles tendinopathy”at short- and intermediate-term follow-ups”
 - no adverse events reported
- **Conclusion:** *“There is some evidence to suggest acupuncture to be a safe and efficacious treatment for relieving pain and improving functional status for the foot and ankle. The results of this systematic review should be interpreted with caution due to the limited [low quality] evidence.”*



Llurda-Almuzara L, Labata-Lezaun N, Meca-Rivera T, Navarro-Santana MJ, Cleland JA, Fernández-de-Las-Peñas C, Pérez-Bellmunt A. Is dry needling effective for the management of plantar heel pain or plantar fasciitis? an updated systematic review and meta-analysis. *Pain Med.* 2021 Jul 25;22(7):1630-1641. doi: 10.1093/pm/pnab114. ¹⁰⁵

- **Study:** Systematic review of PubMed, Cochrane Library, and Web of Science databases through July 31, 2020, for randomized controlled trials (RCTs) involving one group that received dry needling for plantar heel pain “in which outcomes were collected on pain intensity and related disability.” Meta-analysis involved 6 studies and 395 participants.
- **Results:**
 - high study heterogeneity reduced quality of results
 - “low-quality evidence that trigger point dry needling reduces pain intensity in the short term” (MD -1.70 points, 95% confidence interval [CI] -2.80 to -0.60; SMD -1.28, 95% CI -2.11 to -0.44)
 - “moderate-quality evidence that [trigger point dry needling] improves pain intensity” in the long term vs comparison group (MD -1.77 points, 95% CI -2.44 to -1.11; SMD -1.45, 95% CI -2.19 to -0.70)
 - moderate-quality evidence that trigger point dry needling improves related long-term disability vs comparison group (SMD -1.75, 95% CI -2.22 to -1.28)
 - low risk of bias
- **Conclusion:** “Moderate- to low-quality evidence suggests a positive effect of trigger point dry needling for improving pain intensity and pain-related disability in the short term and long term, respectively, in patients with plantar heel pain of musculoskeletal origin. The present results should be considered with caution because of the small number of trials.” Note: dry needling is one of many forms of acupuncture based on muscular trigger points.

Thiagarajah AG. How effective is acupuncture for reducing pain due to plantar fasciitis? *Singapore Med J.* 2017 Feb;58(2):92-97. doi: 10.11622/smedj.2016143. Epub 2016 Aug 16. ¹⁰⁶

- **Methods:** Systematic review of PubMed and Cochrane Library for randomized controlled trials involving acupuncture for plantar fasciitis pain. 4 studies included for analysis: acupuncture vs standard treatment and real vs sham acupuncture.
- **Outcomes:** Visual Analogue Scale (VAS) and the Plantar Fasciitis Pain/Disability Scale
- **Results:**



- “After 4-8 weeks ... acupuncture significantly reduced pain levels in patients with plantar fasciitis” ... “with no further significant reduction in pain” after this time period.
- Minimal side effects reported.
- **Conclusion:** Acupuncture demonstrated short-term reduction of plantar fasciitis pain, but evidence for long-term pain reduction is “insufficient.”

(i). Acupuncture for Endometriosis Pain

Chen C, Li X, Lu S, Yang J, Liu Y. Acupuncture for clinical improvement of endometriosis-related pain: a systematic review and meta-analysis. *Arch Gynecol Obstet.* 2024;310:2101–2114. doi: 10.1007/s00404-024-07675-z. ¹⁰⁷

- **Methods:** Literature search of eight databases (PubMed, EMBASE, Cochrane, Web of Science, China National Knowledge Infrastructure (CNKI), the China Biology Medicine (CBM), Wanfang, and Weipu database) for randomized controlled trials (RCTs) through December 16, 2022, involving acupuncture for endometriosis-related pain.
- **Risk of Bias:** “Two researchers independently screened articles, extracted data, and assessed methodological quality using the Cochrane Collaboration’s risk of bias tool.”
- **Meta-analysis:** Stata software
- **Studies included:** “14 studies involving 793 patients (387 in the acupuncture group and 359 in the control group)”
- **Treatment groups:** placebo, traditional Chinese medicine (TCM), Western medicine
- **Results:**
 - acupuncture vs control “demonstrated significant reductions in pain severity” [SMD=− 1.10, 95% CI (− 1.45, − 0.75), P<0.001]
 - acupuncture vs control showed “improved response rate” [RR=1.25, 95% CI (1.09, 1.44), P=0.02],
 - acupuncture vs control showed “decreased serum CA-125 levels” [SMD=− 0.62, 95% CI (− 1.15, − 0.08), P=0.024].
 - **Subgroup Analysis:** “electroacupuncture and auricular acupuncture were superior to the control group in reducing pain severity, while auricular acupuncture and warm needling showed greater clinical efficacy compared to the control group.”
- **Conclusions:** “acupuncture is effective in alleviating dysmenorrhea and pelvic pain associated with endometriosis, reducing serum CA-125 levels, decreasing the size of nodules, improving patients’ quality of life, and lowering the recurrence rate.”



Xu Y, Zhao W, Li T, Zhao Y, Bu H, Song S. Effects of acupuncture for the treatment of endometriosis-related pain: a systematic review and meta-analysis. *PLoS One*. 2017 Oct 27;12(10):e0186616. doi: 10.1371/journal.pone.0186616. eCollection 2017. ¹⁰⁸

- **Systematic Review:** Literature search of 6 databases in December 2016 for randomised controlled trials involving acupuncture to treat endometriosis-related pain.
- **Meta-Analysis:** 10 studies involving 589 patients included
- **Outcomes Assessed:** “variation in pain level, variation in peripheral blood CA-125 level, and clinical effective rate”
- **Results:**
 - “Only one pilot study used a placebo control and assessed blinding; the rest used various controls (medications and herbs), which were impossible to blind.”
 - Sample sizes: small, “ranging from 8 to 36 patients per arm.”
 - Mean difference (MD) in pain reduction between acupuncture and control groups 1.36 (95% confidence intervals [CI] = 1.01–1.72, P<0.0001)
 - “Acupuncture had a positive effect on peripheral blood CA-125 levels” vs control groups (MD = 5.9, 95% CI = 1.56–10.25, P =0.008)
 - Acupuncture improved clinical effective rate vs control groups (odds ratio = 2.07; 95% CI = 1.24–3.44, P = 0.005).
- **Conclusions:** “The current literature suggests that acupuncture reduces pain and serum CA-125 levels, regardless of the control intervention used.”

b. Acupuncture for Acute Pain

Nielsen A, Dusek JA, Taylor-Swanson L, Tick H. Acupuncture therapy as an evidence-based nonpharmacologic strategy for comprehensive acute pain care: the academic consortium pain task force white paper update. *Pain Med*. 2022;23(9):1582–1612. <https://doi.org/10.1093/pm/pnac056>. ¹⁰⁹

- **Objective:** Researchers sought to update the 2018 white paper on acupuncture for acute “postsurgical/perioperative pain with opioid sparing and acute nonsurgical/trauma pain.”
- **Methods:** Systematic review of PubMed, MEDLINE, CINAHL, and Cochrane Central Register of Controlled Trials; keywords: “acupuncture” and “acupuncture therapy” and “acute pain,” “surgery,” “peri-operative,” “trauma,” “emergency department,” “urgent care,” “review(s),” “systematic review,” “meta-analysis.” “Additional manual review of titles, links, and reference lists”
- **Results:** 22 systematic reviews included for review (including 17 meta-analyses of acupuncture for acute pain, and 1 review of acupuncture for acute pain in intensive care unit); 841 patients total
- **Conclusion.** “The majority of reviews found acupuncture therapy to be an efficacious strategy for acute pain, with *potential to avoid or reduce opioid reliance.*”



(a). Acupuncture for Acute Pancreatic Pain

Zhu F, Yin S, Zhu X, Che D, Li Z, Zhong Y, Yan H, Gan D, Yang L, Wu X, Li L. Acupuncture for relieving abdominal pain and distension in acute pancreatitis: a systematic review and meta-analysis. *Front Psychiatry*. 2021;12:Article 786401. doi:10.3389/fpsyt.2021.786401. ¹¹⁰

- **Study:** nineteen studies involving 1,503 participants with acute pancreatitis were included for analysis
- **Results:** **Acupuncture plus routine treatment (RT)** produced **significant increases in total effectiveness rate (P = 0.001)**
- Acupuncture **reduced visual analog scale (VAS) scores** for abdominal pain (P < 0.0001) and for abdominal distension (P < 0.0001)
- **Conclusion:** *Acupuncture plus RT reduced abdominal pain and distention in patients with acute pancreatitis better than RT alone.*

Zhang K, Gao C, Li C, Li Y, Wang S, Tang Q, Zhao C, Zhai J. Acupuncture for acute pancreatitis: a systematic review and meta-analysis. *Pancreas*. 2019;48(9):1136-1147. doi: 10.1097/MPA.0000000000001399. ¹¹¹

- **Study:** twelve studies were included in the final analysis
- **Results:** **Acupuncture plus routine treatment (RT)** versus RT alone
 - **significantly improved total effectiveness rate and gastrointestinal function.**
 - significantly reduced “acute physiology, ... Chronic Health Evaluation II score, tumor necrosis factor α count,” the time until resumption of regular diet, and length of stay in the hospital.
 - 3 studies reported minor adverse events or reactions.

(b). Acupuncture for Acute Low Back Pain

Lin H, Wang X, Feng Y, et al. Acupuncture versus oral medications for acute/subacute non-specific low back pain: a systematic review and meta-analysis. *Cur Pain Headache Rep*. 2024;28:489–500. doi:10.1007/s11916-023-01201-7. ¹¹²



- **Design:** systematic review and meta-analysis
- **PROSPERO Registration:** (<http://www.crd.york.ac.uk/prospero>) CRD42021278346
- **Systematic Review:** literature search of databases with no language limitation (PubMed, Web of Science, Embase, Cochrane Library, Scopus, Epistemonikos, CNKI, Wan Fang Database, VIP database, CBMLD, CSTJ, clinical trials, EUCTR, World WHO ICTRP, ChiCTR) from inception to 23th April 2022 for randomized controlled trials, cross-over studies, and cohort studies involving acupuncture for acute/subacute non-specific low back pain (NSLBP) according to PRISMA guidelines
- **Evidence Certainty:** GRADE
- **Treatment Groups:** acupuncture versus oral medication
- **Meta-Analysis:** RevMan V.5.3.5 software; fixed/random-effects models; continuous data: weighted mean difference (WMD) with 95% confidence interval (CI); standardized mean difference (SMD) when the “outcome of studies was measured in different ways; dichotomous data: risk ratio w/ 95% CI; alpha value 0.05.
- **Results:**
 - 14 studies involving 1,263 participants met inclusion criteria
 - **“acupuncture therapy was slightly more effective than oral medication in improving pain”** ($P < 0.00001$, $I^2 = 92\%$, $MD = -1.17$, 95% CI [-1.61, -0.72])
 - **“acupuncture therapy exhibited a significant advantage over oral medication with a substantial effect”** ($P < 0.00001$, $I^2 = 90\%$, $SMD = -1.42$, 95% CI [-2.22, -0.62])
 - **“acupuncture therapy was associated with a 12% improvement rate compared to oral medication in patients with acute/subacute NSLBP”** ($P < 0.0001$, $I^2 = 54\%$, $RR = 1.11$, 95% CI [1.05, 1.18])
- **Summary:** “Acupuncture is more effective and safer than oral medication in treating acute/subacute NSLBP. This systematic review is poised to offer valuable guidance to clinicians treating acute/subacute NSLBP and potentially benefit the afflicted patients.”

Su X, Qian H, Chen B, Fan W, Xu D, Tang C, Lu L. Acupuncture for acute low back pain: a systematic review and meta-analysis. *Ann Palliat Med.* 2021;10(4):3924-3936. <http://dx.doi.org/10.21037/apm-20-1998>.¹¹³

- **Systematic Review/Meta-Analysis:** 13 RCTs involving 899 acute low back participants met inclusion criteria.
- **Results:** 11 RCTs involving 707 participants demonstrated **“moderate-quality evidence that acupuncture has a statistically significant association with improvements in VAS (visual analog scale) score.”**
- Two studies showed **no impact upon RMDQ** (Roland-Morris Disability Questionnaire) scores for low back pain effects on functional activities **compared with the control.**
- Three studies showed that acupuncture **impacted the ODI** (Oswestry Disability Index)



low back pain scores **compared with the control.**

- Two studies demonstrated that acupuncture **“influenced the number of pills more than the control treatment.”**
- **Conclusions:** The use of acupuncture for treating low back pain showed **“modest improvements in the [Visual Analog Scale] VAS score, [Oswestry Disability Index] ODI score, and the number of pills, but not the [Roland-Morris Disability Questionnaire] RMDQ score.”**

Cho Y-H, Kim C-K, Heo K-H, Lee MS, Ha I-H, Son DW, Choi BK, Song G-S, Shin B-C. Acupuncture for acute postoperative pain after back surgery: a systematic review and meta-analysis of randomized controlled trials. *Pain Pract.* 2015;15(3):279-91. doi: 10.1111/papr.12208. Epub 2014 Apr 28. ¹¹⁴

- **Systematic Review/Meta-Analysis:** five studies involving 356 acute postoperative low back pain participants met the inclusion criteria; three studies were high-quality.
- **Results**
 - **Acupuncture vs sham**
 - beneficial impact on “visual analogue scale (VAS) for pain intensity 24 hours after surgery” (P = 0.0003).
 - no statistical difference for 24-hour opiate demands (P = 0.21).
- **Conclusion:** *“Encouraging but limited evidence for the effectiveness of acupuncture treatment for acute postoperative pain after back surgery”*

Lee J-H, Choi T-Y, Lee MS, Lee H, Shin B-C, Lee H. Acupuncture for acute low back pain: a systematic review. *Clin J Pain.* 2013;29(2):172-85. doi: 10.1097/AJP.0b013e31824909f9. ¹¹⁵

- **Systematic Review/Meta-Analysis:** 11 RCTs involving 1,139 acute low back pain participants included for analysis.
- **Results:** Compared with nonsteroidal anti-inflammatory drugs (NSAIDs), **acupuncture more effectively relieved acute low back pain in 5 studies.**
- Acupuncture was **more effective than sham acupuncture for pain relief, but was not more effective for function/disability.**
- **Conclusion:** “Acupuncture may be **more effective than medication for symptom improvement or relieve pain better than sham acupuncture in acute LBP.**”

(c). Acupuncture for Acute Post-Tonsillectomy Pain

Gilbey P, Bretler S, Avraham Y, Sharabi-Nov A, Ibrgimov S, Luder A. Acupuncture for posttonsillectomy pain in children: a randomized, controlled study. *Pediatr Anesth.* 2014.



doi: 10.1111/pan.12621. ¹¹⁶

- **Methods:** Randomized, controlled, single-blinded study
- **Population:** 60 children aged 3–12 years undergoing tonsillectomy
- **Treatment Groups:** acupuncture group and conventional postoperative analgesic treatment group
- **Outcome Assessment:** pain levels and presence of unwanted side effects
- **Results:** Acupuncture group: “less pain, less analgesic drug consumption, and higher patient/parent satisfaction with analgesic treatment scores. No adverse effects were recorded.”
- **Conclusions:** “Acupuncture, in addition to conventional analgesic treatment, is an effective treatment for post-tonsillectomy pain. Acupuncture is safe and well received by children and their parents.”

(d). Acupuncture for Premenstrual Pain/Dysmenorrhea (This topic also fits w/ chronic pain.)

Zhang J, Cao L, Wang Y, Jin Y, Xiao X, Zhang Q. Acupuncture for premenstrual syndrome at different intervention time: a systemic review and meta-analysis. *ECAM*. 2019; Article ID 6246285, 9 pages. doi: 10.1155/2019/6246285. ¹¹⁷

- **Methods:** systematic literature review of 9 electronic databases through September 2018 for randomized controlled trials (RCTs) involving acupuncture to treat premenstrual syndrome (PMS) vs medication, sham acupuncture, or no treatment
- **Studies included:** 15 studies involving 1,103 participants
- **Statistical analysis and study heterogeneity analysis:** RevMan5.3 software
- **Results:**
 - “acupuncture significantly increased the effective rate of PMS compared with medicine and sham acupuncture.”
 - Subgroup analyses:
 - “no significant difference among different intervention time to start acupuncture treatment”
 - SP6, LR3, and RN4 were the most commonly used acupuncture points
- **Conclusions:** “acupuncture leads to better effective rate, but the intervention time has no significant effect on the efficacy of acupuncture treatment for PMS.”

Armour M, Ee CC, Hao J, Wilson TM, Yao SS, Smith CA. Acupuncture and acupressure for premenstrual syndrome. *Cochrane Database Syst Rev*. 2018. Issue 8. Art. No.: CD005290. doi: 10.1002/14651858.CD005290.pub2. ¹¹⁸



- **Methods:** Systematic review of databases (Cochrane Gynaecology and Fertility Specialised Register, Cochrane Central Register of Studies Online (CENTRAL CRSO), MEDLINE, Embase, AMED, PsycINFO, CINAHL (through September 21, 2017), two clinical trial databases (through September 21, 2017), and four electronic Chinese databases (through October 15, 2017), Chinese Biomedical Literature database (CBM), China National Knowledge Infrastructure (CNKI), VIP information/Chinese Scientific Journals database and WANFANG), as well as hand searching articles from reference lists for randomized trials involving the use of acupuncture or acupressure to treat premenstrual syndrome (PMS), premenstrual dysphoric disorder (PMDD), or late luteal phase dysphoric disorder (LPDD) vs sham acupuncture, usual care/waitlist controls, or pharmaceutical interventions accepted by the International Society for Premenstrual Disorders (ISPMD).
- **Risk of bias:** Two review authors independently selected, assessed, and extracted data from each study
- **Evidence quality:** use of GRADE assessment tool
- **Primary outcomes:** premenstrual symptoms and adverse events
- **Secondary outcomes:** specific PMS symptoms, response rate, quality of life
- **Studies included:** 5 trials involving 277 women receiving 7-28 treatments
- **Main Results:**
 - **Quality of Evidence:** low to very low (“small sample sizes and risk of bias related to detection bias and selective reporting”)
 - **Acupuncture vs sham acupuncture**
 - “Acupuncture may provide a greater reduction in mood-related PMS symptoms” (mean difference (MD) -9.03, 95% confidence interval (CI) -10.71 to -7.35, one randomised controlled trial (RCT), n = 67, low-quality evidence)
 - Unable to determine differences in adverse event rates amongst treatment groups (risk ratio (RR) 1.74, 95% CI 0.39 to 7.76, three RCTs, n = 167, I² = 0%, very low-quality evidence)
 - Response rates: “little or no difference between the groups” but Fixed Effects model “suggested a higher response rate in the acupuncture group than in the sham group” (RR 2.59, 95% CI 1.71 to 3.92; participants = 100; studies = 2; I² = 82%); Random Effects Model, however, showed no differences d/t high study heterogeneity (RR 4.22, 95% CI 0.45 to 39.88, two RCTs, n = 100, I² = 82%, very low-quality evidence)
 - Quality of Life: “acupuncture may improve quality of life (measured by the WHOQOL-BREF) compared to sham (MD 2.85, 95% CI 1.47 to 4.23, one RCT, n = 67, low-quality evidence)
 - **Acupuncture versus no treatment**
 - “Due to the very low quality of the evidence, we are uncertain whether acupuncture reduces PMS symptoms compared to a no treatment control” (MD -13.60, 95% CI -15.70 to -11.50, one RCT, n = 14)
 - No adverse events reported
 - No data available on “PMS symptoms, response rate or quality of life



outcomes.”

- **Acupressure vs sham acupressure**
 - “acupressure may reduce the number of women with moderate to severe PMS symptoms at the end of the trial compared to sham acupressure” (RR 0.64 95% CI 0.52 to 0.79, one RCT, n = 90, low-quality evidence)
 - Acupressure may improve physical quality of life (MD 24.3, 95% CI 17.18 to 31.42, one RCT, n = 90, low-quality evidence)
 - Acupressure may improve mental quality of life (MD 17.17, 95% CI 13.08 to 21.26, one RCT, n = 90, low-quality evidence)
 - “No data were available on adverse events, specific symptoms or response rates.”
- **Conclusions:** *“limited evidence ... suggests that acupuncture and acupressure may improve both physical and psychological symptoms of PMS when compared to a sham control.”* However, “there was insufficient evidence to determine whether there was a difference between the groups in rates of adverse events” and “there is no evidence comparing acupuncture or acupressure versus current ISPMD recommended treatments for PMS such as selective serotonin reuptake inhibitors (SSRIs).”

(e). Acupuncture for Labor Pain

Yi Y, Ju W, Fu D, Chen R, Bai X, Zhang S. Effect of traditional Chinese medicine therapy on labor pain in patients with natural childbirth: a network meta-analysis. *Medicine*. 2024;103:432024. doi: 10.1097/MD.00000000000039425. ¹¹⁹

- **Methods:** Systematic review of 8 databases “for TCM on labor pain between January 2012 and January 2022.”
Study Quality Assessment: Cochrane Risk of Bias Tool
Network Meta-Analysis: 30 studies involving 3,277 participants and 9 treatment types analyzed using Stata 16.0 software
- **Protocol Registry:** PROSPERO (CRD42022336091).
- **Quality Control:** Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) guidelines
- **Results:**
 - Labor pain at 30 minutes: “**acupuncture + autonomic nerve block** was the most effective treatment modality.”
 - Labor pain at 60 minutes and first stage of labor: “**acupressure + acupuncture** therapy was most effective.”
- **Conclusion:** “A combined treatment with acupressure and acupuncture is the most effective approach for relieving labor pain and shortening the duration of labor. Based on these data, we intend to explore further clinical TCM therapy for relieving maternal pain.”



Hasanin ME, Elsayed SH, Mohamed M. Effect of acupressure on anxiety and pain levels in primiparous women during normal labor: a randomized controlled trial. *JCIM*. 2024;30(7):654-661. doi: 10.1089/jicm.2023.0072. ¹²⁰

- **Goal:** Assess the impacts of acupressure on normal labor pain and anxiety in primiparous women.
- **Study Registry:** database of clinical trials [Clinicaltrials.gov](https://clinicaltrials.gov) NCT05411289
- **Design:** double-blinded randomized controlled trial
- **Participants:** 43 primiparous women 20–30 years old “referred for normal labor.”
- **Treatment Groups:** acupressure or control
- **Treatments:** Acupressure: Large Intestine 4 (LI4), Heart 7 (He-7), and Spleen 6 (SP6)
Control: sham acupressure
- **Outcomes Assessed:** Spielberger Inventory Questionnaire (anxiety); Visual Analog Scale (VAS) for pain pre- and post- intervention; pulse rate; blood pressure
- **Results:**
 - Acupressure: “anxiety score and pain level showed a substantial improvement” ($p < 0.001$)
 - Control: “only the anxiety score showed a significant improvement” ($p < 0.001$)
 - Post-intervention: statistically significant differences between two groups for both pain and anxiety ($p < 0.001$).
 - Blood pressure nor pulse rate did not change significantly for either group ($p < 0.05$).
- **Conclusion:** Acupressure at specific points “was effective in relieving anxiety and pain during labor” and compared with sham, “the acupressure group showed a greater decrease in both anxiety and pain levels.” Authors conclude, “acupressure may be recommended as an effective, affordable, and accessible technique for managing pain and anxiety during labor.”

Arumugam V, Balakrishnan A, Venugopal V, et al. Auriculotherapy for labour pain management: a systematic review and meta-analysis. *J Acupunct Meridian Stud*. 2024 Oct 31;17(5):158-164. doi: 10.51507/j.jams.2024.17.5.158. ¹²¹

- **Design:** systematic review and meta-analysis
- **Methods:** literature search of databases (PubMed, Scopus, ScienceDirect, and Cochrane Library) inception until December 2023 for randomized controlled trials (RCTs) involving auriculotherapy for labor pain intensity and maternal satisfaction
- **Study selection:** two independent authors “based on predefined criteria”
- **Data Extraction:** two independent authors extracted data
- **Meta-Analysis:** random-effects model to synthesize data from 5 studies involving 450 participants; “pooled mean difference (MD), with a 95% confidence interval (CI), was calculated to estimate the effect size.”
- **Primary Outcome:** labor pain intensity via Visual Analog Scale (VAS)
- **Results:**



- “significant reduction in labor pain following auriculotherapy compared with no treatment” (MD, -1.78; 95% CI, -2.62 to -0.93)
- study heterogeneity determined to be significant (I^2 , 87%; $p < 0.01$)
- **Conclusions and relevance:** “auriculotherapy holds promise as a non-pharmacological intervention for alleviating labor pain.”

Yan W, Kan Z, Yin J, Ma Y. Efficacy and safety of transcutaneous electrical acupoint stimulation (TEAS) as an analgesic intervention for labor pain: a network meta-analysis of randomized controlled trials. *Pain Ther.* 2023;12:631–644. doi: 10.1007/s40122-023-00496-z.

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- **Design:** Systematic Review and Meta-Analysis
- **Methods:** Literature search of 4 electronic databases (PubMed, EMBASE, Web of Science, Cochrane CENTRAL) and clinical trials.gov searched from inception until September 4, 2022, for randomized controlled trials (RCTs) involving transcutaneous electrical acupoint stimulation (TEAS) for labor pain
- **Meta-Analysis:** 10 RCTs involving 1,214 participants analyzed using the random effects model using STATA (version SE15.0), R (version 3.6.1), and ADDIS (version 1.16.8) software
- **Results:** TEAS vs controls (6 studies), EA vs controls (3 studies), TEAS vs EA (1 study)
 - Outcome Heterogeneity: none found
 - Treatments vs controls: no significant differences found for standard mean differences (SMDs), odds ratios (ORs), or confidence intervals (CIs)
 - Cumulative ranking curve surface area score to demonstrate probability of being the best option: “TEAS demonstrated possible better effects in the aspects of analgesic efficacy and safety under certain circumstances.”
- **Conclusions:** “TEAS may be a potential alternative for parturients as a simple, noninvasive, and non-pharmacological intervention compared with EA in terms of analgesic efficacy and safety for mothers and neonates.”

Wu L, Zhao H, Zhang Z, et al. Combined spinal-epidural anesthesia with acupoint injection for labor anesthesia reduces IL-1 β /IL-10 ratio in maternal peripheral blood, umbilical cord blood and improves the labor outcomes: a prospective randomized controlled trial. *Clin Immunol.* 2022 Mar;236:108935. doi: 10.1016/j.clim.2022.108935. Epub 2022 Jan 31. ¹²³

- **Design:** Randomized Controlled Trial (RCT)
- **Participants:** 360 healthy pregnant women in labor
- **Treatment Groups:** (1) combined spinal-epidural anesthesia (CSEA) + acupoint injection (AI), (2) CSEA, (3) AI, (4) control group (n = 90 in each group)
- **Outcomes Assessed:** maternal-fetal expression of interleukin-1 β (IL-1 β), interleukin-10 (IL-10), analgesia effect, and labor outcomes
- **Results:** “Compared to the CSEA group, the CSEA+AI group had significantly lower visual analog scale (VAS) scores, adverse events, dose of ropivacaine/sufentanil, and



shorter labor durations. The IL-1 β /IL-10 ratio in maternal peripheral blood and umbilical cord blood was reduced in the CSEA+AI group compared with the CSEA group.”

- **Conclusion:** “The combination of CSEA and AI can reduce the ratio of IL-1 β / IL-10 in maternal peripheral blood and umbilical cord blood, which can effectively relieve labor pain.”

Torkiyan H, Mobarakabadi SS, Heshmat R, Khajavi A, OZgoli G. The effect of GB21 acupressure on pain intensity in the first stage of labor in primiparous women: a randomized controlled trial. *Complement Ther Med.* 2021;58:102683. doi: 10.1016/j.ctim.2021.102683. ¹²⁴

- **Goal:** “to examine the effect of GB21 acupressure on labor pain”
- **Design:** randomized clinical trial
- **Participants:** 174 primiparous women in stage one of labor
- **Treatment Groups:**
 - GB-21 acupressure + routine labor care (n = 58)
 - acupressure given “in three different phases of cervical dilations to 3– 5 cm, 6– 7 cm, and 8– 10 cm”
 - sham acupressure + routine labor care (n = 58)
 - control = routine labor care (n = 58)
- **Primary Outcomes:** pain severity via “pain scale ruler in three cervical dilations” pre- and post- intervention.
- **Data Analysis:** ANOVA, Kruskal–Wallis, paired-t test, Man-n–Whitney tests
- **Results:**
 - “Pain reduction was significantly higher in GB21 groups compared with sham and control groups” (P =0.001).
 - Delivery outcomes: no statistically significant difference among the three treatment groups
- **Conclusions:** “In this study, GB21 acupressure was effective in pain relief during labor, hence recommended as a practical, effective, inexpensive, and accessible method for labor pain management.”

Chen Y, Xiang X-Y, Chin KHR, Gao J, Wu J, Lao L, Chen H. Acupressure for labor pain management: a systematic review and meta-analysis of randomized controlled trials. *Acupunct Med.* 2021 Aug;39(4):243-252. doi: 10.1177/0964528420946044. Epub 2020 Aug 18. ¹²⁵

- **Design:** Systematic Review and Meta-Analysis
- **Methods:** Literature search of 10 primary databases from inception until January 31, 2018, for randomized controlled trials (RCTs) involving acupressure vs standard care during labor/delivery or sham acupressure
- **Quality Control:** Two independent reviewers extracted data
- **Meta-Analysis:** Pooled data from 13 RCTs involving 1,586 patients analyzed using RevMan 5.3 software.



- **Results:**
 - “Acupressure plus standard procedures (ASP) for labor management significantly reduced pain sensation, compared with sham acupressure plus standard procedures (SASP) and standard procedures (SP) alone.”
 - Acupressure elicited immediate analgesic effects that “persisted for at least 60 min” (all $p < 0.01$).
 - Acupressure vs untreated control: “shorter duration of labor,” including first and second stages:
 - first stage (SMD = -0.76, 95% confidence interval (CI) = -1.10 to -0.43; $p < 0.001$; $I^2 = 74\%$)
 - second stage (SMD = -0.37, 95% CI = -0.59 to -0.18; $p < 0.001$; $I^2 = 0\%$).
 - Acupressure to reduce Cesarean section rate = inconclusive
 - Pharmacological painkiller (oxytocin and analgesics) use did not differ among groups
 - Adverse events: none reported
- **Conclusion:** “Moderate evidence indicates that acupressure may have promising effects on labor pain and duration.”

Smith CA, Collins CT, Levett KM, Armour M, Dahlen HG, Tan AL, Mesgarpour B. Acupuncture or acupressure for pain management during labour. *Cochrane Database Syst Rev.* 2020;2:CD009232. ¹²⁶

- **Study:** Cochrane systematic review of Cochrane Pregnancy and Childbirth’s Trials Register (2/2019), Cochrane Central Register (2/2019), MEDLINE (1966 - 2/2019), CINAHL (1980 - 2/2019), WHO International Clinical Trials Registry Platform (2/2019), and ICTRP (2/2019) for randomized controlled trials (RCTs). Meta-analysis of 28 trials and 3,960 women receiving acupuncture, acupressure, placebo, no treatment, or non-pharmacological options for pain during labor.
- **General outcomes:** visual analogue scale (VAS) of 0 to 10 or 0 to 100
- **Results:**
 - 13 trials involved acupuncture and 15 involved acupressure
 - none were “at a low risk of bias on all domains”
 - acupuncture vs sham acupuncture
 - no statistical difference on labor pain (mean difference (MD) -4.42, 95% confidence interval (CI) -12.94 to 4.09, 2 trials, 325 women, low-certainty evidence).
 - “acupuncture may increase satisfaction with pain relief compared to sham acupuncture” (risk ratio (RR) 2.38, 95% CI 1.78 to 3.19, 1 trial, 150 women, moderate-certainty evidence)



- likely reduction in pharmacological pain relief (RR 0.75, 95% CI 0.63 to 0.89, 2 trials, 261 women, moderate-certainty evidence).
- “acupuncture may have no effect on assisted vaginal birth (very low-certainty evidence), and probably little to no effect on cesarean section (low-certainty evidence).”
- acupuncture compared to usual care
 - uncertain reduction in pain levels vs usual care due to low certainty evidence (standardized mean difference (SMD) -1.31, 95% CI -2.14 to -0.49, 4 trials, 495 women, I2 = 93%).
 - “acupuncture may have little to no effect on satisfaction with pain relief (low-certainty evidence)” or reduction in pharmacological use due to very low certainty evidence (average RR 0.72, 95% CI 0.60 to 0.85, 6 trials, 1059 women, I2 = 70%)
 - “acupuncture may have no effect on assisted vaginal birth (very low-certainty evidence), and probably little to no effect on cesarean section (low-certainty evidence).”
- acupuncture compared to no treatment
 - one trial demonstrating uncertain pain reduction with acupuncture (MD -1.16, 95% CI -1.51 to -0.81, 163 women, very low-certainty evidence)
 - low certainty evidence for acupuncture effects on assisted vaginal birth or cesarean section.
- acupuncture compared to sterile water injection
 - acupuncture has uncertain effects on use of pharmacological pain management options or “assisted vaginal birth or cesarean section due to very low certainty evidence
- acupressure compared to a sham control
 - uncertain reduction of pain intensity during labor with acupressure (MD -1.93, 95% CI -3.31 to -0.55, 6 trials, 472 women)
 - uncertain effects of acupressure on assisted vaginal birth due to low certainty evidence
 - “acupressure may have little to no effect on use of pharmacological analgesia (low-certainty evidence).”
 - acupressure likely reduces cesarean section rate (RR 0.44, 95% CI 0.27 to 0.71, 4 trials, 313 women, moderate-certainty evidence).
- acupressure vs usual care
 - uncertain whether acupressure reduces pain intensity in labor more than usual care (SMD -1.07, 95% CI -1.45 to -0.69, 8 trials, 620 women) due to very low certainty evidence



- uncertain whether acupressure increases satisfaction with pain relief more than usual care (MD 1.05, 95% CI 0.75 to 1.35, 1 trial, 105 women) due to very low certainty evidence
- “acupressure may have little to no effect on cesarean section (low-certainty evidence).”
- acupressure vs combined control
 - acupressure: slightly pain intensity reduction during labor vs combined control (SMD -0.42, 95% CI -0.65 to -0.18, 2 trials, 322 women, moderate-certainty evidence).
 - uncertain evidence for acupressure effect on use of pharmacologicals (RR 0.94, 95% CI 0.71 to 1.25, 1 trial, 212 women), childbirth satisfaction, or assisted with vaginal birth or cesarean section due to very low certainty evidence.
- **Conclusions:** “*Acupuncture in comparison to sham acupuncture may increase satisfaction with pain management* and reduce use of pharmacological analgesia. Acupressure in comparison to a combined control and usual care may reduce pain intensity.” Acupuncture versus acupressure produced uncertain results in terms of effects on pain intensity and satisfaction with pain relief (very low-certainty evidence). It is likely that acupuncture has “little to no effect on the rates of [cesarean] or assisted vaginal birth.” Acupressure likely reduces the rate of cesarean sections when compared to sham.

Raana HN, Fan X-N. The effect of acupressure on pain reduction during first stage of labour: a systematic review and meta-analysis. *Complement Ther Clin Pract.* 2020 May;39:101126. doi: 10.1016/j.ctcp.2020.101126. Epub 2020 Feb 29. ¹²⁷

- **Design:** Systematic review and meta-analysis
- **Methods:** Literature search of 5 electronic databases in November 2018 for English-language randomized controlled trials (RCTs) involving acupressure, placebo, and/or no intervention for pain relief during labor and birth
- **Primary Outcome:** labor pain via patient self-rating Visual Analogue Scale (VAS)
- **Results:**
 - 10 RCT’s included
 - Most common acupoints: LI-4 and SP-6
 - “At the active and transitional phase, acupressure significantly reduced labour pain” vs placebo (pooled MD -1.91; 95% CI -2.73,-1.08; pooled MD -3.03; 95% CI -5.03,-1.02, respectively).
 - Acupressure reduced pain more than no intervention group during the active labor phase (pooled MD -3.00; 95% CI -3.88,-2.13)



- Acupressure reduced pain more than no intervention during transitional labor phase (pooled MD -2.03; 95% CI -3.72,-0.35).
- **Conclusion:** “Acupressure can provide significant pain relief during first stage of labour.”

Gönenç IM, Terzioglu F. Effects of massage and acupressure on relieving labor pain, reducing labor time, and increasing delivery satisfaction. *J Nurs Res.* 2020;28(1):e68. ¹²⁸

- **Goal:** To compare the effects of massage and acupressure on labor-related pain, duration, and delivery satisfaction
- **Design:** Randomized controlled trial (RCT)
- **Participants:** n = 120
- **Treatment Groups:** 1) massage; 2) acupressure; 3) massage + acupressure) 4) control group (no massage or acupressure)
- **Outcomes Assessed:** personal information intake, Pregnant Watch Form, Visual Analog Scale (VAS)
- **Statistical Analysis:** Frequency and percentage calculations, Chi-Square test, Student's T-test, Tukey's test, and one-way ANOVA
- **Results:**
 - latent labor phase: “mean VAS scores of the massage-only group and massage + acupressure group were lower” (4.56 ± 1.36 and 4.63 ± 1.52 , respectively) vs control group (6.16 ± 1.46 ; $p < .01$)
 - active and transition labor phases: “mean VAS scores of the massage-only group, acupressure-only group, and massage + acupressure group were significantly lower than that of the control group” ($p < .01$ and $p < .001$, respectively).
 - postpartum phase: “mean VAS score of the massage + acupressure group was lower (2.30 ± 0.70) vs control group (2.96 ± 0.72 ; $p = .003$).
 - time to cervical dilatation and 1- and 5-minute Apgar scores: “similar among all of the groups” ($p > .05$).
 - “Three intervention groups reported relatively more positive feelings than the control group, and all three of the interventions were found to be effective in improving satisfaction.”
- **Conclusions:** “The dual application of massage and acupressure is relatively more effective than either therapy applied alone and that massage is more effective than acupressure.”

(f). Acupuncture for Postpartum Pain



Luxey X, Lemoine A, Dewinter G, Joshi GP, LeRay C, Raeder J, Van de Velde M, Bonnet M-P. Acute pain management after vaginal delivery with perineal tears or episiotomy. *Reg Anesth Pain Med.* 2024;0:1–11. doi:10.1136/rapm-2024-105478. ¹²⁹

- **Design:** Systematic Review and Meta-Analysis
- **Methods:** Literature search of databases (MEDLINE, Embase, and Cochrane) through March 2023 for randomized controlled trials (RCTs) and systematic reviews involving the treatment of “pain after a vaginal delivery with perineal tears or episiotomy”
- **Evidence Quality Assessment:** generic Cochrane Covidence and RoB Vis 2 tools Findings
- **Meta-Analysis:** “79 studies (69 RCTs and 10 systematic reviews and meta-analyses) of good quality of evidence were included” for review.
- **Results:**
 - “Acetaminophen and non-steroidal anti-inflammatory drugs (NSAIDs) are recommended as first-line treatment.”
 - “Epidural morphine (≤ 2 mg) is recommended among women with labor epidural analgesia and severe perineal tears, with adequate respiratory monitoring.”
 - “Local anesthetic infiltration, topical local anesthetic, ointment application, and pudendal nerve block are not recommended due to insufficient or lack of evidence.”
 - “Ice or chemical cold packs are recommended for postpartum pain first-line treatment due to their simplicity of use.”
 - “Transcutaneous nerve stimulation and acupuncture are recommended as adjuvants.”
 - Continuous suture recommended vs an interrupted suture “for the repair of episiotomy or second-degree perineal tears is recommended for the outcome of pain.”
- **Conclusions:** “Postpartum pain management after a vaginal delivery with perineal trauma should include acetaminophen, NSAIDs, and ice or chemical cold packs. Epidural morphine should be reserved for severe perineal tears. A surgical repair technique should depend on perineal tear severity.”

3. Acupuncture for Reproductive Health and Cancer Symptoms (non-pain conditions)

a. Acupuncture for Perimenopause Symptoms

Xing W, Wang X, Zhu W. Effects of acupoint application therapy combined with Chinese herbal medicine on perimenopausal syndrome: a systematic review and meta-analysis of



randomized controlled trials. *Complement Ther Med.* 2023 Mar;72:102916. doi: 10.1016/j.ctim.2023.102916. Epub 2023 Jan 6. ¹³⁰

- **Design:** systematic review and meta-analysis of randomized controlled trials
- **Methods:** literature search of eight databases from inception to August 2022 for randomized controlled trials involving acupuncture plus Chinese herbal medicine treatment for PMS
- **Quality Control:** subgroup analysis, publication bias assessment, sensitivity analysis performed
- **Results:**
 - 8 RCTs with 560 participants met inclusion criteria
 - significant differences for acupuncture + CHM vs CHM alone for the following:
 - Kupperman Menopausal Index (KMI) score (MD = -2.91, 95%CI: -3.91 to -1.91)
 - Total effective rate (RR = 1.22, 95% CI: 1.11-1.34)
 - Pittsburgh Sleep Quality Interview (PSQI) score (MD = -2.86, 95% CI: -3.61 to -2.10)
 - Reduction in the serum luteinizing hormone (LH) (MD = -2.52, 95% CI: -4.70 to -0.34).”
 - no differences between acupuncture + CHM vs CHM alone for the following:
 - lowering serum level of follicle-stimulating hormone (FSH) (MD = -1.66, 95% CI: -3.98-0.67)
 - elevating serum level of oestradiol (E₂) (MD = 2.41, 95% CI: -0.70-5.52)
 - acupuncture + CHM and western medicine (WM):
 - KMI score (MD = -6.80, 95%CI: -7.95 to -5.65) “was substantially different”
 - PSQI score (MD = -0.60, 95% CI: -1.88-0.68) “was not substantially different”
 - Total effective rate for acupuncture + CHM (91.7%) “was higher than the western medicine group (83.49%)”
- **Conclusion:** “Acupoint application combined with CHM may enhance the efficacy and safety of patients with PMS. However, due to the lack of description of an independent testing of purity or potency of the CHM product used in the trials, as well as blinding of participants and investigators, these results should be interpreted with caution.”

b. Acupuncture for Hot Flashes

i. Acupuncture for Menopausal Hot Flashes

Liu C, Wang Z, Guo T, Zhuang L, Gao X. Effect of acupuncture on menopausal hot flashes and serum hormone levels: a systematic review and meta-analysis. *Acupunct Med.* 2022 Aug;40(4):289-298. doi: 10.1177/09645284211056655. Epub 2021 Dec 13. ¹³¹



- **Systematic Review:** Literature search of 10 databases searched through August 2018 for randomized controlled trials (RCTs) involving acupuncture vs sham acupuncture or hormone therapy (HT) to treat menopausal hot flushes. 13 RCTs involving 1,784 participants included.
- **Outcomes:** hot flush frequency and severity; serum levels of estradiol (E₂), luteinizing hormone (LH) and follicle-stimulating hormone (FSH)
- **Meta-analysis:** 7 studies analyzed using Review Manager 5.3 software.
- **Results:**
 - “Acupuncture significantly decreased hot flush frequency” compared w/ sham acupuncture from baseline to post-study (mean difference (MD) -0.84, 95% confidence interval (CI) [-1.64, -0.05], I² = 54%)
 - Acupuncture vs sham “did not impact end scores of hot flush frequency” (MD 0.19, 95% CI [-0.61, 0.99], I² = 0%) or severity (MD 0.02, 95% CI [-0.13, 0.17], I² = 0%).
 - Acupuncture and HT had no difference in their effect upon serum levels of E₂ (MD 6.56, 95% CI [-3.77, 16.89], I² = 76%), FSH (MD 1.06, 95% CI [-1.44, 3.56], I² = 0%) or LH (MD -3.36, 95% CI [-13.37, 6.65], I² = 89%).
- **Conclusion:** “Acupuncture may not decrease hot flush frequency,” and may impact serum hormone levels similar to HT (higher E₂; lower FSH and LH).”

Zhong Z, Dong H, Wang H, Huang Y, Huang D, Huang G. Electroacupuncture for the treatment of perimenopausal syndrome: a systematic review and meta-analysis of randomized controlled trials. *Acupunct Med.* 2022 Apr;40(2):111-122. doi: 10.1177/09645284211055742. Epub 2021 Nov 9. ¹³²

- **Systematic Review:** Literature search of 9 databases up to June 2019 for randomized controlled trials (RCTs) of electroacupuncture to treat perimenopause. “Twelve trials involving 746 women were included.”
- **Results:**
- “EA and hormone therapy (HT) did not significantly differ” for the following:
 - Effective rate (risk ratio (RR) = 0.98, 95% confidence interval (CI) = 0.93 to 1.04)
 - Kupperman index (KI) (mean difference (MD) = -0.25, 95% CI = -0.76 to 0.26)
 - Serum follicle-stimulating hormone (FSH) (MD = -3.80, 95% CI = -11.59 to 3.98)
 - Serum luteinizing hormone (LH) (MD = -2.51, 95% CI = -10.72 to 5.70).
 - “Serum estradiol (E₂) levels were significantly lower in EA versus HT groups” (MD = -60.58, 95% CI = -71.93 to -49.23).
- “EA had a significantly greater effect” on reducing the following:
 - Kupperman index (KI): vs sham (MD = -4.71, 95% CI = -6.57 to -2.86)
 - Hot flush score/24 h (MD = -2.43, 95% CI = -2.93 to -1.93).



- “No significant differences between EA and manual acupuncture (MA)” for the following:
 - Effective rate (RR = 1.14, 95% CI = 0.98 to 1.33)
 - Serum FSH (MD = -2.87, 95% CI = -29.65 to 23.91)
 - LH (MD = 2.73, 95% CI = -9.65 to 15.11)
 - E₂ (MD = 26.80, 95% CI = -12.06 to 65.65)
 - “EA had a better effect than MA on KI” (MD = -2.44, 95% CI = -4.80 to -0.08)
- Subgroup analyses: “EA may have more of a benefit in the pre-menopausal state” (hot flushes score/24 h: MD = -1.66, 95% CI = -3.49 to 0.17) vs post-menopause (p > 0.05).
- **Conclusion:** “The effect of EA appeared broadly similar to HT and MA in the treatment of PMS, although EA-associated reductions in KI were superior to MA and sham EA, suggesting effects beyond placebo.”

Li T, Zhang Y, Cheng Q, Hou M, Zheng X, Zheng Q, Li L. Quantitative study on the efficacy of acupuncture in the treatment of menopausal hot flashes and its comparison with nonhormonal drugs. *Menopause*. 2021 Mar 15;28(5):564-572. doi: 10.1097/GME.0000000000001767. ¹³³

- **Systematic Review:** Literature search of public databases for “randomized clinical studies on acupuncture therapy for the treatment of hot flashes in menopausal women” compared with sham acupuncture, non-hormonal drugs, and placebo.
- **Results:**
 - “17 studies involving 1,123 participants were included.”
 - Study quality: medium to high,
 - Risk of bias: none obvious
 - Baseline number of hot flashes adjusted to 8/day; based on this standardization, hot flash frequency “decreased from baseline”
 - Traditional acupuncture (TA): 3.1 (95% confidence interval [CI]: 2.8-3.4) times/day at week 8
 - Electro-acupuncture (EA): 3.6 (95% CI: 3.2-4.0) times/day at week 8
 - TA & EA: 3.2 (95% CI: 2.9-3.5) times/day at week 8
 - Sham acupuncture: 2.6 (95% CI: 2.2-3.0) times/day at week 8
 - Based on information in the literature “efficacy of electro-acupuncture was comparable to that of selective serotonin reuptake inhibitors/ serotonin-norepinephrine reuptake inhibitors and neuroleptic agents such as gabapentin and escitalopram.”
 - “Efficacy of TA & EA (merged) was significantly higher than that of placebo pills” (2.3, 95% CI: 1.8-2.9).



- **Conclusions:** Acupuncture and electroacupuncture significantly more effective than placebo pills. Efficacy of electroacupuncture comparable to SSRI's/SNRI's (selective serotonin reuptake inhibitors/serotonin-norepinephrine reuptake inhibitors).

He Q-D, Zhong Z-H, Liu M-N, Tong Z-Y, Wu Q-B, Chen M. Efficacy and safety of acupuncture vs. hormone therapy for menopausal syndrome: a systematic review and meta-analysis. *Am J Chin Med.* 2021;49(8):1793-1812. doi: 10.1142/S0192415X21500853. Epub 2021 Nov 12. ¹³⁴

- **Systematic Review:** Literature search of 5 databases for RCTs “comparing acupuncture with [hormone therapy] HT in the treatment of [menopausal syndrome] MPS.”
- **Meta-Analysis:** 15 RCTs involving 1,376 patients.
- **Primary Outcome:** clinical effective rate
- **Secondary Outcomes:** Kupperman index, serum follicle-stimulating hormone (FSH), luteinizing hormone (LH), estradiol (E[Formula: see text]), and side effects
- **Results:**
 - “**acupuncture significantly improved clinical effective rate**” vs hormone therapy (RR = 1.09, 95% CI 1.03 to 1.16, [Formula: see text] = 0.005)
 - acupuncture significantly decreased the Kupperman index (WMD = -2.55, 95% CI = -2.93 to -2.17, [Formula: see text] < 0.00001)
 - acupuncture significantly decreased the incidence of side effects (RR = 0.14, 95% CI = 0.06-0.32, [Formula: see text] < 0.00001).
 - acupuncture vs HT
 - “no statistically significant differences in serum FSH” (WMD = -1.36, 95% CI = -3.25-0.53, [Formula: see text] = 0.16)
 - no statistically significant differences in serum E₂ (WMD = -1.11, 95% CI = -2.59-0.37, [Formula: see text] = 0.14)
 - no statistically significant differences in serum LH (WMD = -1.87, 95% CI = -4.58-0.83, [Formula: see text] = 0.17)
- **Conclusions:** “Based on the current evidence, **manual acupuncture is safer and more effective than HT** and is recommended for the treatment of MPS.”

Tae-Hun Kim T-H, Soo Lee M, Alraek T, Birch S. Acupuncture in sham device controlled trials may not be as effective as acupuncture in the real world: a preliminary network meta-analysis of studies of acupuncture for hot flashes in menopausal women. *Acupunct Med.* 2020;38(1):37–44. doi: 10.1136/acupmed-2018-011671. ¹³⁵

- **Systematic Review:** Literature search of databases (Medline, Embase, Cochrane Library and AMED) through March 2017 for randomised controlled trials involving “acupuncture



for menopausal hot flashes that used two types of sham control treatments.” Eight studies ultimately included.

- **Network Meta-Analysis:** 8 studies included in five-node network meta-analysis using frequentist probability framework
- **Qualitative Analysis:** 8 studies
- **Data Extraction:** two independent reviewers
- **Risk of Bias:** Cochrane risk of bias tool for randomised controlled trials
- **Results:** “Verum acupuncture in the shallow needling controlled trials was more effective than verum acupuncture in the sham device controlled trials” (SMD -7.27 , 95%CI -9.11 to -5.43).
- **Conclusions:** “From this preliminary analysis, we found that different types of verum acupuncture may have different effect sizes with respect to the severity of menopausal hot flashes.”

Befus D, Coeytaux RR, Goldstein KM, McDuffie JR, Shepherd-Banigan M, Goode AP, Kosinski A, Van Noord MG, Adam SS, Masilamani V, Nagi A, Williams JW. Management of menopause symptoms with acupuncture: an umbrella systematic review and meta-analysis. *JACM*. 2018;24(4):314–323. doi: 10.1089/acm.2016.0408. ¹³⁶

- **Systematic Review:** literature search for systematic reviews (SR) and published randomized controlled trials (RCTs) involving acupuncture effectiveness to treat vasomotor symptoms (VMSs), health-related quality of life (HRQOL), and adverse events in perimenopausal or postmenopausal women. 3 SRs and 4 RCTs were included.
- **Meta-analysis:** random-effects model
- **Results:**
 - acupuncture vs no acupuncture
 - statistically significant reduction in VMS frequency (SMD -0.66 , 95% confidence interval [CI] -1.06 to -0.26 , $I^2 = 61.7\%$, 5 trials)
 - statistically significant reduction in VMS severity (SMD -0.49 , 95% CI -0.85 to -0.13 , $I^2 = 18.1\%$, 4 trials)
 - statistically significant increase in HRQOL (SMD -0.93 , 95% CI -1.20 to -0.67 , $I^2 = 0.0\%$, 3 trials).
 - “SMDs were smaller or not statistically significant when acupuncture was compared with sham acupuncture.”
- **Conclusions:** “Evidence from RCTs supports the use of acupuncture as an adjunctive or stand-alone treatment for reducing VMSs and improving HRQOL outcomes, with the caveat that observed clinical benefit associated with acupuncture may be due, in part, or in whole to nonspecific effects. The safety of acupuncture in the treatment of VMSs has



not been rigorously examined, but there is no clear signal for a significant potential for harm.”

ii. Acupuncture for Cancer Treatment-Related Hot Flashes

Li H, Schlaeger JM, Jang MK, Lin Y, Park C, Liu T, Sun M, Doorenbos AZ. Acupuncture improves multiple treatment-related symptoms in breast cancer survivors: a systematic review and meta-analysis. *JACM*. 2021;27(12):1084–1097. doi: 10.1089/acm.2021.0133. ¹³⁷

- **Systematic Review:** Literature search of English databases (PubMed, CINAHL, EMBASE) through June 2021 for randomized clinical trials (RCTs) involving “acupuncture for managing [cancer] treatment-related symptoms.” 26 trials involving 2,055 patients included for analysis.
- **Study Quality:** Cochrane Collaboration Risk of Bias Criteria
- **Primary Outcomes:** pain, hot flashes, sleep disturbance, fatigue, depression, lymphedema, neuropathy, adverse events
- **Meta-Analysis:** 20 studies involving 1,709 patients
- **Results:**
- Acupuncture vs control groups: acupuncture more effectively improved
 - pain intensity [standardized mean difference (SMD) = -0.60, 95% confidence intervals (CI) -1.06 to -0.15]
 - fatigue [SMD = -0.62, 95% CI -1.03 to -0.20]
 - hot flash severity [SMD = -0.52, 95% CI -0.82 to -0.22].
- **Subgroup Analysis:**
 - **acupuncture vs sham:** “acupuncture showed trends but not significant effects on all the treatment-related symptoms”
 - **acupuncture vs waitlist control and usual care:** “acupuncture groups showed significant reductions in pain intensity, fatigue, depression, hot flash severity, and neuropathy.”
- Adverse events:
 - “No serious adverse events were reported related to acupuncture intervention.
 - mild “bruising, pain, swelling, skin infection, hematoma, headache, menstrual bleeding ... reported in 11 studies”
- **Conclusion:** “*acupuncture significantly reduces multiple treatment-related symptoms compared with the usual care or waitlist control group among breast cancer survivors.* The safety of acupuncture was inadequately reported in the included studies. Based on the available data, acupuncture seems to be generally a safe treatment with some mild adverse events. These findings provide evidence-based recommendations for incorporating acupuncture into clinical breast cancer symptom management. Due to the



high risk of bias and blinding issues in some RCTs, more rigorous trials are needed to confirm the efficacy of acupuncture in reducing multiple treatment-related symptoms among breast cancer survivors.”

Chien T-J, Liu C-Y, Fang C-J, Kuo C-Y. The maintenance effect of acupuncture on breast cancer-related menopause symptoms: a systematic review. *Climacteric*. 2020 Apr;23(2):130-139. DOI: 10.1080/13697137.2019.1664460. Epub 2019 Oct 15. ¹³⁸

- **Study Goals:** “This meta-analysis aims to evaluate how long the effect of acupuncture on breast cancer-related hot flushes and menopause symptoms lasts.”
- **Design:** followed Preferred Reporting Items for Systematic Reviews and Meta-Analyses Statement (PRISMA)
- **Systematic Review:** Literature search of 7 databases through Feb 2019 for randomized clinical trials (RCTs) studying “the maintenance effect of acupuncture on hot flushes or menopause symptoms after treatment.”
- **Studies Included:** 13 RCTs involving 943 patients included.
- **Study Quality:** Cochrane criteria
- **Meta-Analysis:** 8 studies included for analysis using RevMan 5.2 software
- **Results:**
 - “Acupuncture had no significant long-term maintenance effect on the frequency or severity of hot flushes” ($p = 0.29$; $p = 0.34$)
 - Acupuncture “had a significant 3-month maintenance effect of ameliorating menopause symptoms at 3 months after treatment ended” ($p = 0.001$).
 - Adverse events: none reported
- **Conclusions:** “Acupuncture significantly alleviated menopause symptoms for at least 3 months, but not hot flushes. Breast cancer patients concerned about the adverse effects of hormone therapy could consider acupuncture as an alternative. Additional acupuncture at 3 months after the initial treatment course could be considered.”

c. Acupuncture for Infertility

Wang Z, Zhou Z, Zhang L, Li X, Li M, Pan Y, Jiao T, Shi X, Liu Q, Wang C, Wang Y. Efficacy and safety of nonpharmacological strategies for the treatment of oligoasthenospermia: a systematic review and Bayesian network meta-analysis. *Eur J Med Res*. 2023;28:6. ¹³⁹

- **Design:** Systematic Review and Bayesian Network Meta-Analysis
- **PROSPERO** Registration Number CRD42022314429



- **Methods:** Literature search of databases (Web of Science, Cochrane Library, Embase, PubMed, Weipu (VIP), Wan Fang Data, China National Knowledge Infrastructure (CNKI), and China Biomedical Literature (CBM)) and grey literature from inception to April 2022 for randomized controlled trials (RCTs) involving “nonpharmacological treatments for oligo-zoospermia.”
- **Quality Control:** Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA-NMA)
- **Meta-Analysis:** Stata 16.0 and Review Manager 5.4 software
- **Results:**
 - 38 RCTs involving 8 non-pharmacological interventions and 3,080 patients involved in quantitative and qualitative analysis
 - “Each intervention outperformed the sham intervention and no treatment approaches in terms of improved efficacy.”
 - Warming acupuncture was most effective for improved total effective rate and sperm concentration (SUCRA=80.1% and 93.4%, respectively)
 - Electroacupuncture was most effective for improved sperm motility a% and a+b% (SUCRA=96.6% and 82.0%, respectively)
 - Incidence of adverse events: 3 most safe interventions: no treatment, warming acupuncture, and sham intervention (SUCRA=88.0%, 68.8% and 62.9%, respectively)
 - Hyperbaric oxygen, 2 Hz TEAS, electroacupuncture most effective at improving reproductive hormone (FSH, LH, T) levels (SUCRA=85.1%, 96.8% and 99.4%, respectively)
- **Conclusions:** “Nonpharmacological treatments for oligoasthenospermia have good clinical efficacy. Warm acupuncture and electroacupuncture have better overall efficacy and safety. These treatment approaches can be recommended based on the actual situation.”

Mo J, Zheng Y, Jin N, Zhou Y. Effectiveness of traditional Chinese medicine formulas combined with acupuncture in the treatment of ovulation dysfunction infertility: a systematic review and meta-analysis. *Medicine*. 2023;102:27. ¹⁴⁰

- **Design:** Systematic Review and Meta-Analysis
- **Methods:** Literature search of 7 electronic databases (PubMed, EMBASE, Web of Science, Cochrane Library, CNKI, Wanfang Database, CBM) from January 1, 2018, to March 12, 2023, for randomized controlled trials involving traditional Chinese medicine (TCM) formulas and acupuncture for ovulation dysfunction infertility
- **Meta-Analysis:** 21 studies included in the review
- **Results:**



- 21 studies met inclusion criteria
- **TCM + acupuncture was more effective at improving sex hormone levels vs western medicine alone:**
 - follicle stimulating hormone (FSH) in older patients” (standardized mean difference [SMD]: 3.00; 95% confidence interval [CI]: 2.35–3.66; P = .024, I2 = 28%)
 - FSH in younger patients (SMD: 0.45; 95% CI: –0.15, 1.05; P = .03, I2 = 71%)
 - estradiol (E2) (SMD: 7.50; 95% CI: v0.47, 15.48; P < .00001, I2 = 99%)
 - progesterone (P) (SMD: 2.20; 95% CI: 2.07–2.33; P < .00001, I2 = 29%).
- TCM + acupuncture was more effective than western medicine alone
 - ovulation rate (risk ratio [RR]: 2.46; 95% CI: 1.72–3.52; P < .00001, I2 = 0%)
 - pregnancy rate (RR: 2.50; 95% CI: 1.96–3.18; P < .00001, I2 = 0%)
 - maximum follicle diameter (MFD) (SMD: 2.27; 95% CI: 1.37–3.16; P < .00001, I2 = 91%) endometrial thickness (SMD: 1.71; 95% CI: 1.31–2.11; P < .00001, I2 = 87%)
- TCM + acupuncture “had better effects on quality of life” (RR: 0.19; 95% CI: 0.15–0.23; P < .00001, I2 = 0%) vs Western medicine alone
- TCM + acupuncture had “reduced adverse reactions” (RR: 0.15; 95% CI: 0.05–0.48; P = .001, I2 = 0%) vs Western medicine alone
- **Conclusion:** “traditional Chinese medicine formulas combined with acupuncture are an effective and safe treatment approach.”

Huang W, Ling J, Fang X, Ou X, Du X. Comparative efficacy of acupuncture-related interventions for tubal obstructive infertility: a systematic review and Bayesian meta-analysis of randomized controlled trials. *Complement Thera Med.* 2023; 79:103003. doi: 10.1016/j.ctim.2023.103003. ¹⁴¹

- **Design:** Systematic Review and Meta-Analysis
- **Methods:** Literature search of databases (PubMed, Cochrane, Embase, Web of Science, China National Knowledge Infrastructure (CNKI), VIP Information, Wanfang Database, and China Biology Medicine (CBM)) via computer from database inception through December 2022 “to retrieve relevant literature on the efficacy and safety of acupuncture and related therapies for the treatment of tubal obstructive infertility.”
- **Quality Control:** “Two researchers independently screened the literature based on strict inclusion criteria, extracted relevant data, and utilized Cochrane Collaboration tools and the Jadad scale”



- **Pairwise Meta-Analysis and Network Meta-Analysis:** 23 studies involving 2,355 patients and 13 interventions analyzed using statistical software StataSE and Rstudio
- **Results:**
 - 23 articles involving 2,355 patients and 13 interventions met inclusion criteria
 - “Acupuncture-related therapies outperformed control interventions in improving pregnancy rates, tubal patency rates, and overall effectiveness while demonstrating a lower incidence of adverse events.”
 - “EA [electroacupuncture] +CHM [Chinese herbal medicine] was identified as the most effective for pregnancy rates, MOX [moxibustion] for tubal patency [openness] rates, and MOX [moxibustion] + AP [acupoint patching with chinese herbs] for overall effectiveness.”
 - “The safety profile of acupuncture-related interventions was acceptable.”
- **Conclusion:** “These findings support acupuncture-related therapies as effective and safe options for tubal obstructive infertility management.”

Zhang H-R, Zhang X, Ma P-H, Sun C-Y, Sun C-Y, Sun C-Y, Liu X-Y, Pu Z-Q, Lin Y-H, Liu B-Y, Liu C-Z, Yan S-Y. Pregnancy benefit of acupuncture on in vitro fertilization: a systematic review and meta-analysis. *Chin J Integr Med.* 2023 Nov;29(11):1021-1032. doi: 10.1007/s11655-023-3748-3. Epub 2023 Oct 10. ¹⁴²

- **Design:** Systematic Review and Meta-Analysis
- **Prospero:** Registration No. PROSPERO CRD42021232430
- **Methods:** Literature search of 4 English databases (PubMed, Web of Science, EMBASE, and Cochrane Register of Controlled Clinical Trials) and 4 Chinese databases (Wanfang, Chinese National Knowledge Infrastructure, Chinese Science and Technology Periodical, SinoMed) from inception until July 2, 2023, for randomized controlled trials (RCTs) involving acupuncture for in vitro fertilization (IVF). Subgroup analysis: participant age, types of acupuncture, type of control, timing of acupuncture, geographical origin of study, repeated IVF failure or not, and acupuncture sessions.
- **Primary Outcomes:** clinical pregnancy rate (CPR) and live birth rate (LBR)
- **Secondary Outcomes:** ongoing pregnancy rate and miscarriage rate
- **Heterogeneity:** random effects model with I^2 statistics
- **Publication Bias:** funnel plots and Egger's tests
- **Results:**
 - 58 eligible RCTs involving 10,968 women undergoing IVF met inclusion criteria
 - “Pooled [clinical pregnancy rate] CPR and [live birth rate] LBR showed a significant difference between acupuncture and control groups” [69 comparisons, relative risk (RR) 1.19, 95% confidence intervals (CI) 1.12 to 1.25, $I^2=0$],



- extremely low evidence; 23 comparisons, RR 1.11, 95%CI 1.02 to 1.21, $I^2=14.6$, low evidence, respectively)
- “Only transcutaneous electrical acupoint stimulation showed a positive effect” on the following:
 - CPR (16 comparisons, RR 1.17, 95%CI 1.06 to 1.29; $I^2=0$, moderate evidence)
 - LBR (9 comparisons, RR 1.20, 95%CI 1.04 to 1.37; $I^2=8.5$, extremely low evidence)
 - **Heterogeneity:** found across all studies
 - **Evidence Quality:** “no studies were graded as high-quality evidence”
 - **Conclusion:** “Results showed that the convincing evidence levels on the associations between acupuncture and IVF pregnant outcomes were relatively low, and the varied methodological design and heterogeneity might influence the findings.”

Zheng X, Yu S, Liu L, Yang H, Wang F, Yang H, Lv X, Yang J. The dose-related efficacy of acupuncture on endometrial receptivity in infertile women: a systematic review and meta-analysis. 2022;10: article 858587. doi: 10.3389/fpubh.2022.858587. ¹⁴³

- **Design:** Systematic Review and Meta-Analysis
- **Methods:** Literature search of 9 databases from database inception to February 26, 2022, for randomized controlled trials (RCTs) involving “the dose-related efficacy of acupuncture” for poor endometrial receptivity (PER).
- **Acupuncture Treatment Groups:** high-dosage (three menstrual cycles), moderate-dosage (one menstrual cycle), low-dosage (two or four days)
- **Outcomes:** endometrial receptivity (ER) via transvaginal sonography (TVS); pregnancy
- **Study heterogeneity:** “sufficient heterogeneity” existed. Authors “prespecified seven subgroup variables (four clinical and three methodological) to investigate the heterogeneities”
- **Meta-Analysis:** 14 RCTs involving 1,564 women included for analysis
- **Results:**
 - 14 RCTs (moderate to low quality) involving 1,564 women met inclusion criteria
 - dosage of acupuncture affected results:
 - moderate or high-dosage: “CPR [clinical pregnancy rate] and part of ER [endometrial receptivity] parameters were improved in the acupuncture group” (i.e., CPR: OR = 2.00, 95% CI [1.24, 3.22], $p = 0.004$, $I^2 = 0\%$ in



one menstrual cycle; OR = 2.49, 95%CI [1.67, 3.72], $p < 0.05$, I2 = 0% in three menstrual cycles).

- **low-dosage:** “no statistical difference was observed in CPR” (OR = 0.07, 95% CI [-0.10, 0.23], $p = 0.44$, I2 = 82%) “and a part of the ER parameters.”
 - subgroup analysis: “four subgroup variables (the routine treatment, risk of performance bias, duration of acupuncture treatment, and the age of participants)” explained some study heterogeneity
- **Conclusion:** “relatively more acupuncture dosage showed better effects for poor endometrial receptivity among [poor endometrial receptivity] PER women.”

Liu X, Shi W, Liu Z, Shi S, Ke C, Zhang P, Tan Z, Zhang W. Effects of acupuncture on luteinized unruptured follicle syndrome: a meta-analysis of randomized controlled trials. *Complement Ther Med.* 2020 Mar;49:102319. doi: 10.1016/j.ctim.2020.102319. Epub 2020 Jan 16.¹⁴⁴

- **Design:** Systematic Review and Meta-Analysis
- **Methods:** Literature search of 6 electronic databases (Wanfang, VIP, China National Knowledge Infrastructure, Pubmed, Cochrane, and Embase) from inception to July 2019 for randomized controlled trials (RCTs) involving acupuncture for luteinized unruptured follicle syndrome
- **Primary Outcomes:** ovulation rate and pregnancy rate
- **Quality Control:** two reviewers
- **Risk of Random Error:** Trial Sequential Analysis software
- **Level of Evidence Needed:** GRADE
- **Meta-Analysis:** 10 studies involving 715 participants included for analysis
- **Results:**
 - 10 studies involving 715 participants met inclusion criteria
 - Acupuncture alone and as an adjunct treatment significantly improved ovulation
 - Results “confirmed by Trial Sequential Analysis”
 - “Evidence of acupuncture improving pregnancy rate was insufficient.”
 - Subgroup analysis: two subgroups showed “improved serum luteinizing hormone and estradiol levels, and decreased pulsatility index and resistance index of ovary artery”
 - Level of evidence: “low” or “very low” for most outcomes
- **Conclusions:** “Acupuncture alone or combined with drugs are effective on Luteinized Unruptured Follicle Syndrome especially for improving ovulation.”



Gao R, Guo B, Bai J, Wu Y, Wu K. Acupuncture and clomiphene citrate for anovulatory infertility: a systematic review and meta-analysis. *Acupunct Med.* 2020 Feb;38(1):25-36. doi: 10.1136/acupmed-2017-011629. Epub 2019 Oct 3. ¹⁴⁵

- **Design:** Systematic Review and Meta-Analysis
- **Methods:** Literature search of 8 databases for studies comparing effectiveness of acupuncture and clomiphene citrate (CC) for anovulatory infertility
- **Treatment groups:** “acupuncture or acupuncture combined with clomiphene citrate (CC) versus CC alone”
- **Quality Control and Risk of Bias:** studies were assessed
- **Meta-analyses:** Nine trials involving 1,441 women included for analysis
- **Results:**
 - Nine trials involving 1,441 women met inclusion criteria
 - Acupuncture as adjuvant with clomiphene citrate (CC) no significant differences:
 - rates of pregnancy (odds ratio (OR) 1.18, 95% CI 0.83 to 1.69)
 - ovulation (OR 2.57, 95% CI 0.59 to 11.29)
 - pregnancy loss (OR 0.98, 95% CI 0.59 to 1.63)
 - Acupuncture alone
 - “did not increase the ovulation rate” (OR 0.41, 95% CI 0.11 to 1.49)
 - **Acupuncture alone vs CC alone had “superior effects”** for:
 - pregnancy rate (OR 2.34, 95% CI 1.76 to 3.10)
 - maximum follicular diameter (mean difference 0.50 mm, 95% CI 0.44 to 0.56 mm)
 - **Acupuncture alone vs CC alone had statistically significant:**
 - “reduction in the rate of pregnancy loss when acupuncture was used as a separate treatment compared with CC alone” (OR 0.19, 95% CI 0.08 to 0.45).
- **Conclusions:** “Based on the above pooled results of the studies, the use of **acupuncture as a monotherapy significantly improved the rate of pregnancy** among the study participants compared with the use of CC alone.”

Zhang J, Huang X, Liu Y, Heb Y, Yu H. A comparison of the effects of Chinese non-pharmaceutical therapies for premature ovarian failure: a PRISMA-compliant systematic review and network meta-analysis. *Medicine.* 2020;99:26. doi:10.1097/MD.0000000000020958. ¹⁴⁶

- **Design:** Systematic Review and Meta-Analysis
- **Protocol registration number:** CRD42020150508



- **Methods:** Literature search of 7 databases(PubMed, the Cochrane Library, Embase, Wanfang, China National Knowledge Infrastructure, VIP Chinese Science, Chinese Biomedical Database) database inception to January 13, 2020, for randomized controlled trials (RCTs) involving acupuncture for premature ovarian failure (POF)
- **Risk of Bias:** RevMan 5.3 software
- **Treatment Groups:** acupuncture alone (acupuncture, warm acupuncture, electro-acupuncture, moxibustion or acupoint catgut embedding alone) vs control (conventional medicine)
- **Primary Outcomes:** Effectiveness rate and total effective rate
- **Secondary Outcomes:** Serum follicle-stimulating hormone (FSH), estradiol (E2), and luteinizing hormone (LH).
- **Meta-Analysis:** Stata14.0 software used to analyze 16 studies involving 1,307 participants
- **Results:**
 - 16 RCTS involving 1,307 participants met inclusion criteria
 - Acupuncture (OR:1.35,95%1.24 to 1.47) “best effectiveness among the four acupuncture” treatments (standardized mean difference [SMD]-16.30,95% 31.33 to 1.28)
 - Acupuncture “most effective and the best in reducing follicle-stimulating hormone [FSH] levels among the four acupuncture treatments.”
 - Acupuncture (SMD 26.67,95%5.95 to 47.40) and acupoint embedding (SMD 41.14,95%11.90 to 70.37) best two treatments for improving estradiol levels
 - **Acupuncture** (SMD-4.90,95% 8.10 to 1.70) was **more effective than acupoint embedding and HRT** at reducing luteinizing hormone (LH) levels
- **Conclusion:** “acupuncture is the most promising therapy for improving menopausal symptoms, decreasing serum follicle-stimulating hormone and luteinizing hormone level[s]. Therefore, acupuncture could be effective for patients with POF, who are intolerant to the adverse effects of hormone replacement therapy or who would prefer non-drug therapies.”

***Acupuncture for Polycystic Ovary Syndrome (PCOS)-Related Infertility**

Wu Y, Xiao QW, Wang SD, Xu HF, Fang YG. Effectiveness of acupuncture for infertility in patients with polycystic ovary syndrome: a systematic review and network meta-analysis. *Endocr Metab Immune Disord Drug Targets*. 2024 Sep 20. doi: 10.2174/0118715303297819240826065755. ¹⁴⁷

- **Design:** Systematic Review and Network Meta-Analysis



- **Methods:** Literature search of databases (PubMed, Web of Science, Embase, Cochrane Library, China National Knowledge Infrastructure (CNKI), Wanfang, and Chongqing VIP) from inception until August 1, 2023, for randomized controlled trials (RCTs) in any language involving treatment polycystic ovary syndrome (PCOS) and infertility with clomiphene citrate (CC) and letrozole (LE) combined with acupuncture (manual (MA), electro (EA), and warm (WA)) vs medication only control group
- **Primary Outcome:** pregnancy outcomes
- **Quality Control:** two independent researchers screened studies, extracted data, assessed risk of bias
- **Meta-Analysis:** R software GEMTC package
- **Results:**
 - acupuncture did not significantly alter serum follicle-stimulating hormone (FSH) levels
 - acupuncture + medication “significantly reduced serum levels of luteinizing hormone (LH) and elevated the testosterone (T) concentrations of patients when compared to medication treatment alone”
 - **clomiphene citrate (CC) + acupuncture:** “significantly escalated serum estradiol (E2) levels” vs CC alone
 - **medication + acupuncture vs medication alone:** significantly increased pregnancy rates
 - **clomiphene citrate (CC) + warming acupuncture (WA) and letrozole (LE) plus manual acupuncture (MA):** “yielded the highest probability of achieving the best pregnancy outcomes”
- **Conclusion:** “For PCOS infertility patients, acupuncture, as a complementary treatment to CC and LE, holds advantages in improving reproductive hormone levels and enhancing pregnancy success rates. The **highest probability of achieving the best pregnancy outcomes** is associated with the treatment **combination of CC with WA and LE with MA.**”

Deng Y-P, Zhou Y-L, Wei T-T, He G-S, Zhu Z-X, Zhang S-N, Liu M-J, Xue J-J, Zhang W-X, Yang X-G. Combined traditional Chinese medicine therapy for the treatment of infertility with polycystic ovary syndrome: a network meta-analysis of randomized controlled trials. *Medicine*. 2024;103:28. doi: 10.1097/MD.00000000000038912. ¹⁴⁸

- **Design:** Systematic Review and Network Meta-Analysis
- **Methods:** Literature search of databases (PubMed, Web of Science, Cochrane Library, Embase, China Knowledge Network, Wanfang, VIP, China Biomedical Literature (SinoMed)) for randomized controlled trials (RCTs) of combined traditional Chinese



medicine (TCM) therapy for the treatment of infertility with polycystic ovarian syndrome (PCOS)

- **Quality Control:** Cochrane 5.3 Risk of Bias Assessment tool
- **Network Meta-Analysis:** Stata 16.0 software used to analyze 28 studies involving 2,771 participants
- **Results:**
 - 28 RCTs using 8 combined TCM therapies involving 2,771 participants met inclusion criteria
 - The following therapies “improved the clinical pregnancy rate better than acupuncture, herbal, and western medicines monotherapy” ($P < .05$)
 - moxibustion + herbal
 - fire acupuncture + herbal
 - acupuncture + herbal
 - electroacupuncture + herbal
 - acupoint application + herbal
 - The following therapies “improved the ovulation rate better than acupuncture, herbal, and western medicines monotherapy” ($P < .05$):
 - ear point pressure + herbal enema + herbal
 - acupuncture and moxibustion + herbal
 - fire acupuncture + herbal
 - acupuncture + herbal
 - “3 most effective therapies for improving the clinical pregnancy rate” include: moxibustion + herbal, fire acupuncture + herbal, and acupuncture + herbal
 - “3 most effective therapies for improving the ovulation rate” include fire acupuncture + herbal, acupuncture + herbal, and ear point pressure + herbal enema + herbal
- **Conclusion:** “The combined TCM therap[ies] demonstrated better efficacy for the treatment of infertility with PCOS compared to acupuncture, herbal, and western medicines monotherapy.”

Yang L, Yang W, Sun M, Luo L, Li HR, Miao R, Pang L, Chen Y, Zou K. Meta analysis of ovulation induction effect and pregnancy outcome of acupuncture & moxibustion combined with clomiphene in patients with polycystic ovary syndrome. *Front Endocrinol.* 20 November 2023; doi:10.3389/fendo.2023.1261016. ¹⁴⁹

- **Design:** Systematic Review and Meta-Analysis
- **Systematic review registration:** <https://www.crd.york.ac.uk/PROSPERO/>
- #myprospero, identifier (CRD42023433057)
- **Methods:** Literature search of 8 databases (The Cochran e Library, Pubmed, Embase,



Web of Science, CNKI, Wanfang, VIP, CBM) using computer from inception through May 2023 for randomized controlled trials involving acupuncture and moxibustion, and clomiphene, acupuncture, and moxibustion for patients with polycystic ovary syndrome (PCOS)

- **Inclusion/Exclusion Criteria:** Inclusion: Rotterdam standards issued by the European Center for Human Reproduction and Embryology and the American Society of Reproductive Medicine in January 2003, or the Expert Consensus on the Diagnosis and Treatment of Polycystic Ovarian Syndrome by the Endocrinology Group of the Obstetrics and Gynecology Branch of the Chinese Medical Association. // Exclusion: related diseases, repetitive literature, incomplete abstract information, no original data
- **Quality Control:** two independent researchers screened literature, extracted data, evaluated risk of bias
- **Treatments:** (1) acupuncture + moxibustion, (2) clomiphene, (3) acupuncture, moxibustion, + clomiphene
- **Primary Outcome:** pregnancy
- **Mesh Meta-Analysis:** 6 randomized controlled trials involving 1,410 PCOS patients analyzed using Stata17.0 software
- **Results:**
 - 6 randomized controlled trials involving 1,410 PCOS patients
 - ovulation rate improvement: “no statistical difference between Acupuncture & Moxibustion (A), Clomiphene (B), Clomiphene combined with Acupuncture & Moxibustion (C)” ($P>0.05$).
 - Acupuncture & Moxibustion (A) versus Clomiphene (B) [MD=0.15,95% CI (-0.51,0.80)]
 - Acupuncture & Moxibustion (A) versus Clomiphene combined with Acupuncture & Moxibustion (C) [MD=1.60,95% CI (0.97,2.23)]
 - Clomiphene (B) versus Clomiphene combined with Acupuncture & Moxibustion (C) [MD=1.45,95% CI (0.91,1.99)]
 - pregnancy outcomes: “the difference between the three intervention methods was statistically significant ($P<0.05$)”
 - Acupuncture & Moxibustion (A) versus Clomiphene (B) [MD=-0.80,95% CI (-1.84,0.23)]
 - Acupuncture & Moxibustion (A) versus Clomiphene combined with Acupuncture & Moxibustion (C) [MD=0.29,95% CI (-0.73,1.30)]
 - Clomiphene (B) versus Clomiphene combined with Acupuncture & Moxibustion (C) [MD=1.09,95% CI (0.39,1.79)]
 - pregnancy rate improvement (best treatment rated high to low):
 - Acupuncture & Moxibustion combined with Clomiphene (C)



- Acupuncture & Moxibustion (A)
- Clomiphene (C)
- **endometrial thickness:** “the difference between the three intervention methods was statistically significant” (P<0.05)
 - Acupuncture & Moxibustion (A) versus Clomiphene (B) [MD=-0.84,95% CI (-1.87,0.19)]
 - Acupuncture & Moxibustion (A) versus Acupuncture & Moxibustion combined with Clomiphene (C) [MD=0.26,95% CI (-1.01,1.53)]
 - Clomiphene (B) versus Acupuncture & Moxibustion combined with Clomiphene (C) [MD=1.10,95% CI (0.36,1.84)]
 - “Acupuncture & Moxibustion combined with Clomiphene (C) has the best effect on improving endometrial thickness”
- **Subgroup Analysis:** “Acupuncture & Moxibustion treatment frequency on ovulation rate and pregnancy rate was not statistically significant.”
- “combination of Acupuncture & Moxibustion, Electroacupuncture and warm Acupuncture & Moxibustion has no effect on the pregnancy rate”
- “combination of Electroacupuncture and Clomiphene has the best effect on improving the ovulation rate”
- Adverse Events: “Acupuncture & Moxibustion combined with Clomiphene can reduce the occurrence of Luteinized Unruptured Follicle Syndrome (LUFS) and Ovarian Hyperstimulation Syndrome (OHSS), and reduce the occurrence of physical adverse reactions such as nausea, vomiting, headache and dermatitis” versus clomiphene therapy alone.”
- **Conclusion:** “Acupuncture & Moxibustion is effective in improving the ovulation promoting effect and pregnancy outcome of PCOS patients. The ovulation promoting effect of Acupuncture & Moxibustion or combined with Clomiphene is similar to that of Clomiphene alone, but **Acupuncture & Moxibustion combined with Clomiphene has more advantages in improving the pregnancy rate of PCOS, and it also can reduce the adverse reactions of Clomiphene alone.** Acupuncture & Moxibustion can be used as a recommended treatment for PCOS.”

Chen X, Lan Y, Yang L, Liu Y, Li H, Zhu X, Zhao Y, Long C, Wang M, Xie Q, Li Z, Wu J. Acupuncture combined with metformin versus metformin alone to improve pregnancy rate in polycystic ovary syndrome: a systematic review and meta-analysis. *Front Endocrinol.* 29 August 2022; doi:10.3389/fendo.2022.978280. ¹⁵⁰

- **Design:** Systematic Review and Meta-Analysis
- **Systematic Review Registration:**
<https://www.crd.york.ac.uk/PROSPERO/#myprospero>



- **Methods:** Literature search of 8 databases for randomized controlled trials (RCTs) involving acupuncture and metformin for polycystic ovary syndrome (PCOS) patients trying to get pregnant
- **Quality Control:** GRADE used “to assess the quality of evidence, study limitations, inconsistencies, inaccuracies, and publication bias.”
- **Treatment Groups:** acupuncture + metformin; metformin alone
- **Results:**
 - 9 RCTs and 1,159 women met inclusion criteria
 - Acupuncture improved pregnancy rate
 - using diagnostic criteria of PCOS [$Z = 2.72$, $p = 0.007$, relative risk (RR) 1.31, 95% CI 1.08 to 1.60, $p = 0.15$, $I^2 = 41\%$].
 - using diagnostic criteria of pregnancy ($Z = 3.22$, $p = 0.001$, RR 1.35, 95% CI 1.13 to 1.63, $p = 0.12$, $I^2 = 42\%$)
 - Acupuncture improved ovulation rate.
 - Subgroup analysis:
 - “according to the number of ovulation patients” ($Z = 2.67$, $p = 0.008$, RR 1.31, 95% CI 1.07 to 1.59, $p = 0.04$, $I^2 = 63\%$)
 - according to ovulation cycle ($Z = 3.57$; $p = 0.0004$, RR 1.18, 95% CI 1.08 to 1.29, $p = 0.57$, $I^2 = 0\%$).
 - “acupuncture combined with metformin could improve homeostatic model assessment of insulin resistance” (HOMA-IR) [mean difference (MD) -0.68 , 95% CI -1.01 to -0.35 , $p = 0.003$, $I^2 = 83\%$].
- **Conclusions:** “*compared with metformin alone, acupuncture combined with metformin has a positive effect on pregnancy rate, ovulation rate, and insulin resistance in PCOS.*”

Wu J, Chen D, Liu N. Effectiveness of acupuncture in polycystic ovary syndrome: a systematic review and meta-analysis of randomized controlled trials. *Medicine* (Baltimore). 2020 May 29;99(22):e20441. doi: 10.1097/MD.00000000000020441. ¹⁵¹

- **Design:** Systematic Review and Meta-Analysis
- **Study registration:** PROSPERO CRD42019128574
- **Methods:** Literature search of databases (Pubmed, Web of Science, Embase, Cochrane, China National Knowledge Infrastructure (CNKI), Wanfang, Chongqing VIP) for randomized controlled trials involving acupuncture treatment for polycystic ovary syndrome (PCOS)
- **Risk of Bias:** Cochrane Handbook for Systematic Reviews of Interventions
- **Evidence Quality:** GRADE (Grading of Recommendations Assessment, Development, and Evaluation)



- **Meta-Analysis:** 22 studies involving 2,315 participants were analyzed using a random-effects model and RevMan 5.3 software
Primary Outcomes: live birth rate, pregnancy and ovulation
- **Secondary Outcomes:** recovery of menstrual period and hormone levels
- **Results:**
 - 22 studies, 2,315 participants
 - Acupuncture improved menstrual period recovery (5 trials; 364 participants; SMD, -0.52; 95% CI [-0.89, -0.14]; I = 67%; P = .0007; low certainty)
 - Acupuncture significantly decreased luteinizing hormone (LH) (13 trials; 917 participants; MD, -0.92; 95% CI [-1.43, -0.41]; I = 60%; P = .0004; very low certainty)
 - Acupuncture significantly decreased testosterone (13 trials; 923 participants; SMD, -0.46; 95% CI [-0.73, -0.20]; I = 75%; P = .0006; very low certainty)
 - “No significant differences were observed in the rates of live birth, pregnancy, and ovulation,” or “LH/follicle-stimulating hormone (FSH) ratio.”
- **Conclusions:** “There was insufficient evidence to support that acupuncture could promote live birth, pregnancy, and ovulation. However, acupuncture could promote the recovery of menstrual cycles as well as downregulate the levels of LH and testosterone in patients with PCOS.”

d. Acupuncture for Correcting Breech Presentation During Labor

Coyle ME, Smith CA, Peat B. Cephalic version by moxibustion for breech presentation. *Cochrane Database Syst Rev.* 2023;5(5):CD003928. ¹⁵²

- **Systematic Review:** Literature search of Cochrane Pregnancy and Childbirth’s Trials Register (CENTRAL, MEDLINE, Embase, CINAHL, and conference proceedings), ClinicalTrials.gov, the WHO International Clinical Trials Registry Platform (ICTRP) through November 4, 2021, and MEDLINE, CINAHL, AMED, Embase and MIDIRS through November 3, 2021, plus reference lists, for published and unpublished randomised or quasi-randomised controlled trials involving the use of moxibustion with/without other techniques (acupuncture, posture) with control to change “the presentation of an unborn baby in the breech position, the need for external cephalic version (ECV), mode of birth, and perinatal morbidity and mortality.”
- **Data collection and analysis:** Two review authors independently determined trial eligibility, assessed trial quality, and extracted data.



- **Outcomes Assessed:** “baby's presentation at birth, need for ECV, mode of birth, perinatal morbidity and mortality, maternal complications and maternal satisfaction, and adverse events.”
- **Evidence Certainty Assessment:** GRADE approach.
- **Meta-Analysis:** 13 studies involving 2,181 women
- **Results:**
 - **Moxibustion plus usual care** “probably reduces the chance of non-cephalic presentation at birth” (7 trials, 1152 women; risk ratio (RR) 0.87, 95% confidence interval (CI) 0.78 to 0.99, I2 = 38%; moderate-certainty evidence)
 - **Moxibustion plus usual care** on the need for external cephalic version (ECV) procedure to adjust breech presentation show uncertain effects (4 trials, 692 women; RR 0.62, 95% CI 0.32 to 1.21, I2 = 78%; low-certainty evidence)
 - **Moxibustion plus usual care** “probably has little to no effect on the chance of caesarean section” (6 trials, 1030 women; RR 0.94, 95% CI 0.83 to 1.05, I2 = 0%; moderate-certainty evidence). moxibustion plus usual care produced uncertain evidence regarding “the chance of premature rupture of membranes” (3 trials, 402 women; RR 1.31, 95% CI 0.17 to 10.21, I2 = 59%; low-certainty evidence)
 - **“Moxibustion plus usual care** probably reduces the use of oxytocin” (1 trial, 260 women; RR 0.28, 95% CI 0.13 to 0.60; moderate-certainty evidence).
 - **Moxibustion plus usual care** produced uncertain effects on “the chance of cord blood pH less than 7.1” (1 trial, 212 women; RR 3.00, 95% CI 0.32 to 28.38; low-certainty evidence)
 - **Moxibustion plus usual care** produces uncertain effects on producing potential adverse events “(including nausea, unpleasant odour, abdominal pain and uterine contractions; intervention: 27/65, control: 0/57)” (122 women; RR 48.33, 95% CI 3.01 to 774.86; very low-certainty evidence).
 - **Moxibustion plus usual care vs sham moxibustion plus usual care:** “moxibustion probably reduces the chance of non-cephalic presentation at birth” (1 trial, 272 women; RR 0.74, 95% CI 0.58 to 0.95; moderate-certainty evidence)
 - **Moxibustion plus usual care vs sham moxibustion plus usual care:** moxibustion “probably results in little to no effect on the rate of caesarean section” (1 trial, 272 women; RR 0.84, 95% CI 0.68 to 1.04; moderate-certainty evidence).
 - “No study that compared moxibustion plus usual care with sham moxibustion plus usual care reported on the clinically important outcomes of need for ECV, premature rupture of membranes, use of oxytocin, and cord blood pH less than 7.1, and one trial that reported adverse events reported data for the whole sample.”



- **Moxibustion + acupuncture + usual care** studies reported “very little evidence about the effect of the combination on non-cephalic presentation at birth” (1 trial, 226 women; RR 0.73, 95% CI 0.57 to 0.94) “and at the end of treatment” (2 trials, 254 women; RR 0.73, 95% CI 0.57 to 0.93), “and on the need for ECV” (1 trial, 14 women; RR 0.45, 95% CI 0.07 to 3.01).
- “Very little evidence about whether moxibustion plus acupuncture plus usual care reduced the chance of caesarean section” (2 trials, 240 women; RR 0.80, 95% CI 0.65 to 0.99) or pre-eclampsia (1 trial, 14 women; RR 5.00, 95% CI 0.24 to 104.15). Evidence certainty not assessed for this contrast.
- **Maternal Satisfaction:** Not all of the included studies reported on maternal satisfaction
 - “women found moxibustion acceptable, not painful, and with few side effects, although some said that was 'hard to judge'.”
 - “In the second study (Guittier 2009) women found moxibustion acceptable, and it was viewed favourably. Most women reported little or no pain (96%)”
- **Safety:** “The most frequently reported adverse events were increased fetal movements, uterine contractions, nausea, headache, and burns from holding the moxibustion stick too close to the skin.”
- **Conclusions:** Authors reported “moderate-certainty evidence that **moxibustion plus usual care probably reduces the chance of non-cephalic presentation at birth.**” Authors found “uncertain evidence about the need for [external cephalic version] ECV.” Additionally, the authors found “moderate-certainty evidence from one study shows that moxibustion plus usual care probably reduces the use of oxytocin before or during labour.” It does not appear that moxibustion plus usual care affects caesarean section rates, and authors were “uncertain about its effects on the chance of premature rupture of membranes and cord blood pH less than 7.1.” Authors reported that “adverse events were inadequately reported in most trials.”

Liao J-A, Shao S-C, Chang C-T, Chai PY-C, Owang K-L, Huang T-H, Yang C-H, Lee T-J, Chen Y-C. Correction of breech presentation with moxibustion and acupuncture: a systematic review and meta-analysis. *Healthcare*. 2021;9:619. ¹⁵³

- **Systematic Review:** Literature review of PubMed, MEDLINE, Embase, Cochrane Central Register of Controlled Trials (CENTRAL), Chinese Electronic Periodical Services (CEPS), and ClinicalTrials.gov databases for randomized controlled trials (RCTs) involving the use of moxibustion and acupuncture for breech presentation.
- **Meta-Analysis:** 16 RCTs involving 2,555 participants
- **Outcomes:** Safety and effectiveness



- **Results:**
 - “Compared to control, moxibustion significantly increased cephalic presentation at birth” (RR = 1.39; 95% CI = 1.21–1.58).
 - “Moxibustion also seemed to elicit better clinical outcomes in the Asian population” (RR = 1.42;
 - 95% CI = 1.21–1.67) vs non-Asian populations (RR = 1.20; 95% CI = 1.01–1.43).
 - after sensitivity analysis, results were inconsistent relative to control
 - Moxibustion + acupuncture “was synergistic for correcting breech presentation” (RR = 1.53; 95% CI = 1.26–1.86) in one RCT.
- **Conclusions:** “*Our findings suggest that moxibustion therapy has positive effects on correcting breech presentation, especially in the Asian population.*”

3. Acupuncture for Gastrointestinal Symptoms

a. Acupuncture for General Gastrointestinal Symptoms

Wang L, Luo X, Qing X, Fang S, Jiang T, Wang Q, Zhong Z, Yang Y, Yang J, Song G, Su X, Wei W. Symptom effects and central mechanism of acupuncture in patients with functional gastrointestinal disorders: a systematic review based on fMRI studies. *BMC Gastroenterol.* 2024 Jan 24;24(1):47. doi: 10.1186/s12876-024-03124-y. ¹⁵⁴

- **Systematic Review:** Computerized systematic review of databases (PubMed, EMBASE, Web of Science, Cochrane Library, China National Knowledge Infrastructure (CNKI)) of randomized controlled trials (RCTs) involving fMRI studies of acupuncture for functional gastrointestinal disorder (FGID) patients from database inception through June 22, 2022.
- **Meta-Analysis:** 10 RCTs involving 474 participants included for analysis; “4 [f]unctional dyspepsia (FD) studies, 3 irritable bowel syndrome (IBS) studies, and 3 functional constipation (FC) studies.”
- **Statistics:** Continuous variables: mean difference (MD) expressed with 95% confidence interval (CI). Heterogeneity: chi-squared (χ^2) test and inconsistency index statistic (I^2). Significance indicated by ($I^2 > 50\%$ or $P < 0.1$); if so, random effects model used. Not significant ($I^2 \leq 50\%$ or $P \geq 0.1$): fixed effects model.
- **Quality control:** 2 independent research screened results, extracted data, evaluated study quality
- **Results:**
 - “The score of improvements in both gastrointestinal symptoms and psychological symptoms showed that acupuncture could significantly improve the clinical symptoms of FGIDs patients, including abdominal pain, abdominal distension,



frequency of defecation, and stool characteristics, and could relieve anxiety and depression symptoms of patients.”

- “Acupuncture could regulate brain functional connections and functional activity in FGIDs patients, mainly including insula, anterior cingulate cortex, prefrontal cortex, thalamus, hippocampus, amygdala and other brain regions.”
- **Conclusion:** “Acupuncture can improve gastrointestinal symptoms and psychological status in [FGID] patients, and regulate functional connectivity and activity of brain regions such as insula, ACC, PFC, thalamus, HIPP, amygdala, etc.”

Wang X-Y, Wang H, Guan Y-Y, Cai R-L, Shen G-M. Acupuncture for functional gastrointestinal disorders: a systematic review and meta-analysis. *J Gastroenterol Hepatol.* 2021 Nov;36(11):3015-3026. doi: 10.1111/jgh.15645. Epub 2021 Aug 18. doi: 10.1111/jgh.15645. ¹⁵⁵

- **Systematic Review:** review of databases (Cochrane Library, EMBASE, PUBMED, Web of Science, Wanfang Database, China National Knowledge Infrastructure, VIP Database) through December 31, 2019, for randomized controlled trials (RCT’s) involving acupuncture (AT) for functional gastrointestinal disorders (FGIDs)
- **Meta-Analysis:** 61 studies involving 9,447 participants
- **Results:**
 - acupuncture improved symptom severity in all of the following comparisons:
 - acupuncture vs pharmacotherapy (RR 1.13, 95% CI 1.09-1.17)
 - acupuncture vs placebo acupuncture (RR 1.69, 95% CI 1.37-2.08)
 - acupuncture vs no specific treatment (RR 1.86, 95% CI 1.31-2.62)
 - acupuncture plus other active treatments (RR 1.25, 95% CI 1.21-1.30)
 - sub-group analysis:
 - results for “functional dyspepsia, irritable bowel syndrome, and functional constipation also supported this finding”
 - acupuncture improved symptom severity
 - lower adverse events for acupuncture than other treatments (RR 0.75, 95% CI 0.56-0.99)
- **Conclusions:** acupuncture “significantly associated with relief of FGIDs symptoms,” with moderate or low quality evidence.

b. Acupuncture for Postprandial Distress

Xiao G, Zhao Y, Chen X, Xiong F. Acupuncture is effective in the treatment of postprandial distress syndrome: a systematic review and meta-analysis. *Medicine (Baltimore).* 2023 Jun 23;102(25):e33968. doi: 10.1097/MD.00000000000033968. ¹⁵⁶



- **Systematic Review:** Review of databases (CNKI, Medline, Cochrane Central, Web of Science, and Clinical Trial) for randomized controlled trials involving acupuncture for postprandial distress syndrome (PDS)
- **Meta-Analysis:** 12 studies involving 1,113 patients
sensitivity analysis and publication bias Analysis: Stata 16.1 software
- **Study Quality Assessment:** Cochrane tool
- **Primary Outcomes:** overall therapeutic rate, SID score, HADS Score, NDI score, and side effects
- **Results:** acupuncture had a statistically significantly impact upon the treatment of PDS, including patient quality of life
- **Risk of Bias Assessment:** low
- **Conclusions:** acupuncture is “an effective clinical treatment method” for postprandial distress syndrome (PDS).

Du J, Feng Y, Yuan Q, Gong H, An J, Wu L, Dai Q, Xu B, Wang H, Luo J. Efficacy of acupuncture treatment for postprandial distress syndrome: a systematic review and meta-analysis. *J Immunol Res.* 2022 Jun 2:2022:6969960. doi: 10.1155/2022/6969960. eCollection 2022. doi: 10.1155/2022/6969960. ¹⁵⁷

- **Systematic Review:** Search databases (Web of Science, the Cochrane Library, PubMed, and Embase) for randomized controlled trials involving acupuncture treatment for postprandial distress syndrome (PDS).
- **Quality Control:** two independent reviewers.
- **Meta-Analysis:** five studies involving 1,253 participants (experimental n=643; control n=610) pooled for analysis with Stata 15.0 software
- **Results:**
 - Week 4 total therapeutic effect (OTE)
 - acupuncture demonstrated statistical significance (OR 4.74, 95% CI 02.88-7.83, $Z = 6.10$, $P = 0 < 0.05$).
 - Week 4 NDI (Nepean Dyspepsia Index) scores
 - acupuncture demonstrated statistical significance (SMD 0.61, 95% CI 0.48 to 0.74)
 - Week 16 NDI scores
 - acupuncture significantly improved scores (SMD 0.49, 95% CI 0.27 to 0.71)
 - Week 4 SID (Dyspepsia Symptom Index) scores
 - After acupuncture, scores decreased significantly (SMD-0.52, 95% CI -0.73 to -0.32)
 - Week 16 SID scores



- After acupuncture, scores decreased significantly (SMD-0.59, 95% CI -0.81 to -0.36).
- Week 4 postprandial satiety scores
 - Scores significantly lower after acupuncture (SMD-0.63, 95% CI -0.76 to -0.50)
- Week 4 early satiety scores
 - Scores significantly lower after acupuncture (SMD-0.51, 95% CI -0.64 to -0.37)
- **Conclusion:** Acupuncture demonstrated statistically significant improvements for postprandial distress syndrome (PDS) patients, alleviating the postprandial fullness and early satiety symptoms and improving quality of life. Authors concluded that “acupuncture was an effective therapeutic strategy for postprandial distress syndrome.”

c. Acupuncture for Gastrointestinal Reflux Disease (GERD)/Dyspepsia

Liao X, Tian Y, Zhang Y, Bian Z, Wang P, Li P, Fang J, Shao X. Acupuncture for functional dyspepsia: Bayesian meta-analysis. *Complement Ther Med.* 2024 Jun;82:103051. doi: 10.1016/j.ctim.2024.103051. Epub 2024 May 16. doi: 10.1016/j.ctim.2024.103051. ¹⁵⁸

- **Systematic Review:** Review of 8 electronic databases through April 2023 for randomized controlled trials involving acupuncture functional dyspepsia (FD).
- **Study Quality Assessment:** Cochrane Risk of Bias Tool
- **Meta-Analysis:** 34 studies involving 2,950 participants underwent pairwise meta-analyses, network meta-analyses, and Bayesian network meta-analysis; Bayesian analysis performed “to compare and rank the efficacy of different acupuncture therapies.”
- **Results:**
 - a combination of various acupuncture methods or acupuncture + biomedicine was “more effective in improving symptoms of functional dyspepsia” versus biomedicine alone
 - **early satiation and postprandial fullness symptoms:** acupuncture + biomedicine more effective at alleviating symptoms epigastric pain: acupuncture + moxibustion was the “most effective treatment”
 - **burning sensations:** moxibustion was the most effective treatment
 - **promoting motilin levels:** moxibustion (particularly warming needle) was most effective
- **Conclusion:** “*The findings of this study demonstrate that acupuncture, both independently and in conjunction with other modalities, emerged as a secure and effective treatment option for patients with functional dyspepsia.*”



Woo JY, Pikov V, Chen JDZ. Neuromodulation for gastroesophageal reflux disease: a systematic review. *J Transl Gastroenterol.* 2023;1(1):47-56. Epub 2023 Sep 25. ¹⁵⁹

- **Systematic Review:** PRISMA guided review of 3 databases (Medline (Ovid), Embase, and PubMed) of studies involving neuromodulation treatment (manual acupuncture (MA), LES electrical stimulation, or transcutaneous electrical acustimulation (TEA)) for gastroesophageal reflux disease (GERD) symptoms including lower esophageal sphincter (LES) pressure, esophageal motility, gastric motility, and parasympathetic activity.
- **Inclusion and Exclusion Criteria Assessment:** Covidence software
- **Meta-Analysis:** 13 studies included (4 MA, 4 LES, 5 TEA)
- **Results:**
 - “All evaluated studies demonstrated significant beneficial effects on GERD symptoms, using patient-completed questionnaires, objective 24-[hour] measurement of esophageal pH, and patient-reported use of proton pump inhibitors.”
 - “Electrical stimulation significantly increased LES pressure”
 - “Transcutaneous electrical acustimulation significantly improved esophageal motility, gastric motility, and parasympathetic activity.”
 - No severe adverse effects reported.

Conclusions: “*Neuromodulation therapies were effective in treating the GERD symptoms and key underlying GERD pathophysiologies. They are thus valuable options for individualized GERD treatment.*”

Liu J, Song G, Huang Y, Lv C, Wang Y, Wu D, Sun C, Jing M, Yu Y. Placebo response rates in acupuncture therapy trials for functional dyspepsia: a systematic review and meta-analysis. *J Clin Gastroenterol.* 2022 Apr 1;56(4):299-310. doi:10.1097/MCG.0000000000001679. ¹⁶⁰

- **Systematic Review:** Review of databases (PubMed, Web of Science, Cochrane Library, and Embase, plus 4 Chinese language databases) through January 2021 for randomized controlled trials involving manual acupuncture (MA) and electroacupuncture (EA) for functional dyspepsia (FD) patients. 13 studies were ultimately included.
- **Meta-Analysis:** 8 studies pooled for quantitative analysis using RevMan 5.20 software
- **Treatment Outcomes:** symptom scores and quality of life
- **Statistics:** standard mean difference (SMD) or weighted mean difference (WMD) with a 95% confidence interval (CI); sensitivity analyses using Stata 11.0 statistical software
- **Quality Assessments:** Jadad scale and Standards for Reporting Interventions in Clinical Trials of Acupuncture (STRICTA) checklist.
- **Publication Bias:** Egger’s Test and Begg’s test using Stata 11.0 statistical software



- **Results:**
 - subjective outcomes for FD symptoms
 - combined effect of sham manual acupuncture [SMD=-0.42, 95% CI (-0.72, -0.12); P=0.005]
 - combined effect of sham electroacupuncture [SMD=-0.54, 95% CI (-0.81, -0.27); P<0.001].
 - subjective outcomes for FD quality of life
 - combined effect of post-sham manual acupuncture [SMD=-0.32, 95% CI (-0.52, -0.12); P=0.002].
 - objective outcomes for dominant frequency
 - combined effect of sham electroacupuncture [WMD=-0.11, 95% CI (-0.30, -0.08); P=0.24]
 - objective outcomes for dominant power
 - combined effect of sham electroacupuncture [WMD=-3.35, 95% CI (-8.04, 1.35); P=0.16].
- **Conclusions:** “*sham MA and sham EA remarkably improve symptoms and quality of life scores of FD without influencing objective outcomes, highlighting the [importance] of sham controls in acupuncture therapy clinical trials.*”
- **Note:** these results and conclusions support the premise that sham manual acupuncture and sham electroacupuncture have treatment effects, as has been notably demonstrated in strong, landmark studies such as Vickers 2012 and 2018.

Zhang J, Liu Y, Huang X, Chen Y, Lu L, Lan K, Yu H. Efficacy comparison of different acupuncture treatments for functional dyspepsia: a systematic review with network meta-analysis. *Evid Based Complement Alternat Med.* 2020 Mar 18;2020:3872919. doi: 10.1155/2020/3872919. eCollection 2020. doi: 10.1155/2020/3872919. ¹⁶¹

- **Systematic Review: Review of databases** (PubMed, the Cochrane Library, Embase, Wanfang database, China National Knowledge Infrastructure (CNKI) database, Chinese Science and Technique Journals (CQVIP), and Chinese Biomedical Database (CBM)) through Oct 10, 2019, randomized controlled trials (RCTs) comparing various styles/methods of acupuncture to treat functional dyspepsia (FD). 35 studies involving 3,301 participants and 10 interventions included for analysis.



- **Pairwise Meta-Analysis:** RevMan 5.3
- **Network Meta-Analysis (NMA):** frequentist framework
- **Risk of Bias:** Cochrane risk of bias tool
- **NMA Results:**
 - “Five types of acupuncture (manual acupuncture, acupoint application, moxibustion, acupoint catgut embedding, and warm acupuncture alone) all were superior to prokinetics (itopride, mosapride, and domperidone) and sham acupuncture in terms of improving the symptoms of functional dyspepsia.”
 - **“Manual acupuncture and electroacupuncture were more effective** in improving the MOS 36 Item Short-Form Health Survey (SF-36) compared to itopride and sham acupuncture”
 - **“Electroacupuncture was the best among the three acupuncture therapies** (acupuncture, electroacupuncture, and acupoint catgut embedding)”
 - “Moxibustion and manual acupuncture were more effective in improving Nepean Dyspepsia Life Quality Index (NDLQI) compared to itopride, domperidone, and sham acupuncture”
 - **“Moxibustion ranks first among the three acupuncture therapies** (acupuncture, electroacupuncture, moxibustion)”
- **Conclusions:** Acupuncture is effective for functional dyspepsia and should be “considered an alternative treatment for FD patients who are unresponsive to prokinetics or intolerant to the adverse effects of prokinetics.”

Mao X, Guo S, Ni W, Zhang T, Liu Q, Du S, Luo M, Pan Y, Wu B, Su X, Yang Y, Guo Y, Chen JJD, Rong P, Wei W. Electroacupuncture for the treatment of functional dyspepsia: a systematic review and meta-analysis. *Medicine (Baltimore)*. 2020 Nov 6;99(45):e23014. doi: 10.1097/MD.00000000000023014. ¹⁶²

- **Systematic Review:** Review of databases (Embase, PubMed, and the Cochrane Central Register of Controlled Trials (Cochrane Library)) February 3, 2020, for randomized controlled trials involving electroacupuncture (EA) to treat functional dyspepsia (FD)
- **Treatment Groups:** electroacupuncture (EA), sham-EA, or pharmacologic medication (PM)



- **Quality and Risk of Bias Assessments:** two independent reviewers
- **Meta-Analysis:** 7 RCT's involving 853 patients; Cochrane Collaboration's risk of bias tool; RevMan 5.3 software
- **Results:**
 - EA “significantly improve[d] clinical symptoms”
 - EA vs sham-EA:
 - EA “more effective in reducing symptom scores” (SMD -3.44, 95% CI -4.21 to -2.67)
 - EA more effective at “increasing normal slow waves of electrogastrogram” (SMD 0.93, 95% CI -0.30 to 1.55)
 - EA plus PM:
 - “no significant difference in reducing symptom scores” (SMD -0.18, 95% CI -0.51 to 0.16), no significant difference in “increasing the effective rate of clinical symptoms” (risk ratio 1.04, 95% CI 0.96 to 1.13)
 - no significant difference in “enhancing the level of plasma motilin” (SMD 0.93, 95% CI -0.30 to 1.55)
 - no significant difference in “reducing gastric half-emptying time” (SMD 0.02, 95% CI -0.16 to 0.20).
 - adverse events: “very few” reported
- **Conclusion:** “This meta-analysis suggests that EA is better than the placebo (sham-EA) in treating FD, and the therapeutic effect of EA on FD is equivalent to that of PM on FD. Compared with PM, EA for FD is safer and has fewer adverse reactions. Despite limitations due to the quality and number of the included studies, EA might be used as an effective and safe treatment for FD.”

Zhu J, Guo Y, Liu S, Su X, Li Y, Yang Y, Hou L, Wang G, Zhang J, Chen JJ, Wang Q, Wei R, Wei W. Acupuncture for the treatment of gastro-oesophageal reflux disease: a systematic review and meta-analysis. *Acupunct Med.* 2017 Oct;35(5):316-323. doi: 10.1136/acupmed-2016-011205. ¹⁶³

- **Systematic Review:** Review of 4 English and 4 Chinese databases through June 2016 for randomized controlled trials (RCT's) involving acupuncture to treat of gastro-oesophageal reflux disease (GORD)



- **Treatments:** manual acupuncture (MA), electroacupuncture (EA), Western medicine (WM)
- **Data Extraction/Quality Evaluation:** two independent authors
- **Meta-Analysis:** RevMan 5.2.0 software; 12 studies involving 1,235 patients
- **Results:**
 - “patients receiving MA/EA combined with WM had a superior global symptom improvement compared with those receiving WM alone” (relative risk (RR) 1.17, 95% CI 1.09 to 1.26; $p=0.03$; six studies)
 - “no significant heterogeneity” ($I^2=0\%$, $p=0.41$)
 - “recurrence rates of those receiving MA/EA alone were lower than those receiving WM” (RR 0.42, 95% CI 0.29 to 0.61; $p<0.001$; three studies)
 - “low heterogeneity” ($I^2=7\%$, $p=0.34$)
 - “global symptom improvement (six studies) and symptom scores (three studies) were similar” (both $p>0.05$).
 - “acupuncture also improves quality of life in patients with GORD” according to authors’ descriptive analysis
- **Conclusion:** “acupuncture is an effective and safe treatment for GORD. However, due to the small sample size and poor methodological quality of the included trials, further studies are required to validate our conclusions.”

Pang B, Jiang T, Du YH, et al. Acupuncture for functional dyspepsia: what strength does it have? a systematic review and meta-analysis of randomized controlled trials. *ECAM*. 2016. doi: 10.1155/2016/3862916. ¹⁶⁴

- **Systematic Review:** Review of databases for randomized controlled trials (RCTs) involving acupuncture (manual and electro) vs sham acupuncture or medication to treat functional dyspepsia (FD)
- **Meta-Analysis:** 16 studies involving 1,436 patients
- **Results:**
 - study quality: “five of the trials rated as high quality, and 11 trials were regarded to be of low quality”
 - (5 RCTs) acupuncture improved Nepean Dyspepsia Index (NDI) scores
 - NDSI had high heterogeneity (2-week treatment $P=0.003$, $I^2 = 89\%$; 4-week treatment: $P = 0.01$, $I = 85\%$) and NDQLI (2-week treatment: $P = 0.02$, $I =$ treatment: $P = 0.003$, $I 82\%$; 4-week treatment: $P = 0.005$, $I = 87\%$)
 - random effects model



- “favorable effect of acupuncture on NDSI after 4-week treatment” vs sham (MD 20.91, 95% CI 6.55 to 35.26, $P = 0.004$); no difference after 2 weeks
- acupuncture vs sham affected NDLQI scores at 2 weeks (MD 10.57, 95% CI 1.20 to 19.94, $P = 0.03$) and 4 weeks (MD 10.49, 95% CI 0.24 to 20.74, $P = 0.04$)
 - pooled estimate of subgroups
 - acupuncture vs sham reduced NDSI scores ($P < 0.0001$)
 - acupuncture vs sham improved NDLQI scores ($P = 0.0002$)
- (7 RCTs) symptom scores (qualitative analysis d/t heterogeneous scale scoring
 - “the results of all the five RCTs [undergoing descriptive analysis] revealed a comparative benefit of acupuncture for improving the symptoms of FD patients compared to sham acupuncture”
- (3 studies) acupuncture improved MOS 36-Item Short-Form Health Survey (SF-36) scores (2-week treatment: MD 21.30, 95% CI 18.53 to 24.07, $P < 0.00001$; 4-week treatment: MD 12.61, 95% CI 9.21 to 16.01, $P < 0.00001$)
- (3 studies) ineffective rate results based on random effects model analysis: acupuncture had a therapeutic effect when compared with sham (subjective assessment: RR 0.22, 95% CI 0.07 to 0.64, $P = 0.006$; objective assessment: RR 0.16, 95% CI 0.06 to 0.40, $P = 0.0001$; total: RR 0.20, 95% CI 0.10 to 0.39, $P < 0.00001$)
- acupuncture reduced “relevant symptoms (especially postprandial fullness and early satiation)”
- (2 studies) safety/adverse events: 1 trial adverse event rate 1.69% (hematoma/pain during needling); 1 trial (electrical sensations during needle manipulation)
- **Comparative analysis of acupuncture vs conventional prokinetic agents** (including Itopride, Mosapride, and Domperidone) used as control (10 RCTs (916 participants))
 - NDI (2 studies): “significant difference in favour of acupuncture, with no heterogeneity” (Figure 7, MD 11.71, 95% CI 8.73 to 14.69, $P < 0.00001$)
 - NDLQI (1 study): significant difference between acupuncture and control for interference, know/control, eat/drink categories of NDLQI
 - symptom scores (9 RCTs): “significant difference between acupuncture and medication groups in reducing the symptom scores of FD patients” (MD 1.31, 95% CI 0.55 to 2.07, $P = 0.0007$)
 - “acupuncture might be superior to medication in improving postprandial fullness” (MD 0.32, 95% CI 0.02 to 0.61 $P = 0.04$)
 - “and early satiation” (MD 0.31, 95% CI 0.16 to 0.46, $P = 0.0001$)



- “no difference was found in relieving epigastric pain” (MD 0.14, 95% CI -0.10 to 0.37 , $P = 0.25$) “and epigastric burning” (MD -0.08 , 95% CI -0.21 to 0.06 , $P = 0.27$)
- “beneficial effect of acupuncture in improving the major symptoms of FD patients compared to medication (MD 0.17, 95% CI 0.02 to 0.32, $P = 0.03$)
- descriptive analysis (4 trials): “all of the four RCTs affirmed the therapeutic effect of acupuncture for improving the symptoms of FD patients in comparison with medication.”
 - SF-36 (3 studies): acupuncture improved quality of life better than conventional medications (MD 15.24, 95% CI 5.79 to 14.60, $P < 0.00001$)
 - ineffective rate (10 RCTs): “pooled data demonstrated a more favorable effect of acupuncture therapy than medication, with no heterogeneity (subjective assessment: RR 0.37, 95% CI 0.23 to 0.58, $P < 0.0001$, $I^2 = 0\%$; objective assessment: RR 0.31, 95% CI 0.17 to 0.55, $P < 0.0001$, $I^2 = 0\%$)
 - adverse effects (1 trial): dizziness and headache in 1 medication group patient; recovery after medication withdrawal
- **Conclusions:** “acupuncture therapy achieves statistically significant effect for FD in comparison with sham acupuncture and is superior to medication (prokinetic agents) in improving the symptoms and quality of life of FD patients. Nonetheless, despite stringent methodological analyses, the conclusion of our review still needs to be strengthened by additional RCTs of higher quality.”

d. Acupuncture for Gastrointestinal Symptoms During Pregnancy

Hu Y, Yang Q, Hu X. The efficacy and safety of acupuncture and moxibustion for the management of nausea and vomiting in pregnant women: a systematic review and meta-analysis. *Heliyon*. 2024 Jan 11;10(2):e24439. doi: 10.1016/j.heliyon.2024.e24439. eCollection 2024 Jan 30. ¹⁶⁵

- **Systematic Review:** Review of electronic databases (PubMed, Embase, ISI Web, Medline, Cochrane, clinicaltrial.gov, and several Chinese databases) for randomized controlled trials
- **Meta-Analysis:** 21 trials involving 2,392 pregnant women were included in the quantitative analysis
- **Efficacy and Safety Evaluations:** Forest Plots
- **Publication Bias Assessments:** Egger's test
- **Results:**



- **Acupuncture/moxibustion more effective than control** to reduce nausea and vomiting in early pregnancy (RR: 0.28; 95%CI: 0.21, 0.37).
- **Acupuncture was more effective than traditional herbs** to reduce nausea and vomiting in early pregnancy (RR: 0.08; 95 % CI: 0.01, 0.60)
- **Acupuncture was more effective than conventional therapy** to reduce nausea and vomiting in early pregnancy (RR: 0.15; 95 % CI: 0.04, 0.57)
- **Acupuncture was more effective than blank control** group to reduce nausea and vomiting in early pregnancy (RR: 0.33; 95 % CI: 0.22, 0.51).
- **Moxibustion alleviated nausea and vomiting better** than the blank control group (RR: 0.21; 95 % CI: 0.08, 0.52)
- “No significant differences in severe adverse events between the acupuncture group and the control group” (RR: 0.77; 95%CI: 0.52, 1.14)
- No significant differences in severe adverse events between the acupuncture group and the blank control group (RR: 0.61; 95%CI: 0.34, 1.10)
- No significant differences in severe adverse events between the acupuncture group and the sham acupuncture group (RR: 1.05; 95%CI: 0.63, 1.73)
- No significant differences in severe adverse events between the acupuncture group and conventional therapy group (RR: 0.32; 95%CI: 0.06, 1.55).
- **Conclusion:** “*Acupuncture and moxibustion might be effective for the management of nausea and vomiting in early pregnant women. Moreover, acupuncture might be a relatively safe treatment for pregnancy.*”

Tingting L, Tongue L, Mingfu L. Effectiveness and safety of acupuncture in treatment of pregnancy-related symptoms: a systematic review and meta-analysis. *J Tradit Chin Med.* 2024 Feb;44(1):16-26. doi: 10.19852/j.cnki.jtcm.20231204.006. ¹⁶⁶

- **Systematic Review:** Review of databases (PubMed, Embase, Cochrane Library, Chinese Biomedical Literature Database, and China National Knowledge Infrastructure Database) through November 2021 for randomized controlled trials (RCTs) for studies involving acupuncture (abbreviated AM in this paper) for “severe vomiting, insomnia, pharyngeal and pelvic pain, mood abnormalities, and dyspepsia during pregnancy.”
- **Meta-Analysis:** 16 studies involving 1,178 participants were included in the study overall; 964 patients’ data included for meta-analysis
- **Treatment Groups:** acupuncture, sham acupuncture, or western (analgesic) medicine
- **Results:**
 - **Acupuncture more effective than western medicine** to treat “discomfort during pregnancy” [odds ratio (OR) = 1.19, 95% confidence interval (CI) (1.11, 1.28), $P < 0.01$].



- Acupuncture was more effective than the control for improving visual analog scale scores [standard mean difference (SMD) = 0.62, 95% CI(0.53, 0.71), $P < 0.01$].
- Acupuncture was more effective than the control for improving Numerical Rating Scale (NRS) scores [$OR = 7.31$, 95% CI(3.36, 15.94), $P < 0.01$].
- No significant differences among acupuncture, sham acupuncture, or analgesic medicine groups for adverse effects [$OR = 0.70$, 95% CI(0.39, 1.28), $P = 0.25$]; mild, low incidence adverse events reported for treatment and control groups
- **Conclusions:** *Acupuncture is “more effective than other treatments or pharmacotherapy alone in the treatment of pregnancy-related symptoms, and is relatively safe. However, the quality of the included trials was rather poor, and high-quality studies are required to confirm our findings.”*

Wang X, Yang G, Li K, Yang F, Liang X, Wu S. Efficacy and safety of acupressure in nausea and vomiting during pregnancy: a systematic review and meta-analysis of randomized controlled trials. *Arch Gynecol Obstet.* 2024 Apr;309(4):1237-1248. doi: 10.1007/s00404-023-07313-0. Epub 2023 Dec 16. ¹⁶⁷

- **Systematic Review:** Review of databases (PubMed, Embase, Springer, Web of Science, Cochrane Library) through July 31, 2023, for randomized controlled trials (RCT) involving acupressure for treatment of nausea and vomiting during pregnancy. 11 RCTs involving 1,378 pregnant women included in the study.
- **Meta-Analysis:** 10 RCTs involving 1,298 pregnant women included for analysis with Stata 17.0 software
- **Quality Control:** Independent assessment of studies selected, data extraction, and risk of bias by researchers
- **Methodological Quality Assessment:** Cochrane Risk of Bias tool
- **Publication bias:** Begg's test (no publication bias found)
- **Study Quality:** moderate
- **Results:**
 - Acupressure more effective than sham acupressure at improving symptoms scores (pooled MD, - 1.33; 95%CI [- 2.06, - 0.61]; $P < 0.001$)
 - Acupressure more effective than control group at improving symptoms scores (pooled MD, - 0.73; 95%CI [- 1.08, - 0.39]; $P < 0.001$)
 - Acupressure more effective than sham acupressure at improving “ incidence of effective rate” (pooled RR, 1.78; 95%CI [1.03, 3.07]; $P = 0.039$).
 - “No statistical significance was found between acupressure and control group” for effectiveness rate (pooled RR, 4.53; 95%CI [0.67, 30.48]; $P = 0.120$)



- Acupressure vs sham acupressure resulted in no differences in improvement for the following:
 - preventing nausea and vomiting during pregnancy (pooled RR, 0.83; 95%CI [0.50, 1.38]; P = 0.476)
 - shortening the duration of hospital stay (pooled MD, - 0.78; 95%CI [- 1.98, 0.41]; P = 0.199) improving patient satisfaction (pooled RR, 1.36; 95%CI [0.47, 3.91]; P = 0.570)
- **adverse events:** minimal acupressure-related adverse events reported by one study
- **Conclusion:** *“Acupressure may have potential favorable or encouraging effect[s] on treating nausea and vomiting during pregnancy, but strong supportive data are not yet available. Well-designed and large-scale RCTs should be conducted for assessing and confirming the efficacy and safety of acupressure in nausea and vomiting during pregnancy.”*

Tan M-Y, Shu S-H, Liu R-L, Zhao Q. The efficacy and safety of complementary and alternative medicine in the treatment of nausea and vomiting during pregnancy: a systematic review and meta-analysis. *Front Public Health*. 2023 Mar 9;11:1108756. doi: 10.3389/fpubh.2023.1108756. eCollection 2023. ¹⁶⁸

- **Systematic Review:** Search of 8 databases (PubMed, EMBASE, the Cochrane Library, Web of Science, China National Knowledge Infrastructure, Wanfang, SinoMed, and VIP) through October 25, 2022, for randomized controlled trials (RCTs) involving acupuncture for nausea and vomiting during pregnancy (NVP)
- **Treatment Groups:** acupuncture, conventional medicine, or placebo
- **Quality of Evidence Assessment:** Grades of Recommendation, Assessment, Development and Evaluation (GRADE)
- **Meta-Analysis:** 33 RCT's analyzed using Stata 15.0 software
- **Results:**
 - Effective Rate
 - **“acupuncture treatment was superior to conventional medicine”** [RR = 1.71, 95% CI (1.02, 2.86), P = 0.042; Low-quality evidence].
 - ginger more effective than placebo [RR = 1.68, 95% CI (1.09, 2.57), P = 0.018; Low-quality evidence]
 - **acupressure performed better than conventional medicine** [RR = 1.55, 95% CI (1.30, 1.86), P ≤ 0.001; Low-quality evidence].
 - acupressure performed the same as placebo [RR = 1.25, 95% CI (0.94, 1.65), P = 0.124; Low-quality evidence].
 - Rhodes Index



- ginger had statistically significant effects and performed better than conventional medicine [WMD = -0.52, 95% CI (-0.79, -0.24), $P \leq 0.001$; Moderate-quality evidence]
- Vomiting
 - ginger had the same effect as drugs [SMD = 0.30, 95% CI (-0.12, 0.73), $P = 0.160$; Low-quality evidence].
- Visual analog scale (VAS) of nausea
 - ginger had a lower (more effective) score than placebo [WMD = -1.21, 95% CI (-2.34, -0.08), $P = 0.036$; Low-quality evidence].
- Antiemetic effects
 - ginger performed the same as placebo [WMD = 0.05, 95% CI (-0.23, 0.32), $P = 0.743$; Low-quality evidence].
- Antiemetic Drug Reduction
 - acupressure performed better than conventional medicine [SMD = -0.44, 95% CI (-0.77, -0.11), $P = 0.008$; Low-quality evidence]
- Safety: acupuncture shown to be “safer than conventional medicine or a placebo.”
- **Conclusion**: Acupuncture, acupressure, and ginger alleviated NVP.

Griffiths JD, Gyte GM, Popham PA, Williams K, Paranjothy S, Broughton HK, Brown HC, Thomas J. Interventions for preventing nausea and vomiting in women undergoing regional anaesthesia for caesarean section. *Cochrane Database Syst Rev.* 2021 May 18;5(5):CD007579. doi: 10.1002/14651858.CD007579.pub3. ¹⁶⁹

- **Systematic Review**: review of databases (Cochrane Pregnancy and Childbirth's Trials Register, ClinicalTrials.gov and the WHO International Clinical Trials Registry Platform (ICTRP)) through April 16, 2020, for randomized controlled trials (RCTs) involving pharmacological and non-pharmacological interventions versus placebo or no intervention for nausea/vomiting during anesthesia for cesarean section.
- **Meta-Analysis**: 69 studies involving 8,928 female participants contributed data
- **Risk Assessment**: independently assessment for risk of bias by study authors
- **Primary Outcomes**: “intraoperative and postoperative nausea and vomiting”
- **Evidence Certainty Assessment**: GRADE
- **Results**
 - Overall evidence certainty: moderate to very low based on GRADE
 - 5-HT₃ antagonists
 - may reduce intraoperative nausea (average risk ratio (aRR) 0.55, 95% confidence interval (CI) 0.42 to 0.71, 12 studies, 1419 women, low-certainty evidence)



- possible reduction in intraoperative vomiting based on uncertain evidence (aRR 0.46, 95% CI 0.29 to 0.73, 11 studies, 1414 women, very low-certainty evidence)
- likely “reduction in postoperative nausea” (aRR 0.40, 95% CI 0.30 to 0.54, 10 studies, 1340 women, moderate-certainty evidence)
- may reduce postoperative vomiting (aRR 0.47, 95% CI 0.31 to 0.69, 10 studies, 1450 women, low-certainty evidence)
- dopamine antagonists
 - “may reduce intraoperative nausea” based on “very uncertain” evidence (aRR 0.38, 95% CI 0.27 to 0.52, 15 studies, 1180 women, very low-certainty evidence)
 - “may reduce intraoperative vomiting” (aRR 0.41, 95% CI 0.28 to 0.60, 12 studies, 942 women, low-certainty evidence)
 - may reduce postoperative nausea (aRR 0.61, 95% CI 0.48 to 0.79, 7 studies, 601 women, low-certainty evidence)
 - uncertain evidence for reduction in postoperative vomiting (aRR 0.63, 95% CI 0.44 to 0.92, 9 studies, 860 women, very low-certainty evidence)
- corticosteroids
 - possible reduction of intraoperative nausea based on uncertain evidence (aRR 0.56, 95% CI 0.37 to 0.83, 6 studies, 609 women, very low-certainty evidence)
 - possible reduction of intraoperative vomiting based on uncertain evidence (aRR 0.52, 95% CI 0.31 to 0.87, 6 studies, 609 women, very low-certainty evidence)
 - likely reduction in postoperative nausea (aRR 0.59, 95% CI 0.49 to 0.73, 6 studies, 733 women, moderate-certainty evidence)
 - “may reduce postoperative vomiting” (aRR 0.68, 95% CI 0.49 to 0.95, 7 studies, 793 women, low-certainty evidence).
- antihistamines
 - low/no effect on intraoperative nausea (RR 0.99, 95% CI 0.47 to 2.11, 1 study, 149 women, very low-certainty evidence)
 - low/no effect on intraoperative vomiting (no events in the one study of 149 women).
 - “may reduce postoperative nausea” (aRR 0.44, 95% CI 0.30 to 0.64, 4 studies, 514 women, low-certainty evidence)
 - uncertain reduction of postoperative vomiting (average RR 0.48, 95% CI 0.29 to 0.81, 3 studies, 333 women, very low-certainty evidence).
- anticholinergics



- “may reduce intraoperative nausea” (aRR 0.67, 95% CI 0.51 to 0.87, 4 studies, 453 women, low-certainty evidence)
- low/no effect on intraoperative vomiting (aRR 0.79, 95% CI 0.40 to 1.54, 4 studies; 453 women, very low-certainty evidence)
- “may reduce postoperative vomiting” (aRR 0.55, 95% CI 0.41 to 0.74, 1 study, 161 women, low-certainty evidence)
- sedatives
 - likely decrease intraoperative nausea (aRR 0.65, 95% CI 0.51 to 0.82, 8 studies, 593 women, moderate-certainty evidence)
 - likely decrease intraoperative vomiting (aRR 0.35, 95% CI 0.24 to 0.52, 8 studies, 593 women, moderate-certainty evidence).
 - uncertain reduction of postoperative nausea (aRR 0.25, 95% CI 0.09 to 0.71, 2 studies, 145 women, very low-certainty evidence)
 - “may reduce postoperative vomiting” (aRR 0.09, 95% CI 0.03 to 0.28, 2 studies, 145 women, low-certainty evidence)
- opioid antagonists
 - “no studies assessing intraoperative nausea or vomiting”
 - likely low/no effect on postoperative nausea (aRR 0.75, 95% CI 0.39 to 1.45, 1 study, 120 women, low-certainty evidence)
 - likely low/no effect on postoperative vomiting (aRR 1.25, 95% CI 0.35 to 4.43, 1 study, 120 women, low-certainty evidence)
- acupuncture/acupressure
 - may reduce intraoperative nausea based on uncertain evidence (aRR 0.55, 95% CI 0.41 to 0.74, 9 studies, 1221 women, very low-certainty evidence)
- acupressure
 - “may reduce intraoperative vomiting” (aRR 0.52, 95% CI 0.33 to 0.80, 9 studies, 1221 women, low-certainty evidence)
 - uncertain reduction of postoperative nausea (aRR 0.46, 95% CI 0.27 to 0.75, 7 studies, 1069 women, very low-certainty evidence)
 - uncertain reduction of postoperative vomiting (aRR 0.52, 95% CI 0.34 to 0.79, 7 studies, 1069 women, very low-certainty evidence)
- ginger
 - uncertain effects on intraoperative nausea (aRR 0.66, 95% CI 0.36 to 1.21, 2 studies, 331 women, very low-certainty evidence)
 - uncertain effects upon intraoperative vomiting (aRR 0.62, 95% CI 0.38 to 1.00, 2 studies, 331 women, very low-certainty evidence)



- uncertain effects upon postoperative nausea (aRR 0.63, 95% CI 0.22 to 1.77, 1 study, 92 women, very low-certainty evidence)
- uncertain effects upon postoperative vomiting (aRR 0.20, 95% CI 0.02 to 1.65, 1 study, 92 women, very low-certainty evidence).
- **Conclusions:** “5-HT₃ antagonists, dopamine antagonists, corticosteroids, sedatives and acupressure probably or possibly have efficacy in reducing nausea and vomiting in women undergoing regional anaesthesia for caesarean section. However the certainty of evidence varied widely and was generally low.”

Lu H, Zheng C, Zhong Y, Cheng L, Zhou Y. Effectiveness of acupuncture in the treatment of hyperemesis gravidarum: a systematic review and meta-analysis. *Evid Based Complement Alternat Med.* 2021 Jul 27;2021:2731446. doi: 10.1155/2021/2731446. eCollection 2021. ¹⁷⁰

- **Systematic Review:** Review of databases (PubMed, the Cochrane Library, EMBASE, Web of Science, China National Knowledge Infrastructure (CNKI), Chinese Biological Medical (CBM), Wanfang Database, and China Science and Technology Journal (VIP)) through January 20, 2021, for published randomized controlled trials (RCT's) and searched grey literature (Chinese Cochrane Center, Chinese Clinical Trial Registry, GreyNet International, Open Grey) through January 20, 2021, for literature involving acupuncture to treat hyperemesis gravidarum (HG)
- **Quality Evaluation:** two independent authors using Cochrane Handbook 5.1.0 and Review Manager 5.2 software
- **Data Analysis:** Review Manager 5.2 and STATA 12.0 software
- **Heterogeneity Analysis:** Cochran Chi-square test and *I*² statistic.
- **Publication Bias:** Egger's tests together with funnel plots were used to identify publication bias.
- **Meta-Analysis:** 16 studies involving 1,043 participants
- **Results:**
 - **acupuncture “significantly higher effective rate” compared with conventional treatment** (OR: 8.11, 95% CI: 5.29~12.43; *P* < 0.00001)
 - acupuncture participants had “a higher conversion rate of urine ketone” (RR: 1.36, 95% CI: 1.15~1.60; *P*=0.0003)
 - acupuncture participants had improved nausea and vomiting (OR: 26.44, 95% CI: 3.54~197.31; *P*=0.001)
 - acupuncture participants had “relatively higher improvement rate of food intake” (RR: 1.17, 95% CI: 1.01~1.36; *P*=0.04)
 - acupuncture patients had “shortened hospitalization time and manifested with a lower pregnancy termination rate and fewer adverse events.”



- “No statistical variation in the improvement of nausea intensity, vomiting episodes, and lassitude symptom, recurrence rate, and serum potassium was observed.”
- **Conclusion:** “Our study suggested that acupuncture was effective in treating HG. However, as the potential inferior quality and underlying publication bias were found in the included studies, there is a need for more superior-quality RCTs to examine their effectiveness and safety.”

e. Acupuncture for Gastrointestinal Symptoms During Cancer

Yan Y, López-Alcalde J, Zhang L, Siebenhüner AR, Witt CM, Barth J. Acupuncture for the prevention of chemotherapy-induced nausea and vomiting in cancer patients: a systematic review and meta-analysis. *Cancer Med.* 2023 Jun;12(11):12504-12517. doi: 10.1002/cam4.5962. Epub 2023 May 24. doi: 10.1002/cam4.5962. ¹⁷¹

- **Systematic Review:** Review of databases (MEDLINE, EMBASE, Cochrane CENTRAL, CINAHL, Chinese Biomedical Literature Database, VIP Chinese Science and Technology Periodicals Database, China National Knowledge Infrastructure, and Wanfang) for randomized controlled trials (RCTs) involving acupuncture, sham acupuncture, or usual care (UC) for the treatment of for the prevention of chemotherapy-induced nausea and vomiting (CINV).
Primary Outcome: “complete control (no vomiting episodes and/or no more than mild nausea) of CINV.”
- **Meta-Analysis:** 38 RCTs involving 2,503 patients included for analysis
- **Certainty of Evidence Assessment:** GRADE
- **Results:**
 - **Acupuncture plus usual care (UC)** vs UC alone improved control of acute vomiting (RR, 1.13; 95% CI, 1.02 to 1.25; 10 studies)
 - **Acupuncture plus usual care (UC)** vs US alone improved control of delayed vomiting (RR, 1.47; 95% CI, 1.07 to 2.00; 10 studies)
 - Certainty of evidence: low or very low.
 - Exploratory moderator analysis: “adequate reporting of planned rescue antiemetics might decrease the effect size of complete control of acute vomiting ($p = 0.035$)”
- **Conclusion:** “*Acupuncture in addition to usual care may increase the complete control of chemotherapy-induced acute vomiting and delayed vomiting but the certainty of evidence was very low.*”



Yao Z, Xu Z, Xu T, Liu X, Xu S, Wan C, Zhou X. Moxibustion for alleviating chemotherapy-induced gastrointestinal adverse effects: a systematic review of randomized controlled trials. *Complement Ther Clin Pract.* 2022 Feb;46:101527. doi: 10.1016/j.ctcp.2021.101527. Epub 2022 Jan 5. ¹⁷²

- **Systematic Review:** Search of 7 databases searched through August 28, 2021, for randomized controlled trials (RCTs) involving moxibustion for chemotherapy side-effects of gastrointestinal issues
- **Meta-Analysis:** 32 randomized controlled trials (RCTs) involving 2,990 participants
- **Outcome Measures:** Karnofsky performance status (KPS), quality of life scores, incidence of moxibustion-related adverse events
- **Results:**
 - moxibustion significantly reduced nausea/vomiting vs controls (RR 0.70, 95% CI 0.61-0.79)
 - moxibustion significantly reduced severe nausea/vomiting vs controls (RR 0.39, 95% CI 0.29-0.51)
 - moxibustion significantly reduced the incidence of diarrhea (RR 0.56, 95% CI 0.38-0.82), constipation (RR 0.59, 95% CI 0.44-0.78)
 - moxibustion significantly reduced the incidence of abdominal distension (RR 0.60, 95% CI 0.46-0.78)
 - moxibustion significantly improved KPS scores (MD 7.53, 95% CI 3.42-11.64)
 - moxibustion significantly improved quality of life scores (MD 8.88, 95% CI 0.96-16.80)
 - moxibustion did not show benefit for lack of appetite (RR 0.69, 95% CI 0.40-1.22)
 - moxibustion did not show benefit for abdominal pain (RR 0.60, 95% CI 0.28-1.30).
- **Adverse Events:** mild
- **Evidence Quality:** moderate-to very-low-quality
- **Conclusions:** moxibustion is a safe treatment after chemotherapy to reduce nausea, vomiting, diarrhea, constipation, and abdominal distension, and improve “performance status and quality of life” in cancer patients. Effects upon abdominal pain and low appetite need to be supported with more evidence.

Zhang X-W, Hou W-B, Pu F-L, Wang X-F, Wang Y-R, Yang M, Cheng K, Wang Y-R, Yang M, Cheng K, Wang Y, Robinson N, Liu J-P. Acupuncture for cancer-related conditions: an overview of systematic reviews. *Phytomed.* 2022 Nov;106:154430. doi: 10.1016/j.phymed.2022.154430. Epub 2022 Sep 5. ¹⁷³



- **Study Design:** Systematic Review of Systematic Reviews
Methods: Systematic review of databases (Pubmed, Embase, the Cochrane Library, Web of Science, CNKI, VIP, Sinomed, Wanfang) through October 16, 2021, for systematic reviews (SRs) and randomized controlled trials (RCTs) involving acupuncture for cancer-related conditions. 51 studies included for either meta-analysis or qualitative analysis (narrative description) involving 35,733 participants
- **Methodological Quality/Risk of Bias Assessment:** AMSTAR 2 and ROBIS software tools
- **Results:**
 - Methodological quality: 1 high, 5 low, 45 very low.
 - Risk of Bias: 16 low risk of bias (31.37%); 35 high risk of bias (68.63%)
 - Acupuncture effectively treated the following cancer-related symptoms:
 - cancer-related pain (17 SRs, 80 RCTs)
 - fatigue (7 SRs, 18 RCTs)
 - insomnia (4 SRs, 10 RCTs)
 - quality of life (2 SRs, 15 RCTs)
 - chemotherapy-related symptoms:
 - nausea and vomiting (3 SRs, 36 RCTs)
 - bone marrow suppression (2 SRs, 21 RCTs)
 - Symptoms specific cancer-related conditions:
 - breast cancer-related menopause (3 SRs, 6 RCTs)
 - hot flashes (12 SRs, 13 RCTs)
 - arthralgia (5 SRs, 10 RCTs)
 - nasopharyngeal cancer-related dysphagia (1 SRs, 7 RCTs)
 - Acupuncture helped improve other conditions:
 - lymphoedema (3 SRs, 3 RCTs)
 - gastrointestinal function (5 SRs, 27 RCTs)
 - xerostomia (4 SRs, 7 RCTs).
 - Inconsistent results for the following:
 - chemotherapy-induced peripheral neuropathy (3 SRs, 6 RCTs)
 - depression and anxiety (3 SRs, 9 RCTs)
 - Adverse Events: “no severe adverse events related were reported.”
- **Conclusion:** “Evidence from SRs showed that *acupuncture is beneficial to cancer survivors with cancer-related pain, fatigue, insomnia, improved quality of life, nausea and vomiting, bone marrow suppression, menopausal symptoms, arthralgia, and dysphagia, and may also be potential for lymphoedema, gastrointestinal function, and xerostomia. For neuropathy, depression and anxiety, acupuncture should be used as an option based on individual conditions. Acupuncture is relatively safe without serious adverse events. More well-designed clinical trials of acupuncture are recommended on cancer-related depression and anxiety, arthralgia, xerostomia, gastrointestinal dysfunction and dysphagia.*”

Han C, Liu Y, Fan H, Li D, Guo N. Acupuncture relieves opioid-induced constipation in clinical cancer therapy – a meta-analysis and systematic review. *Clin Epidemiol.*



2021;13:907–919. ¹⁷⁴

- **Systematic Review:** Review of databases (Pubmed, Embase, Cochrane library, and Web of Science) of acupuncture for opioid analgesia-induced constipation
- **Meta-Analysis:** 5 RCTs involving 656 participants included for analysis
- **Results**
 - **acupuncture group**
 - 86% symptom remission, higher than control group (78.9%; RR, 1.10, 95% CI [1.03, 1.18])
 - lower “symptom scores, reporting on defecation, frequency, defecation straining, abdominal pain, defecation time, and stool property” vs controls (SMD) –2.21 [–4.15, –0.27].
 - high quality of life (QOL) (SMD, –0.43 [–0.83, –0.03])
 - reduced PAC-QOL scores vs control group with (SMD, –1.02 [–1.78, –0.26]).
- **acupuncture + drug therapy**
 - improved quality of life better (SMD, –1.77 [–2.51, –1.02]) (P < 0.05) than acupuncture alone
- **Conclusions:** acupuncture has therapeutic effects upon opioid-induced constipation. Acupuncture plus drugs improves outcomes.

f. Acupuncture for Gastrointestinal Symptoms During/After Surgery

McDonald J, Janz S. The acupuncture evidence project: a comparative literature review. Australian Acupuncture and Chinese Medicine Association. January 2017. ²

- 122 conditions reviewed
- “Evidence of effect” found for 117 conditions
- No evidence of effect found for five conditions
- Level of “evidence of effect” increased for 24 conditions over time
- **Positive acupuncture treatment effect** for eight conditions: low back pain, migraines, knee osteoarthritis, headache, post-operative pain, chronic allergic rhinitis, and both chemotherapy-induced and *post-operative nausea/vomiting*.
- **Cost-effectiveness** identified for 10 conditions: chronic pain, low back pain, migraine, neck pain, osteoarthritis, ambulatory anesthesia, depression, dysmenorrhea, headache, post-operative nausea and vomiting, and allergic rhinitis.
- **Evidence of safety** identified for 9 conditions: low back pain, migraine, knee osteoarthritis, prostatitis pain, chronic pelvic pain, ambulatory anesthesia, Alzheimer's disease, cancer-related psychological symptoms, depression, and allergic rhinitis.



- **Conclusions:** Acupuncture demonstrated a positive treatment effect for eight conditions: migraine prophylaxis, headache, chronic low back pain, allergic rhinitis, knee osteoarthritis, chemotherapy-induced nausea and vomiting, post-operative nausea and vomiting, and post-operative pain.

Huang W-H, Zhang J, Ding S-S, Xue J-J. Efficacy of acupuncture for nausea and vomiting after laparoscopic surgery: a systematic review and meta-analysis. *Asian J Surg.* 2023 Oct;46(10):4462-4464. doi: 10.1016/j.asjsur.2023.04.107. Epub 2023 May 5. ¹⁷⁵

- **Systematic Review/Meta-Analysis:** Review of databases resulted in selection of 16 randomized controlled trials (RCT's) involving 1,900 participants with post-operative nausea and vomiting (PONV) for analysis.
- **Treatment groups:** acupuncture (N=1,020) and control (N=880)
- **Results:**
 - 24 hour post-operative nausea and vomiting (PONV)
 - lower in acupuncture group vs control group (RR 1/4 0.52, 95% CI 0.43e0.62, P < 0.05)
 - 24 hour post-operative nausea and vomiting (PONV) scores
 - no significant differences between acupuncture and control (SMD 1/4 0.54, 95%CI -0.54e0.06, P > 0.05)
 - 24 hour post-operative antiemetic demand rate
 - no significant differences between acupuncture and control (RR 1/4 0.62,95% CI 0.33e1.15, P > 0.05)
 - 24 hour post-operative dizziness incidence rate
 - no significant differences between acupuncture and control (RR 1/4 0.56, 95% CI 0.25e1.24, P > 0.05)
- **Conclusions:** *“The results of this study suggest that in patients with laparoscopic PONV, acupuncture therapy may have a more positive effect on its reduced incidence.”*

Lu L, Xie C, Li X, Zhou Y, Yin Z, Wei P, Gao H, Wang J, Yong Y, Song J. Efficacy and safety of electrical acupoint stimulation for postoperative nausea and vomiting: a systematic review and meta-analysis. *PLoS One.* 2023 May 31;18(5):e0285943. doi: 10.1371/journal.pone.0285943. eCollection 2023. ¹⁷⁶

- **Systematic Review:** Review of databases (PubMed, Embase, Cochrane Library, Web of Science, and ClinicalTrials.gov) through March 19, 2020, for studies involving electrical acupoint stimulation for postoperative nausea and vomiting.
- **Meta-Analysis:** 26 studies involving 2,064 patients included for analysis
- **Results:**



- incidence of postoperative nausea and vomiting
 - electrical acupoint stimulation reduced the incidence when compared with control (RR 0.49, 95% CI 0.41 to 0.57, $P < 0.001$)
- postoperative nausea
 - electrical acupoint stimulation reduced the incidence when compared with control (RR 0.55, 95% CI 0.47 to 0.64, $P < 0.001$)
- postoperative vomiting
 - electrical acupoint stimulation reduced the incidence when compared with control (RR 0.56, 95% CI 0.45 to 0.70, $P < 0.001$)
- number of patients requiring antiemetic rescue
 - electrical acupoint stimulation reduced the number (RR 0.60, 95% CI 0.43 to 0.85, $P = 0.004$).
- adverse events: no differences among treatments were observed
- subgroup analysis: electroacupuncture and transcutaneous electrical acupoint stimulation (TEAS) had significant effects
 - electroacupuncture (RR 0.58, 95% CI 0.46 to 0.74, $P < 0.001$)
 - transcutaneous electrical acupoint stimulation (RR 0.44, 95% CI 0.34 to 0.58, $P < 0.001$)
- preoperative vs postoperative vs perioperative treatment: electrical acupoint stimulation was effective whether administered before, during, or after surgery
 - preoperatively (RR 0.40, 95% CI 0.27 to 0.60, $P < 0.001$)
 - postoperatively (RR 0.59, 95% CI 0.46 to 0.76, $P < 0.001$)
 - perioperatively (RR 0.50, 95% CI 0.37 to 0.67, $P < 0.001$)
- **Evidence quality**: moderate to low.
- **Conclusions**: “*Electrical acupoint stimulation probably reduce[s] the incidence of postoperative nausea and vomiting, postoperative nausea, postoperative vomiting, and reduce[s] the number of patients requiring antiemetic rescue, with few adverse events.*”

Han Z, Zhang X, Yang H, Yuan P, Wang H, Du G. Suggested electroacupuncture for postoperative nausea and vomiting: a comprehensive meta-analysis and systematic review of randomized controlled trials. *Med Sci Monit.* 2023 Oct 18;29:e941262. doi: 10.12659/MSM.941262. ¹⁷⁷

- **Systematic Review**: Review of databases (PubMed, Web of Science, and China National Knowledge Infrastructure (CNKI)) through October 1, 2016, for randomized controlled trials (RCT's) involving electroacupuncture for prevention of post-operative nausea and vomiting (PONV) after general anesthesia
- **Primary Outcomes**: PONV incidence



- **Secondary Outcomes:** “incidence of postoperative nausea (PON) at 6 h, postoperative vomiting (POV) at 6 h, and postoperative antiemetic requirement.”
- **Meta-Analysis:** 8 RCTs involving 899 participants included for analysis with RevMan 5.4.1 software.
- **Results:**
 - PONV occurrence rate
 - “no significant difference in between electroacupuncture and control groups” (OR=0.31, 95% CI [0.06, 1.49], P=0.14, I²=82%)
 - incidence of PON at 6 hour postoperative
 - electroacupuncture significantly reduced incidence compared with controls (OR=0.43, 95% CI [0.27, 0.67], P=0.0002, I²=0%)
 - incidence of POV at 6 hour postoperative
 - electroacupuncture significantly reduced incidence compared with controls (OR=0.38, 95% CI [0.23, 0.63], P=0.0001, I²=0%)
 - postoperative requirement for antiemetic medications
 - electroacupuncture significantly reduced requirement (OR=0.44, 95% CI [0.25, 0.78], P=0.005, I²=61%)
 - adverse events: reports from one study indicated that 3 patients experienced pain and itching at acupuncture sites that lasted less than 2 hours and 2 patients refused a second acupuncture treatment.
- **Conclusions:** “Based on current evidence, electroacupuncture significantly reduces the occurrence rate of PON and POV at 6 h after surgery and the use of antiemetic medication postoperatively.”

Gao N, Chen H, Wang Y, Guo Y, Liu Z, Wang W. Acupuncture to improve patient discomfort during upper gastrointestinal endoscopy: systematic review and meta-analysis. *Front Med (Lausanne)*. 2022 Jun 3;9:865035. doi: 10.3389/fmed.2022.865035. eCollection 2022.¹⁷⁸

- **Systematic Review:** review of 9 databases through June 2021 for randomized controlled trials (RCTs) involving acupuncture to reduce upper gastrointestinal endoscopy (UGE) discomfort
- **Analysis:** 23 RCT's involving 3,349 patients
- **Risk of Bias:** RevMan V.5.3
- **Treatment Groups:** acupuncture, topical pharyngeal anesthesia with lidocaine hydrochloride (TPALH)
- **Analysis Results:** **Acupuncture** (including manual acupuncture, electroacupuncture, auricular-plaster, superficial needle (SFN), acupressure) + **TPALH combined** “resulted



in greater improvements regarding visual analog scale (VAS) scores and the incidence of nausea and vomiting (INV)” vs TPALH alone.

- **Meta-analysis Results: significant improvement of VAS scores with superficial needle (SFN) + TPALH combined** vs sham SFN + TPALH (MD -1.11, 95% CI -1.52 to -0.70, $P < 0.00001$).
- **Adverse Events:** low
- **Risk of Bias:** medium-to-high
- **Conclusion:** “Acupuncture, as adjunctive therapy to TPA, may result in *less patient discomfort* than TPA alone.”

Zheng X-Z, Xiong Q-J, Liu D, Wei K, Lai Y. Effectiveness of acupuncture therapy on postoperative nausea and vomiting after gynecologic surgery: a meta-analysis and systematic review. *J Perianesth Nurs.* 2021 Oct;36(5):564-572. doi: 10.1016/j.jopan.2020.12.005. Epub 2021 Aug 14. ¹⁷⁹

- **Systematic Review:** review of databases (PubMed, EMBASE, Cochrane Library) through December 31, 2019, for randomized controlled trials (RCT’s) or prospective cohort studies involving acupuncture therapy (AT) on postoperative nausea and vomiting (PONV) after gynecologic surgery (GS)
- **Meta-Analysis:** 9 RCT’s and 1 prospective cohort study; total of 1,075 participants
- **Primary outcomes:** incidence of postoperative nausea (PON) and postoperative vomiting (POV)
- **Secondary Outcomes:** need for rescue antiemetics, side effects, patient satisfaction
- **Results:**
 - acupuncture “significantly reduced the risk” of developing postoperative nausea by 48% (relative risk = 0.52; 95% confidence interval, 0.44 to 0.61; $P < .00001$)
 - acupuncture “significantly reduced the risk” of developing postoperative nausea and postoperative vomiting by 48% 42% (relative risk = 0.58; 95% confidence interval, 0.49 to 0.68; $P < .00001$)
 - side effects: “no significant differences” ($P = .54$)
 - rescue antiemetic usage: acupuncture group had lower usage ($P < .00001$)
 - satisfaction with postoperative recovery: acupuncture group had higher satisfaction ($P < .0001$) “optimal therapeutic effect of AT on preventing PONV was achieved when the treatment time was controlled within 30 minutes and transcutaneous acupoint electrical stimulation was applied.”
- **Conclusion:** “*AT is an effective and safe physical therapy for the prophylaxis of PONV in patients undergoing GS.*”



Zhang Y, Zhang C, Yan M, Wang N, Liu J, Wu A. The effectiveness of PC6 acupuncture in the prevention of postoperative nausea and vomiting in children: a systematic review and meta-analysis. *Paediatr Anaesth.* 2020 May;30(5):552-563. doi: 10.1111/pan.13860. Epub 2020 Apr 22. ¹⁸⁰

- **Systematic Review:** Review of databases (MEDLINE, EMBASE, CENTRAL, Chinese Database of Biology and Medicine) searched until January 16, 2019, for randomized controlled trials (RCT's) involving acupuncture to prevent/treat postoperative (0-4 hours and 24-hours) nausea and vomiting in pediatric patients
- **Control groups:** “standardized care control or standardized care combined with sham control”
- **Meta-Analysis:** 16 studies involving 1,773 patients

Results:

- acupuncture reduced postoperative vomiting during 0-4 hours (RR = 0.47, 95% CI 0.26, 0.84; low quality)
- acupuncture reduced postoperative vomiting within 24 hours (RR = 0.74, 95% CI 0.60, 0.91; low quality)
- acupuncture reduced postoperative vomiting during 0-4 hours when performed before anesthesia (RR = 0.34, 95% CI 0.18, 0.64; moderate quality)
- acupuncture reduced postoperative vomiting during 0-24 hours when performed during anesthesia (RR = 0.81, 95% CI 0.70, 0.93; moderate quality)
- “RR value was more robust when acupuncture was performed before anesthesia.”
- acupuncture reduced 0-24 hours postoperative nausea (RR = 0.73, 95% CI 0.60, 0.88; moderate quality)
- acupuncture reduced “the utilization of remedies during the first 4 hours” (RR = 0.64, 95% CI 0.45, 0.89; moderate quality).
- **Conclusion:** “*Acupuncture reduces the incidence of postoperative nausea and vomiting* as well as the utilization of antiemetic remedies, particularly during the first 4 hours following the operation. Acupuncture performed before anesthesia was demonstrated to be the most ideal intervention time for children.”

Yin Z, Xiao Q, Xu G, Cheng Y, Yang H, Zhou J, Fu Y, Chen J, Zhao L, Liang F. Acupuncture for the postcholecystectomy syndrome: a systematic review and meta-analysis. *Evid Based Complement Alternat Med.* 2020 Jul 30;2020:7509481. doi: 10.1155/2020/7509481. eCollection 2020. ¹⁸¹

- **Systematic Review:** Review of databases (PubMed, Embase, Cochrane Library, Web of Science (WoS), Chinese databases (Chinese Biomedical Literature Database (CBM), China National Knowledge Infrastructure (CNKI), WanFang Database (WF), and China



Science and Technology Journal Database (VIP)), and other sources (WHO ICTRP, ChiCTR, Clinical Trials, and Grey Literature Database)) through February 1, 2020, for randomized controlled trials (RCTs) involving acupuncture to treat post-cholecystectomy syndrome (PCS)

- **Meta-Analysis:** RevMan 5.3 software; 14 studies involving 1,593 participants
- **Risk of Bias Assessment:** Cochrane Collaboration' risk of bias tool
- **Evidence Quality Assessment:** Grading of Recommendations Assessment, Development, and Evaluation (GRADE) approach
- **Results:**
 - “acupuncture in combination with conventional medicine (CM) did not show statistical differences in reduction in pain.”
 - **“acupuncture in combination with CM significantly reduced the incidence of postoperative nausea and vomiting (PONV)”** (RR, 0.71; 95% CI, 0.55-0.92)
 - **acupuncture in combination with CM significantly “improved gastrointestinal function recovery** compared to the CM group”
 - adverse events: “acceptable”
- **Conclusion:** “Acupuncture may be an effective and safe treatment for PCS. However, this study lacks conclusive evidence due to poor quality evidence, limited data, and clinical heterogeneity of acupuncture methods in the included studies.”

4. Acupuncture for Allergic Rhinitis

McDonald J, Janz S. The acupuncture evidence project: a comparative literature review. Australian Acupuncture and Chinese Medicine Association. January 2017.²

- 122 conditions reviewed
- “Evidence of effect” found for 117 conditions
- No evidence of effect found for five conditions
- Level of “evidence of effect” increased for 24 conditions over time
- **Positive acupuncture treatment effect** for eight conditions: low back pain, migraines, knee osteoarthritis, headache, post-operative pain, chronic allergic rhinitis, and both chemotherapy-induced and post-operative nausea/vomiting.
- **Cost-effectiveness** identified for 10 conditions: chronic pain, low back pain, migraine, neck pain, osteoarthritis, ambulatory anesthesia, depression, dysmenorrhea, headache, post-operative nausea and vomiting, and allergic rhinitis.
- **Evidence of safety** identified for 9 conditions: low back pain, migraine, knee osteoarthritis, prostatitis pain, chronic pelvic pain, ambulatory anesthesia, Alzheimer's disease, cancer-related psychological symptoms, depression, and allergic rhinitis.
- **Conclusions:** Acupuncture demonstrated a positive treatment effect for eight conditions: migraine prophylaxis, headache, chronic low back pain, allergic rhinitis, knee



osteoarthritis, chemotherapy-induced nausea and vomiting, post-operative nausea and vomiting, and post-operative pain.

Xiao Q, Ni Z, Wang R, Jiang W, Yuan J. Efficacy of acupuncture for allergic rhinitis in children: systematic review and meta-analysis with trial sequential analysis. *Int Forum Allergy Rhinol.* 2024 Jul 17. doi: 10.1002/alr.23414. ¹⁸²

- **Design:** Systematic Review and Meta-Analysis
- **Methods:** Literature search of 8 databases until August 27, 2023, for randomized controlled trials comparing acupuncture, acupuncture plus medication, or medication alone in children with allergic rhinitis.
- **Primary Outcome:** total nasal symptom score (TNSS)
- **Secondary Outcomes:** serum immunoglobulin E levels, relapse rates
- **Risk of Bias:** Cochrane Risk of Bias tool (version 5.1.0)
- **Quality Control:** Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)
- **Results:**
 - 13 studies involving 1,186 pediatric allergic rhinitis patients ages 3 and 14 years met inclusion criteria
 - “**acupuncture group (AC group) versus medication group (Med group)** shows no significant difference in the treatment of AR in children” (risk ratio [RR] = 1.10, 95% CI = 0.97 to 1.24, $p = 0.13$), while TSA suggested the included sample size did not exceed required information size (RIS).
 - “**Significant differences were found between the AC + Med group versus the Med group**” (RR = 1.29, 95% CI = 1.17 to 1.42, $p < 0.00001$), with sufficient sample size.
 - “Serum IgE [levels] after treatment which favored the Med group (MD = 51.94, 95% CI [22.24, 81.65], $p = 0.0006$).
 - “significant heterogeneity” for IgE level results
 - Relapse rate: “AC group had a lower relapse rate than the Med group” (RR = 0.40, 95% CI = 0.26-0.63, $p < 0.0001$).
- **Conclusions:** “*Acupuncture is an efficacious treatment for allergic rhinitis in children, but this conclusion might be limited by the generally low quality of evidence. TSA suggested additional high-quality trials with larger sample sizes and longer treatment durations were needed.*”

Tang M, Wang J, Zhang Q. Clinical efficacy of acupoint catgut embedding in the treatment of allergic rhinitis: a systematic review and meta-analysis. *Am J Otolaryngol.* 2024 Mar-Apr;45(2):104135. doi: 10.1016/j.amjoto.2023.104135. Epub 2023 Dec 12. ¹⁸³



- **Design:** Systematic Review and Meta-analysis.
- **Methods:** Literature search of databases (Pubmed, Web of Science, Embase, Elsevier, CNKI, and VIP) from database inception to December 30, 2022, for clinical randomized controlled trials (RCTs) involving acupoint catgut embedding for allergic rhinitis.
- **Meta-Analysis:** RevMan5.4 and Stata12 software used to analyze data
- **Results:**
 - 17 articles involving 1,231 patients met inclusion criteria
 - “total effective rate of acupoint catgut embedding for allergic rhinitis was higher than that of the control group” [Pooled Odds Ratio = 5.19, 95%CI (3.14, 8.58), $P < 0.00001$].
 - “total effective rate of acupoint catgut embedding in the treatment of allergic rhinitis was stable” according to sensitivity analysis.
 - “efficacy of the acupoint embedding group was better than that of the western medicine group” [OR = 5.78, 95%CI (3.25, 10.27), $P < 0.00001$].
 - “acupoint embedding decreased serum IL-33 levels” [MD = -70.79, 95%CI (-102.60, -38.98), $P < 0.0001$]
 - acupoint embedding showed a statistically significant improvement in TNNSS score compared with control group [MD = -0.25, 95%CI (-0.40, -0.11), $P = 0.0005$]
- **Conclusion:** “Acupoint catgut embedding in the treatment of allergic rhinitis has a certain effect, but the accuracy of this conclusion still needs to be verified by higher-quality RCT in the later stage.”

Du S-H, Guo W, Yang C, Chen S, Guo S-N, Du S, Du Z-M, Fei Y-T, Zhao J-P. Filiform needle acupuncture for allergic rhinitis: a systematic review and meta-analysis. *J Integr Med.* 2022 Nov;20(6):497-513. doi: 10.1016/j.joim.2022.08.004. Epub 2022 Aug 24. ¹⁸⁴

- **Design:** Systematic Review and Meta-Analysis
- **PROSPERO registration number:** CRD42020218745.
- **Methods:** Literature search of 8 electronic databases (PubMed, Embase, Cochrane Library, Web of Science, China National Knowledge Infrastructure (CNKI), Wanfang Data Journal Database (Wanfang), Chinese Science and Technology Journal Database (VIP), and Chinese Biomedical Literature Database (SinoMed)) from inception to October 14, 2021, for randomized controlled trials involving filiform needle acupuncture (FNA) treatment of allergic rhinitis (AR). “Additional studies were acquired from clinical trial registration platforms and reference lists.”
- **Treatment Groups:** filiform needle acupuncture (FNA), sham acupuncture, no treatment or conventional medication
- **Quality Control:** two researchers independently extracted data; results cross-checked



- **Primary Outcome:** symptom score (Total Nasal Symptom Score or Visual Analogue Scale)
- **Secondary Outcomes:** AR control questionnaire, quality of life (QoL) score (different versions of Rhinoconjunctivitis Quality of Life Questionnaire), medication score (use of rescue medication), mental health score, total IgE, adverse event rate, clinical economic indicators, and patient satisfaction scores
- **Quality Control:** Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)
- **Study Confidence:** GRADE approach
- **Statistics:** “Standardized mean difference (SMD) or mean difference (MD) with 95% confidence interval was used to calculate the effect size for continuous data, while risk ratio with 95% CI was used for dichotomous data.”
- **Heterogeneity:** I² statistic. “If I² ≥ 50%, the heterogeneity among studies was considered statistically significant.” When significant, sensitivity analyses used.
- **Publication Bias:** funnel plots and Egger’s test
- **Meta-Analysis:** 30 studies analyzed using ReviewManager 5.4.1 and Stata 12.0 software and qualitative methods
- **Results:**
 - 30 studies met inclusion criteria
 - **“FNA significantly reduced the symptom score”** vs sham acupuncture (SMD: -0.29 [-0.43, -0.15]), AR’s impact on QoL (SMD: -0.23 [-0.37, -0.08]) and medication score (SMD: -0.3 [-0.49, -0.11])
 - **“FNA dramatically reduced the symptom score”** versus no treatment control (SMD: -0.8 [-1.2, -0.39]) and AR’s impact on QoL (SMD: -0.82 [-1.13, -0.52]).
 - Patient Satisfaction: improved with FNA
 - Cost-Effective: FNA determined likely to be cost-effective
 - Evidence Levels: most were high confidence
 - Reduced Symptom Score: **“FNA significantly outperformed conventional medication”** (SMD: -0.48 [-0.85, -0.1])
 - Adverse Events: rates were similar among FNA, sham acupuncture, no treatment (rates lowest for FNA)
 - Evidence Quality: very low
- **Conclusions:** ***“FNA is an effective and safe intervention for AR and can help with symptom relief, QoL improvement, reducing medication usage, and increasing patient satisfaction.”*** Further studies are needed to verify its cost-effectiveness and superiority over conventional medication and the best therapeutic strategies.”

He M, Qin W, Qin Z, Zhao C. Acupuncture for allergic rhinitis: a systematic review and meta-analysis. *Eur J Med Res.* 2022 Apr 25;27(1):58. doi: 10.1186/s40001-022-00682-3. ¹⁸⁵



- **Design:** Systematic Review and Meta-Analysis
- **Methods:** Literature search of databases for randomized controlled trials (RCTs) involving acupuncture and other therapies treatment for allergic rhinitis
- **Quality Control:** Cochrane methodology standard and statistical analysis using trial sequential analysis
- **Publication Bias:** funnel plot
- **Heterogeneity:** I² statistic; “estimate ≤50% accompanied by a statistically significant Chi² statistic (p<0.1) was interpreted as evidence of substantial levels of heterogeneity”
- **Meta-Analysis:** 27 trials pooled for meta-analysis according to random-effect model; primary outcome analyzed using trial sequential analysis (TSA); dichotomous outcomes: required information size (RIS) calculated using control group risk of an event” and relative risk reduction of 20%, 2-sided alpha (0.05) and beta of (0.20) // 30 studies included in qualitative analysis
- **Results:**
 - 30 trials with 4,413 participants met inclusion criteria
 - “Acupuncture improved the nasal symptoms on Total Nasal Symptom Score (TNSS) and quality of life measured by Rhinoconjunctivitis Quality of Life Questionnaire (RQLQ) in adults with AR, compared to acupuncture with no intervention.”
 - Acupuncture was more effective than sham acupuncture for nasal symptoms (RQLQ subscale, n = 489, MD - 0.60, 95% CI - 1.16 to - 0.04)
 - Acupuncture was more effective than sham acupuncture for quality of life (RQLQ, n = 248, - 8.47 95% CI - 14.91, - 2.03).
 - “No clear difference was observed between acupuncture and cetirizine or loratadine.”
 - “Trial sequential analysis (TSA) failed to confirm the aforementioned results.”
 - “Effect of acupuncture for children/adolescents with AR remains unclear due to” insufficient data, performance bias, attrition bias, and potentially selection bias
- **Conclusion:** “*Acupuncture may have an advantage over no intervention and sham acupuncture in improving nasal symptoms and quality of life* for adults with AR. The *effect of acupuncture and cetirizine or loratadine for AR may be similar*. Additional trials are necessary to confirm these results.”

Mengxia S, Wenfang S, Jiangxia WU, Zelin YU, Lihua X. Efficacy and safety of acupoint application for allergic rhinitis: a systematic review and meta-analysis of randomized controlled trials. *J Tradit Chin Med.* 2022 Dec;42(6):858-868. doi: 10.19852/j.cnki.jtcm.2022.06.003. ¹⁸⁶

- **Design:** Systematic Review and Meta-Analysis



- **Methods:** Literature search of 7 databases (PubMed, Cochrane, Embase, China National Knowledge Infrastructure, Wanfang Database, China Science and Technology Journal Database, China Biology Medicine disc) and the international clinical trial registration platform from January 2010 to March 2020 for randomized controlled trials (RCTs) involving acupoint application (AA) for allergic rhinitis (AR)
- **Treatment Groups:** AA versus placebo, AA vs Western Medicine or other alternative therapies
- **Quality Control:** 2 independent reviewers
- **Risk of Bias:** Cochrane Collaboration’s Risk of Bias Assessment tool
- **Heterogeneity:** “ $I^2 > 50\%$ was considered substantial heterogeneity.” If so, random effect model used; if not, fixed effects model used
- **Evidence Quality:** Grading of Recommendations Assessment Development and Evaluation (GRADE)
- **Meta-Analysis:** RevMan 5.3 software used to analyze data from 28 RCTs involving 3,282 participants // 28 studies also included in qualitative analysis
- **Outcomes:** total effective rate, recurrence rate, total nasal symptom score (TNSS), visual analogue scale (VAS), quality of life measured by the Rhinitis Quality of Life Questionnaire (RQLQ) or Short Form-36 (SF-36), adverse events, and biomarkers including immunoglobulin E (IgE), peripheral blood eosinophil count (EOS), interleukin-4 (IL-4), interferon gamma (INF- γ), safety
- **Results:**
 - 28 RCTs involving 3,282 participants met inclusion criteria
 - “The short-term and long-term efficacy of AA was significantly better than placebo” for the following measures:
 - higher total effective rate [: 3.05, 95% (1.84, 5.07), after treatment; : 9.29, 95% (2.57, 33.66), at 6 months]
 - lower recurrence rate [: 0.55, 95% (0.45, 0.66), at 6 months; : 0.65, 95% (0.57, 0.74), at 1 year] lower TNSS [: -3.09, 95% (-3.58, -2.61), after treatment]
 - lower RQLQ [: -14.79, 95% (-21.49, -8.10), after treatment; : -11.92, 95% (-17.40, -6.45), at 4-6 months]
 - “AA had better long-term total effective rate” vs western medicine [: 1.33, 95%CI (1.05, 1.69), at 3 months; : 1.49, 95% 1.22 to 1.81, at 1 year]
 - AA had lower recurrence rate vs western medicine [: 0.48, 95% (0.39, 0.58), at 6 months; : 0.45, 95% (0.33, 0.60), at 1 year]
 - “AA had better long-term total effective rate versus acupuncture” [: 2.06, 95% (1.28, 3.31), at 1 year] or oral Chinese medicine [: 1.21, 95% (1.09, 1.34), ≥ 6 months].



- **AA and Western Medicine** reduced post-treatment serum levels of IgE, EOS, and IL-4
- Adverse Event: AA caused some “local skin reaction without systemic side effects”
- **Conclusions:** “*The short-term (within one month) and long-term (at 3 months, 6 months and 1 year) efficacy of acupoint application on AR was better than that of placebo.* The long-term efficacy of acupoint application was superior to that of Western Medicine (at 3 months, 6 months and 1 year), oral Chinese medicine (at more than 6 months) and acupuncture (at 1 year). AA can reduce serum IgE, EOS, and IL-4 level[s] of AR patients in a short run. Acupoint application is safe, but severe skin reactions can reduce patient compliance.”

Sun Z-R, Wang C-B, Yin H-N, Luan Y-X, Liu Y-X, Gong R-Q, Gong N, Wang B-L-G, Miao C-X. [Network Meta-analysis of acupuncture and moxibustion for allergic rhinitis]. *Zhongguo Zhen Jiu.* 2021 Nov 12;41(11):1295-302. doi: 10.13703/j.0255-2930.20200916-0002. ¹⁸⁷

- **Design:** Systematic Review and Network Meta-Analysis
- **Methods:** Literature search of databases (PubMed, EMbase, Cochrane Library, CNKI, Wanfang VIP) from inception to August 17, 2020 for randomized controlled trials involving acupuncture and moxibustion for treatment of allergic rhinitis
- **Meta-Analysis and Network Meta-Analysis:** RevMan5.3 and GeMTC0.14.3 used to analyze data from 50 RCTs involving 4,260 patients
- **Results:**
 - 50 RCTs involving 4,260 patients and 5 acupuncture and moxibustion therapies (acupuncture, moxibustion, acupoint application, acupoint thread-embedding and auricular point therapy) met inclusion criteria
 - total effective rate:
 - “acupuncture, moxibustion and acupoint thread-embedding were **superior to western medication** and auricular point therapy” ($P<0.05$)
 - “moxibustion was superior to acupoint application” ($P<0.05$)
 - “acupoint thread-embedding was superior to acupoint application” ($P<0.05$)
 - “acupoint thread-embedding was most likely to be the best treatment” ($P<0.05$).
 - total effective rate at follow-up:



- “acupuncture, moxibustion, acupoint thread-embedding and auricular point therapy were **superior to western medication**” ($P<0.05$)
- “acupuncture and moxibustion were superior to acupoint application” ($P<0.05$).
- “moxibustion was most likely to be the best treatment” ($P<0.05$).
- total nasal symptom score: moxibustion and acupoint thread-embedding were superior to acupuncture ($P<0.05$).
- **Conclusion:** “*The therapeutic effect of acupuncture and moxibustion on allergic rhinitis is better than western medication, and acupoint thread-embedding has the best curative effect.*”

Yin Z, Geng G, Xu G, Zhao L, Liang F. Acupuncture methods for allergic rhinitis: a systematic review and bayesian meta-analysis of randomized controlled trials. *Chin Med.* 2020 Oct 12;15:109.doi: 10.1186/s13020-020-00389-9. ¹⁸⁸

- **Design:** Systematic Review and Bayesian Meta-Analysis
- **Methods:** Literature search of databases (PubMed, Embase, Cochrane library, Web of Science, CNKI, WF, VIP, CBM, AMED) plus “related registration platforms” for relevant reports published from inception to 1 July 2020 in several scientific databases
- **Primary Outcomes:** nasal symptoms
- **Meta-Analysis:** 39 studies with 3,433 participants analyzed using RevMan, ADDIS, and STATA software with statistical “intra-class correlation coefficient”
- **Results:**
 - 39 studies with 3,433 participants met inclusion criteria
 - “all acupuncture types were superior to sham acupuncture in terms of total nasal symptom score and rhinoconjunctivitis quality of life questionnaire”
 - moxibustion: “most effective intervention as it reduced nasal symptoms in 6 treatments.”
 - “**manual acupuncture plus conventional medicine** was recommended as the most effective intervention in improving the quality of life in 9 treatments”
 - “moxibustion was recommended as the most effective intervention that changed the content of IgE in 9 treatments”
 - adverse Events: “acceptable”
 - study Quality: moderate
- **Conclusion:** “All acupuncture methods are effective and safe for AR. Moreover, either moxibustion or manual acupuncture plus conventional medicine are potentially the most effective treatment strategies for AR. Based on these findings, it is evident that acupuncture therapy is not inferior to pharmacologic therapy. Therefore, for AR patients



who are either unresponsive to conventional medicine or are intolerant to adverse events, acupuncture therapy should be administered”

Feng S, Han M, Fan Y, et al. Acupuncture for the treatment of allergic rhinitis: a systematic review and meta-analysis. *Am J Rhinol Allergy*. 2015;29(1):57-62. ¹⁸⁹

- **Study:** Systematic review of PubMed, EMBASE, Cochrane, and China National Knowledge Infrastructure 1980 - July 11, 2013 for randomized controlled trials (RCTs); meta-analysis of 13 studies involving 2,365 participants with allergic rhinitis (AR)
- **Interventions:** acupuncture (n = 1,126) vs control (n = 1,239)
- **Outcome Assessments:** efficacy, safety
- **Results:** acupuncture significantly > control
 - Nasal symptom scores (weighted mean difference [WMD]: -4.42, 95% confidence interval [CI]: -8.42 to -0.43, p = 0.03)
 - Medication scores (WMD: 1.39, 95% CI: -2.18 to -0.61, p = 0005)
 - Serum IgE (WMD: -75.00, 95% CI: -91.17 to -58.83, p < 0.00001).
 - Rhinitis Quality of Life Questionnaire (RQLQ) and 36-Item Short-Form (SF-36) scores “ultimately point to the efficacy of acupuncture treatment in improving quality of life in AR patients.”
 - Safety: “no serious systemic reaction[s]” or fatalities
- **Conclusion:** “*Our meta-analysis suggests that acupuncture could be a safe and valid treatment option for AR patients.*”

5. Acupuncture for Substance Use Reduction

a. Acupuncture for General Substance Use Reduction

Dowell D, Ragan KR, Jones CM, Baldwin GT, Chou R. CDC Clinical Practice Guideline for Prescribing Opioids for Pain — United States, 2022. *MMWR Recomm Rep* 2022;71(No. RR-3):1–95. doi:<http://dx.doi.org/10.15585/mmwr.rr7103a1>. ⁵

- **Purpose:** To provide *clinical recommendations for adult (≥18 years) pain care, including opioid prescriptions*. This document “updates the CDC Guideline for Prescribing Opioids for Chronic Pain — United States, 2016 (*MMWR Recomm Rep* 2016;65[No. RR-1]:1–49) and includes recommendations for managing acute (duration of <1 month), subacute (duration of 1–3 months), and chronic (duration of >3 months) pain.
- **Four Main Focus Areas:**
 - 1) ascertaining choice to use opioids



- 2) choosing opioids and “determining opioid dosages”
 - 3) “deciding duration of initial opioid prescription and conducting follow-up”
 - 4) “assessing risk and addressing potential harms of opioid use.”
- **Evidence Quality:** Grading of Recommendations Assessment, Development, and Evaluation (GRADE) framework (consider scientific evidence, benefits and harms, patient/clinician values/preferences, resources)
 - **Consulting Bodies:** Board of Scientific Counselors of the National Center for Injury Prevention and Control (a federally chartered advisory committee), the public, and peer reviewers
 - **Results:**
 - “CDC recommends that persons with pain receive appropriate pain treatment, with careful *consideration of the benefits and risks of all treatment options* in the context of the patient’s circumstances. Recommendations *should not be applied as inflexible standards* of care across patient populations. This clinical practice guideline is intended to improve communication between clinicians and patients about the benefits and risks of pain treatments, including opioid therapy; improve the effectiveness and safety of pain treatment; mitigate pain; improve function and quality of life for patients with pain; and reduce risks associated with opioid pain therapy, including opioid use disorder, overdose, and death.”
 - Acupuncture is recommended multiple times in the 2022 guidelines (versus 0 times in the 2016 guidelines) as a non-pharmacological pain-management option for the following conditions:
 - acute low back pain
 - low back pain
 - chronic pain
 - neck pain
 - knee osteoarthritis

b. Acupuncture for Opioid Use Reduction During/After Surgical Procedures

Yang Y, Ji H, Lu Y, Hong J, Yang G, Kong X, Liu J, Ma X. Sedative-sparing effect of acupuncture in gastrointestinal endoscopy: systematic review and meta-analysis. *Front Med (Lausanne)*. 2023 Jun 16;10:1189429. doi: 10.3389/fmed.2023.1189429. eCollection 2023.¹⁹⁰

- **Systematic Review:** Review of databases (PubMed, Embase, Web of Science, Cochrane Library, Chinese Biomedical Databases (CBM), Wanfang database, China National Knowledge Infrastructure (CNKI), SinoMed, and Chinese Scientific Journal Database (VIP)) through November 5, 2022, for randomized controlled trials (RCTs) involving



acupuncture for gastrointestinal endoscopy with propofol sedative
Meta-Analysis: 10 studies involving 1,331 participants included for analysis

- **Treatments:** acupuncture, placebo, sham acupuncture, or sedative only
- **Bias Assessment:** Cochrane risk-of-bias tool
- **Statistics, Sensitivity Analysis, and Bias Analysis:** Stata 16.0 software
- **Primary Outcome:** sedative consumption
- **Secondary Outcomes:** adverse event incidence and wake-up time
- **Results:**
 - sedative consumption significantly lower in acupuncture group vs control group [mean difference (MD) = -29.32, 95% CI (-36.13, -22.50), $P < 0.001$]
 - wake-up time significantly lower in acupuncture group vs control group [MD = -3.87, 95% CI (-5.43, -2.31), $P < 0.001$]
 - incidence of adverse events (hypotension, nausea, vomiting, coughing) significantly lower in acupuncture group vs control group ($P < 0.05$)
- **Conclusion:** “Acupuncture combined with sedation reduces sedative consumption and wake-up time compared with sedation alone in gastrointestinal endoscopy; this combined approach allows patients to regain consciousness more quickly after examination and lower the risk of adverse effects.”

Cheng SI, Kelleher DC, DeMeo D, Zhong H, Birch G, Ast MP. Intraoperative acupuncture as part of a multimodal analgesic regimen to reduce opioid usage after total knee arthroplasty: a prospective cohort trial. *Med Acupunct.* 2022; 34(1). doi: 10.1089/acu.2021.0072.¹⁹¹

- **Study:** 41 patients participated in this study received electro-auricular (ear) acupuncture intraoperatively as part of an analgesia protocol for total knee arthroplasty surgery
- **Results:**
 - 26/40 (65%) participants maintained low-dose opioid intake.
 - 3/40 (7%) participants were opioid-free for 30 days.
 - 40/40 (100%) of participants were opioid-free after 30 days.
- **Conclusion:** Electro-auricular acupuncture reduced the need for opioids after total knee arthroplasty surgery.

Pham T, Ma O, Agiro A, Bukowiec J, Flannery T. Do acupuncture services reduce subsequent utilization of opioids and surgical interventions compared to noninvasive therapies among patients with pain conditions? *Pain Med.* 2021;22(11):2754-2762. doi: 10.1093/pm/pnab187.¹⁹²

- **Study:** retrospective observational study of administrative claims from large commercial insurance plans involving 52,346 patients treated with either acupuncture or



non-steroidal anti-inflammatory drugs (NSAIDs) or physical therapy (PT)

- **Results:** Acupuncture treatment group resulted in **lower patient use of post-index opioid use** for those “with ($P < .001$) and without ($P < .001$) baseline opioid use.”
- Acupuncture use resulted in a **lower number of emergency department visits** ($P < .001$).
- A **small increase in invasive surgical procedures** occurred with the acupuncture group ($P = .006$).
- Acupuncture use resulted in **higher total medical and pharmacy costs** ($P = .006$).
- **Conclusion:** *Acupuncture reduced opioid use and emergency department visits.*

Han C, Liu Y, Fan H, Li D, Guo N. Acupuncture relieves opioid-induced constipation in clinical cancer therapy - a meta-analysis and systematic review. *Clin Epidemiol.* 2021 Oct 2;13:907-919. doi: 10.2147/CLEP.S324193. PMID: 34629905; PMCID: PMC8495145. ¹⁹³

- **Study:** systematic review of PubMed, Embase, Cochrane, and Web of Science; meta-analysis of 5 randomized controlled trials (RCTs) involving participants with opioid-induced constipation (OIC)
- **Treatments:** acupuncture alone or plus medication in OIC patients were included.
- **Outcomes:** symptom scores (defecation frequency, defecation straining, abdominal pain, defecation time, and stool property); quality of life (QOL) scores
- **Results:** “An overall remission rate of 86.8% in the acupuncture-treated group was achieved, higher than the control group (78.9%; RR, 1.10, 95% CI [1.03, 1.18]).”
- acupuncture group:
 - symptom scores lower: standardized mean difference (SMD) of -2.21 [$-4.15, -0.27$].
 - quality of life (QOL) higher as shown by reduced PAC-QOL scores (SMD, -1.02 [$-1.78, -0.26$]).
- **acupuncture + medication:**
 - greater quality of life: (SMD, -1.77 [$-2.51, -1.02$]) ($P < 0.05$)
- **Conclusions:** “*Our data confirmed the therapeutic effects of acupuncture in the treatment of OIC. The co-intervention of acupuncture with drugs improves the outcomes of OIC patients better than a single strategy.*”

Tedesco D, Gori D, Desai KR, Asch S, Carroll IR, Curtin C, McDonald KM, Fantini MP, Hernandez-Boussard T. Drug-free interventions to reduce pain or opioid consumption after total knee arthroplasty: a systematic review and meta-analysis. *JAMA Surg.* 2017; 152(10): e172872. doi: [10.1001/jamasurg.2017.2872](https://doi.org/10.1001/jamasurg.2017.2872). ¹⁹⁴

- **Study:** 39 randomized clinical trials involving 2,391 patients were included.
- **Results:** There was **moderate certainty evidence** that **electrotherapy reduced opioid**



use from -5.90 to -1.10 mg/kg morphine equivalents per 48 hours (P = .004).

- There was **moderate yet statistically significant evidence** that **acupuncture delayed opioid use** (P < .001).
- There was **low certainty yet statistically significant evidence** for **acupuncture reducing pain** (P = .003).
- **Conclusions:** *Electrotherapy and acupuncture after total knee arthroplasty surgery are associated with reduced and delayed opioid consumption.*

Feeney C, Bruns E, LeCompte G, Forati A, Chen T, Matecki A. Acupuncture for pain and nausea in the intensive care unit: a feasibility study in a public safety net hospital. *JACM*. 2017. doi: 10.1089/acm.2016.0323. ¹⁹⁵

- **Study:** Prospective study to assess “the feasibility and acceptability of providing acupuncture treatment to relieve pain and nausea symptoms in [576] intensive care unit (ICU) patients” from November 14, 2014 through April 2015
 - 32.2% of 576 patients eligible for acupuncture
 - 42% of these received acupuncture
- **Treatments:** three 20-minute acupuncture sessions for pain and/or nausea plus usual care
- **Primary Outcomes:** number of patients accepting acupuncture treatment, perceptions of acupuncture effects on pain and nausea, incidence of adverse events from acupuncture
- **Secondary Outcomes:** “medication use, ICU and hospital length of stay, and frequency and pattern of Traditional Chinese Medicine (TCM) diagnoses”
- **Results:**
 - 2.36 decrease in self-reported pain scores from baseline to immediately after treatment
 - Most patient reported experiencing reduced pain and anxiety
 - “No major adverse effects were reported.”
 - “Significant decrease in morphine usage after each treatment.” (p-value not reported)
 - Most common TCM diagnosis: Qi and Blood Stagnation
- **Conclusions:** *“Acupuncture is feasible, safe, and acceptable in an ICU setting by patients from diverse backgrounds.”*

c. Acupuncture for Opioid Addiction Treatment

Lee EJ. Effects of auriculotherapy on addiction: a systematic review. *J Addict Dis*. 2022;40(3):415-427. doi:10.1080/10550887.2021.2016011. ¹⁹⁶

- **Study:** systematic review of PubMed, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Medline for the randomized controlled trials (RCTs) involving auriculotherapy acupuncture for addiction from January 1, 1994, through March 31, 2021.



- **Meta-analysis** involving 36 studies
- **Results:**
 - Individual study quality evaluated using Cochrane risk of bias tool
 - moderate to high risk of bias
 - 4 studies earned low bias/high quality scores
 - 23/36 studies (64%) reported that auriculotherapy effectively treated “addiction such as opioids, cocaine, alcohol, heroin, nicotine, and gambling.”
 - Most common point combinations in 4/36 studies
 - Acupuncture: NADA protocol (Shenmen, Sympathetic, Liver, Lung, and Kidney)
 - Acupressure: Shenmen, Subcortex, Heart, Lung, and Liver

Wen H, Chen R, Zhang P, Wei X, Dong Y, Ge S, Luo W, Zhou Y, Xiao S, Lu L. Acupuncture for opioid dependence patients receiving methadone maintenance treatment: a network meta-analysis. *Front Psych.* 2021;12. doi: 10.3389/fpsyt.2021.767613. ¹⁹⁷

- **Systematic review:** 5 English and 3 Chinese databases through August 20, 2020, for studies involving the use of acupuncture to treat opioid dependence in patients receiving methadone maintenance treatment (MMT)
- **Meta-analysis:** pairwise, cumulative, and network meta-analyses of 20 trials involving 1,197 participants
- **Interventions:**
 - Western Medicine (WM) = methadone maintenance treatment (MMT)
 - Traditional Chinese medicine (TCM) and four types of acupuncture: manual acupuncture (MA), electro-acupuncture (EA), auricular acupuncture (AA), transcutaneous electrical acupoint stimulation (TEAS).
- **Study quality:** assessed using Cochrane risk of bias tool 5.1.0.
- **Primary Outcome:** recovery rate or effective rate
- **Secondary Outcome:** withdrawal symptoms scores as measured by the Modified Himmelsbach Opiate Withdrawal Scale (MHOWS)
- **Results:**
 - 20 trials included
 - None of included studies at low risk of bias
 - Pairwise meta-analysis results:
 - MHOWS: Manual acupuncture more effective than electroacupuncture, TEAS, and WM/MMT
 - electro-acupuncture mean difference (MD) (-6.15, 95% CI: -9.45 to -2.85, $P < 0.05$)
 - TEAS mean difference (MD) (-10.44, 95% CI: -16.11 to -4.77, $P < 0.05$)



- Methadone Maintenance Therapy (MMT)/western medicine (WM): mean difference (MD) (-8.59, 95% CI: -15.96 to -1.23, $P < 0.01$)
- network meta-analysis results:
 - effective rate: MA comparatively but not statistically more effective than WM/MMT (RR: 1.40, 95% CI: 1.05 to 1.99)
 - MHOWS
 - MA more effective than WM/MMT (MD: -5.74, 95% CI: -11.60 to -0.10)
 - TEAS more effective than WM (MD: -15.34, 95% CI: -27.34 to -3.46)
- **Conclusions:** “*acupuncture related-therapies may effectively be used for treating patients receiving MMT. ... manual acupuncture may be the best choice for opioid dependence among all kinds of acupuncture-related therapies.*”

Wen H, Wei X, Ge S, Zeng J, Luo W, Chen R, Dong Y, Xiao S, Lai Y, Lu L. Clinical and economic evaluation of acupuncture for opioid-dependent patients receiving methadone maintenance treatment: the integrative clinical trial and evidence-based data. *Front Public Health*. 2021;9:1-12. ¹⁹⁸

- **Study:** parallel arm randomized controlled trial (RCT) involving 123 patients receiving acupuncture and methadone maintenance treatment (MMT)
- **Results:** acupuncture + methadone maintenance treatment (MMT) significantly improved daily methadone dosage, visual analog scores (VAS), and Pittsburgh Sleep Quality Index (PSQI).
- Treatments shown to be “**economically efficient.**”
- **Quality-Adjusted Life Year (QALY)**, a generic measure that includes both quality and quantity of life, **and cost were higher for the treatment group** versus the control group.
- **Conclusions:** acupuncture serves as a **clinically effective, cost-effective** “adjuvant therapy” for MMT patients, “**reducing the dosage of methadone, improving drug cravings, and alleviating insomnia,**” as well as improving quality of life.

Jackson HJ, Walters J, Raman R. Auricular acupuncture to facilitate outpatient opioid weaning: a randomized pilot study. *Med Acupunct*. 2021;33(2):153-158. doi: 10.1089/acu.2020.1450. ¹⁹⁹

- **Study:** 9 participants (intervention group); 6 participants (standard of care outpatient opioid tapering)
- **Results:** Anxiety slightly higher and **depression lower in the acupuncture group** versus the standard of care group, but **results not statistically significant**
- **Standard of care group had greater withdrawal symptoms and higher pain levels.**



- **Conclusions:** Although the impact of acupuncture treatment was not statistically significant compared with standard of care, researchers suggested that the **auricular acupuncture NADA protocol can be easily and effectively incorporated into standard of care for opioid tapering.**
- Due to the **small size of this study**, future larger studies were recommended to determine treatment effects.

Chen Z, Wang Y, Wang R, Xie J, Ren Y. Efficacy of acupuncture for treating opioid use disorder in adults: a systematic review and meta-analysis. *Evid Based Complement Altern Med.* 2018 Dec 2;2018:3724708. doi: 10.1155/2018/3724708. eCollection 2018. ²⁰⁰

- **Study:** Systematic review; 9 studies involving 1,063 participants included for meta-analysis
- **Results:**
 - Acupuncture was **more useful than no treatment or sham treatment to reduce opioid craving, insomnia, and depression.**
 - **Electroacupuncture did a better job** than sham electroacupuncture or transcutaneous electrical acupoint stimulation (TEAS) **to alleviate craving and depression.**
 - TEAS alleviated symptoms of insomnia and anxiety compared to no treatment or sham.
- **Conclusions:** There is evidence supporting the use of acupuncture, electroacupuncture, and TEAS to relieve opioid cravings, insomnia, anxiety, and depression. Conclusions limited: **low-quality** evidence and small number of studies.

d. Acupuncture for Opioid Use Reduction for Pain Conditions

He Y, Guo X, May BH, Zhang AL, Liu Y, Lu C, Mao JJ, Xue CC, Zhang H. Clinical evidence for association of acupuncture and acupressure with improved cancer pain: a systematic review and meta-analysis. *JAMA Oncol.* 2020 Feb 1;6(2):271-278. doi: 10.1001/jamaoncol.2019.5233. ¹⁰⁰

- **Systematic review:** 14 randomized controlled trials (RCTs) in English and Chinese involving 920 cancer pain patients pooled for meta-analysis



- **Comparisons:** acupuncture and acupressure vs sham acupuncture, analgesic therapy, and standard care
- **Primary outcomes:** pain levels measured by the Brief Pain Inventory, Numerical Rating Scale, Visual Analog Scale, Verbal Rating Scale.
- **Results:** 7 sham-controlled RCTs demonstrated that **acupuncture compared to sham was superior for reducing cancer pain** (mean difference [MD], -1.38 points; 95% CI, -2.13 to -0.64 points; I² = 81%)
 - these 7 studies considered high quality with low bias risk
- 6 RCTs with treatments combining **acupuncture and acupressure with analgesic therapy showed a “favorable association” with pain reduction** (MD, -1.44 points; 95% CI, -1.98 to -0.89; I² = 92%)
 - moderate evidence grade (study heterogeneity)
- 2 RCTs with treatments combining **acupuncture and acupressure with analgesic therapy showed a “favorable association” with opioid dosage reduction** (MD, -30.00 mg morphine equivalent daily dose; 95% CI, -37.5 mg to -22.5 mg)
 - moderate evidence grade (study heterogeneity)
- **Conclusions:** “*acupuncture and/or acupressure was significantly associated with reduced cancer pain and decreased use of analgesics.*”

Montgomery AD, Ottenbacher R. Battlefield acupuncture for chronic pain management in patients on long-term opioid therapy. *Med Acupunct.* 2020 Feb 1;32(1):38-44. doi: 10.1089/acu.2019.1382. Epub 2020 Feb 3. ²⁰¹

- **Retrospective cohort study:** comparing 24 veterans who received Battlefield Acupuncture auricular protocol plus opioids for chronic pain to 23 veterans who received opioids but not Battlefield Acupuncture
- **Outcomes assessed:** numeric rating scale (NRS) of pain 3 months before treatment, before and after treatment, and 6 months after treatment
- **Results:** Researchers found “significant average decreases of 1.3 points on the NRS occurred in 66.1% immediately after the procedure” but no overall significant pain reduction or reduction in average opioid consumption was found.
- **Conclusions:** Battlefield Acupuncture was effective for immediate pain reduction.

e. Acupuncture for Smoking/Nicotine Use Reduction

Zhang Y-Y, Su Y-Z, Tian Z-Y, Liang S-B, Liu Y-J, Li Y-F, Qiao H-F, Robinson N, Liu J-P. Acupuncture and related acupoint therapies for smoking cessation: an umbrella review and updated meta-analysis. *Tob Induc Dis.* 2024;22(April):64. doi: 10.18332/tid/186147. ²⁰²



- **Methods:** Literature search of 8 databases from inception to December 2023 for systematic reviews (SRs) and randomized controlled trials (RCTs) “comparing acupuncture with sham acupuncture, pharmacotherapy, behavioral therapy, or no treatment”
- **Primary Outcome:** smoking abstinence rate
Study Quality: AMSTAR-2 software
- **Evidence Quality/Certainty:** GRADE approach
- **Updated Meta-Analysis:** analysis of pooled smoking abstinence rate data
- **Statistics:** risk ratios (RR) with 95% confidence intervals (CIs)
- **Results:**
 - 13 SRs (low or very low quality) and 20 RCTs (16 of which were high risk of performance bias) involving 8 acupuncture and related therapies met inclusion criteria
 - Short-term (≤ 6 months) abstinence rate: “Most SRs suggested that filiform needle acupuncture or acupressure had a better effect than sham acupuncture, but the findings were inconsistent.”
 - “Updated meta-analysis also suggested that filiform needle acupuncture was more effective than sham acupuncture” (RR=1.44; 95% CI: 1.02–2.02; I²= 66%; low certainty; 9 RCTs, n=1358).
 - “Filiform needle acupuncture combined with acupressure was comparable to nicotine patches” (RR=0.99; 95% CI: 0.74–1.32; low certainty; 6 RCTs, n= 524).
 - “Acupressure was superior to counseling” (RR=1.46; 95% CI: 1.14–1.87; I² =5%; low certainty; 8 RCTs, n=595).
 - Adverse Events: no serious ones reported
- **Conclusions:** “Low certainty evidence suggests that filiform needle acupuncture and auricular acupressure appear to be safe and effective in achieving short-term smoking cessation. However, long-term follow-up data are needed.”

Liu Z-Y, CHen S-M, Chang J, Wang Y-Y, Yang J-S. [Acupuncture for treatment of tobacco withdrawal syndrome: systematic review and meta-analysis] [Article in Chinese]. *Zhongguo Zhen Jiu*. 2023 May 12;43(5):575-83. ²⁰³

- **Design:** Systematic Review and Meta-Analysis
- **Methods:** Literature review of databases (CNKI, Wanfang, VIP, SinoMed, PubMed, Cochrane, Medline, EMBase) from January 1, 2011, to December 31, 2021, for



randomized controlled trials (RCTs) involving “acupuncture for treatment of tobacco withdrawal syndrome”

- **Meta-Analysis:** RevMan5.4.1 software
- **Results:**
 - 23 RCTs involving 2,120 patients met inclusion criteria
 - “Compared with medication, acupuncture showed no significant difference at improving” the following test scores:
 - Fagerström test for nicotine dependence (FTND) score ($MD=0.16$, 95% CI : -0.08, 0.41)
 - Heaviness of smoking index (HSI) score ($MD=0.11$, 95% CI : -0.13, 0.36)
 - Minnesota nicotine withdrawal scale (MNWS) score ($MD=0.12$, 95% CI : -0.11, 1.35)
 - Questionnaire of smoking urges (QSU) score ($MD=-0.30$, 95% CI : -2.78, 2.18)
 - Hamilton depression scale (HAMD) score ($MD=0.76$, 95% CI : -1.54, 3.06)
 - Abstinence rate ($RR=0.95$, 95% CI : 0.82, 1.10)
 - Effective rate ($RR=1.01$, 95% CI : 0.95, 1.07)
 - “Acupuncture was superior to sham acupuncture in reducing [Minnesota nicotine withdrawal scale] MNWS score” ($MD=-4.88$, 95% CI : -5.21, -4.55, $P<0.000\ 01$)
 - “Acupuncture was superior to cognitive behavioral therapy in reducing [Fagerström test for nicotine dependence] FTND score” ($MD=-1.41$, 95% CI : -1.74, -1.08)
 - Acupuncture performed better than cognitive behavioral therapy at reducing MNWS score ($MD=-4.28$, 95% CI : -5.31, -3.25)
 - Acupuncture performed better than cognitive behavioral therapy at “increasing abstinence rate” ($RR=2.19$, 95% CI : 1.39, 3.45, $P<0.000\ 01$, $P<0.001$).
- **Conclusion:** “Acupuncture could effectively improve tobacco withdrawal syndrome, increase abstinence rate and effective rate. Limited by the quantity and quality of the included studies, this conclusion needs to be verified by more studies.”

Dai R, Cao Y, Zhang H, Zhao N, Ren D, Jiang X, Zheng G, Bao S. Comparison between acupuncture and nicotine replacement therapies for smoking cessation based on randomized controlled trials: a systematic review and Bayesian network meta-analysis. *ECAM*. 2021; Article ID 9997516, 11 pages. Doi: 10.1155/2021/9997516. ²⁰⁴

- **Design:** Systematic Review and Bayesian Network Meta-Analysis
- **Methods:** Literature search of databases (PubMed, Cochrane Library, Embase, Web of Science, Chinese Biomedical Database (CBM)) for randomized controlled trials (RCTs)
- **Risk of Bias:** Cochrane Collaborative Quality Assessment
- **Bayesian Network Meta-Analysis:** 23 studies involving 2,706 patients analyzed using WinBUGS 1.4.3, Stata 14, and RevMan 5.3.5 software
- **Primary Outcomes:** efficacy and safety
- **Results:**



- 23 studies involving 2,706 patients and 6 treatments met inclusion criteria
- short-term abstinence rates, Fagerstrom test for nicotine dependence (FTND) scores, and daily smoking: “no significant difference” among the following groups: “[acupuncture therapy] AT, sham acupuncture therapy (SAT), auricular acupressure (AA), sham auricular acupressure (SAA), acupuncture plus auricular acupressure (APAA), and nicotine replacement therapy (NRT)”
- long-term abstinence rate: “significant difference between [sham auricular acupressure] SAA and [auricular acupressure] AA with risk ratio (RR) of 2.49” (95% CI 1.14, 5.97)
- comparison of abstinence rates: “5e probabilistic ranking results showed that [acupuncture plus auricular acupressure] APAA and [auricular acupressure] AA were superior to other interventions”
- **Conclusions**: “AA was superior to SAA in smoke quitting, but there was no difference among other interventions in long-term truncation rates. There was no difference in short-term abstinence rates among these selected groups. We need large sample RCTs to clarify the advantages of interventions such as APAA and AA.”

Lee EJ. Effects of auriculotherapy on addiction: a systematic review. *J Addict Dis.* 2022 Jul-Sep;40(3):415-427. doi: 10.1080/10550887.2021.2016011. Epub 2022 Feb 18. ²⁰⁵

- **Study Goal**: “to find an effective protocol involving auricular acupuncture points, intervention duration and frequency, and stimulating methods.”
- **Design**: Systematic Review only (no meta-analysis)
- **Methods**: Literature review of databases (PubMed, Cumulative Index to Nursing and Allied Health Literature (CINAHL), and Medline) from January 1, 1994, through March 31, 2021, for randomized controlled trials (RCTs) involving auricular acupuncture to treat addiction using keywords “auricular, acupuncture, addiction, substance misuse, smoking, randomized controlled trial, clinical trial, and human.”
- **Outcomes Assessed**:
 - **Opiates**: 10-item Short Opioid Withdrawal Scale, Visual Analog Scale for Heroin Craving, 36-Item Short Form Health Survey
 - **Cocaine**: Cocaine/Heroin Craving Index, Cocaine Craving Questionnaire-Now, Halikas Cocaine Craving Scale
 - **Alcohol**: Obsessive Compulsive Drinking Scale, Alcohol-Withdrawal Syndrome Scale, Clinical Institute Withdrawal Assessment
 - **Smoking/Nicotine**: smoking cessation rates via urine test, carbon monoxide, serum cotinine, Mood and Physical Symptoms Scale, Nicotine Withdrawal Symptom Score
 - **Other Drug Use**: Finnegan Neonatal Abstinence Scoring System, State Anxiety, Acupuncture Treatment Assessment Scale
 - **Gambling**: Thrill Seeking scale
- **Risk of Bias**: Cochrane tool



- **Results:**
 - 36 studies met inclusion criteria (addiction: 6 acupuncture and 3 acupressure studies; substance use: 6 acupuncture and 2 acupressure studies; smoking: 13 acupuncture and 10 acupressure studies)
 - moderate to high risk of bias; “four studies (11.1%) earned scores of 6, indicating the lowest risk of bias and highest quality RCT.”
 - “23 [studies] (64%) reported that auriculotherapy was effective for treating addiction such as opioids, cocaine, alcohol, heroin, nicotine, and gambling.”
 - most common auricular acupuncture protocol used in 4/36 studies: NADA protocol “shenmen, sympathetic, liver, lung, and kidney”
 - most common acupressure point combinations used in 4/36 studies: “shenmen, subcortex, heart, lung, and liver.”
- **Conclusions:** Although there is no conclusion section in this paper, the abstract contained a brief conclusive statement, “Acupressure may be helpful for treatment of addiction.”

6. Acupuncture for Mental Health Outcomes

a. Acupuncture for Mental Health Outcomes: Combined Presentations

Yin X, Liang T, Lu , Yue H, Li S, Zhong VW, Zhang W, Zhou S, Mi Y, Wu H, Xu S. Effect of electroacupuncture on insomnia in patients with depression: a randomized clinical trial. *JAMA Netw Open.* 2022;5(7):e2220563. doi: 10.1001/jamanetworkopen.2022.20563. ²⁰⁶

- **Study:** 32-week blinded, randomized, sham-controlled clinical trial (8-week intervention with 24-week follow-up) conducted from September 1, 2016, to July 30, 2019, in China
- **Participants:** 270 (194 female; 76 male; ages 18-70 years) diagnosed with insomnia and depression
- **Treatment groups:** (1) electroacupuncture (EA) + standard care (SC); (2) sham acupuncture (SA) + standard care; (3) standard care
- **Number of treatments:** 3 treatments/week for 8 weeks = 24 sessions
- **Primary outcomes:** Pittsburgh Sleep Quality Index (PSQI) scores at baseline and after 24 treatments
- **Secondary outcomes:** Pittsburgh Sleep Quality Index (PSQI) scores at 12, 20, and 32 weeks; actigraphy recordings of sleep parameters; Insomnia Severity Index (ISI) scores; Hamilton Depression Rating Scale (HAM-D-17) scores; Self-rating Anxiety Scale (SAS) scores
- **Results:**
 - 247 (91.5%) participants completed all outcome measurements at week 32
 - **EA mean PSQI score differences** baseline-8 weeks: -6.2 (95% CI, -6.9 to -5.6)
 - **EA vs sham PSQI score differences** at week 8: -3.6 (95% CI, -4.4 to -2.8; P < .001) (P < .001)



- **EA vs control groups PSQI score differences** at week 8: -5.1 (95% CI, -6.0 to -4.2; $P < .001$) ($P < .001$)
- Actigraphy recordings baseline-8 weeks: **EA offered “significant improvement in total sleep time”** (29.1 [95% CI, 21.5-36.7] minutes) ($P < .001$)
- **Electroacupuncture benefits showed persistence at week 24 post-intervention**
 - **“Significant improvement in the 17-item Hamilton Depression Rating Scale”** (-10.7 [95% CI, -11.8 to -9.7]), ($P < .001$)
 - **Significant improvement in Insomnia Severity Index** (-7.6 [95% CI, -8.5 to -6.7]) scores, ($P < .001$)
 - **Significant improvement in Self-rating Anxiety Scale** (-2.9 [95% CI, -4.1 to -1.7]) scores, ($P < .001$)
- No differences amongst treatment groups for waking during sleep frequency
- Zero serious adverse events
- **Conclusions:** *“Quality of sleep improved significantly in the EA group compared with the SA or control group at week 8 and was sustained at week 32.”*

Hou Y, Sun H, Wang Z, et al. Efficacy of acupuncture treatment for diarrhea-predominant irritable bowel syndrome with comorbid anxiety and depression: a meta-analysis and systematic review. *Medicine*. 2024;103:46. doi: 10.1097/MD.000000000040207.²⁰⁷

- **Design:** meta-analysis and systematic review
- **Methods:** Literature search of 7 databases (Chinese Journal Full-text, Wanfang Academic Journals Full-text, VIP Chinese Scientific Journals Full-text, China Biomedical Literature, PubMed, Embase, Cochrane Library) from inception to August 1, 2023, for randomized controlled trials (RCTs) involving acupuncture treatment for irritable bowel syndrome (IBS) with anxiety and depression
- **Meta-Analysis:** RevMan 5.4 and Stata 17.0 software
- **Results:**
 - 16 RCTs involving 1,305 IBS-D patients (treatment, n=691; control, n=614)
 - Acupuncture vs oral medication improved the following:
 - HAMD scores (MD = 0.88, 95% CI = [0.68, 1.07], $P < .00001$)
 - HAMA scores (MD = 2.32, 95% CI = [1.70, 2.93], $P < .00001$)
 - Self-rating anxiety scale scores (MD = 11.67, 95% CI = [10.85, 12.49], $P < .00001$)
 - SDS scores (MD = 9.84, 95% CI = [8.52, 11.16], $P < .00001$)
 - IBS-SSS scores (MD = 37.48, 95% CI = [12.17, 62.78], $P = .004$)
 - Overall response rate (MD = 1.27, 95% CI = [1.20, 1.35], $P < .00001$)
 - Relapse rate (MD = 0.27, 95% CI = [0.16, 0.47], $P < .00001$)
- **Conclusion:** “Acupuncture treatment has a definite and beneficial effect on IBS-D patients with comorbid anxiety and depression.”



Huang S, Zhang D, Shi X, et al. Acupuncture and related therapies for anxiety and depression in patients with premature ovarian insufficiency and diminished ovarian reserve: a systematic review and meta-analysis. *Front Psych.* 2024;15:1495418. doi: 10.3389/fpsy.2024.1495418. ²⁰⁸

- **Design:** systematic review and meta-analysis
- **Systematic review registration:** <https://www.crd.york.ac.uk/>, identifier CRD42023488015
- **Methods:** literature search of 8 databases (PubMed, Web of Science, EMBASE and Cochrane Library, China Biomedical (CBM), China National Knowledge Infrastructure (CNKI), Wanfang, VIP) up to October 30, 2024, for randomized controlled trials involving acupuncture/related therapies treatment of anxiety and depression in patients with premature ovarian insufficiency and diminished ovarian reserve
- **Meta-Analysis:** 12 studies involving 780 patients pooled for analysis
- **Results:**
 - 12 RCTs with 780 patients met inclusion criteria (POI, n=403; DOR, n=297; POF, n=80)
 - “Acupuncture-related therapy was obviously superior to hormone therapy in relieving” the following:
 - anxiety symptoms (SMD: -0.90; 95%CI: -1.28,-0.53; P<0.00001)
 - depressive symptoms (SMD: -0.82; 95% CI: -1.25, -0.40; P=0.0001).
- **Conclusions:** “Acupuncture-related therapy was more effective than hormone therapy in improving anxiety and depression symptoms in patients with ovarian hypofunction. This study supports the use of acupuncture-related therapies for women experiencing decreased ovarian function associated with mental health issues.”

Ma F, Zhang H, Li B, Cheng P, Yu M, Wang X. Acupuncture and moxibustion for malignant tumor patients with psychological symptoms of insomnia, anxiety and depression: a systematic review and meta-analysis. *J Tradit Chin Med.* 2023;43(3):441-456. ²⁰⁹

- **Design:** systematic review and meta-analysis
- **Prospective Register of Systematic Reviews (PROSPERO):** CRD42020197084
- **Methods:** Literature search of 7 databases before April 2020 for randomized controlled trials (RCT) comparing acupuncture and moxibustion therapy (AMT) for cancer-related psychological symptoms (CRPS) “to routine care or conventional drug for alleviating CRPS of insomnia, depression, and anxiety”
- **Quality Control:** “Two independent reviewers performed the data extraction and assessed the risk of bias”
- **Results:**
 - 30 RCTs involving 2,483 cancer patients met inclusion criteria
 - “Treatment group was significantly better than the control group in improving” the following measures:
 - depression effective rate [RR = 1.29, 95% CI (1.12, 1.49), P = 0.0004]
 - quality of life (QOL) [MD = 1.11, 95% CI (0.80, 1.42), P < 0.000 01]



- Self-rating Anxiety Scale (SAS) [MD = -7.75, 95% CI (-10.44, -5.05), P < 0.000 01].
- “No statistically significant difference between two groups in improving the insomnia effective rate” [RR = 1.18, 95% CI (0.93, 1.51), P = 0.18].
- Subgroup Analysis:
 - AMT vs routine care “helps relieve CRPS better evaluated by Pittsburgh Sleep Quality Index (PSQI), Hamilton Depression Scale (HAMD), and Self-rating Depression Scale (SDS), and depression effective rate.”
 - AMT vs conventional drug: “AMT performs better evaluated by SDS, depression effective rate and QOL.”
 - “Conventional drug showed higher treatment efficacy on improving insomnia effective rate compared with AMT.”
 - AMT + conventional drug vs conventional drug alone “resulted in a significant reduction on CRPS such as PSQI, HAMD, SDS, and SAS, and also had a meaningful improvement on insomnia effective rate, depression effective rate and QOL.”
 - Adverse Events: AMT had fewer reports than drug
- **Conclusion:** “The results suggested that AMT might be effective in improving CPRI; however, a definite conclusion could not be drawn because the quality of trials are low. Further large-scale and high-quality RCTs to verify the efficacy and safety of AMT on CRPS are still warranted.”

Wang T, Tan J-YB, Yao L-Q, et al. Effects of somatic acupoint stimulation on anxiety and depression in cancer patients: an updated systematic review of randomized controlled trials. *Complement Ther Clin Pract.* 2023 May;51:101735. doi: 10.1016/j.ctcp.2023.101735. Epub 2023 Feb 13. ²¹⁰

- **Design:** systematic review w/ meta-analysis and qualitative analysis
- **Registration:** The systematic review protocol has been registered with PROSPERO (CRD42019133070).
- **Methods:** Literature search of 13 electronic databases until August 2022 for randomized controlled trials (RCTs) involving somatic acupoint stimulation (SAS) for cancer patients with anxiety and depression.
- **Methodological Quality:** Cochrane Back Review Group Risk of Bias Assessment Criteria
- **Evidence Quality:** Grading of Recommendations, Assessment, Development and Evaluations (GRADE)
- **Results:**
 - 28 studies met inclusion criteria
 - Methodological quality and level of evidence: “suboptimal, with no high-quality evidence identified”
 - SAS “significantly decrease[d] the anxiety of cancer patients” according to moderate level evidence (Acupuncture: [random effect model, SMD = -0.52, 95%



CI = -0.79 to -0.24, $p = 0.0002$] and Acupressure: [random effect model, SMD = -0.89, 95% CI = -1.25 to -0.52, $p < 0.00001$]

- “Data analysis indicated that SAS can decrease depression significantly” according to low-quality evidence (Acupuncture: [random effect model, SMD = -1.26, 95% CI = -2.08 to -0.44, $p = 0.003$] and Acupressure: [random effect model, SMD = -1.42, 95% CI = -2.41 to -0.42, $p = 0.005$])
- “No statistically significant difference was identified between true and sham acupoints stimulation for both anxiety and depression”
- **Conclusions:** “This systematic review provides the latest research evidence to support SAS as a *promising intervention for alleviating anxiety and depression in cancer patients*. However, the research evidence should be interpreted prudently as methodological concerns were identified in some included studies, and some sub-group analyses were performed with a relatively small sample size. More rigorously designed large-scale RCTs with placebo-controlled comparisons are warranted to generate high-quality evidence.”

Li Z, Feng J, Yin S, Chen X, Yang Q, Gao X, Che D, Zhou L, Yan H, Zhong Y, Zhu F. *BMC Complement Med Ther*. Effects of acupuncture on mental health of migraine patients: a systematic review and meta-analysis. 2023 Aug 4;23(1):278. doi:10.1186/s12906-023-04103-8. ²¹¹

- **Study:** 13 RCT's involving a total of 1,766 migraine patients pooled for analysis
- **Results:** Acupuncture vs sham acupuncture or medication **improved migraine patients' rating scores and mental health exam performance:**
 - **Self-Rated Anxiety Scale (SAS) scores** (WMD: -5.64; 95% CI: -10.89, -0.39; $p = 0.035$)
 - **Self-Rated Depression Scale (SDS) scores** (WMD: -4.65; 95% CI: -9.25, -0.05; $p = 0.048$)
 - **Short Form 36 Mental Health (MH) scores** (SMD: 0.77; 95% CI: 0.19, 1.35; $p = 0.009$)
 - **Visual Analog Scale (VAS) scores** (SMD: -1.06; 95% CI: -1.73, -0.4; $p = 0.002$;))
 - **Migraine-Specific Quality of Life Questionnaire scores (MSQ)** (WMD: 4.76; 95% CI: 2.36, 7.15; $p < 0.001$)
- **Conclusion:** “Compared with Western medicine and sham acupuncture, **acupuncture seems to be able to effectively improve anxiety and depression in migraine patients**. And it may be more effective in improving SF36-mental health, VAS and MSQ than [sham] acupuncture or Western medicine.”

Wang X, Shi X, Lv J, et al. Acupuncture and related therapies for the anxiety and depression in irritable bowel syndrome with diarrhea (IBS-D): a network meta-analysis of randomized controlled trials. *Front Psych*. 2022;13:1067329. doi:10.3389/fpsy.2022.1067329. ²¹²



- **Design:** network meta-analysis
- **Systematic review registration:** [<https://www.crd.york.ac.uk/>], identifier [CRD42022364560].
- **Methods:** literature search of 7 databases for randomized controlled trials involving acupuncture-related therapies for patients with irritable bowel syndrome with diarrhea (IBS-D).
- **Quality Control:** “independent literature screening and data extraction”
- **Outcomes:** Hamilton anxiety rating scale (HAMA), Hamilton depression rating scale (HAMD), self-rating anxiety scale (SAS), and self-rating depression scale (SDS)
- **Network Meta-Analysis (NMA):** Revman 5.4, Stata 15.0, WinBUGS 1.4.3 software, SUCRA
- **Results:**
 - 24 studies with 1,885 patients and 8 types of acupuncture/related therapies met inclusion criteria
 - SAS: “combined therapies were more efficacious than anti-diarrheal or antispasmodic (western medicine, WM)” (SMD: -8.92 ; 95% CI: $-15.30, -2.47$)
 - SDS: “combined therapies were more efficacious than WM” (SMD: -8.45 ; 95% CI: $-15.50, -1.41$)
 - HAMA: “moxibustion (MOX) was more efficacious than placebo (SMD: -8.66 ; 95% CI: $-16.64, -0.38$)
 - HAMD: MOX was more efficacious than all other included interventions.”
 - Response Rate: “MOX was more efficacious than the following interventions: acupuncture
 - (ACU) (SMD: 0.29 ; 95% CI: $0.08, 0.93$), Chinese herb medicine (CH) (SMD: 0.09 ; 95% CI: $0.02, 0.36$), combined therapies (SMD: 0.23 ; 95% CI: $0.06, 0.85$), electroacupuncture (EA) (SMD: 0.06 ; 95% CI: $0.01, 0.33$), warm acupuncture (WA) (SMD: 22.16 ; 95% CI: $3.53, 148.10$), WM (SMD: 15.59 ; 95% CI: $4.68, 61.21$), and placebo (SMD: 9.80 ; 95% CI: $2.90, 45.51$)
 - Combined therapies more effective than: CH (SMD: 0.39 ; 95% CI: $0.19, 0.80$), WA (SMD: 4.96 ; 95% CI: $1.30, 21.62$), and WM (SMD: 3.62 ; 95% CI: $2.35, 5.66$)
 - Comprehensive Ranking: “MOX, ACU, combined therapies, and EA had high SUCRA rankings”
- **Conclusion:** “MOX, ACU, combined therapies, and EA better alleviate anxiety and depression among IBS-D patients, and with a higher safety level, may be the optimal therapies. In addition, combining acupuncture-related treatments and other therapies also delivers a higher global benefit level.”

Zhao F-Y, Kennedy GA, Spencer SJ, Conduit R, Zhang W-J, Fu Q-Q, Zheng Z. The role of acupuncture in the management of insomnia and a major or residual symptom among patients with active or previous depression. *Front Psych.* 14 April 2022;13. doi: 10.3389/fpsy.2022.863134. ²¹³



- **Design:** systematic review
- **Systematic Review Registration:** https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021269880, PROSPERO, identifier: CRD42021269880
- **Methods:** Literature search of 7 databases from inception to December 2021 for randomized controlled trials (RCTs) involving acupuncture treatment for depression-related insomnia (DI)
- **Treatment Groups:** acupuncture, waitlist-control, placebo-/sham-acupuncture, standard care [Western Pharmacotherapy and/or cognitive-behavioral therapy (CBT)]
- **Quality Control:** Cochrane criteria
- **Results:**
 - 21 studies involving 1,571 participants met inclusion criteria
 - acupuncture vs placebo acupuncture significantly reduced the global scores of both the Pittsburg Sleep Quality Index (PSQI) for patients with depression-related insomnia [MD = -3.12, 95% CI (-5.16, -1.08), $p < 0.01$]
 - acupuncture vs placebo acupuncture significantly reduced the Hamilton Depression Scale (HAMD) scores for patients with depression-related insomnia [SMD = -2.67, 95% CI (-3.51, -1.84), $p < 0.01$]
 - “When compared with conventional pharmacotherapy (antidepressants and/or hypnotics), the results favored acupuncture in decreasing PSQI” [MD = -1.17, 95% CI (-2.26, -0.08), $p = 0.03$] and HAMD [SMD = -0.47, 95% CI (-0.91, -0.02), $p = 0.04$].
 - “Acupuncture was comparable to conventional pharmacotherapy in reducing scores of each domain of PSQI.”
 - “For insomnia as a residual symptom of previous or partially remitted depression, acupuncture conferred a very limited, non-significant therapeutic advantage against sham-/placebo-acupuncture.”
 - “No study was available to address the efficacy differences between acupuncture and CBT or the synergistic effect of these two therapies.”
- **Conclusions:** “There is a low to moderate level of evidence supporting *acupuncture as a safe and effective remedy alternative to or adjuvant to conventional pharmacotherapy* (antidepressant and/or hypnotic) in improving insomnia and other depression symptoms among patients with active depression. Furthermore, the patients’ complaint of disrupted sleep continuity is most likely to benefit from acupuncture. The benefit of acupuncture on residual insomnia associated with previous or partially remitted depression is limited. Future acupuncture studies need to consider applying optimal dosage and addressing deficiencies in trial quality.”



Tu M, Jiang Y, Yu J, et al. Acupuncture for treating chronic stable angina pectoris associated anxiety and depression: a systematic review and meta-analysis. *Complement Ther Clin Pract.* 2021;Nov:45:101484. doi: 10.1016/j.ctcp.2021.101484. Epub 2021 Sep 8. ²¹⁴

- **Design:** systematic review and meta-analysis
- **Methods:** literature search of 8 electronic databases (PubMed, Embase, Web of Science, the Cochrane Library, CBM, CNKI, VIP and Wanfang Database) from inception to January 2021 for randomized controlled trials (RCTs) or controlled clinical trials involving acupuncture for treatment of anxiety and depression in patients with chronic stable angina pectoris (CSAP)
- **Meta-Analysis:** RevMan 5.3
- **Risk of Bias:** Revised Cochrane Risk of Bias tool (ROB) 2.0
- **Evidence Quality:** GRADEprofiler 3.2.2 was used to rate the quality of evidence
- **Results:**
 - 7 trials involving 893 subjects met inclusion criteria
 - **acupuncture + standard care:** “more effective in relieving anxiety and depression, reducing angina attack frequency, and angina pain intensity than sham acupuncture with standard care and standard care alone.”
 - treatment effect persisted “16 weeks after acupuncture.”
 - Safety: high
 - Evidence Quality: low to moderate
- **Conclusion:** “Acupuncture may be used as an adjunctive therapy to treat CSAP-associated anxiety and depression. However, more high-quality RCTs are required to confirm our findings.”

Dong B, Chen Z, Yin X, Li D, Ma J, Yin P, Cao Y, Lao L, Xu S. The efficacy of acupuncture for treating depression-related insomnia compared with a control group: a systematic review and meta-analysis. *BioMed Res Int.* 2017;Article ID 9614810:11 pages. doi: 10.1155/2017/9614810. ²¹⁵

- **Methods:** Review of 7 databases from 1946 to March 30, 2016, for randomized controlled trials involving acupuncture treatment for adults with depression-related insomnia
- **Meta-Analysis:** 18 studies
- **Results.**
 - 18 randomized-controlled clinical trials (RCTs) met inclusion criteria
 - “**acupuncture** treatment made significant improvements in PSQI score” vs western medicine (MD = -2.37, 95% CI -3.52 to -1.21)
 - **acupuncture + western medicine** “had a better effect on improving sleep quality” vs western medicine alone (MD = -2.63, 95% CI -4.40 to -0.86)
 - no statistical difference in HAMD scores for **acupuncture + western medicine** (MD = -2.76, 95% CI -7.65 to 2.12)



- **acupuncture + western medicine** had better effect at improving depression vs western medicine alone (MD = -5.46, CI -8.55 to -2.38)
- **Conclusion:** “This systematic review indicates that acupuncture could be an alternative therapy to medication for treating depression-related insomnia.”

Sniezek DP, Siddiqui IJ. Acupuncture for treating anxiety and depression in women: a clinical systematic review. *Med Acupunct.* 2013 Jun;25(3):164-172. doi: 10.1089/acu.2012.0900. ²¹⁶

- **Study:** Systematic review of published randomized controlled trials involving acupuncture treatment for anxiety and/or depression in women. Meta-analysis of 6 articles involving 605 participants
- **Results:**
 - “There was a significant difference between acupuncture and at least one control in all six trials.”
 - Research quality varied amongst trials.
- **Conclusions:** “*There is high-level evidence to support the use of acupuncture for treating major depressive disorder in pregnancy.*”

b. Acupuncture for Mental Health Outcomes: Depression

Zheng L, Sun Z, Liu C, Zhang J, Jin Y, Jin H. Acupuncture-adjuvant therapies for treating perimenopausal depression: a network meta-analysis. *Medicine (Baltimore).* 2023 Aug 18;102(33):e34694. doi: 10.1097/MD.00000000000034694. ²¹⁷

- **Study:** 27 studies involving 2,269 PMD patients with perimenopausal depression (PMD) and 8 different interventions pooled for meta-analysis
- **Primary outcomes:** Hamilton Depression Scale score and efficacy rate
- **Secondary outcomes:** levels of follicle-stimulating hormone, luteinizing hormone, estradiol, and the Kupperman score.
- **Results:** “**warm acupuncture** (OR = 1.55, 95% CI: 1.00-2.44), **electroacupuncture** (OR = 1.34, 95% CI: 1.00-1.8), **abdominal acupuncture** (OR = 1.19, 95% CI: 0.73-1.96), and **common acupuncture** (OR = 1.4, 95% CI: 0.9-2.17) **more effective than fluoxetine and menopausal hormone treatment in the treatment of PMD.**”
- **Warm acupuncture more effective at reducing Hamilton Depression Scale scores** than “electroacupuncture (SMD = -1.22, 95% CI: -2.34 to -0.09), thread embedding (SMD = -1.31, 95% CI: -2.21 to -0.40), abdominal acupuncture (SMD = -1.33, 95% CI: -2.42 to -0.24), and common acupuncture (SMD = -1.46, 95% CI: -2.26 to -0.66).”
- **Conclusion:** *warm acupuncture provided the most effective treatment for PMD*



Xu G, Lei H, Huang L, Xiao Q, Huang B, Zhou Z, Tian H, Huang F, Liu Y, Zhao L, Li X, Liang F. The dose-effect association between acupuncture sessions and its effects on major depressive disorder: a meta-regression of randomized controlled trials. *J Affect Disord.* 2022 Aug 1;310:318-327. doi: 10.1016/j.jad.2022.04.155. Epub 2022 May 2. ²¹⁸

- **Study:** 62 studies involving 2,269 patients diagnosed with major depressive disorder (MDD) included for meta-regression analysis
- **Outcomes:** Hamilton rating scale for depression (HAMD) to measure symptom severity
- **Results dose-dependent:** more acupuncture sessions associated with greater reduction in HAMD scores and improved MDD symptoms
 - 8 acupuncture treatments: HAMD score decreased from 17.68 (95% CI: -11.81, -4.80) to 8.30 (95% CI: 14.23-21.13)
 - 24 acupuncture treatments: decrease in HAMD scores for 51% of cases (95% CI: 48% to 54%).
 - 36 acupuncture treatments: “**improvement in HAMD scores peaked at 66% of cases**” (95% CI: 59% to 72%).”
- **Conclusions:** “A **dose-effect relationship** was found between the **number of acupuncture sessions and HAMD scores**. 36 acupuncture sessions were associated with optimal clinical response.”

Xu G, Xiao Q, Huang B, Lei H, Yin Z, Huang L, Zhou Z, Tian H, Huang F, Liu Y, Sun M, Zhao L, Liang F. Clinical evidence for association of acupuncture with improved major depressive disorder: a systematic review and meta-analysis of randomized control trials. *Neuropsychobiology.* 2023;82(1):1. Epub 2022 Dec 22. ²¹⁹

- **Study:** 43 studies involving 3,756 participants with major depressive disorder (MDD) pooled for meta-analysis
- **Primary outcomes:** Hamilton rating scale for depression (HAMD) and Self-Rating Depression Scale (SDS)
- **Results**
 - “**High-quality evidence**” for **acupuncture or acupuncture + antidepressant medications** to treat MDD vs sham acupuncture or antidepressants alone
 - “**High-quality evidence** showed that acupuncture led to **fewer adverse effects than antidepressants.**”
- **Conclusions:** According to **high-quality evidence**, acupuncture and acupuncture + antidepressant treatment of MDD yielded a **statistically significant reduction in HAMD scores**.



Ching WL, Li HJ, Guo J, Yao L, Chau J, Lo S, Yuen CS, Ng BFL, Yu EC-L, Zhaoxiang Bian Z, Lau AY, Zhong LLD. Acupuncture for post-stroke depression: a systematic review and network meta-analysis. *BMC Psychiatry* 2023;23:314. doi: 10.1186/s12888-023-04749-1.

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- **Study:** 62 randomized controlled trials involving 5,308 participants included
- **Primary outcome:** survey post-stroke depression measuring depressive symptoms
- **Secondary outcomes:** effectiveness for neurological function and the quality of life
- **Results: acupuncture alone or acupuncture plus “repetitive transcranial magnetic stimulation (RTMS),” significantly reduced Hamilton Depression Rating Scale scores**
 - Acupuncture + RTMS had “the highest probability of improving depressive symptoms with a probability of 49.43%.”
 - “Traditional Chinese medicine (TCM) alone or with pharmaceuticals” was better at reducing depressive symptoms
- **Conclusions:** “The results of this study indicate that **acupuncture alone or combined with other therapies** appears to be **effective in improving depression symptoms** of stroke survivors.”

Xu M-M, Guo P, Ma Q-Y, Zhou X, Wei Y-L, Wang L, Chen Y, Guo Y. Can acupuncture enhance therapeutic effectiveness of antidepressants and reduce adverse drug reactions in patients with depression? a systematic review and meta-analysis. *J Integr Med.* 2022 Jul;20(4):305-320. doi: 10.1016/j.joim.2022.05.002. Epub 2022 May 6. ²²¹

- **Study:** 16 studies involving 1,958 participants with depression included for analysis
- **Primary outcomes:** (1) severity of depression symptoms based on Hamilton Depression Rating Scale-17 (HAMD-17), World Health Organization Quality of Life-BREF scores, Self-Rating Depression Scale (SDS), and Self-Esteem Rating Scales (SERS)
- **Secondary outcomes:** remission rate, treatment response, social function, and antidepressant dose changes
- **Results:** Most studies had “**high risk** of performance bias and **low or unclear risk** of selection bias, detection bias, attrition bias, reporting bias, and other bias.”
- **Acupuncture + antidepressants vs. antidepressants alone:**
 - **Reduced HAMD-17 scores** (standard mean difference [SMD] -0.44, 95% confidence interval [CI] -0.55 to -0.33, $P < 0.01$; $I_2 = 14\%$)
 - HAMD-17 scores showed:
 - “significantly higher remission rates” (RR 1.52, 95% CI 1.26 to 1.83, $P < 0.01$; $I_2 = 0\%$)
 - significantly higher treatment responses (RR 1.35, 95% CI 1.24 to 1.47, $P < 0.01$; $I_2 = 19\%$)



- **Reduced Self-rating Depression Scale (SDS) scores** (SMD -0.53, 95% CI -0.84 to -0.23, $P < 0.01$; $I_2 = 79\%$)
- **Reduced Side Effect Rating Scale (SERS) scores** (SMD -1.11, 95% CI -1.56 to -0.66, $P < 0.01$; $I_2 = 89\%$)
- **Enhanced World Health Organization Quality of Life-BREF scores** (SMD 0.31, 95% CI 0.18 to 0.44, $P < 0.01$; $I_2 = 15\%$)
- **“Decreased the number of participants who increased their antidepressant dosages”** (relative risk [RR] 0.32, 95% CI 0.22 to 0.48, $P < 0.01$; $I_2 = 0\%$)
- **Conclusions:** “Acupuncture as an adjunct to antidepressants **may enhance the therapeutic effectiveness and reduce the adverse drug reactions** in patients receiving antidepressants.” **Note: interpret findings with caution:** low or moderate quality evidence and “lack of comparative, placebo-controlled data”

Hang X, Li J, Zhang Y, Li Z, Zhang Y, Ye X, Tang Q, Sun W. Efficacy of frequently-used acupuncture methods for specific parts and conventional pharmaceutical interventions in treating post-stroke depression patients: a network meta-analysis. *Complement Ther Clin Pract.* 2021 Nov;45:101471. doi: 10.1016/j.ctcp.2021.101471. Epub 2021 Aug 4. ²²²

- **Study:** 51 studies involving 3,966 participants with post-stroke depression (PSD) and 12 acupuncture interventions
- **Results**
 - **Most effective: scalp acupuncture plus conventional acupuncture**
 - **Second most effective:** auricular acupuncture
 - **Next most effective** in order of effectiveness: eye acupuncture, eye acupuncture + drug, auricular acupuncture + drug, auricular acupuncture + conventional acupuncture, scalp acupuncture, scalp acupuncture + drug, abdominal acupuncture, conventional acupuncture + drug, drug, conventional acupuncture.”
- **Conclusions:** “*12 acupuncture methods may be effective and safe in improving the condition of patients with PSD.*”

Hu Z, Lam Wai C, Li H, Yao L, Wang Z, Huang W, Bian Z, Zhong LDL. A network meta-analysis on the effectiveness and safety of acupuncture in treating patients with major depressive disorder. 2021;11:10384. doi: 10.1038/s41598-021-88263-y. ²²³

- **Systematic review and network meta-analysis:** searched 8 databases (PubMed, Embase, Allied and Complementary Medicine Database, Cochrane Library, Wan Fang Data, China National Knowledge Infrastructure, China Biology Medicine disc, and Chongqing VIP Database) through January 17, 2021, for studies involving “effectiveness and safety of acupuncture, common pharmacological treatments or other non-medication



therapies for [major depressive disorder (MDD)].” Network meta-analysis performed with 71 studies involving 5,774 participants

- **Results:**

- “Fifty studies involving 3881 patients in the main [network meta-analysis] reported changes in depression scores using the HAMD scale.”
- **“Combined interventions of electro-acupuncture (EA) with selective serotonin**

reuptake inhibitors (SSRIs) and manual acupuncture (MA) with SSRIs were more effective in improving depression symptoms compared with acupuncture alone, pharmacological interventions alone, or other inactive groups.”

- EA + SSRIs showed greatest improvement of depression symptoms compared with
 - MA (MD: - 2.64, 95% CI: - 5.19 to - 0.10)
 - Sham EA (MD: - 7.04, 95% CI: - 14.10 to - 0.03)
 - Sham MA (MD: - 16.65, 95% CI: - 23.98 to - 9.34)
 - SSRIs (MD: - 4.11, 95% CI: - 5.89 to - 2.33)
- **EA more effective for alleviating depression symptoms** vs sham MA (MD: - 12.87, 95% CI: - 20.15 to - 5.56)
- **MA + SSRIs more effective than SSRIs alone** (MD: - 2.47, 95% CI: - 3.85 to - 1.11)
- **MA alone > sham MA for depression symptom reduction** (MD: - 14.02, 95% CI: - 20.89, - 7.15)
- SUCRA probability scores (closer to 100 = higher probability of best treatment to alleviate depression)
 - **“EA plus SSRIs had the highest probability [of] improving depression symptoms;”** probability score = 0.9518
 - **Acupuncture + SNRIs** vs SNRIs alone probability score = 0.8994
 - **MA + SSRIs** probability score = 0.784
 - EA probability score = 0.4648
 - **EA + SNRIs** probability score = 0.3956
 - Sham MA probability score = 0.0052.
 - SNRI probability score = 0.205

- **Conclusions:** *“acupuncture and its combinations could be safe and effective interventions for MDD patients. EA with SSRIs seems to be the most effective intervention among the assessed interventions.”*

Zhao F-Y, Fu Q-Q, Kennedy GA, Conduit R, Zhang W-J, Zheng Z. Acupuncture as an independent or adjuvant management to standard care for perimenopausal depression: a



systematic review and meta-analysis. *Front Psychiatry*. 2021; 12:666988. doi: 10.3389/fpsyt.2021.666988. ²²⁴

- **Systematic review and meta-analysis:** Systematic review of seven databases through December 2020 searched for randomized controlled trials (RCTs) involving acupuncture to treat perimenopausal depression. 25 studies involving 2,213 women included for meta-analysis.
- **Study quality assessment:** “Cochrane criteria were followed.”
- **Treatment groups:**
 - acupuncture vs waitlist control or placebo/sham acupuncture
 - acupuncture + plus standard care (antidepressant and/or hormone replacement therapy (HRT))
 - acupuncture vs standard care (antidepressant and/or HRT)
- **Results:**
 - acupuncture vs standard care: “acupuncture significantly reduced the global scores of Hamilton Depression Scale (HAMD)” [standardized mean difference (SMD) = -0.54, 95% CI (-0.91, -0.16), $p < 0.01$]
 - “Therapeutic effect of acupuncture maintained at 2-, 4-, and 12-week follow-ups.”
 - acupuncture + standard care: “more effective than standard care alone in decreasing HAMD scores” [SMD = -0.82, 95% CI (-1.07, -0.58), $p < 0.01$].
 - acupuncture vs antidepressants: “better effects in decreasing Kupperman index (KI) scores” [MD = -4.55, 95% CI (-8.46, -0.65), $p = 0.02$]
 - acupuncture vs antidepressants + HRT: “better effects in decreasing Kupperman index (KI) scores” [MD = -0.89, 95% CI (-1.34, -0.43), $p < 0.01$].
 - acupuncture vs placebo/sham acupuncture or HRT alone: not enough RCTs available to assess
- **Conclusions:** “*Acupuncture alone or combined with standard care was associated with significant improvements in PMD and reductions of other menopausal symptoms. This finding suggests that acupuncture may be a useful addition to treatment for PMD.*”

Zhichao H, Ching LW, Huijuan L, Liang Y, Zhiyu W, Weiyang H, Zhaoxiang B, Zhong LD. A network meta-analysis on the effectiveness and safety of acupuncture in treating patients with major depressive disorder. *Sci Rep*. 2021;11:10384. doi: 10.1038/s41598-021-88263-y. ²²⁵

- **Systematic review and meta-analysis:** Review of 8 databases (PubMed, Embase, Allied and Complementary Medicine Database, Cochrane Library, Wan Fang Data, China National Knowledge Infrastructure, China Biology Medicine disc, and Chongqing VIP



Database) through Jan 17, 2021. 71 studies involving 5,856 participants were included for qualitative meta-synthesis and quantitative meta-analysis.

- **Inclusion criteria:** 2 independent reviewers, with 3rd reviewer to resolve disagreements
 - randomized control trials (RCTs) using “a double-blind, single-blind, or quasi-blind design”
 - patients diagnosed with major depressive disorder (MDD) according to “the Diagnostic and Statistical Manual of Mental Disorders (DSM), the International Classification of Diseases (ICD) and the Chinese Classification of Mental Disorders (CCMD)”
 - 3 types of acupuncture used: “manual acupuncture (MA), electro-acupuncture (EA), acupuncture alone or combined with antidepressant medications” versus “antidepressant medications, blank control, waitlist control, placebo control, or other non-medication therapies”
 - Excluded diagnoses: “post-stroke depression, postpartum depression, depression during pregnancy, and depression due to the general medical condition”
- **Data Synthesis and Analysis:**
 - **Network plot** showing interrelationships among all treatments
 - **Bayesian Network Meta-Analyses**
- **Study Quality Assessment:** two independent reviewers
 - **Risk of bias:** Revised Cochrane risk-of-bias tool for randomized trials (RoB 2)
 - **Quality of acupuncture procedure reporting:** Revised Standards for Reporting Interventions in Clinical Trials of Acupuncture (STRICTA) guidelines
- **Evidence Certainty Assessment:** Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach to assess the certainty of the evidence.
- **Primary Outcome Measures:** Hamilton Depression Rating Scale (HDRS, also abbreviated as HAMD) and Self-Rated Depression Scale (SDS)
- **Secondary Outcome Measures:** (1) Side Effect Rating Scale (SERS), (2) Treatment Emergent Symptom Scale (TESS), and (3) number of adverse events
- **Results:**
 - most effective in improving depression symptoms compared with acupuncture alone, pharmacological interventions alone, or other inactive groups
 - **Electro-acupuncture (EA) + selective serotonin reuptake inhibitors (SSRIs)**
 - “highest effect in improving depression symptoms of MDD.”
 - **Manual acupuncture (MA) + SSRIs**
 - **acupuncture + serotonin-norepinephrine reuptake inhibitors (SNRIs) “more effective than SNRIs alone.”**



- **Conclusion:** “Acupuncture and its [pharmacological] combinations could be safe and effective interventions for MDD patients. EA with SSRIs seems to be the most effective intervention among the assessed interventions.”

Xiao X, Zhang J, Jin Y, Wang Y, Chengdu QZ. Effectiveness and safety of acupuncture for perimenopausal depression: a systematic review and meta-analysis of randomized controlled trials. *ECAM*. 2020;5865697. doi: 10.1155/2020/5865697. ²²⁶

- **Systematic Review and Meta-Analysis:** Systematic review of “Cochrane Central Register of Controlled Trials, PubMed, EMBASE, CNKI, VIP Citation Databases, Wan Fang databases and online trial registries such as ClinicalTrials.gov for “randomized controlled trials (RCTs) assessing the efficacy and safety of acupuncture for perimenopausal depression.” 16 RCTs involving 1,311 patients included for meta-analysis.
- **Literature quality, data extraction quality, and risk of bias assessments:** performed by two independent reviewers
- **Results:**
 - acupuncture vs antidepressants:
 - “acupuncture was more effective in the treatment of perimenopausal depression than antidepressants” (OR = 2.68, 95% CI (1.84, 3.90), $P < 0.00001$)
 - “treatment effect of acupuncture was more stable than that of antidepressants “(MD = - 2.4, 95% CI (- 3.37, - 1.43), $P < 0.00001$).
 - manual acupuncture vs. antidepressants:
 - HAMD scores lower than antidepressant group (MD = - 2.35, 95% CI (- 2.93, - 1.77), $P < 0.00001$)
 - electro-acupuncture vs. antidepressants:
 - HAMD scores lower than antidepressant group (MD = - 1.2, 95% CI (- 1.92, - 0.48), $P = 0.001$))
 - adverse events: “acupuncture was safer than antidepressants based on the incidence of adverse events” (OR = 0.23, 95% CI (0.1, 0.52), $P = 0.0004$).
 - estrogen levels: “acupuncture [had] no effect on estrogen levels” ($P \geq 0.05$)
- **Conclusions:** “Acupuncture for perimenopausal depression is safe and effective. Moreover, it has **more stable long-term effects than antidepressants and hormone replacement therapy (HRT)**. We recommend acupuncture as a clinical treatment of perimenopausal depression.”



Armour M, Smith CA, Wang LQ, Naidoo D, Yang GY, MacPherson H, Lee MS, Hay P. **Acupuncture for depression: a systematic review and meta-analysis.** *J Clin Med.* 2019;8(8) Epub 2019 Jul 31. ²²⁷

- **Study:** 29 studies involving 2,268 participants diagnosed with depression pooled for meta-analysis
- **Results:** Acupuncture treatment resulted in “**clinically significant reductions in the severity of depression compared to**” the following:
 - **usual care** (Hedges (g) = 0.41, 95% confidence interval (CI) 0.18 to 0.63)
 - **sham acupuncture** (g = 0.55, 95% CI 0.31 to 0.79)
 - **adjunct to antidepressant medication** (g = 0.84, 95% CI 0.61 to 1.07).
- “Significant correlation” between **more acupuncture treatments** and reduction of depression symptoms (p = 0.015)
- **Conclusions:** Acupuncture may be a useful addition to standard care, including antidepressant pharmaceuticals, for treating depression.

Smith CA, Armour M, Lee MS, Wang LQ, Hay PJ. **Acupuncture for depression.** *Cochrane Database Syst Rev.* 2018;3(3):CD004046. Epub 2018 Mar 4. ²²⁸

- **Study:** 64 published/unpublished randomized controlled trials involving 7,104 adult male/ female participants diagnosed with depression pooled for analysis
- **Results:**
 - **Acupuncture vs no treatment/waitlist/treatment-as-usual:** both **manual- and electroacupuncture “may moderately reduce the severity of depression”** (SMD -0.66, 95% CI -1.06 to -0.25, five trials, 488 participants); low-quality evidence
 - **Acupuncture vs control (invasive acupuncture, non-invasive sham):** **reduced “severity of depression [by] 1.69 points on the Hamilton Depression Rating Scale (HAMD)”** (95% CI -3.33 to -0.05, 14 trials, 841 participants; low-quality evidence).
 - **Acupuncture vs medication:** “**acupuncture may confer small benefit in reducing the severity of depression**” (SMD -0.23, 95% CI -0.40 to -0.05, 31 trials, 3,127 participants). Note: variations exist depending on medication and mode of acupuncture; overall low-quality evidence
 - **Acupuncture + medication vs medication alone:** **acupuncture was “highly beneficial in reducing the severity of depression”** (SMD -1.15, 95% CI -1.63 to



-0.66, 11 trials, 775 participants). Note: large variation in results depending on modality of acupuncture stimulation; very low-quality evidence.

- **Acupuncture vs psychotherapy: unclear if there are any statistical differences** (SMD -0.5, 95% CI -1.33 to 0.33, two trials, 497 participants; low-quality evidence)
- **Conclusions: Acupuncture reduced depression symptoms compared with no treatment or treatment-as-usual.** (*Reduction in depression symptom severity was less when comparing acupuncture to sham acupuncture controls.*) **Acupuncture may offer some benefits in combination with or in place of medication.** Benefits of acupuncture vs psychotherapy are not discernible. All results based on “very low quality of evidence.”

Tong P, Dong L-P, Yang Y, Shi Y-H, Sun T, Bo P. Traditional Chinese acupuncture and postpartum depression: a systematic review and meta-analysis. *J Chin Med Assoc.* 2019 Sep;82(9):719-726.doi: 10.1097/JCMA.000000000000140. ²²⁹

- **Methods:** Systematic review of databases, including PUBMED, EMBASE, Cochrane Controlled Trials Register, through September 2018 for randomized controlled trials (RCT's) involving acupuncture in patients with postpartum depression (PPD). Meta-analysis: 12 RCT's involving 887 PPD patients (treatment group, n=443; control group, n=444) analyzed using Comprehensive Meta-Analysis 2.0 software.
- **Results:**
 - acupuncture group had “significantly better performances”
 - Hamilton Depression Scale random-effect model: pooled MD -1.27 (95% CI: -2.55 to 0.01; p = 0.05, I = 83%)
 - Effective rate: pooled RR was 1.20 (95% CI: 1.09 to 1.33; p < 0.0001, I = 46%)
 - subgroup analysis (acupuncture therapy alone): “only effective rate showed a significantly better performance.”
- **Conclusion:** “acupuncture seems to be effective in improving some symptoms of PPD, although the evidence is uncertain.”

Smith CA, Shewamene Z, Galbally M, Schmied V, Dahlen HG. The effect of complementary medicines and therapies on maternal anxiety and depression in pregnancy: a systematic review and meta-analysis. *J Affect Disord.* 2019;245:428-39. ²³⁰

- **Methods:** Systematic review of databases (CENTRAL, EMBASE, PubMed) for randomized controlled trials (RCTs) involving the usage of “complementary therapies and medicines versus control” to treat antenatal depression and anxiety. 20 RCTs involving 1,092 women were included for analysis.
Primary outcome: antenatal depression or anxiety.
- **Results:**



- "Acupuncture reduced the number of women diagnosed with antenatal depression" (RR 1.68, 95% CI 1.06-2.66, 1 trial).
- "Massage reduced the severity of antenatal depression in one trial of 149 women" (SMD -0.73, 95%CI -1.07--0.39).
- Bright light therapy reduced antenatal depression (RR 4.80, 95% CI -8.39--1.21, 27 women).
- "No evidence of a reduction in depression and anxiety from relaxation, yoga, mindfulness and fish oils."
- Overall the risk of bias was high or unclear for the majority of studies.
- **Conclusion:** "Acupuncture, bright light therapy, and massage may reduce antenatal depression. There is a need for high quality and larger studies that include postnatal follow up and maternal and neonatal outcomes."

Di YM, Yang L, Shergis JL, Zhang AL, Li Y, Guo X, Xue CC, Lu C. Clinical evidence of Chinese medicine therapies for depression in women during perimenopause and menopause. *Complement Ther Med.* 2019 Dec;47:102071.doi: 10.1016/j.ctim.2019.03.019. Epub 2019 Mar 28. ²³¹

- **Design:** systematic review
- **Methods:** literature search of 9 English and Chinese databases for randomized controlled trials (RCTs) involving acupuncture and Chinese herbal medicine for perimenopause and menopause. "Search terms included perimenopause, menopause, depression, Chinese herbal medicine, acupuncture, RCTs, and their synonyms."
- **Study Quality:** Cochrane Risk of Bias Tool.
- **Results:** 18 RCTs met inclusion criteria
 - Acupuncture + CHM, tuina massage significantly improved Hamilton Rating Scale of Depression (HRSD) and Kuppermans Index of Menopause compared with antidepressants.
 - "Either CHM and acupuncture reduced HRSD scores, indicating less severe depression, showing comparable effects to antidepressants."
- **Conclusion:** "CHM and acupuncture treatment in perimenopause and menopausal women resulted in reduced severity of depression. Results should be interpreted with caution given the small number of studies included in this review and further RCTs are warranted to validate findings from this review."

c. Acupuncture for Mental Health Outcomes: Anxiety

(a.) Acupuncture for General Anxiety

Xu Z, Zhang X, Shi H, Liang M, Ning F, Wang Q, Jia H. Efficacy of acupuncture for anxiety and depression in functional dyspepsia: a systematic review and meta-analysis. *PLoS One.* 2024 Mar 7;19(3):e0298438. doi: 10.1371/journal.pone.0298438. eCollection 2024. doi: 10.1371/journal.pone.0298438. ²³²



- **Systematic Review:** Review of databases (PubMed, Embase, Cochrane Library, Web of Science, CNKI, Wanfang Data, Sinomed, and VIP Database) through April 30, 2023, for randomized controlled trials (RCTs) involving a comparison of acupuncture versus “placebo or drugs for symptom alleviation.”
- **Meta-analyses:** 16 RCTs including 1,315 participants underwent analysis
- **Bias risk assessment:** Cochrane Risk of Bias tool
- **Evidence assessment:** Grading of Recommendations Assessment, Development, and Evaluation (GRADE) system
- **Statistics:** Mean difference (MD), risk ratio (RR), and corresponding 95% confidence intervals (CI)
- **Outcomes:** Self-Rating Anxiety Scale (SAS), Self-Rating Depression Scale (SDS), Hamilton Anxiety Rating Scale (HAMA) and Hamilton Depression Rating Scale (HAMD)
- **Results:**
 - **Self-Rating Anxiety Scale (SAS)**
 - “Acupuncture demonstrated marked superiority over placebo” (MD = -7.07, 95% CI: -11.03 to -3.10, very low quality evidence)
 - **Self-Rating Depression Scale (SDS)**
 - Acupuncture “more effective” than placebo in reducing SDS scores (MD = -4.63, 95%CI: -6.28 to -2.98, low quality evidence)
 - *Acupuncture “more effective” than first-line drugs* in reducing SDS scores (MD = -2.71, 95%CI: -5.19 to -0.23, very low quality evidence).
 - **Hamilton Anxiety Rating Scale (HAMA) and Hamilton Depression Rating Scale (HAMD) scores**
 - “Acupuncture consistently outperformed” placebo (HAMA: MD = -2.58, 95%CI: -4.33 to -0.83, very low quality evidence; HAMD: MD = -1.89, 95%CI: -3.11 to -0.67, low quality evidence)
 - “Acupuncture consistently outperformed” first-line drugs (HAMA: MD = -5.76, 95%CI: -10.18 to -1.35, very low quality evidence; HAMD: MD = -5.59, 95% CI: -7.59 to -3.59, very low quality evidence).
 - **Hospital Anxiety and Depression Scale (HADS)**
 - “No significant difference was observed between acupuncture and placebo.”
- **Conclusions:** *“Based on current clinical evidence, acupuncture might have a positive effect on depression and anxiety in patients with FD.”*

Li M, Liu X, Ye X, Zhuang L. Efficacy of acupuncture for generalized anxiety disorder: a PRISMA-compliant systematic review and meta-analysis. *Medicine (Baltimore)*. 2022 Dec 9;101(49):e30076. doi: 10.1097/MD.00000000000030076. ²³³



- **Study:** 27 studies involving 1,782 participants with generalized anxiety disorder (GAD) pooled for meta-analysis
- **Primary outcome:** Hamilton Anxiety Scale (HAMA)
- **Secondary outcomes:** total effective rate, Self-Rating Anxiety Scale (SAS), Treatment Emergent Symptom Scale (TESS)
- **Results for acupuncture group**
 - **superior anxiety scores** vs. control group:
 - HAMA score [MD = -0.78, 95%CI (-1.09, -0.46)], the total effective rate [RR = 1.14, 95%CI (1.09, 1.19)]
 - SAS score [MD = -2.55, 95%CI (-3.31, -1.80)]
 - **higher safety with fewer adverse events** vs. control group: **lower TESS scores** [MD = -1.54, 95%CI (-1.92, -1.17)]
- **Conclusions:** *“Acupuncture can effectively relieve the anxiety symptoms of generalized anxiety disorder patients with fewer side effects.”*

Xiang-Yun Y, Ning-Bo Y, Fang-Fang H, Shuai R, Zhan-jiang L. Effectiveness of acupuncture on anxiety disorder: a systematic review and meta-analysis of randomised controlled trials. *Ann Gen Psychiatry*. 2021;20:9. ²³⁴

- **Systematic review:** English and Chinese language databases (PubMed, Scopus, Cochrane Central Register, Embase, WanFang data, VIP Chinese Science and Technology Journal Database, China National Knowledge Infrastructure) searched for randomized controlled trials (RCTs) involving acupuncture for the treatment of generalized anxiety disorder (GAD)
- **Meta-analysis:** 20 trials involving 1,823 participants
- **Primary outcome:** anxiety symptoms pre- and post-treatment
- **Secondary outcomes:** side effects and dropout rate.
- **Results:**
 - Egger’s test for publication bias: “asymmetry of the funnel plot in all studies was not significant” ($t=-0.34$, $p=0.74$) indicating unlikely publication bias
 - meta-analysis of anxiety symptoms: “acupuncture was more effective than the control” standard mean effect size of -0.41 (95% CI -0.50 to -0.31 ; $p<0.001$)
 - “acupuncture intervention showed good tolerance and safety”
- **Conclusion:** *“acupuncture therapy aimed at reducing anxiety in patients with GAD has certain beneficial effects compared to controls.”*

Amorim D, Amado J, Brito I, et al. Acupuncture and electroacupuncture for anxiety disorders: a systematic review of the clinical research. *Complement Ther Clin Pract*.



2018;31:31-37. ²³⁵

- **Systematic review:** B-On, PubMed, Scielo, Science Direct and Scopus searched for English-language clinical trials (controlled, randomized and non-randomized) published from 2017-2020 involving acupuncture treatment of anxiety
- **Qualitative analysis:** 13 papers
- **Results:** “Highly variable” methodology, design, and research quality
 - Acupuncture significantly improved immune function of anxious women and demonstrated immune modulatory effects (vs simple linear up/down regulation)
 - “Both auricular acupuncture ($p = 0.012$) and intranasal midazolam ($p < 0.001$) [had] an anxiety reducing effect relative to the control group.” Midazolam led to longer sedation duration.
 - No significant difference for all treatment groups; “ACTH and 5-HT levels decreased in all groups” ($p > 0.05$); fewer side effects with acupuncture ($p < 0.01$); acupuncture prevented adverse side-effects in combined treatments
 - Both electroacupuncture and alprazolam reduced anxiety $> 80\%$ ($p < 0.01$). No significant differences between treatment groups ($p > 0.05$); EA fewer side effects.
 - “Auricular acupuncture reduced anxiety ($p < 0.001$) more effectively than Sham acupuncture ($p < 0.001$). ... Control group anxiety increased significantly before the dental treatment” ($p = 0.004$).
 - HAM-A scores “significantly lower” in acupuncture group (34.9% decrease) vs sham acupuncture group (19.4% decrease)” ($p = 0.0008$)
 - BIS anxiety values “significantly lower” in acupuncture ($p < 0.0004$) vs sham acupuncture group ($p < 0.0042$) and STAI-S values lower in acupuncture ($p = 0.018$) vs sham groups ($p = 0.156$)
 - Reduced anxiety in acupuncture group ($p = 0.0146$)
 - “Significant improvement in state and trait anxiety” in acupuncture vs waitlist control group ($p < 0.0001$). Once waitlist participants received acupuncture, results were similar. “Improvements were maintained after 10 weeks of follow-up for both groups.”
 - “All complementary and alternative medicine treatments were effective [in] reducing anxiety ($p < 0.001$).”
 - Acupuncture effectively reduced anxiety vs control group ($p \leq 0.003$); acupuncture more effective than sham acupuncture ($p \leq 0.021$)
 - Acupuncture group “showed significant decrease on cognitive and somatic anxiety compared to the [sham acupuncture] group” ($p \leq 0.001$) and waitlist control group ($p < 0.001$).
 - “Acupuncture group decreased heart rate compared to sham group” ($p \leq 0.004$).
 - Acupuncture vs control group ($p \leq 0.829$).
 - “No adverse effects were verified.”
- **Conclusions:** “Acupuncture therapy to treat anxiety disorders as it yields effective outcomes, with fewer side effects than conventional treatment.”



Goyatá SL, Avelino CC, Santos SV, Souza Junior DI, Gurgel MD, Terra Fde S. Effects from acupuncture in treating anxiety: integrative review. *Rev Bras Enferm.* 2016 Jun;69(3):602-9. English, Portuguese. doi: 10.1590/0034-7167.2016690325i. ²³⁶

- **Study:** Systematic review of CINAHL, LILACS, PUBMED-PICO, SciELO, and Cochrane Library from 2001- 2014 using “keywords anxiety, acupuncture therapy, acupuncture, and anxiety disorders.” Meta-analysis of 19 studies with participant ranging from 4 to 1,201 per study (6 of which were randomized controlled trials involving 412 participants)
- **Results:**
 - 11 studies determined to have “strong evidence levels”
 - 5 of 6 articles involving randomized clinical studies “were found to be of reasonable quality.”
 - 2 studies demonstrated “positive and statistically significant effects from using acupuncture for treating subjects with anxiety.”
- **Conclusion:** “acupuncture seems to be a promising treatment for anxiety.”

(b.) Acupuncture for Women’s Health-Related Anxiety

Hullender Rubin LE. Effect of acupuncture on IVF-related anxiety: a systematic review and meta-analysis. *RBMO.* 2022;45(1):69-80. doi:10.1016/j. ²³⁷

- **Study Goal:** “to examine the effect of acupuncture on IVF-related state anxiety”
- **Systematic Review:** review of databases (PubMed, Embase, Web of Science, CINAHL and Cochrane Library) for published and unpublished randomized controlled trials (RCT) involving acupuncture “administered during ovarian stimulation, oocyte retrieval, IVF embryo transfer or frozen embryo transfer,” sham acupuncture, control, or other treatment, patients diagnosed with primary or secondary infertility who were undergoing IVF, as well as the measurement of anxiety at two time intervals during the study.
- **Primary Outcomes:** anxiety (Spielberger State-Trait Anxiety Index, Hamilton Anxiety Rating Scale, 100-point visual analogue scale (VAS), or Standard Form-36)
- **Secondary Outcomes:** stress scales (Perceived Stress Scale or other stress assessment) and Quality of Life (QoL) scales (36-SF or other)
- **Study Selection and Data Extraction:** two independent reviewers
- **Risk of Bias:** two independent reviewers using Risk of Bias 2 assessment from Cochrane
- **Study Quality:** GRADE approach
- **Heterogeneity:** tau-squared, I^2 , and chi-squared statistics
- **Meta-Analysis:** 8 trials involving 2,253 participants (1,785 completed anxiety assessment); RevMan 5.4 software
- **Results:**



- Random Effects Model
 - “small but significant effects on state anxiety with acupuncture versus any control” (standardized mean difference -0.21 , 95% confidence interval -0.39 to -0.04 , representing very low certainty evidence).
 - “high risk of performance bias and substantial heterogeneity across trials” ($I^2 = 68\%$ in 8 trials comprising 1,785 people)
- Stress
 - similar stress among groups (4 trials w/ 1,027 people) (SMD -0.08 , 95% CI -0.24 to 0.08 , $P = 0.32$, $I^2 = 39\%$, very low certainty evidence)
 - “No evidence that acupuncture reduced serum cortisol” vs control in 2 trials ($N = 596$, SMD -0.51 , 95% CI -1.12 to 0.11 , $P = 0.11$, $I^2 = 0\%$, low certainty)
- Quality of Life (2 studies, 607 participants)
 - No difference among groups for the following:
 - well-being (mean difference 0.20 , 95% CI -2.30 to 2.69 , $P = 0.88$)
 - physical function: (mean difference 0.08 , 95% CI -2.63 to 2.79 , $P = 0.95$)
 - energy/fatigue: (mean difference 0.15 , 95% CI -3.25 to 3.55 , $P = 0.93$)
 - pain: (mean difference 0.46 , 95% CI -2.53 to 3.46 , $P = 0.76$)
 - overall low certainty evidence; no heterogeneity
- Pregnancy and Birth Outcomes
 - Acupuncture vs any control: no significant difference among groups for cerebroplacental ratio (CPR) (8 trials, 2,253 participants); moderate heterogeneity (risk ratio [RR] 1.03 , 95% CI 0.91 to 1.16 , $P = 0.11$, $I^2 = 41\%$, very low certainty)
 - Acupuncture vs any control during embryo transfer ($I^2 = 56\%$) and no heterogeneity during TVOR ($I^2 = 0\%$)
 - No difference between groups on CPR during embryo transfer ($n = 6$, $N = 1820$, RR = 0.99 , 95% CI 0.79 to 1.24 , $P = 0.95$, very low certainty)
 - Acupuncture vs sham control: “substantial heterogeneity” and “no difference between groups” when studies “categorized by type of control” ($n = 5$, $N = 1671$, RR = 0.97 , 95% CI 0.75 to 1.26 , $P = 0.81$, $I^2 = 65\%$, very low certainty)
 - Acupuncture affected CPR no better than control ($n = 3$, $N = 579$, RR = 1.13 , 95% CI 0.90 to 1.42 , $P = 0.28$, $I^2 = 0\%$)
 - No difference between groups in live birth rate ($n = 3$, $N = 1405$, RR = 1.13 , 95% CI 0.94 to 1.36 , $P = 0.18$, $I^2 = 0\%$, low certainty)
- Satisfaction



- No difference between groups (n = 3, N = 578, SMD 0.03, 95% CI -0.31, 0.37, P = 0.86, $I^2 = 76\%$)
- Adverse Outcomes
 - Miscarriage incidence “not significant between groups” (n = 3, N = 683, RR = 0.94, 95% CI 0.64 to 1.37, P = 0.74, $I^2 = 0\%$)
 - Ectopic pregnancies “not significant between groups” (n = 1, N = 183, RR = 0.40, 95% CI 0.04 to 4.30, P = 0.45, moderate certainty)
 - Puncture site itching greater in control group vs acupuncture group (n = 2, N = 596, RR = 0.63, 95% CI 0.46 to 0.86, P = 0.003, $I^2 = 0\%$, low certainty)
 - Nausea, tiredness, drowsiness, fainting, headache, or chest pain: no differences between groups (moderate certainty)
- Subgroup Analysis
 - State anxiety based on studies with two acupuncture treatments (n = 5, N = 1174, SMD = -0.19, 95% CI -0.36 to -0.02, P = 0.03; chi squared = 8.23, degrees of freedom [df] = 4, P = 0.08, $I^2 = 51\%$, very low certainty)
 - State anxiety based on more than 2 acupuncture treatments, “no difference between groups” was found (n = 3, N = 611, SMD, -0.335, 95% CI -0.84 to 0.14, P = 0.16; chi-squared = 1316, df = 2, P = 0.001, $I^2 = 85\%$, very low certainty)
 - “When acupuncture was performed only on the day of embryo transfer (three trials, 742 participants), acupuncture provided small effects on state anxiety compared with controls” (mean difference -0.89, 95% CI -1.68 to -0.09, P = 0.03, $I^2 = 76\%$, very low certainty)
 - 1-4 acupuncture sessions prior to embryo retrieval and embryo transfer (n = 3, N = 611): no difference in state anxiety between treatment groups (SMD -0.35, 95% CI -0.84 to 0.14, P = 0.16, $I^2 = 85\%$)
 - “State anxiety not impacted by acupuncture during TVOR” vs no acupuncture (n= 2, N = 432, SMD -0.17, 95% CI -0.36 to 0.02, P = 0.08, $I^2 = 0\%$, low certainty)
 - Acupuncture vs sham: no difference in state anxiety (n = 5, N = 1207, SM -0.16, 95% CI -0.39 to 0.06, P = 0.16, $I^2 = 70\%$, very low certainty)
 - Acupuncture vs no acupuncture/other treatment: state anxiety less in acupuncture group (n = 3, N = 578, SMD -0.30, 95% CI -0.57 to -0.04, P = 0.03, $I^2 = 60\%$, very low certainty)
 - Acupuncture greater impact on reducing state anxiety during IVF embryo transfer vs “any control treatment” (n = 6, N = 1353) SMD -0.25, 95% CI -0.48 to -0.01, P = 0.04, $I^2 = 76\%$, very low certainty)



- Acupuncture had no impact on state anxiety vs control during treatments for pain during TVOR (n = 2, N = 432, SMD -0.17, 95% CI -0.36 to 0.02, P = 0.08, I² = 0%, low certainty)
- Sensitivity analysis
 - Studies grouped by assessment scale (n = 5, N = 1277 used STAI scale)
 - Anxiety was “modestly reduced with acupuncture compared with the control group” (mean difference -1.05, 95% CI -2.09 to -0.00, P = 0.05, I² = 60%, very low certainty)
 - “No difference between groups on state anxiety when measured by scales other than STAI” (n = 3, N = 578, SDM -0.38, 95% -0.88 to 0.12, P = 0.13, I² = 85%, very low certainty)
- **Conclusions:** “Acupuncture is a drug-free and safe treatment that may benefit those who are burdened with IVF-related anxiety, but more investigation is needed for confirmation.”

Mehrnoush V, Darsareh F, Roozbeh N, Ziraie A. Efficacy of the complementary and alternative therapies for the management of psychological symptoms of menopause: a systematic review of randomized controlled trials. *J Menopausal Med.* 2021;27:115-131. doi:10.6118/jmm.21022. ²³⁸

- **Study:** Systematic review of PubMed, Web of Science, Scopus, Cochrane, Google Scholar from January 2000 - May 2021, with “keywords menopause, menopausal symptoms, psychological symptoms, and complementary and alternative medicine.” Meta-analysis of 33 articles involving 3,092 participants
- **Study quality assessment:** using the “Mixed Methods Appraisal Tool (MMAT) for randomized clinical trials” and (Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA))
- **Outcome assessments:** most commonly used were Menopausal Rating Scale, Menopause-Specific Quality of Life Questionnaire, Kupperman Menopause Index, Greene Climacteric Scale, and Women’s Health Questionnaire
- **Results:**
 - More than 50% of the studies received high quality scores
 - 41 intervention groups and 33 control groups among included studies
 - Authors found that aromatherapy, massage, yoga, acupuncture, dietary supplements, and herbal supplements “improved psychological symptoms during menopause.”
 - Dietary supplements: curcumin, Vitamin E, phytoestrogens
 - Herbal supplements: evening primrose oil, St. John’s wort (*Hypericum perforatum*), lavender, bitter orange, *Schisandra chinensis*, grapeseed, maca, Er-Xian decoction, wild yam (*Dioscorea*), Black cohosh (*Cimicifuga racemosa*), Combination Dang Gui (*Angelicae sinensis*) and Huang Qi (*Astragalus membranaceus*)



- The “effectiveness of reflexology and exercise was debatable.”
- **Conclusions:** “Despite the positive effect of various CAM interventions on reducing psychological symptoms, necessary precautions should be taken when using them in the clinical setting. More research with a higher methodology quality is required to make better decisions about the effect of various CAM interventions on psychological symptoms of menopause.”

(c.) Acupuncture for Anxiety in Parkinson’s Patients

Wu Z, Liu C, Chan V, Wu X, et al. Efficacy of acupuncture in ameliorating anxiety in Parkinson’s disease: a systematic review and meta-analysis with trial sequential analysis. *Front Aging Neurosci.* 2024;16:1462851. doi: 10.3389/fnagi.2024.1462851.²³⁹

- **Design:** systematic review and meta-analysis with trial sequential analysis
- **Systematic review registration:** <https://www.crd.york.ac.uk/PROSPERO/>
- **Methods:** literature search of 8 databases for randomized controlled trials (RCTs) involving acupuncture treatment of anxiety for Parkinson’s Disease (PD) patients
- **Primary Outcomes:** Hamilton Anxiety Scale (HAMA) and the Self-Rating Anxiety Scale (SAS).
- **Secondary Outcomes:** Parkinson’s Disease Questionnaire-39 (PDQ-39), Unified Parkinson’s Disease Rating Scale (UPDRS)
- **Risk of Bias:** Cochrane RoB 2.0 tool
- **Evidence Certainty:** GRADE system
- **Evidence Sufficiency:** Trial Sequential Analysis (TSA)
- **Meta-Analysis:** 14 studies pooled for analysis
- **Results:**
 - 14 studies met inclusion criteria
 - “Manual acupuncture (MA) + routine drug treatment (RDT) group improved more than the RDT alone group.”
 - “MA was more effective than sham acupuncture.”
 - “MA+ traditional Chinese medicine (TCM) was also more effective than TCM.”
 - “Auricular therapy (AT) was not as effective as control therapy (CT).”
 - “Electroacupuncture (EA) + routine drug treatment (RDT) group was not as effective as RDT.”
 - Subgroup analysis of PDQ-39 and UPDRS: “acupuncture group had better clinical efficacy than CT”
 - Overall Evidence Certainty (GRADE): anxiety outcomes (low), PDQ-39 (very low), UPDRS (low)
 - “TSA results indicate insufficient evidence”



- **Conclusion:** “Our analysis suggests that **MA combined with RDT may help ameliorate anxiety in PD patients**, although the evidence is weak due to low quality RCTs. EA and AT showed no significant effects, highlighting the need for more rigorous studies with better controls and longer follow-up. The potential of acupuncture for PD-related anxiety should be considered with caution until stronger evidence becomes available.”

Jing-qi F; Wei-jing L; Wei-qiang T; Xin L; Yu-ting W; Nan-bu W; Li-xing . Effectiveness of acupuncture for anxiety among patients with Parkinson Disease - a randomized clinical trial. *JAMA Netw Open.* 2022;5(9):e2232133. doi:10.1001/jamanetworkopen.2022.32133. ²⁴⁰

- **Study:** randomized, double-blinded, clinical trial involving 70 patients (34 women (48.5%); 36 men (51.4%)) with Parkinson disease and anxiety
- **Interventions:** real acupuncture or sham acupuncture for 8 weeks
- **Primary Outcome:** Hamilton Anxiety Scale (HAM-A) score
- **Secondary Outcomes:** Unified Parkinson Disease Rating Scale (UPDRS) scores, 39-item Parkinson Disease Questionnaire (PDQ-39), serum levels of the adrenocorticotrophic hormone (ACTH) and cortisol (CORT)
- **Results:**
 - Sixty-four patients (91%) completed the intervention and the 8-week follow-up
 - Post-treatment HAM-A score for real vs sham groups: 0.22 (95% CI, -0.63 to 1.07; P = .62)
 - After follow-up, real acupuncture group HAM-A scores showed a “significant 7.03-point greater (95% CI, 6.18 to 7.88; P < .001) reduction ... compared with the sham” acupuncture group.
 - “Four mild adverse reactions occurred during the study.”
- **Conclusions:** “This study found **acupuncture to be an effective treatment for anxiety in patients with [Parkinson disease]**. These findings suggest that acupuncture may enhance the wellbeing of patients who have Parkinson disease and anxiety.”

(d.) Acupuncture for Pre- and Peri-Operative Anxiety

Wang X, Yu Q, Zhu J, et al. Acupuncture and moxibustion in the treatment of gynecological perioperative anxiety: a systematic review and meta-analysis. *J Pain Res.* 2024;17 3515–3538. ²⁴¹

- **Methods:** search of databases (PubMed, Embase, Cochrane Library, Web of Science, CNKI, Wanfang, VIP, CBM) from inception to March 20, 2023, for studies involving acupuncture and/or moxibustion treatment of gynecological perioperative anxiety
- **Quality Control:** “Literature screening and data extraction were independently conducted by two investigators”
- **Risk of Bias:** Cochrane risk-of-bias tool 2.0
- **Meta-Analysis:** Stata 15.1 software



- **Results:**
 - 20 studies involving 3,254 patients met inclusion criteria (treatment n=1,578; control n=1676)
 - “acupuncture and moxibustion therapy resulted in a reduction” in the following measures vs control:
 - postoperative State-Trait Anxiety Inventory (STAI-S) scores (mean difference [MD] = -3.50, 95% confidence interval [CI] [-6.93 to -0.07], P = 0.046)
 - preoperative and postoperative Visual Analogue Scale-Anxiety (VAS-anxiety) and Self-Rating Anxiety Scale (SAS) scores (pre-operation: SMD = -1.04, 95% CI [-1.73 to -0.35], P = 0.003; post-operation: SMD = -0.78, 95% CI [-1.21 to -0.35], P < 0.001)
 - “no significant variances were noted between the two groups” for the following measures:
 - preoperative and intraoperative STAI-S scores (pre-operation: MD = -3.38, 95% CI [-9.58 to 2.82], P = 0.286)
 - intraoperative: MD = -1.09, 95% CI [-7.32 to 5.13], P = 0.730)
 - intraoperative VAS-anxiety and SAS scores (SMD = -0.44, 95% CI [-1.51 to 0.64], P = 0.427)
- **Conclusion:** “During the perioperative period of gynecological surgery, **acupuncture and moxibustion therapy show potential in alleviating anxiety in patients.** It is noteworthy that the current level of evidence is limited by the small sample size. Therefore, further validation of these findings is necessary.”

Xie W, Ye F, Yan X, Cao M, Ho M-H, YYan J, Kwok Y, Lee JJ. Acupressure can reduce preoperative anxiety in adults with elective surgery: a systematic review and meta-analysis of randomised controlled trials. *Int J Nurs Stud.* 2023 Sep;145:104531. doi: 10.1016/j.ijnurstu.2023.104531. Epub 2023 May 22. ²⁴²

- **Design:** systematic review and meta-analysis.
- **Search Methods:** literature search of databases (PubMed, Cochrane Library, EMBASE, CINAHL, China National Knowledge Infrastructure, WanFang Data Knowledge Service Platform) from inception through September 2022 using key words “acupressure” and “preoperative anxiety” for randomized controlled trials involving acupressure for preoperative anxiety
- **Quality Control:** “Pairs of researchers independently screened and extracted data”
- **Risk of Bias:** Cochrane risk of bias tool Version 2.0
- **Meta-Analysis:** pooled analysis “of overall effects and prespecified subgroup (i.e., surgery types, intervention providers, and acupressure stimulation tools)” and random-effects using Review Manager Software 5.4.1. // Meta-regression using STATA 16 to determine heterogeneity.
- **Results:**
 - 24 studies involving 2,537 participants from 5 countries met inclusion criteria
 - acupressure vs usual care or placebo: “acupressure showed a large effect size for



- preoperative anxiety” (SMD = -1.30; 95%CI = -1.54 to -1.06; $p < 0.001$; $I^2 = 86\%$).
- significant heart rate reduction of -4.58 BPM (95%CI = -6.70 to -2.46; $I^2 = 89\%$), -6.05 mmHg (95%CI = -8.73 to -3.37; $p < 0.001$; $I^2 = 88\%$)
- significant reduction in systolic and diastolic blood pressure of -3.18 mmHg (95%CI = -5.09 to -1.27; $p = 0.001$; $I^2 = 78\%$)
- subgroup analysis:
 - “significant differences in surgery types and acupressure stimulation tools”
 - no significant difference for type of intervention provider (i.e., healthcare professionals or self-administered)
- **Conclusion:** “Acupressure appears efficacious as a therapy for improving preoperative anxiety and physiological parameters amongst adults with elective surgery. Self-administered acupressure, which is effective with a large effect, may be considered as an evidence-based approach to managing preoperative anxiety. Hence, this review aids in the development of acupressure in different types of elective surgeries and the improvement of the rigour of acupressure therapy.”

Usichenko TI, Hua K, Cummings M, et al. Auricular stimulation for preoperative anxiety - a systematic review and meta-analysis of randomized controlled clinical trials. *J Clin Anesth.* 2022 Feb;76:110581. doi: 10.1016/j.jclinane.2021.110581. Epub 2021 Nov 12. ²⁴³

- **Design:** systematic review and meta-analysis
- **Methods:** Literature search of databases (MEDLINE (PubMed), EMBASE, Cochrane Central Register of Controlled Trials (CENTRAL), ISI Web of Science, Scopus) from inception to June 2020 for randomized controlled trials (RCTs) involving use of auricular stimulation (AS) for preoperative anxiety.
- **Quality Control:** “Study selection and data extraction were performed by 2 independent reviewers with ability to resolve disagreements by a third author.”
- **Meta-Analyses, Risk of Bias, Evidence Quality:** Cochrane 6.2, 2021 handbook
- **Treatment Interventions:** auricular stimulation (AS) vs pharmacological and non-pharmacological treatments
- **Outcomes:** anxiety scores, safety, physiological parameters, perioperative medications requirement, intensity of postoperative pain.
- **Results:**
 - 15 studies with 1,603 patients met inclusion criteria
 - AS reduced anxiety scores vs sham control (Standardized Mean Difference (SMD) -0.72, 95% confidence interval (CI) -1.09 to -0.36, $p < 0.0001$; 8 trials; 701 patients; heterogeneity: $I^2 80\%$; GRADE: moderate certainty)
 - AS reduced anxiety scores vs no intervention (SMD -1.01, 95% CI -1.58 to -0.45, $p = 0.0004$; 4 trials; 420 patients; heterogeneity: $I^2 84\%$; GRADE: very low certainty)



- “no difference between AS and benzodiazepines” (SMD -0.03; 95% CI: -0.34 to 0.28; $p = 0.84$; 3 trials; 158 patients; heterogeneity: $I^2 0\%$; GRADE: very low certainty).
- Adverse Events: no serious reports for AS
- **Conclusions:** “AS may be useful in treatment of preoperative anxiety. Due to heterogeneous certainty in effect estimates, further research is needed to clarify the actual efficacy of AS for preoperative anxiety.”

Tong QY, Liu R, Zhang K, Gao Y, Cui GW, Shen WD. Can acupuncture therapy reduce preoperative anxiety? A systematic review and meta-analysis. *J Integr Med.* 2021;19(1):20. Epub 2020 Nov 18. ²⁴⁴

- **Study:** 12 studies involving 916 patients with preoperative anxiety included for meta-analysis
- **Results: Acupuncture patients compared with control group experienced reduced:**
 - **State-Trait Anxiety Inventory Scale (STAI-S) scores** (mean difference [MD] = -9.07, 95% confidence interval [CI] [-13.19 to -4.96], $P < 0.0001$)
 - moderate quality evidence
 - **Visual Analogue Scale (VAS) scores** (MD = -1.37, 95% CI [-2.29 to -0.45], $P = 0.003$)
 - low-quality evidence
- **No difference treatment vs. control for Hamilton Anxiety Scale (HAMA) scores**
 - (MD = -3.98, 95% CI [-12.89 to 4.92], $P = 0.38$).”
 - moderate quality evidence
- **Conclusion:** Acupuncture *may decrease anxiety* in preoperative patients

d. Acupuncture for Mental Health Outcomes: Insomnia

(a.) Acupuncture for General Insomnia

Xu H-Y, Wu L-N, Zhang Y, Ba T, Zhao X-F. Efficacy and safety of electroacupuncture for



insomnia: a systematic review and meta-analysis. *J Integr Med.* 2024 Jul;22(4):460-473. doi: 10.1016/j.joim.2024.05.005. Epub 2024 May 31. ²⁴⁵

- **Search strategy:** Literature review of databases (PubMed, Cochrane Library, Embase, Web of Science, Chinese Biomedical Literature Database, China National Knowledge Infrastructure, Wanfang Data, VIP Full-text e-Journals Database) up to January 15, 2023, for randomized clinical trials involving electroacupuncture to treat insomnia
- **Treatment Groups:** electroacupuncture, sham acupuncture, no treatment, usual care (UC), general acupuncture
- **Meta-Analysis:** Stata15.0 software
- **Outcome Measures:** continuous variables: Pittsburgh Sleep Quality Index (PSQI), Insomnia Severity Index, weighted mean difference (WMD); dichotomous variables: clinical response rate, adverse events
- **Results:**
 - 31 trials with 2,226 subjects met inclusion criteria
 - **“Electroacupuncture was more effective in improving insomnia** compared with the control group (sham acupuncture, no treatment, UC and general acupuncture)” (RR = 1.21; 95% CI: [1.16, 1.27])
 - Electroacupuncture significantly reduced “PSQI score in insomnia patients after treatment and at follow-up” (WMD = -3.23; 95% CI: [-4.29, -2.17]; P < 0.001).
 - “Receiving electroacupuncture for seven to nine weeks provided the best efficacy” (P < 0.05)
 - Adverse Events: “no significant difference in the incidence of adverse events between the EA and control groups (sham acupuncture and no treatment or UC” (RR = 1.48; 95% CI: [0.91, 2.40]; P = 0.117).
- **Conclusion:** **“Electroacupuncture can significantly promote better sleep quality in insomnia patients** and is suitable for the treatment of various types of insomnia. However, the articles included were single-center trials with small sample sizes, and some articles were of poor quality. Therefore, further research is still needed to confirm these findings.”

Luo W, Wu Z, Li S, Zhang W, Lai M, Lin Z, Chen S, Yang Z. The efficacy of Tiaoshen acupuncture in Traditional Chinese Medicine for insomnia treatment: a systematic review and meta-analysis. *Altern Ther Health Med.* 2024 Dec;30(12):132-138. ²⁴⁶

- **Design:** A systematic review and meta-analysis was conducted.



- **Study Registry:** International Platform of Registered Systematic Review and Meta-analysis Protocols (INPLASY), 2023100051
- **Methods:** Literature search of electronic databases (Chinese National Knowledge Infrastructure (CNKI), Wanfang, SinoMed, Weipu, PubMed, Web of Science, EMBASE, Cochrane) up to September 15, 2023, for randomized controlled trials (RCTs) involving Tiaoshen acupuncture for insomnia.
- **Quality Control:** Cochrane Risk of Bias tool
- **Meta-Analysis:** Review Manager 5.3
- **Results:**
 - 13 articles involving 849 patients met inclusion criteria
 - Tiaoshen acupuncture decreased Pittsburgh Sleep Quality Index scores (PSQI) score [RR=-3.03, 95% CI (-3.73, -2.33), P < .00001] compared to superficial sham acupuncture
 - Tiaoshen acupuncture decreased hyperarousal (HAS) scale scores [RR=-7.75, 95% CI (-12.29, -3.22), P < .0008] compared to superficial sham acupuncture
 - Tiaoshen acupuncture decreased fatigue scale-14 (FS-14) scores [RR=-2.11, 95% CI (-2.83, -1.38), P < .00001] compared to superficial sham acupuncture
 - Publication Bias: suggested by funnel plot
- **Conclusions:** “Acupuncture with the Tiaoshen method could enhance sleep quality and efficiency. Due to the low quality of some literature, further high-quality RCTs are needed to improve the level of evidence.”

Hu W, Zhou H, Zeng Y, Zeng Q, Huang Z, Wang C. Efficacy of acupuncture or moxibustion in treating senile insomnia compared with a control group: a systematic review and meta-analysis. *Medicine*. 2023;102:42. doi: 10.1097/MD.00000000000034842. ²⁴⁷

- **Design:** systematic review and meta-analysis
- **Methods:** literature search of 7 electronic databases from inception to March 11, 2023 for identify randomized controlled trials involving acupuncture or moxibustion treatment for senile insomnia
- **Meta-Analysis:** RevMan (version 5.3) and STATA (version 17.0) software; 16 RCTs analyzed for rate of improvement, 14 for PSQI score improvement
- **Risk of Bias:** Cochrane risk-of-bias tool
- **Results:**
 - 20 studies (2007-2022) involving 1,677 patients met inclusion criteria
 - Efficacy:
 - “acupuncture or moxibustion alone was significantly better than western drugs” (RR = 1.12; 95% CI, 1.06–1.20)



- “acupuncture combined with drugs was better than drugs alone” (RR = 1.20; 95% CI, 1.12–1.29)
- “acupuncture combined with cognitive behavior therapy intervention (CBT-I) was significantly better than CBT-I alone” (RR = 1.52; 95% CI, 1.07–2.17)
- Pittsburgh Sleep Quality Index (sleep quality) scores:
 - “acupuncture or moxibustion alone was more effective than western drugs” (MD = -1.82; 95% CI, -2.37 to -1.26)
 - “acupuncture combined with drugs was more effective than drugs alone” (MD = -3.10; 95% CI, -4.25 to -1.95)
 - “acupuncture was significantly more effective than sham acupuncture” (MD = -4.18; 95% CI, -5.85 to -2.51) and psychological intervention (MD = -3.54; 95% CI, -4.33 to -2.75)
- **Conclusions:** “This meta-analysis revealed that **acupuncture or moxibustion alone or combination with other therapies (drugs, CBT-I or psychological intervention) has high clinical efficacy** and can improve the sleep quality of patients with senile insomnia.”

Liu S, Liu J, Sua J, Zhanga F. Efficacy and safety of electroacupuncture for secondary sleep disorders: a meta-analysis and systematic review. *Medicine*. 2023;102:26. <http://dx.doi.org/10.1097/MD.00000000000034150>.²⁴⁸

- **Design:** meta-analysis and systematic review
- **Methods:** Literature search of databases (CNKI, Wanfang, VIP database, Web of Science, EMBASE, PubMed, Cochrane Library) on February 28, 2023, for randomized controlled trials involving electroacupuncture for secondary sleep disorders
- **Quality Control:** “two independent reviewers conducted literature screening, data extraction, and risk of bias (ROB) assessment.”
- **Risk of Bias:** Cochrane Risk-of-Bias tool
- **Meta-Analysis:** RevMan 5.4 software and Stata 15.0
- **Results:**
 - 13 RCTs involving 820 patients (EA n = 414; control n = 406) met inclusion criteria
 - EA vs control:
 - improved secondary insomnia (relative risk = 3.90, 95% confidence interval [CI] [1.87, 8.13], P < .001)
 - reduced Pittsburgh Sleep Quality Index scores (mean difference [MD] = -2.26, 95% CI [-4.14, -0.37], P = .02)



- reduced Athens Insomnia Scale scores (MD = -0.57 , 95% CI [-2.70 , 1.56], $P = .60$)
- prolonged total sleep time (MD = 2.63 , 95% CI [-0.59 , 5.86], $P = .11$)
- did not increase adverse events (relative risk = 0.50 , 95% CI [0.18 , 1.44], $P = .20$).
- **Conclusion:** “EA may be a promising treatment for secondary sleep disorders; however, more high-quality studies are needed to confirm our findings.

Lu Y, Zhu H, Wang Q, et al. Comparative effectiveness of multiple acupuncture therapies for primary insomnia: a systematic review and network meta-analysis of randomized trial. *Sleep Med.* 2022 May;93:39-48. doi: 10.1016/j.sleep.2022.03.012. Epub 2022 Mar 24. ²⁴⁹

- **Design:** systematic review and network meta-analysis
- **Methods:** systematic literature search of databases for randomized controlled trials (RCTs) reporting on multiple acupuncture therapies for primary insomnia (PI)
- **Quality Control:** “pairs of reviewers independently conducted literature screening, data extraction, and risk of bias assessment.”
- **Meta-Analysis:** R and Stata software
- **Evidence Certainty:** The Grading of Recommendations Assessment, Development, and Evaluation system (GRADE)
- **Results:**
 - 57 RCTs with 4,678 patients met inclusion criteria
 - **“multiple acupuncture therapies” more effective for Pittsburgh sleep quality index scores than usual treatment**
 - **most effective (moderate certainty evidence): acupoints catgut embedding (ACE)**
 - most effective (low-certainty evidence): auricular acupressure or auricular acupuncture + manual acupuncture (AP + MA), electroacupuncture plus acupoint application (EA + APA), and intradermal needle (IN)
 - **effective rate: combinations of acupuncture offered significant improvement vs usual care (ACE, ACE + MA, AP + MA, EA, EA + APA, HPN, MA and PBN + MA)**
 - not enough data to report results for Epworth Sleepiness Scale, Athens Insomnia Scale, and recurrence rate
 - adverse events: “hematoma, pain, headache, and bleeding.”
- **Conclusions:** “With moderate to low certainty of evidence, multiple acupuncture therapies showed impressive insomnia improvement, especially ACE, AP + MA, and EA + APA. Differences between therapies were small or insignificant and based-on low or very low certainty of evidence.”



Luo S-W, Huang N-P, Xiang Q, Huang X-Q, Tan Z-W, Teng X, Li X-J, Tu X, Gao X-L. A systematic review and meta-analysis of acupuncture combined with Tuina in the treatment of insomnia. *Medicine*. 2022;101:51. ²⁵⁰

- **Design:** systematic review and meta-analysis
- **Methods:** Literature search of databases (PubMed, Cochrane Library, Web of Science, China National Knowledge Infrastructure, Wan Fang Database, China Science and Technology Journal Database) for clinical randomized controlled trials (RCTs) of acupuncture plus tuina for insomnia
- **Meta-Analysis:** RevMan5.4 software
- **Results:**
 - 29 studies involving 2,688 participants met inclusion criteria
 - **acupuncture plus tuina massage performed better than drugs** or acupuncture alone for total clinical effectiveness, Pittsburgh Sleep Quality Index (PSQI), and Statistical Self-Rating Anxiety Scale score (SAS) (OR = 3.59, 95% confidence interval [CI] [2.77, 4.66], Z = 9.62 [P < .00001]) (MD = -2.44, 95% CI [-2.93, -1.95], Z = 9.72 [P < .00001]) (MD = -8.42, 95% CI [-10.23, -6.61], Z = 9.09 [P < .00001])
 - “no statistically significant difference in Statistical Self-rating Depression Scale score (SDS)” (MD = -5.26, 95% CI [-11.29,0.78], Z = 1.71 [P > .05])
- **Conclusion:** “Acupuncture combined with Tuina has obvious clinical advantages in the treatment of insomnia. This result is expected to provide a reference for the clinical treatment of insomnia, but the long-term effect of clinical efficacy still needs further study.”

Fang Q-Q, Wang X-Q, Liu C-Y, Xi H-Q, Wan Q-Y, Qin S, Xu L, Tian Q-M, Pan R, Wu W-Z. The efficacy of acupuncture on the sleep structure of patients with insomnia: a systematic review and meta-analysis. *Anat Rec (Hoboken)*. 2021 Nov;304(11):2412-2425. doi: 10.1002/ar.24745. Epub 2021 Sep 9. ²⁵¹

- **Design:** systematic review and meta-analysis
- **Methods:** Literature search “based on MeSH terms and free words” of databases (Cochrane Library, PubMed, Web of science, CKNI (China Knowledge Resource Integrated Database), WanFang Database, Chongqing VIP Information) from inception until July 10, 2020, for randomized controlled trials (RCTs) involving acupuncture treatment for insomnia
- **Results:**



- “(1) compared with the Western medicine groups, the **acupuncture groups showed significant advantages** in reducing the percentage of N1 sleep stage and N2 sleep stage, as well as increasing that of N3 sleep stage and REM sleep stage.”
- “**no significant difference** was found in increasing the effective rate, reducing total PSQI score, improving the total sleep time, reducing sleep latency, and improving sleep efficiency between the Western medicine groups and the acupuncture groups.”
- “(2) Compared with the sham acupuncture groups, the acupuncture treatment showed advantages in increasing the effective rate, reducing Pittsburgh Sleep Quality Index (PSQI) score, increasing the total sleep time, and improving sleep efficiency.”
- “no significant difference was observed between the sham acupuncture groups and the acupuncture groups with regard to reducing sleep latency, the percentage of N1 sleep stage and N2 sleep stage, as well as increasing that of N3 sleep stage and REM sleep stage.”
- **Conclusion:** unavailable in abstract and could not obtain copy of full pdf

Zhao F-Y, Fu Q-Q, Kennedy GA, Conduit R, Zhang W-J, Wu W-Z, Zheng Z. Can acupuncture improve objective sleep indices in patients with primary insomnia? A systematic review and meta-analysis. *Sleep Med.* 2021 Apr;80:244-259. doi: 10.1016/j.sleep.2021.01.053. Epub 2021 Feb 2. ²⁵²

- **Study:** 11 randomized controlled trials involving involving acupuncture, sham acupuncture, or waitlist control with a total of 775 patients with primary insomnia (PI) included for meta-analysis
- **Primary outcomes:** polysomnography (PSG), actigraphy, and “micromovement sensitive mattress/pillow sleep monitoring systems”
- **Results:** Acupuncture results compared with sham acupuncture or waitlist:
 - **Improved total sleep time** [MD = 55.29, 95%CI (29.16, 81.42), $p < 0.01$]
 - **Improved sleep efficiency** [MD = 8.96, 95%CI (3.97, 13.95), $p < 0.01$],”
 - **Less waking after sleep onset** [MD = -49.54, 95%CI (-82.98, -16.09), $p < 0.01$]
 - **Awakened during sleep fewer times** [MD = -6.29, 95%CI (-10.75, -1.82), $p < 0.01$]
- **Acupuncture outperformed sham acupuncture or waitlist when participants received at least 12 acupuncture treatments**
- Researchers reported, “*most studies reviewed were heterogeneous and at risk of bias due to methodological issues.*”
- **Conclusions:** “acupuncture was **significantly associated with improvements in several objective sleep parameters** (increases in total sleep time and sleep efficiency, and



reductions in wake after sleep onset and number of awakening times) **as well as subjective sleep quantity and quality** in patients with PI. **A minimum therapeutic threshold dosage (≥ 12 sessions) is recommended.”**

Zhang J, He Y, Huang X, Liu Y, Yu H. The effects of acupuncture versus sham/placebo acupuncture for insomnia: a systematic review and meta-analysis of randomized controlled trials. *Complement Ther Clin Pract.* 2020 Nov;41:101253. doi: 10.1016/j.ctcp.2020.101253. Epub 2020 Nov 1. ²⁵³

- **Study:** 15 studies involving 1,108 patients with insomnia pooled for meta-analysis
- **Primary outcomes:** Pittsburgh sleep quality index (PSQI) scores
- **Results: Acupuncture therapy significantly more effective than sham acupuncture** at improving the following scores:
 - Pittsburgh sleep quality index (PSQI)
 - Insomnia Severity Index (ISI)
 - Total Sleep Time (TST)
 - Sleep-Onset Latency (SOL)
 - Wake after Sleep Onset (WASO)
 - Sleep Efficiency (SE)
- **Acupuncture more effective than other acupuncture modalities for PSQI scores** subgroup analysis:
 - **acupuncture superior to sham** (3RCTs, MD = -7.34,95% [-8.02,-6.66],I2 = 86%)
 - **acupuncture superior to minimal acupuncture** (5 RCTs, MD = -3.29,95% [-3.95, -2.63],I2 = 53%)
 - **auricular acupressure superior to sham** (1 RCT, MD = -4.16,95% [-6.57, -1.75])
 - **minimal acupuncture superior to electroacupuncture** (2 RCTs, MD = 0.70,95%CI [0.52, 0.87],I2 = 0%)
 - **no significant differences:** (1) auricular acupressure vs “minimal acupuncture,” (2) electroacupuncture vs sham, (3) electroacupuncture vs “minimal acupuncture”
- **Persistence of effects:** During follow-up, **acupuncture therapy was still significantly more effective than sham acupuncture on the PSQI**
- **Conclusion:** *Acupuncture more effective than placebo/sham acupuncture in the treatment of insomnia*

Wang Z-J, Zhang Y, Guo W, Zhuang L-X, Lao X, Willcox ML, Hu X-Y. Is single acupoint Sanyinjiao (SP 6) effective in managing insomnia? A systematic review of randomized controlled trials. *Global Health Med.* 2020; 2(4):212-220. Doi: 10.35772/ghm.2020.01010. ²⁵⁴



- **Design:** systematic review
- **Study Registry:** PROSPERO CRD42019140855
- **Methods:** Literature search of English and Chinese databases for randomized controlled trials on single acupuncture point Spleen-6 for insomnia
- **Methodological Quality:** “two authors independently using the Cochrane Risk of Bias Tool, and reporting quality was assessed by the STRICTA checklist.”
- **Primary Outcome:** Pittsburgh Sleep Quality Index (PSQI)
Secondary Outcomes: clinical effect, sleep duration via polysomnogram (PSG)
- **Meta-Analysis:** RevMan 5.3 software
- **Results:**
 - 4 trials involving 288 participants met inclusion criteria
 - acupuncture at SP-6 improved the following:
 - sleep quality (MD -0.30, 95% CI [-0.52, -0.08])
 - deep sleep duration (MD 80.46, 95% CI [56.47, 104.45])
 - rapid eye movement (REM) duration (MD 91.53, 95% CI [68.41, 114.65])
 - clinical effect
- **Conclusion:** “Some limited evidence showed that single acupoint stimulation of SP 6 could improve sleep quality, lengthen deep sleep and REM duration of patients with insomnia. However, the findings in this review should be interpreted with caution due to methodological limitations.”

Kim S-H, Jeong J-H, Lim J-H, Kim B-K. Acupuncture using pattern-identification for the treatment of insomnia disorder: a systematic review and meta-analysis of randomized controlled trials. *Integr Med Res.* 2019;8:216–226. doi: 10.1016/j.imr.2019.08.002. ²⁵⁵

- **Design:** systematic review and meta-analysis
- **Methods:** literature search of databases (PubMed, Cochrane CENTRAL, EMBASE, CINAHL, PsycINFO, CNKI, and 3 Korean (OASIS, NDSL, RISS4U) from 2000 to April 12, 2018, for randomized controlled trials “comparing acupuncture using pattern identification (only) with medication in primary insomnia.”
- **Primary Outcomes:** response rate, Pittsburgh Sleep Quality Index (PSQI)
- **Meta-Analysis:** 19 studies included in quantitative analysis
- **Results:**
 - 19 low-quality RCTs met inclusion criteria (11 manual acupuncture, n=1079 patients, 8 electro-acupuncture, n=442 patients)
 - “**acupuncture improved total effectiveness rate**” compared with medication” (Risk Ratio [RR] = 1.23, 95% confidence intervals [CIs]: 1.12–1.35, $p < 0.00001$; $I^2 = 80\%$)



- **acupuncture improved PSQI scores compared with medication** (MD = -1.92, 95% CI: -2.41-1.42, $p < 0.00001$; $I^2 = 30\%$)
- Risk of Bias Assessments: unclear or high
- **Conclusions:** “Acupuncture using pattern identification led to significantly improved total effectiveness rate compared to medication. With regard to PSQI, as compared to the control group, acupuncture using pattern identification was similar to medication. However, this study has limitations of high risk of bias, not using a standardized pattern-diagnosis-treatment and not comparing with standar[d]ized acupuncture without pattern identification.”

Cao H-J, Yu M-L, Wang L-Q, Fei Y-T, Xu H, Liu J-P. Acupuncture for primary insomnia: an updated systematic review of randomized controlled trials. *J Altern Complement Med.* 2019 May;25(5):451-474. doi: 10.1089/acm.2018.0046. Epub 2019 Apr 23. ²⁵⁶

- **Design:** randomized controlled trials
- **Methods:** literature search of 11 databases from January 2008 to October 2017 for randomized controlled trials (RCTs) involving acupuncture effectiveness and safety for primary insomnia
- **Quality Control:** “Two authors independently extracted data and assessed risk of bias independently”
- **Meta-Analysis:** RevMan 5.3 software; “trial sequential analysis when appropriate”
- **Evidence Quality Assessment:** GRADE (Grading of Recommendations Assessment, Development, and Evaluation)
- **Results:**
 - 73 RCTs involving 5,533 participants met inclusion criteria
 - **acupuncture reduced Pittsburgh Sleep Quality Index (PSQI) scores better than no treatment** (mean difference [MD] -5.58, 95% confidence interval [CI] -6.85 to -4.31, $I^2 = 0\%$, $p < 0.00001$, 2 trials, fixed effect model, 105 participants); very low quality evidence.
 - **acupuncture + pharmaceuticals “showed better improvement than drugs alone on decreasing the PSQI total scores”** (MD -3.17, 95% CI -4.74 to -1.61, $I^2 = 72\%$, 4 trials, random-effects model (REM), $p < 0.0001$, 253 participants, low quality).
 - acupuncture vs no treatment showed better improvement at decreasing the PSQI total scores (MD -8.46, 95% CI -9.59 to -7.33, $I^2 = 0\%$, $p < 0.00001$, 2 trials, 65 participants).
 - **“acupuncture showed more benefit than estazolam on PSQI** (with enough statistical power) on Athens Insomnia Scale (MD -1.64, 95% CI -2.40 to -0.89, $I^2 = 0\%$, $p < 0.0001$, 3 trials, fixed-effects model, 180 participants); very low-quality evidence
 - **acupuncture showed more benefit than estazolam on PSQI** (with enough statistical power) on SPIEGEL (MD -2.86, 95% CI -3.54 to -2.18, $p <$



0.00001, $I^2 = 0\%$, 5 trials, fixed-effects model, 326 participants); very low-quality evidence

- **adverse events:** “low-quality evidence showed less adverse events from acupuncture than western medications” (risk ratio 0.23, 95% CI 0.11-0.48, $I^2 = 56\%$, $p < 0.0001$, 11 trials, REM, 914 participants)
Publication Bias: “likely present based on the PSQI total scores.”
- **Conclusions:** “acupuncture might result in improvement [vs] no treatment on PSQI scores and appears safe. However, the quality of the evidence is varied from very low to low due to the potential risk of bias and inconsistency among included trials. Further large sample size and rigorously designed RCTs are still needed.”

Yin X, Gou M, Xu J, Dong B, Yin P, Masquelin F, Wu J, Lao L, Xu S. Efficacy and safety of acupuncture treatment on primary insomnia: a randomized controlled trial. *Sleep Med.* 2017;37:193. Epub 2017 Mar 8. ²⁵⁷

- **Study:** Single-center, single-blinded, randomized controlled clinical trial to evaluate the efficacy and safety of acupuncture treatment for primary insomnia.
- **Participants:** 72 patients with primary insomnia
- **Treatment groups:** acupuncture treatment or control (sham acupuncture) groups
- **Number of treatments:** 3x/week for 4 weeks = 12 sessions
- **Primary outcome:** Insomnia Severity Index (ISI)
- **Secondary outcomes:** sleep efficiency (SE), sleep awakenings (SA), total sleep time (TST) recorded by Actigraphy, Self-Rating Anxiety Scale (SAS), Self-Rating Depression Scale (SDS)
- **Results: sleep improved in both groups**
 - Paired T-Test results demonstrated **significant differences for all outcome measurements before and after acupuncture treatment.**
 - **ISI scores in acupuncture group “improved dramatically” ... with “similar significant improvements ... observed in the SE, TST and SDS scores”**
 - 2 weeks post-treatment ($F = 11.3$, $p = 0.001$)
 - 4 weeks post-treatment ($F = 33.6$, $p < 0.001$)
 - 2-week follow-up ($F = 39.4$, $p < 0.001$)
 - 4-week follow-up ($F = 34.1$, $p < 0.001$)
- **After 8 weeks, SA and SAS scores showed significant differences** between treatment groups, but “**remarkable decrements in SA and SAS** were found in the acupuncture treatment group **after the two-week and four-week follow-ups.**”
- **Conclusion:** “*Acupuncture treatment is more effective than sham acupuncture treatment in increasing insomnia patients' sleep quality and improving their psychological health.*”



Kim S-A, Lee S-H, Kim J-H, van den Noort M, Bosch P, Won T, Yeo S, Lim S. Efficacy of acupuncture for insomnia: a systematic review and meta-analysis. *Am J Chin Med.* 2021;49(5):1135-1150. doi: 10.1142/S0192415X21500543. ²⁵⁸

- **Study:** 22 randomized controlled trials involving 1,678 cancer patients or survivors (mean age 44-64 years) included for review (PRISMA reporting guidelines selection of database search results); 6 of these underwent quantitative meta-analysis; 22 underwent qualitative analysis.
- **Results**
 - Highly heterogeneous studies overall
 - Breast cancer patients most common subgroup represented
 - **Qualitative evidence:** “suggested a **beneficial efficacy of acupuncture** on sleep without serious adverse events in several studies (55%).”
 - **Meta-analysis (4 studies):** “acupuncture produced a **significant improvement in the total Pittsburgh Sleep Quality Index (PSQI) score** relative to the wait-list control among breast cancer patients undergoing active cancer treatments” (MD -1.92, 95% CI -3.25 to -0.59, $p = 0.005$)
 - **PSQI scores (2 studies):** similar results for real and sham acupuncture post-intervention; no significant difference between groups (MD: -0.68, 95% CI: -2.44 to 1.07, $p = 0.44$).
 - **Manual acupuncture vs estazolam (2 studies)**
 - *immediately post-intervention* both had similar results (RR: 0.94, 95% CI: 0.87 to 1.01, $p = 0.09$)
 - acupuncture: “**significantly better effective rate vs estazolam at 1-week post-intervention follow-up**” (RR: 1.25, 95% CI: 1.10 to 1.43, $p = 0.0009$).
 - All included studies reported “**related adverse events were mild or moderate in severity.**”
- **Conclusion:** Acupuncture **may provide statistically significant alleviation of cancer-related insomnia** in patients and survivors.

Shergis JL, Ni X, Jackson ML, et al. A systematic review of acupuncture for sleep quality in people with insomnia. *Complement Ther Med.* 2016;26:11-20. doi:10.1016/j.ctim.2016.02.007. ²⁵⁹

- **Study:** Systematic review of English and Chinese databases involving; meta-analysis of 30 studies involving 2,363 participants with insomnia
- **Interventions:** acupuncture vs sham/placebo or standard pharmacotherapy
- **Risk of bias:** assessed via Cochrane risk of bias tool
- **Primary outcome:** sleep quality assessed by Pittsburgh Sleep Quality Index (PSQI)



- **Results:**
 - “Acupuncture point combinations included the use of at least one of the recommended points for insomnia, HT7, GV20, SP6.”
 - **Acupuncture > sham/placebo** in terms of PSQI (MD -0.79, 95% CI -1.38, -0.19, I(2)=49%).
 - **Acupuncture > pharmacotherapy** (benzodiazepine receptor agonists or antidepressants) (MD -2.76, 95% CI -3.67, -1.85, I(2)=94%).
 - Most studies had risk of bias with high heterogeneity
 - Mild adverse events reported unrelated to acupuncture treatments
- **Conclusions:** “Acupuncture compared to sham/placebo and pharmacotherapy showed statistically significant results [for the treatment of insomnia].”

Ye Z, Lai H, Ning J, et al. Traditional Chinese medicine for insomnia: recommendation mapping of the global clinical guidelines. *J Ethnopharmacol.* 2024 Mar 25;322:117601. doi: 10.1016/j.jep.2023.117601. Epub 2023 Dec 18. ²⁶⁰

- **Design:** systematic review
- **Methods:** Literature search of PubMed, Web of Science, Embase, CNKI, Wanfang, Chinese Biomedical Literature Database, Chinese Medical Association, Chinese Sleep Research Society, Medsci, Medlive, British National Institute of Health and Clinical Excellence (NICE), and the International Guidelines Collaboration Network (GIN) from inception to March 5, 2023, “for clinical practice guidelines on insomnia.”
- **Quality Control:** “Four evaluators conducted independent assessments of the quality of the guidelines by employing the AGREE II tool.”
- **Results:**
 - 13 clinical practice guidelines met inclusion criteria; these included 211 recommendations (127 evidence-based; 84 expert consensus)
 - Study Quality: “overall suboptimal”
 - highest score: “scope and purpose” (58.1%)
 - lowest score: “applicability” (13.0%)
 - “74.8% (n = 95) of the evidence-based recommendations and 61.9% (n = 52) of the expert consensus recommendations were supported by “low or low certainty” evidence
 - 44 recommendations were compiled into four evidence maps, including “Chinese medicines, Chinese medicine prescriptions, acupuncture, and massage”
 - “Chinese herbal remedies and acupuncture exhibited robust support, substantiated by high-certainty evidence” and included herbal decoctions, body acupuncture, ear acupuncture
 - “proprietary Chinese medicines needed more high-certainty evidence, predominantly yielding weak recommendations.”
 - other therapies: low or very low certainty evidence
 - weak recommendations from expert consensus: “need more substantive clinical research evidence” for magnetic therapy, bathing, and fumigation



- weakly endorsed d/t being based on observational studies: hot ironing and acupoint injection
- based on limited studies: qigong, gua sha, and moxibustion
- **Conclusions:** Improved quality for insomnia guidelines is needed. Traditional Chinese Medicine (TCM) recommendations rely on mainly low-certainty evidence. “The evidence supporting TCM therapy recommendations must be fortified to achieve a more substantial level of recommendation and higher certainty.” There is a huge need for “high-quality clinical investigations dedicated to TCM, with a specific focus on ascertaining its long-term efficacy, safety, and potential side effects in the context of insomnia treatment.”

(b.) Acupuncture for Cancer-Related Insomnia

Chen L, Li J, Xu S, Liu Z, Jiao Y, Zhou Z. Efficacy of acupuncture therapy on cancer-related insomnia: a systematic review and network meta-analysis. *Front Neurol.* 2024;15:1342383. doi: 10.3389/fneur.2024.1342383. ²⁶¹

- **Design:** systematic review and network meta-analysis
- **Clinical trial registration:** <https://clinicaltrials.gov/>, identifier INPLASY202210095
- **Methods:** literature search of 8 databases (PubMed, Embase, Cochrane library, Web of Science, China National Knowledge Infrastructure, Wanfang Database, VIP Database, and China Biology Medicine disc) up to July 31, 2023, for randomized controlled trials (RCTs) involving acupuncture for cancer-related insomnia
- **Primary Outcome:** Pittsburgh sleep quality index (PSQI)
- **Meta-Analysis:** 37 studies involving 3,246 participants and 16 interventions analyzed using STATA 15, R, and OpenBUGS
- **Quality Assessment:** PRISMA
- **Results:**
 - 37 studies involving 3,246 participants and 16 interventions met inclusion criteria
 - “Auriculotherapy + moxibustion [surface under the cumulative ranking curve (SUCRA) 98.98%] and auriculotherapy (SUCRA 77.47%) came out top of the ranking, which were more effective than control, medicine, usual care and sham acupuncture.”
- **Conclusion:** “Auriculotherapy + moxibustion and auriculotherapy + acupuncture emerged as the top two acupuncture regimes for CRI and future studies should pay more attention to CRI.”

Weng Y, Ren X, Zu Z, Xiao L, Chen M. Efficacy and safety of acupuncture for the treatment of insomnia in breast cancer patients: a systematic review and meta-analysis. *Complement Ther Med.* 2024 Nov;86:103087. doi: 10.1016/j.ctim.2024.103087. Epub 2024 Sep 17. ²⁶²

- **Design:** systematic review and meta-analysis



- **Methods:** literature search of 6 medical databases up to April 2024 for randomized controlled trials (RCTs) reporting on the effectiveness and safety of acupuncture for breast cancer-related insomnia.
- **Primary Outcome:** The Pittsburgh Sleep Quality Index (PSQI) score
- **Secondary Outcomes:** Insomnia Severity Index (ISI), Sleep Onset Latency (SOL), Wake After Sleep Onset (WASO), Total Sleep Time (TST), Sleep Efficiency (SE); some “were measured by Actiwatch and sleep diary”
- **Results:**
 - 7 articles involving 434 participants met inclusion criteria
 - “acupuncture produced a significant improvement in the total PSQI score” (MD 95 %CI = -2.16[-2.88, - 1.45], P < 0.001)
 - acupuncture did not result in statistically significant ISI scores vs controls (MD 95 %CI = -1.53[-3.97, 0.91], P = 0.22).
 - “no substantial disparity observed in the enhancement of Sleep Onset Latency” as measured by Actiwatch (SOL) for experimental vs control groups (MD 95 %CI = -6.40[-13.19, 0.39], P = 0.06)
 - no significant difference in Wake After Sleep Onset for experimental vs control groups (WASO) (MD 95 %CI = -1.45[-7.09, 4.20], P = 0.62)
 - no significant difference in Total Sleep Time (TST) (MD 95 %CI = 3.54 [-4.71, 11.79], P = 0.40)
 - “significant distinction was observed in Sleep Efficiency (SE) improvement” between experimental vs control groups (MD 95 %CI = 2.43 [0.14, 4.72], P = 0.04)
 - “significant difference in the amelioration of SOL” between experimental and control groups as measured by sleep diary (MD 95 %CI = -9.15[-16.48, - 1.81], P = 0.01), TST (MD 95 %CI = 29.92 [16.74, 43.10], P < 0.001)
 - significant difference in SE between experimental and control groups as measured by sleep diary (MD 95 %CI = 4.57 [1.92, 7.23], P = 0.0007)
 - “no significant divergence was observed in the improvement of WASO” between experimental and control groups (MD 95 %CI = 4.53[-4.81, 13.87], P = 0.34).
 - adverse events: “mild in severity”
- **Conclusions:** “Acupuncture can partially alleviate insomnia symptoms in breast cancer patients. Moreover, acupuncture is safe and may serve as a dependable alternative therapy in clinical settings. Owing to the limited number of studies included, potential biases of heterogeneous interventions, and methodological weaknesses of long-term follow-up, more high-quality RCTs with large sample sizes should be conducted to evaluate acupuncture treatment.”

Liu P, Li L, Xu D, Xin S, Hu N, Li C. Acupuncture for cancer-related insomnia: systematic review and meta-analysis of randomised controlled trials. *BMJ Support Palliat Care*. 2024 Nov 20;14(4):378-391. doi: 10.1136/spcare-2024-005051. ²⁶³

- **Design:** systematic review and meta-analysis



- **Methods:** systematic literature search of 4 electronic English-language databases (PubMed, EMBASE, Scopus, Cochrane Library) for randomized controlled trials (RCTs) involving acupuncture for treatment of cancer-related insomnia (CRI)
- **Statistics:** odds ratio (OR) and 95% confidence intervals (CIs)
- **Heterogeneity Assessment:** Cochrane Q, I² statistics, p value
- **Meta-Analysis:** 10 RCTs involving 561 participants analyzed using RevMan V.5.3.
- **Results:**
 - 10 RCTs involving 561 participants met inclusion criteria
 - “acupuncture improved Pittsburgh Sleep Quality Index (PSQI) scores and CRI more than control” → pooled OR 1.66 (95% CI 1.12 to 2.46), OR of 5.90 (95% CI 2.64 to 13.23)
 - electroacupuncture improved Pittsburgh Sleep Quality Index (PSQI) scores and CRI more than control → OR 2.30 (95% CI 1.48 to 3.58)
 - auricular-acupuncture improved Pittsburgh Sleep Quality Index (PSQI) scores and CRI more than control OR 2.72
 - “acupuncture improved the Insomnia Severity Index (ISI) and CRI more than control” → OR 1.31 (95% CI 0.69 to 2.48), 5.29 (95% CI 2.18 to 12.84), 3.17 (95% CI 1.35 to 7.44) and OR 1.64 (95% CI 1.00 to 2.68)
- **Conclusion:** “The change in PSQI and ISI scores showed that acupuncture moderately improved insomnia in patients with cancer. Acupuncture is safe and effective, enabling subsequent clinical treatments.”

Guo Z, Wang Y, Liu W, Huang H, Tang X, Wu Z, Lu L, Fan B, Cui S, Xu N. Acupuncture-related therapy for cancer-related insomnia: an overview of systematic reviews and meta-analysis. *Complement Ther Med.* 2024 Oct;85:103074. doi: 10.1016/j.ctim.2024.103074. Epub 2024 Aug 10. ²⁶⁴

- **Design:** Systematic review/meta-analysis of systematic reviews and meta-analyses
- **Method:** Literature search of 8 databases for systematic reviews/meta-analyses (SRs/MAs) of randomized controlled trials involving acupuncture therapy for cancer-related insomnia (CRI)
- **Quality Control:** “Two reviewers conducted comprehensive searches, ... extracted data, ... and conducted a detailed assessment of methodological quality, risk of bias, and quality of evidence using AMSTAR-2, ROBIS, and GRADE tools.” Manually excluded duplicate studies. Assessed risk of bias.
- **Statistics:** Corrected Covered Area (CCA) using the GROOVE tool to determine degree of overlap of systematic reviews
- **Meta-Analysis:** 10 SRs/MAs included for analysis
- **Results:**
 - 10 SRs/MAs met inclusion criteria
 - “AMSRAT-2 results indicate significant methodological flaws in SRs/MAs, with the main issues focusing on the lack of provision of exclusion checklist for the studies.”



- “Over half of the SRs/MAs have a high risk of bias due to incomplete retrieval and failure to follow the protocol.”
- “Most SRs/MAs demonstrated considerable completeness in reporting quality.”
- Overall level of evidence is low”
- “High overlap indicates redundant SRs/MAs.”
- “Exploratory analysis suggests that acupuncture therapy may be effective for CRI; however, with a high risk of bias, caution is needed in interpreting the results.”
- Sensitivity analysis: stable
- Publication Bias: none indicated via funnel plot
- Safety: “Most SRs/MAs acknowledge the safety of acupuncture.”
- **Conclusion:** Current evidence for acupuncture to treat CRI is low. Authors cite need for improvements in “methodology, risk of bias, and quality of reporting.” Authors state, “Acupuncture therapy shows potential but lacks sufficient support; high-level evidence is warranted to elucidate the effectiveness of acupuncture in treating CRI.”

Ou Y, Lin D, Ni X, et al. Acupuncture and moxibustion in patients with cancer-related insomnia: a systematic review and network meta-analysis. *Front Psych.* 2023;14:1108686. doi: 10.3389/fpsy.2023.1108686. ²⁶⁵

- **Design:** Systematic review and network meta-analysis
- **Methods:** Literature search of 8 medical databases up to June 2022 for randomized controlled trials (RCTs) involving acupuncture and moxibustion to treat cancer-related insomnia
- **Quality Control:** “Two independent reviewers assessed the risk of bias and conducted the research selection, data extraction, and quality assessment.” GRADE used for evidence quality, PRISMA used for study quality.
- **Primary Outcome:** Pittsburgh Sleep Quality Index (PSQI)
- **Secondary Outcomes:** Adverse events, effective rates
- **Network Meta-Analysis (NMA):** Used frequency models to analyze 16 trials and 12 interventions and create a network plot
- **Efficacy Rate:** “Ratio of patients with insomnia symptom relief to the total number of patients”
- **Results:**
 - 31 RCTs involving 3,046 participants and 16 acupuncture- and moxibustion-related therapies met inclusion criteria
 - Consistency model for p-values across studies “was acceptable (p=0.8197).”
 - GRADE evidence quality results: medium, low, and very low
 - “Transcutaneous electrical acupoint stimulation [surface under the cumulative ranking curve (SUCRA) 85.7%] and acupuncture and moxibustion (SUCRA 79.1%) were more effective than Western medicine, routine care, and placebo-sham acupuncture.”



- “Western medicine showed significantly better effects than placebo-sham acupuncture.”
- The best acupuncture and moxibustion therapies for CRI were as follows:
 - “transcutaneous electrical acupoint stimulation (SUCRA 85.7%)”
 - “acupuncture and moxibustion (SUCRA 79.1%)”
 - “auricular acupuncture (SUCRA 62.9%)”
 - “routine care combined with intradermal needling (SUCRA 55.0%)”
 - “intradermal needling alone (SUCRA 53.3%)”
- Adverse Events: “No serious acupuncture- or moxibustion-related adverse events were reported”
- **Conclusion:** “Acupuncture and moxibustion are effective and relatively safe in treating CRI. The relatively conservative recommended order of acupuncture- and moxibustion-related therapies for CRI is as follows: transcutaneous electrical acupoint stimulation, acupuncture and moxibustion, and auricular acupuncture.” Authors note, “the methodological quality of the included studies was generally poor, and further high-quality RCTs are needed to strengthen the evidence base.”

Wang CC, Han EY, Jenkins M, Hong X, Pang S, Whitehead L, Kirk DL, Williams A. The safety and efficacy of using moxibustion and or acupuncture for cancer-related insomnia: a systematic review and meta-analysis of randomised controlled trials. *Palliat Care Soc Pr.* 2022;16:1–16. doi: 10.1177/26323524211070569. ²⁶⁶

- **Design:** systematic review and meta-analysis
- **Systematic Review Registration Number:** CRD42019141785
- **Methods:** literature search of 9 English- or Chinese-language databases from inception to July 2020 for randomised clinical trials (RCTs) involving acupuncture and/or moxibustion treatment for cancer-related insomnia.
- **Primary Outcome:** Pittsburgh Sleep Quality Index (PSQI) score
- **Methodological Quality:** Cochrane tools
- **Evaluation of Reporting Quality:** PRISMA
- **Meta-Analysis:** Cochrane Review Manager
- **Results:**
 - 14 RCTs met inclusion criteria
 - 12 RCTs showed moxibustion and or acupuncture had “positive effects” upon PSQI scores (n=997, mean difference (MD)=-1.84, 95% confidence interval (CI)=-2.75 to -0.94, p<0.01)
 - 5 RCTs “showed significant difference between two groups” (n=358, risk ratio (RR)=0.45, 95% CI=0.26–0.80, I² =39%).
- **Conclusion:** “The meta-analyses demonstrated that moxibustion and or acupuncture showed a positive effect in managing CRI. Such modalities could be considered an add-on option in the current CRI management regimen.”



Yu NX, Liu CY, Chen B, et al. The clinical efficacy and safety of acupuncture intervention on cancer-related insomnia: a systematic review and meta-analysis. *Front Neurosci.* 2022;16:1026759. doi: 10.3389/fnins.2022.1026759. ²⁶⁷

- **Design:** systematic review and meta-analysis
- **Systematic review registration:** <https://www.crd.york.ac.uk/prospero/>
- **Methods:** Literature search of 7 databases from database establishment to March 31, 2022, for randomized controlled trials (RCTs) involving acupuncture treatment for cancer-related insomnia (CRI)
- **Quality Control:** “Literature screening and data extraction were performed independently by two researchers.”
- **Outcomes Assessments:** 10 studies used PSQI rating scale; 4 studies used ISI rating scale; sleep logs
- **Meta-Analysis:** RevMan 5.4 software used to analyze PSQI and ISI “together as continuous data”
 - **Efficacy Analysis:** Relative Risk (RR)
 - **Continuous Analysis Results:** Mean Difference (MD); 95% confidence intervals (CI)
 - **Heterogeneity:** I² statistic (0–100%)
- **Results:**
 - 13 articles involving 1,109 participants (treatment group n = 517; control group n = 592) met inclusion criteria; 10 articles in English and 3 in Chinese
 - “significant improvement in PSQI scores in patients with CRI by acupuncture intervention” (MD = -1.83, 95%CI= [-2.71, -0.94], P < 0.0001; MD = 0.79, 95%CI= [-0.46, 2.03], P = 0.22)
 - acupuncture did not have a statistically significant impact on ISI scores vs controls
 - 4 items on sleep disorder logs showed statistically significant differences for acupuncture vs control (relative risk RR = 0.47, 95%CI = [0.33, 0.66], P < 0.0001)
- **Conclusion:** Acupuncture can improve the symptoms of patients with CRI to some extent, but due to the relatively small number and low quality of the included literature in this study, more high-quality clinical trials are needed as supplement the evidences in future.

Wan Q, Luo S, Wang X, et al. Association of acupuncture and auricular acupressure with the improvement of sleep disturbances in cancer survivors: a systematic review and meta-analysis. *Front Oncol.* 2022;12:856093. doi: 10.3389/fonc.2022.856093. ²⁶⁸

- **Design:** systematic review and meta-analysis
- **Systematic Review Registration:** <https://www.crd.york.ac.uk/prospero/>, CRD42020171612
- **Methods:** literature search of 4 English-language and 4 Chinese-language databases from inception to July 30, 2021, for RCTs “comparing acupuncture and auricular acupressure with sham control, drug therapy, behavior therapy, or usual care for managing cancer”



- **Study Quality:** Cochrane Collaboration risk of bias (ROB) tool
- **Statistical Effect Sizes:** Mean differences (MDs), 95% confidence intervals (CIs)
- **Results:**
 - 13 RCTs involving 961 patients met inclusion criteria
 - Risk of Performance Bias/Reporting Bias: “high or unclear”
 - Short-term effects:
 - No differences between of acupuncture vs sham control for the following:
 - sleep scales (MD, 1.98; 95% CI, 0.33–3.64; $p = 0.02$; $I^2 = 36\%$)
 - wait list control (MD, 0.40; 95% CI, -0.87 – 1.68 ; $p = 0.54$; $I^2 = 49\%$)
 - drug therapy (MD, 1.18; 95% CI, -3.09 – 5.46 ; $p = 0.59$; $I^2 = 98\%$)
 - Long-term effects:
 - no significant impact of acupuncture on insomnia scale scores vs sham in 2 RCTs (MD, 1.71; 95% CI, -2.38 – 5.81 ; $p = 0.41$; $I^2 = 89\%$)
 - subgroup analyses for reduction in insomnia scale scores “suggested no evidence” for auricular acupressure (MD, 3.14; 95% CI= 1.52 , 4.76 ; $p = 0.0001$; $I^2 = 0\%$) or acupuncture (MD, 0.54; 95% CI= -1.27 , 2.34 ; $p = 0.56$; $I^2 = 0\%$)
- **Conclusions:** “This systematic review and meta-analysis found no evidence about acupuncture or auricular acupressure in the improvement of sleep disturbances in cancer survivors in terms of short- or long-term effect. Adverse events were minor. The finding was inconsistent with previous research and suggested that more well-designed and large-scale randomized controlled trials are needed to identify the efficacy of acupuncture and auricular acupressure for sleep disturbances in cancer survivors.”

Choi T-Y, Kim JI, Lim H-J, Lee M-S. Acupuncture for managing cancer-related insomnia: a systematic review of randomized clinical trials. *Integr Cancer Ther.* 2017;16(2):135–146.

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- **Design:** systematic review
- **Methods:** literature search of 2 databases from their inception through January 2016 with no language restriction for randomized controlled trials (RCTs) and quasi-RCTs involving acupuncture treatment for cancer-related insomnia
- **Quality Control:** “data extraction and the risk of bias assessments were performed by 2 independent reviewers”
- **Qualitative Analysis:** 6 RCTs
- **Results:**
 - 6 RCTs met inclusion criteria
 - Risk of Bias: “unclear or low”
 - Pittsburgh Sleep Quality Index: “Three RCTs showed equivalent effects”
 - Response Rate: 2 RCTs demonstrated similar effects to conventional drugs
 - Hours sleeping and times awoken each night: “acupuncture was better than hormone therapy” based on 1 study



- 3 week follow-up (2 RCTs) “superior effects of acupuncture compared with conventional drugs”
- **Conclusion:** “low level of evidence that acupuncture may be superior to sham acupuncture, drugs or [hormone] therapy. However, the number of studies and effect size are small for clinical significance. Further clinical trials are warranted.”

Zhang J, Zhang Z, Huang S, Qiu X, Lixing Lao L, Yong Huang Y, Zhang Z-J. Acupuncture for cancer-related insomnia: a systematic review and meta-analysis. *Phytomedicine*. 2022;102:154160. doi: 10.1016/j.phymed.2022.154160. ²⁷⁰

- **Systematic Review:** Systematic review of 10 databases and 2 trials record platforms (Cochrane Central Register of Controlled Trials, MEDLINE, EMBASE, PUBMED, Web of Science, PsycINFO, Allied and Complementary Medicine, Cumulative Index to Nursing and Allied Health Literature, China National Knowledge Infrastructure, Wanfang Digital Journals, ClinicalTrials, World Health Organization International Clinical Trials Registry Platform) through November 2021 for randomized controlled trials regarding acupuncture treatment of cancer-related insomnia.
- **Meta-Analysis:** 22 studies involving 1,678 cancer patients or survivors included for analysis; qualitative synthesis (16) and quantitative meta-analysis (6)
- **Trial Quality Assessment:** Jadad score and Risk of Bias (2.0).
- **Results:**
 - highly heterogeneous studies (participant characteristics and experimental methods)
 - most common participant diagnoses: cancer, particularly breast cancer
 - qualitative synthesis
 - “suggested a beneficial efficacy of acupuncture on sleep without serious adverse events” in 55% of studies
 - quantitative meta-analysis
 - acupuncture vs waitlist control
 - total Pittsburgh Sleep Quality Index (PSQI) scores significantly improved for breast cancer patients receiving acupuncture (MD -1.92, 95% CI -3.25 to -0.59, p = 0.005)
 - real vs sham acupuncture
 - similar post-treatment impact on PSQI scores (MD: -0.68, 95% CI: -2.44 to 1.07, p = 0.44)
 - manual acupuncture vs estazolam
 - similar effectiveness rate “immediately post-intervention” (RR: 0.94, 95% CI: 0.87 to 1.01, p = 0.09)
 - manual acupuncture vs estazolam



- “significantly better effective rate ... at 1-week post-intervention” (RR: 1.25, 95% CI:1.10 to 1.43, p = 0.0009).
- acupuncture related adverse events
 - all mild or moderate severity
- **Conclusion:** “*Acupuncture has great potential to be used to manage cancer-related insomnia for cancer patients or survivors.*”

(c.) Acupuncture for Perimenopause-Related Insomnia

Li Z, Yin S, Feng J, Gao X, Yang Q, Zhu F. Acupuncture combined with Chinese herbal medicine in the treatment of perimenopausal insomnia: a systematic review and meta-analysis. *Medicine*. 2023;102:45. doi: 10.1097/MD.00000000000035942. ²⁷¹

- **Methods:** Systematic review of 8 databases for randomized controlled trials (RCTs) involving acupuncture and traditional Chinese medicine vs western medicine to treat perimenopausal insomnia (PMI) patients. Meta-analysis of 15 studies involving 1,188 patients
- **Primary Outcomes:** “Pittsburgh Sleep Quality Index (PSQI) and the total effective rate of treatment”
- **Secondary Outcomes:** secondary outcomes of the study included estradiol (E₂), luteinizing hormone (LH), follicle-stimulating hormone (FSH) and the Hamilton Anxiety Rating Scale (HAMA) scores
- **Risk of Bias:** Cochrane Risk of Bias Tool 2.0
- **Study Quality:** Newcastle-Ottawa Scale
- **Results:**
 - 15 studies involving 1,188 patients
 - acupuncture + traditional Chinese medicine was more effective than western medicine in the following ways:
 - Efficiency (RR: 1.18; 95% CI: 1.08, 1.29; P = .001)
 - Pittsburgh Sleep Quality Index (PSQI) (WMD: -2.77; 95% CI: 4.15-1.39; P < .0001)
 - Follicle-stimulating hormone (FSH) (WMD: -31.45; 95% CI: 42.7-20.2; P < .001)
 - Hamilton Anxiety Score (HAMA) (WMD: -2.62, 95% CI: -3.93, -1.32; P < .0001)
 - No differences found between acupuncture/Chinese medicine vs western medicine for changes in estradiol (E₂) (WMD: 5.07; 95% CI: 5.78-15.92; P = .36) and luteinizing hormone (LH) (WMD: -4.86; 95% CI: 11.5-1.78; P = .151)



- **Conclusion:** acupuncture + Chinese medicine “seems to have a more positive effect than western medicine alone in improving sleep and [FSH] in PMI patients, but no difference has been found in improving E2 and LH. This study provides a basis for acupuncture combined with Chinese medicine to treat PMI.”

Zhao F-Y, Fu Q-Q, Kennedy GA, Conduit R, Wu W-W, Zhang W-J, Zheng Z. Comparative utility of acupuncture and western medication in the management of perimenopausal insomnia: a systematic review and meta-analysis. 2021;Article ID 5566742:1-16.

doi: 10.1155/2021/5566742. ²⁷²

- **Systematic review:** Systematic review of 11 databases through March 2020 for randomized controlled trials (RCTs) involving treatment of perimenopausal insomnia (PMI) treatment with acupuncture, acupuncture plus pharmacotherapy, or acupuncture versus pharmacotherapy
- **Meta-analysis:** Fifteen studies involving 1,410 women included for meta-analysis.
- **Study quality:** “Cochrane criteria were followed.”
- **Results:**
 - 15 studies involving 1,410 women
 - “acupuncture [vs hypnotics] significantly reduced the global scores of Pittsburgh Sleep Quality Index (PSQI)” scores [MD = -2.38, 95% CI (-3.38, -1.37), $p < 0.01$]
 - acupuncture vs hypnotics significantly reduced the Kupperman Index scores [MD = -5.95, 95% CI (-10.68, -1.21), $p = 0.01$]
 - acupuncture plus hypnotics: “more effective than hypnotics alone in decreasing PSQI scores” [MD = -3.13, 95% CI (-5.43, -0.83), $p < 0.01$].
- **Conclusions:** “*In comparison to hypnotics, acupuncture was associated with significant improvements in PMI, and reductions of other menopausal symptoms. This finding suggests that acupuncture may be a useful addition to treatment for PMI.*”

Chiu H-Y, Hsieh Y-J, Tsai P-S. Acupuncture to reduce sleep disturbances in perimenopausal and postmenopausal women: a systematic review and meta-analysis. *Obstet Gynecol.* 2016 Mar;127(3):507-515. doi: 10.1097/AOG.0000000000001268. ²⁷³

- **Objective:** To examine the association of acupuncture with sleep disturbances and serum sex hormone levels in perimenopausal and postmenopausal women and whether there are associated changes in sex hormone levels.
- **Design:** systematic review and meta-analysis
- **Methods:** literature search of electronic databases (EMBASE, PubMed, PsycINFO, CINAHL, ClinicalTrials.gov, Wanfang Data Chinese Database, China Knowledge



Resource Integrated Database) plus reference lists of selected studies for randomized controlled trials involving acupuncture for perimenopausal and postmenopausal insomnia

- **Quality Control:** PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analysis)
- **Outcomes:** sleep quality and sex hormone levels
- **Results:**
 - 31 studies involving 2,433 participants
 - Acupuncture significantly reduced sleep disturbances (odds ratio [OR] 0.21, 95% confidence interval [CI] 0.14-0.31)
 - Acupuncture significantly increased serum estradiol (pooled difference in means 7.56 pg/mL, 95% CI 4.03-11.08)
 - Acupuncture significantly reduced serum follicle-stimulating hormone (-6.75 milli-international units/mL, 95% CI -12.16 to -1.34) and luteinizing hormone (-2.71 milli-international units/mL, 95% CI -4.22 to -1.20)
 - Larger acupuncture effect sizes of changes in serum estradiol had significantly lower odds of sleep disturbances (ORs 0.07 and 0.36, P=.02).
- **Conclusions:** “Acupuncture is associated with a significant reduction in sleep disturbances in women experiencing menopause-related sleep disturbances. Our findings suggest that acupuncture should be adopted as part of a multimodal approach for improving sleep disturbances in perimenopausal and postmenopausal women.”

(d.) Acupuncture for Stroke-Related Insomnia

Su Q, Wang L, Yu H, Li H, Zou D, Ni X. Chinese herbal medicine and acupuncture for insomnia in stroke patients: a systematic review and meta-analysis of randomised controlled trials. *Sleep Med.* 2024 Aug;120:65-84. doi: 10.1016/j.sleep.2024.05.006. Epub 2024 May 11.²⁷⁴

- **Design:** systematic review and meta-analysis
- **Registration:** PROSPERO No. CRD42020194029 and No. CRD42020194030
- **Methods:** literature search of 6 databases from inception to June 2023 for randomised controlled trials (RCTs) involving Chinese herbal medicine (CHM) and acupuncture for sleep issues in adults with stroke
- **Primary Outcome:** Pittsburgh Sleep Quality Index (PSQI) scores
- **Meta-Analysis:** pairwise random-effect
- **Results:**
 - 54 RCTs (CHM = 35, acupuncture = 19)



- “Compared with placebo/sham procedure, CHM and acupuncture were more effective in improving PSQI scores.”
- **“CHM outperformed benzodiazepine drugs (BZDs) while it presented an effect similar to that of non-BZDs in improving sleep quality.”** (moderate quality evidence)
- “CHM and acupuncture also provided additional benefits to the patients treated with pharmacological agents alone.”
- CHM prescriptions were difficult to assess due to “various factors and methodological quality”
- “evidence on the comparative effectiveness between acupuncture and other therapies was conflicting or limited.”
- **Conclusions:** Overall, CHM and acupuncture used alone or in combination with pharmacotherapy can safely improve sleep in stroke patients with insomnia. In the future, RCTs on outstanding CHM prescriptions and the comparative effectiveness research between acupuncture and other therapies are needed.

Zhou L, Hu X, Yu Z, et al. Efficacy and safety of acupuncture in the treatment of poststroke insomnia: a systematic review and meta-analysis of twenty-six randomized controlled trials. *ECAM*. 2022;Article ID 5188311:16 pages. doi: 10.1155/2022/5188311. ²⁷⁵

- **Design:** systematic review and meta-analysis
- **Methods:** literature search of databases (PubMed, the Cochrane Library, Embase, Web of Science, China Biology Medicine (CBM), CNKI, VIP, Wanfang) from inception to April 29, 2021, for randomized controlled trials involving acupuncture treatment of poststroke insomnia
- **Quality Control:** “two reviewers independently screened the literature, extracted the data, and evaluated the risk of bias in the included studies”
- **Meta-Analysis:** RevMan 5.3 and STATA 16.0
- **Outcome Quality:** Grading of Recommendations Assessment, Development and Evaluation (GRADE)
- **Results:**
 - 26 studies involving 1,874 participants (treatment n=942, control n = 932) met inclusion criteria
 - “Compared with oral medications alone, acupuncture alone or acupuncture combined with oral medications could improve the clinical effective rate and the sleep quality of patients” (RR = 1.21; 95% CI: 1.15, 1.27; P < 0.00001 and MD = 3.41; 95% CI: 2.40, 4.41; P < 0.00001)
 - Adverse Reactions: “the incidence of acupuncture alone or acupuncture combined with oral drugs was lower than that of oral drugs alone, which was safer” (RR= 0.21; 95% CI: 0.09, 0.48; P = 0.0002)
 - Sensitivity analysis: “results were stable.”
 - Evidence Quality via GRADE: clinical effective rate (low), PSQI score (low), adverse reactions (very low)



- **Conclusion:** “Acupuncture alone or acupuncture combined with oral drugs is more effective and safer than oral drugs alone in the treatment of poststroke insomnia, which is suitable to promote in clinical practice.”

Yang J. Acupuncture treatment for post-stroke insomnia: a systematic review and meta-analysis of randomized controlled trials. *Complement Ther Clin Pract.* 2021 Aug;44:101396. doi: 10.1016/j.ctcp.2021.101396. Epub 2021 Apr 23. ²⁷⁶

- **Design:** systematic review and meta-analysis
- **Methods:** Literature search of 5 databases before April 2020 randomized controlled trials involving acupuncture for post-stroke insomnia
- **Primary Outcomes:** improvement rate, Pittsburgh sleep quality index (PSQI) scores
- **Secondary Outcomes:** follow-up PSQI scores, safety
- **Results:**
 - 41 trials met inclusion criteria
 - “Compared to drugs...acupuncture had a higher rate of improvement in sleep” (risk ratio: 1.21, 95% confidence interval [CI]: 1.17, 1.24)
 - Compared to drugs, acupuncture demonstrated better PSQI scores “immediately and three months after treatment” (weighted mean differences [WMD]: 3.23, 95%CI: 3.92, -2.54; and -6.18, 95%CI: 8.28, -4.07, respectively).
 - Side Effects: minor and rare
- **Conclusion:** “The existing evidence suggests acupuncture may be more effective in treating post-stroke insomnia than drugs. It also appears to have a good safety profile and more long-term benefits”

Lee S-H, Lim SM. Acupuncture for insomnia after stroke: a systematic review and meta-analysis. *BMC Complement Altern Med.* 2016;16:228. doi: 10.1186/s12906-016-1220-z. ²⁷⁷

- **Design:** systematic review and meta-analysis
- **Methods:** literature search of 7 databases in any language from inception through October 2014 for randomized controlled trials (RCTs) involving acupuncture vs placebo or conventional care for post-stroke insomnia
- **Primary Assessments:** Pittsburgh sleep quality index (PSQI), insomnia severity index (ISI), Athens insomnia scale (AIS), efficacy standards of Chinese medicine
- **Results:**
 - 13 studies met inclusion criteria
 - “acupuncture appeared to be more effective than drugs for treatment of insomnia after stroke” according to PSQI results (weighted mean difference, 4.31; 95 % confidence interval [CI], 1.67–6.95; P = 0.001)
 - acupuncture more effective than drugs for treatment of post-stroke insomnia according to efficacy standards (risk ratio, 1.25; 95 % CI, 1.12–1.40; P < 0.001)
 - “intra-dermal acupuncture had significant effects compared with sham acupuncture, as assessed by the ISI” (weighted mean difference, 4.44; 95 % CI,



2.75–6.13; $P < 0.001$) and the AIS (weighted mean difference, 3.64; 95 % CI, 2.28–5.00; $P < 0.001$).

- **Conclusions:** “acupuncture could be effective for treating insomnia after stroke.”

(e.) Acupuncture for Hypertension-Related Insomnia

Zhang J, Zhou X, Jiang H, et al. Acupuncture for insomnia symptoms in hypertensive patients: a systematic review and meta-analysis. *Front Neurol.* 2024;15:1329132. doi: 10.3389/fneur.2024.1329132. ²⁷⁸

- **Design:** systematic review and meta-analysis
- **Study Registry:** PROSPERO, number CRD42023461760
- **Methods:** literature search of databases (PubMed, Web of Science, Cochrane Library, WANFANG, China National Knowledge Infrastructure (CNKI), Sinomed, and the Chinese Journal of Science and Technology (VIP)) plus “forward and backward articles of studies” from inception until 10 September 2023, for randomized controlled trials (RCTs) involving acupuncture treatment for insomnia in hypertensive patients.
- **Evidence Quality:** Cochrane Risk of Bias tool
- **Results:**
 - 16 RCTs with 1,309 patients met inclusion criteria
 - “acupuncture was significantly more effective than the control group in reducing insomnia symptoms, as indicated by a greater decrease in the PSQI score” (MD = -3.1 , 95% CI [-3.77 to -2.62], $p < 0.00001$).
 - “improvements in both systolic and diastolic blood pressure were more pronounced in the acupuncture group compared to the control group” (SBP: MD = -10.31 , 95% CI [-16.98 to -3.64], $p = 0.002$; DBP: MD = -5.71 , 95% CI [-8.19 to -3.23], $p < 0.00001$).
- **Conclusions:** “acupuncture not only improves sleep quality but also lowers blood pressure in patients suffering from hypertension and insomnia. Further research is warranted to elucidate optimal acupuncture points and the duration of treatment for maximized therapeutic effect.”

e. Acupuncture for Mental Health Outcomes: PTSD (Fight, Flight, Freeze)

Kwon C-Y, Lee B, Kim S-H. Effectiveness and safety of ear acupuncture for trauma-related mental disorders after large-scale disasters: a PRISMA-compliant systematic review. *Medicine.* 2020;99:8doi: 10.1097/MD.000000000019342. ²⁷⁹

- **Design:** systematic review
- **PROSPERO Registration Number:** CRD42019134658
- **Methods:** Literature search 15 electronic databases up to November 2019 for clinical



studies involving acupuncture to treat trauma-related mental disorders after large-scale disasters

- **Methodological Quality Assessment:** “assessed using appropriate tools”
- **Results:**
 - 10 studies (3 randomized controlled trials (RCTs), 3 pre/post studies, 1 case report, 1 qualitative research, 2 public mental health service reports) met inclusion criteria
 - “ear acupuncture improved overall post-traumatic stress disorder (PTSD) related symptoms in patients with PTSD after disasters.”
 - “ear acupuncture improved a few subscales of the Pittsburgh sleep quality index in one RCT, other outcomes including sleep diary, actigraph, and the insomnia severity index were not improved”
 - methodological Quality: “generally low”
 - no serious adverse events reported
- **Conclusion:** Authors report finding evidence for ear acupuncture in trauma-related scenarios, but reported that this evidence was limited due to the “small number of studies included and their heterogeneity.” Conclusions could therefore not be drawn “about its effectiveness and safety.”

Hempel S, Shekelle PG, Taylor SL, Solloway MR. The evidence map of acupuncture. Department of Veterans Affairs VA-ESP Project #05-226. January 2014. <https://www.hsrd.research.va.gov/publications/esp/acupuncture.pdf>¹

- 1,223 studies electronically located, of which 183 met inclusion criteria (65 for pain, 44 for wellness, 20 for mental health, and 49 for “other”)
- “Regarding topics with fewer primary research studies and positive results, a review on posttraumatic stress disorder (PTSD) was identified that included 4 RCTs. The review found that *acupuncture was superior to waitlist control* (posttraumatic symptom scale-self report effect size [ES] -0.98, p=0.001) *and cognitive behavioral therapy alone* (Revised Impact on Event Scale ES -1.56, p<0.001) based on one RCT each.”

Hollifield M, Sinclair-Lian N, Warner TD, Hammerschlag R. Acupuncture for posttraumatic stress disorder: a randomized controlled pilot trial. *J Nerv Ment Dis.* 2007 Jun;195(6):504-13.doi:10.1097/NMD.0b013e31803044f8.²⁸⁰

- **Purpose:** “to evaluate the potential efficacy and acceptability of acupuncture for posttraumatic stress disorder (PTSD)”
- **Participants:** 84 people diagnosed with PTSD



- **Study groups:** acupuncture treatment (ACU), group cognitive-behavioral therapy (CBT), wait-list control (WLC)
- **Primary outcome measure:** self-reported PTSD symptoms at baseline, end of treatment, and at 3-month follow-up
- **Results:**
 - **acupuncture demonstrated treatment effects for PTSD** ($F [1, 46] = 12.60$; $p < 0.01$; Cohen's $d = 1.29$)
 - **acupuncture results similar to cognitive behavioral therapy** ($F [1, 47] = 12.45$; $p < 0.01$; $d = 1.42$) (ACU vs. CBT, $d = 0.29$).
- **Persistence of effects:** “*Symptom reductions at end treatment were maintained at 3-month follow-up for both interventions.*”
- **Conclusions:** “*Acupuncture may be an efficacious and acceptable ... treatment option for PTSD.*”

Engel CC, Cordova EH, Benedek DM, Liu X, Gore KL, Goertz C, Freed MC, Crawford C, Jonas WB, Ursano RJ. Randomized effectiveness trial of a brief course of acupuncture for posttraumatic stress disorder. *Med Care.* 2014 Dec;52(12 Suppl 5):S57-64. doi: 10.1097/MLR.000000000000237. ²⁸¹

- **Participants:** 55 military service members diagnosed with PTSD
- **Treatments:** 8 one-hour acupuncture treatments 2x/week plus “usual PTSD care (UPC)” or UPC only
- **Primary outcomes:** PTSD Checklist (PCL) and the Clinician-administered PTSD Scale (CAPS) scores at baseline, 4, 8, and 12 weeks
- **Secondary outcomes:** depression, pain severity, and mental/physical health functioning
- **Results:**
 - **acupuncture vs usual care**
 - **significantly greater “mean improvement in PTSD severity”** (PCL $\Delta=19.8\pm13.3$ vs. 9.7 ± 12.9 , $P<0.001$; CAPS $\Delta=35.0\pm20.26$ vs. 10.9 ± 20.8 , $P<0.0001$)
 - “**significantly greater improvements in depression, pain, and physical and mental health functioning.**”
- **Conclusions:** “*Acupuncture was effective for reducing PTSD symptoms*” in this small sample size group.

7. Safety of Acupuncture



Coyle ME, Smith CA, Peat B. Cephalic version by moxibustion for breech presentation. *Cochrane Database Syst Rev.* 2023;5(5):CD003928. ¹⁵²

- **Systematic Review:** Literature search of Cochrane Pregnancy and Childbirth’s Trials Register (CENTRAL, MEDLINE, Embase, CINAHL, and conference proceedings), ClinicalTrials.gov, the WHO International Clinical Trials Registry Platform (ICTRP) through November 4, 2021, and MEDLINE, CINAHL, AMED, Embase and MIDIRS through November 3, 2021, plus reference lists, for published and unpublished randomised or quasi-randomised controlled trials involving the use of moxibustion with/without other techniques (acupuncture, posture) with control to change “the presentation of an unborn baby in the breech position, the need for external cephalic version (ECV), mode of birth, and perinatal morbidity and mortality.”
- **Data collection and analysis:** Two review authors independently determined trial eligibility, assessed trial quality, and extracted data.
- **Outcomes Assessed:** “baby's presentation at birth, need for ECV, mode of birth, perinatal morbidity and mortality, maternal complications and **maternal satisfaction**, and adverse events.”
- **Evidence Certainty Assessment:** GRADE approach.
- **Meta-Analysis:** 13 studies involving 2,181 women
- **Safety Results:** See above section for moxibustion/breech presentation results; see below for patient satisfaction results
 - **Safety:** “The most frequently reported adverse events were increased fetal movements, uterine contractions, nausea, headache, and burns from holding the moxibustion stick too close to the skin.”
- **Overall completeness and applicability of evidence:** “In studies that assessed maternal satisfaction with treatment, **women found moxibustion to be acceptable**; however, there is limited evidence on maternal satisfaction.”

Yang L, Yang W, Sun M, Luo L, Li HR, Miao R, Pang L, Chen Y, Zou K. Meta analysis of ovulation induction effect and pregnancy outcome of acupuncture & moxibustion combined with clomiphene in patients with polycystic ovary syndrome. *Front Endocrinol.* 20 November 2023; doi:10.3389/fendo.2023.1261016. ¹⁴⁹



- **Design:** Systematic Review and Meta-Analysis
- **Systematic review registration:** <https://www.crd.york.ac.uk/PROSPERO/>
- #myprospero, identifier (CRD42023433057)
- **Methods:** Literature search of 8 databases (The Cochrane Library, Pubmed, Embase, Web of Science, CNKI, Wanfang, VIP, CBM) using computer from inception through May 2023 for randomized controlled trials involving acupuncture and moxibustion, and clomiphene, acupuncture, and moxibustion for patients with polycystic ovary syndrome (PCOS)
- **Quality Control:** two independent researchers screened literature, extracted data, evaluated risk of bias
- **Treatments:** (1) acupuncture + moxibustion, (2) clomiphene, (3) acupuncture, moxibustion, + clomiphene
- **Primary Outcome:** pregnancy
- **Mesh Meta-Analysis:** 6 randomized controlled trials involving 1,410 PCOS patients analyzed using Stata17.0 software
- **Conclusion:** “Acupuncture & Moxibustion is effective in improving the ovulation promoting effect and pregnancy outcome of PCOS patients. The ovulation promoting effect of Acupuncture & Moxibustion or combined with Clomiphene is similar to that of Clomiphene alone, but **Acupuncture & Moxibustion combined with Clomiphene has more advantages in improving the pregnancy rate of PCOS**, and it also **can reduce the adverse reactions of Clomiphene alone**. Acupuncture & Moxibustion can be used as a recommended treatment for PCOS.”

Witt CM, Pach D, Brinkhaus B, Wruck K, Tag B, Mank S, Willich SN. Safety of acupuncture: results of a prospective observational study with 229,230 patients and introduction of a medical information and consent form. *Forsch Komplementarmed.* 2009;16:91–97. ²⁸²

- **Study:** prospective observational study involving 229,230 patients receiving 10.2 +/- 3.0 acupuncture treatments for hip or knee chronic osteoarthritis pain, low back pain, neck pain or headache, allergic rhinitis, asthma, or dysmenorrhoea aimed to assess safety and to develop a new medical questionnaire
- **Results:**
 - 229,230 patients received “10.2 +/- 3.0 acupuncture treatments.”
 - 19,726 patients (8.6%) one adverse event
 - 4,963 (2.2%) one adverse event requiring treatment
 - common adverse events:
 - bleeding/haematoma (6.1% of patients, 58% of all adverse events)
 - pain (1.7%)
 - vegetative symptoms (0.7%)



- pneumothorax: two patients (1 needed hospitalization; 1 needed observation only)
- nerve lesion of the lower limb lasting 180 days (longest side-effect duration)
- new medical consent form included 5 sections: “introduction to acupuncture and moxibustion, risks of acupuncture, conditions that can increase the risk, doctor's statement, and consent.”
- **Conclusion:** “*Acupuncture provided by physicians is a relatively safe treatment and the proposed consent form could support both patients and professionals in the process of obtaining informed consent.*”

Zhang AL, Parker SJ, Smit DV, Taylor DM, Xu CCL. Acupuncture and standard emergency department care for pain and/or nausea and its impact on emergency care delivery: a feasibility study. 2014;32(3). doi: 10.1136/acupmed-2013-010501. ²⁸³

- **Study:** feasibility study involving 400 patients presenting to the Melbourne, Australia, emergency department with pain or nausea from January - August 2010. “To evaluate the feasibility of delivering acupuncture in an emergency department (ED) to patients presenting with pain and/or nausea.
- **Treatment Groups:** acupuncture + usual care (n=200) and usual care + “retrospective data closely matched from ED electronic health records” (n=200)
- **Outcomes:** Visual Analogue Scale (VAS) scores 0-10 and Morrow Index scores 1-6
- **Results:**
 - Acupuncture refusal rate: 31% (most common reason: symptoms abated by previous medical treatment (n=36))
 - Willingness to repeat acupuncture (84.3%)
 - “definitely, yes” = 52.5% of participants
 - “probably, yes” = 31.8% of participants
 - Satisfaction score of 10 for acupuncture: 57%
 - Most common conditions treated
 - musculoskeletal conditions were the (n=117, 58.5%)
 - abdominal/flank pain (n=49, 24.5%)
 - Adverse events (2%) rare and mild.
 - Reduced pain scores baseline (mean±SD of 7.01±2.02) to post-acupuncture (mean±SD of 4.72±2.62)
 - Reduced nausea scores baseline (mean±SD of 2.6±2.19) to post-acupuncture (mean±SD of 1.42±1.86)
- **Conclusions:** “Acupuncture in the ED appears safe and acceptable for patients with pain and/or nausea.” Acupuncture plus usual care “may provide effective pain and nausea relief in ED patients.”

Clarkson CE, O'Mahony D, Jones DE. Adverse event reporting in studies of penetrating acupuncture during pregnancy: a systematic review. *Acta Obstet Gynecol Scand.* 2015 May;94(5):453-64. doi: 10.1111/aogs.12587. Epub 2015 Mar 3. PMID: 25603694. ²⁸⁴



- **Study:** Systematic review of MEDLINE, CINAHL, Allied and Complementary Medicine Database, Physiotherapy Evidence Database (PEDro) between 2000-2014; meta-analysis of 17 studies involving penetrating acupuncture and mention of adverse events
- **Quality analysis of publications:** PEDro scale or Downs and Black checklist
Quality of reporting: STRICTA and CONSORT guidelines; Good Clinical Practice adverse event guidelines
- **Results:** “Overall quality of reporting of adverse events was poor, with information describing the adverse events often lacking in detail.”
 - Trends observed:
 - adverse events during acupuncture treatment 3–17%
 - adverse events in non-acupuncture groups 4–25%
 - percentage of women affected by an adverse event during acupuncture 14–17%
 - percentage of women affected by an adverse event in non-acupuncture group 15–19%
- **Conclusions:** “Adverse event reporting within acupuncture trials is generally poor. The trends noted were that adverse events do occur, but would appear to be largely minor and comparable to non-acupuncture-related interventions.”

Park J, Sohn Y, White AR, Lee H. The safety of acupuncture during pregnancy: a systematic review. *Acupunct Med.* 2014 Jun;32(3):257-66. doi:10.1136/acupmed-2013-010480. Epub 2014 Feb 19. PMID: 24554789; PMCID: PMC4112450. ²⁸⁵

- **Study:** Systematic review of Medline, Embase, Cochrane Central Register, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Allied and Complementary Medicine Database (AMED) and five Korean databases through February 2013 for studies involving acupuncture and/or moxibustion for treatment of any condition in pregnant women (excluding acupuncture for delivery, abortion, assisted reproduction or postpartum)
- **Outcomes:** causality assessment rating AEs as certain, probable, or possible
- **Results:** 25 studies of the 105 included studies (27 of articles, or 25.7%) reported AEs.
 - Total incidence of AE: 1.9%; prevalence of AEs that were “certainly, probably, or possibly causally related to acupuncture was 1.3%.”
 - AEs “were all mild/moderate in severity, with needling pain being the most frequent.”
 - “Severe AEs or deaths were few and all considered unlikely to have been caused by acupuncture.”
- **Conclusions:** “Acupuncture during pregnancy appears to be associated with few AEs when correctly applied.”

White A. The safety of acupuncture – evidence from the UK. *Acupunct Med.* 2006; 24(Suppl):53–57. doi: 10.1136/aim.24.Suppl.53. ²⁸⁶



- **Study:** Two prospective surveys of 652 medical professionals trained in acupuncture (doctors, physiotherapists, acupuncturists) who “monitored adverse events” during and after acupuncture treatments
- **Results:**
 - 6,733 adverse reactions were reported for 66,229 patients (10.2% adverse event rate)
 - most common adverse events
 - tiredness (3%)
 - bleeding or bruising (3%)
 - aggravation of symptoms (2%)
 - pain at needling site (1%)
 - “no serious adverse events”
 - “86 (0.1%) of the treatments [were] associated with an event that the practitioner judged to be significant,” but did not have ongoing impacts upon patient health
- **Conclusion:** “*The risks associated with acupuncture can be classified as negligible, and acupuncture is a very safe treatment in the hands of competent practitioners.*”

American Specialty Health Incorporated Health Services Department. *Acupuncture: does acupuncture provided within a managed care setting meet patient expectations and quality outcomes? 2016;1–12.* ³¹¹

- **Study:** annual outcomes survey involving CG-CAHPS questions plus “additional ASH proprietary questions” for patients 18+ years old seeing ASHn providers January - June in 2014 and 2015
- **Goals:** “to determine whether acupuncture services provided within a managed care setting ***could meet or exceed national*** CG-CAHPS [Clinician & Group Consumer Assessment of Healthcare Providers and Systems] ***benchmarks for patient satisfaction.***”
- **Outcomes:** ***acupuncture patient satisfaction rates***
- **Safety Results:**
 - **2014:** 98% of national participants and 97% of CA respondents “**agreed or strongly agreed that the provider and staff ensured their safety.**”
 - **2015:** 98.3 – 98.4% of both national and CA respondents “**agreed or strongly agreed that the provider and staff ensured their safety.**”
- **Conclusions:** “*High satisfaction levels were reported for care, safety, and effectively treating the primary presenting condition, as well as “high levels of willingness to recommend others to ASH for benefits and to their individual practitioners.”*”

In addition to the studies included within this section, **65 additional studies**^{2,13,16,18,20,21,27,28,29,40,42,50,55,57,58,66,73,80,104,112,116,134,136,137,139,140,141,162,164,165,166,167,168,172,173,179,181,184,188,189,195,202,209,212,213,214,222,223,225,226,233,234,237,248,256,257,262,263,264,265,267,274,275,276,279} included in this review contain results and/or conclusions regarding ***low adverse events and the safety of acupuncture.***

8. Cost-Effectiveness of Acupuncture

a. General Cost-Effectiveness of Acupuncture



Smith CL, Mulcahy M. The impact of inpatient acupuncture on a mixed hospital floor: a pragmatic 3-month cost-effectiveness retrospective evaluation. *Med Acupunct.* 2024 Feb 1;36(1):27-33.doi: 10.1089/acu.2023.0009. Epub 2024 Feb 13. ²⁸⁷

Pilot comparison study hospital cost of stay (COS), length of stay (LOS), and patient satisfaction patients receiving 3 months of acupuncture for pain vs non-intervention control group

- **Outcomes:** pre- and post-intervention scores, number of treatments, diagnosis related groups (DRGs)
- **Results:**
 - “Patients' pain significantly decreased each time they were treated.”
 - Consumer Assessment of Healthcare Providers and Systems scores: increased to 85, 99, and 97 during acupuncture intervention and then lowered to baseline levels after acupuncture treatments subsided.
 - “LOS was higher in the intervention group (+7.8 days), but acupuncture saved the hospital an anticipated \$125,770 in the projected COS during that 3-month time alone.”
- **Conclusions:** “Acupuncture was a potent pain-relief alternative for hospitalized patients, providing more satisfaction. Acupuncture resulted in longer LOS, but the aggregate COS was 86% less than expected. Acupuncture may be a financially viable, clinically impactful adjunct to hospital care.”

Ambrósio EMM, Bloor K, MacPherson H. Costs and consequences of acupuncture as a treatment for chronic pain: a systematic review of economic evaluations conducted alongside randomised controlled trials. *Complement Ther Med.* Oct 2012;20(5):364-74. PMID: 22863652. DOI: 10.1016/j.ctim.2012.05.002. ²⁸⁸

- **Study:** Systematic review of health and economic databases plus manual searches for randomized controlled trials (RCTs) involving acupuncture treatment for chronic pain (low back pain, neck pain, dysmenorrhoea, migraine, headache, and osteoarthritis); meta-analysis of 8 economic evaluations, 7 cost-utility analyses, and 1 cost-effectiveness analysis
- **Results:**
 - 7 cost-utility analyses: “acupuncture was found to be clinically effective but cost more.”



- “cost per quality adjusted life year (QALY) gained ranged from £2527 [\$3,212.07] to £14,976 [\$19,035.99] per QALY,” below “the UK National Institute for Health and Clinical Excellence of £20,000 to £30,000.”
- 1 cost-effectiveness study: “both clinical benefits and cost savings associated with acupuncture for migraine.”
- general study heterogeneity (professionals providing acupuncture, style of acupuncture used, and country where the studies took place)
- **Conclusion:** “*The cost per QALY gained in all seven cost-utility studies was found to be below typical thresholds of willingness to pay. Acupuncture appears to be a cost-effective intervention for some chronic pain conditions.*”

Kim SY, Lee H, Chae Y, Park HJ, Lee H. A systematic review of cost-effectiveness analyses alongside randomised controlled trials of acupuncture. *Acupunct Med.* 2012;30:273–285. ²⁸⁹

- **Study:** systematic review of 11 databases through March 2011 for randomized controlled trials involving acupuncture plus economic evaluations (cost-effectiveness, cost-utility, and cost-benefit) for any medical condition. Seventeen studies “assessed using Cochrane criteria for risk of bias and a modified version of the checklist for economic evaluation.”
- **Results:**
 - 9 studies used cost-utility analyses (CUAs)
 - “*All CUAs showed that acupuncture with or without usual care was cost-effective compared with waiting list control or usual care alone.*”
 - German study ICER scores
 - €3011/QALY (dysmenorrhoea)
 - €22298/QALY (allergic rhinitis)
 - UK study ICER scores
 - £3855 [\$4,922.60]/QALY (osteoarthritis) to £9951[\$12,707.10] /QALY (headache)
 - 8 studies used cost-effectiveness analyses (CEAs) of acupuncture effectiveness to improve clinical symptoms assessed
 - “*Acupuncture was beneficial at a relatively low cost in six European and Asian studies.*”
 - CUA’s vs CEAs
 - “All CUAs were well-designed with a low risk of bias, but this was not the case for CEAs.”
 - **Conclusions:** “*Overall, this review demonstrates the cost-effectiveness of acupuncture.*”

b. Cost-Effectiveness and Persistence of Acupuncture Effects for Chronic Pain

McDonald J, Janz S. The acupuncture evidence project: a comparative literature review. Australian Acupuncture and Chinese Medicine Association. January 2017. ²



- Cost-effectiveness of acupuncture identified for 10 conditions: chronic pain, low back pain, migraine, neck pain, osteoarthritis, ambulatory anesthesia, depression, dysmenorrhea, headache, post-operative nausea and vomiting, and allergic rhinitis

Vickers AJ, Vertosick EA, Lewith GL, MacPherson H, Foster NE, Sherman KJ, Irnich D, Witt CM. Acupuncture for chronic pain: update of an individual patient data meta-analysis. *J Pain*. 2018 May; 19(5):455–474. doi:10.1016/j.jpain.2017.11.005. ⁴

- **Study:** Updated 2012 individual patient data meta-analysis with an **additional 13 RCTs (42 studies; 20,827 patients total)** to demonstrate effect of acupuncture on 4 chronic pain conditions (non-specific musculoskeletal pain, osteoarthritis, chronic headache, shoulder pain)
- **Methods:** MEDLINE and Cochrane Central Registry of Controlled Trials searched for randomized trials (acupuncture vs. sham + acupuncture vs. no control) through December 31, 2015
- **Main outcome measures:** pain and function
- **Results similar to 2012 study:**³ *“Acupuncture was superior to both sham and no acupuncture control for each pain condition (all $p < 0.001$).”*
 - Acupuncture vs no acupuncture control: differences close to 0.5 standard deviations (SD)
 - Acupuncture vs sham: differences of 0.2 SDs
- **Persistence:** *“clear evidence that the effects of acupuncture persist over time with only a small decrease, approximately 15%, in treatment effect at one year.”*
- **Acupuncture effect sizes were related to the type of control used;** there were **smaller differences between acupuncture and sham acupuncture groups.**
- **Conclusion:** *“acupuncture is effective for the treatment of chronic pain, with treatment effects persisting over time.”*

Cummings M. Modellvorhaben Akupunktur—a summary of the ART, ARC and GERAC trials. *Acupunct Med*. 2009;27(1):26-30. ⁶

- **Study:** German Federal Committee of Physicians and Health Insurers October 2000 recommendation to implement Model Projects on Acupuncture ("Modellvorhaben Akupunktur") study “to determine the evidence-based role of acupuncture in the treatment of certain illnesses.”
 - 51,666 participants in ART, ARC, GERAC combined; COMP participant numbers not reported (recruitment goal 480)
 - “Largest clinical studies on acupuncture ever performed.”
- **Overall Conclusions:**



- “Acupuncture appears to be **effective in a range of chronic conditions** and it seems to have **acceptable cost-effectiveness** in Western health economic terms.”
- German health officials included acupuncture (April 2006) “into **routine reimbursement by social health insurance funds for chronic low back pain and chronic osteoarthritis of the knee.**”

MacPherson H, Vertosick EA, Foster NE, Lewith G, Linde K, Sherman KJ, Witt CM, Vickers AJ. The persistence of the effects of acupuncture after a course of treatment: a meta-analysis of patients with chronic pain. *Pain*. 2017 May; 158(5): 784–793. doi:10.1097/j.pain.0000000000000747.²⁹⁰

- **Study:** 29 trials involving 17,922 patients with chronic musculoskeletal pain (low back, neck, and shoulder pain), knee osteoarthritis, and headache/migraine pain pooled for meta-analysis
- **Outcomes:** pre- and post-treatment pain scores
- **Results:** Long-term follow-up data for 20 trials involving 6,376 patients
 - **Treatment effect persisted at 3 months** (95% CI: -0.014 to 0.037, p = 0.4) for trials comparing acupuncture vs control (wait-list, usual care)
 - “The central estimate [expected values of liabilities] suggests that **about 90% of the benefit of acupuncture relative to controls would be sustained at 12 months.**”
 - **Acupuncture vs sham acupuncture demonstrated a lower comparable effect at 3 months** (95% CI: 0.000 to 0.050, p = 0.050) and about a 50% reduction in effect size at 12 months.
- **Authors concluded:**
 - The effects of acupuncture treatment for chronic pain can be expected to last at least 12 months.
 - **“Patients can generally be reassured that treatment effects persist.”**
 - *“Studies of the cost-effectiveness of acupuncture should take [these] findings into account when considering the time horizon of acupuncture effects.”*

c. Cost-Effectiveness of Acupuncture for Chronic and Acute Low Back Pain

Elton D (Optum Insurance). The National Academies of Science, Engineering, Medicine. Session 3 [Video]. YouTube. Published Dec 7, 2018. Accessed January 22, 2022. <https://www.youtube.com/watch?v=vQO5CsuzfRM>.²⁹¹

- **Percentage of non-surgical low back pain patients seeking first-line care:**



- specialists (38.3%)
- chiropractors/physical therapists/acupuncturists (31.3%)
- primary care physicians (30.4%)
- **Total medical episode costs:**
 - chiropractors/physical therapists/acupuncturists (\$619)
 - primary care physician visits (\$728)
 - specialist care (\$1,728)
- **Summary**
 - **Health care cost savings of over \$100 per medical non-surgical low back pain event** *when patients saw conservative integrative care providers (acupuncturists/chiropractors/physical therapists) first* compared to primary care physicians
 - **\$1,000 savings per medical event** *when patients saw conservative integrative providers first* compared to receiving specialist care

Taylor P, Pezzullo L, Grant SJ, Bensoussan A. Cost-effectiveness of acupuncture for chronic non-specific back pain. *Pain Pract.* 2014;14(7):599-606. ²⁹²

- **Study:** Systematic review and meta-analyses to assess cost-effectiveness of acupuncture, acupuncture plus standard care, sham acupuncture, and routine care to relieve chronic low back pain
- **Outcomes measured:** incremental cost-effectiveness ratio (ICER) presented as cost (A\$) per disability-adjusted life-year (DALY) saved using World Health Organization (WHO) benchmarks
- **Results:**
 - Participants receiving **acupuncture + standard care** vs standard care only experienced **“a significant improvement in pain”**
 - Acupuncture + standard care vs sham acupuncture + standard care: **“a weak positive effect** was found for **weeks 12 to 16**, but this was **not significant.**”
 - Acupuncture vs standard care: **“a significant positive effect was found at week 8**, but not at weeks 26 or 52.”
 - According to the established WHO benchmarks, “acupuncture as a complement to standard care for relief of chronic LBP is **highly cost-effective**, costing around



\$48,562 per DALY avoided.” Cost reduces to \$18,960 per DALY avoided “when comorbid depression is alleviated at the same rate as pain.”

- **Costs explained:** “A very highly cost-effective intervention is one that costs less than gross domestic product per capita per quality-adjusted life-year (QALY) gained or DALY averted, or less than around \$A52,000 in 2009.”
- **Conclusions:** Acupuncture was found to be a **cost-effective treatment strategy** in patients with chronic low back pain

Witt CM, Jena S, Selim D, Brinkhaus B, Reinhold T, Wruck K, Liecker B, Linde K, Wegscheider K, Willich SN. **Pragmatic randomized trial evaluating the clinical and economic effectiveness of acupuncture for chronic low back pain.** *Am J Epidemiol.* 2006;164(5):487–496. doi:10.1093/aje/kwj224. ²⁹³

- **Study:** 11,630 German patients (average age 52.9 years; 59% female) with chronic low back pain were allocated to an acupuncture group (N = 1,549), a no-acupuncture control group (N = 1,544), or a nonrandomized acupuncture group (N = 8,537).
- **Outcomes measured:** back function (Hannover Functional Ability Questionnaire), pain, and quality of life at baseline, 3 months, 6 months
- **Results:**
 - **Acupuncture group at 3 months**
 - **back function improved 12.1** (standard error (SE), 0.4) **to 74.5** (SE, 0.4) points
 - **Control group at 3 months**
 - **back function improved by 2.7** (SE, 0.4) **to 65.1** (SE, 0.4) points (difference 9.4 points (95% confidence interval 8.3, 10.5); p < 0.001)
 - Nonrandomized acupuncture group participants demonstrated improvements on par with the randomized acupuncture treatment group participants.
 - “The incremental cost-effectiveness ratio was €10,526 [\$11,485.34] per quality-adjusted life year.”
- **Conclusions:** “*Acupuncture plus routine care was associated with **marked clinical improvements** in these patients and was **relatively cost-effective.**”*

Skonnord T, Fetveit A, Skjeie H, Brekke M, Grotle M, Klovning A, Aas E. **Cost-effectiveness analysis of acupuncture compared with usual care for acute non-specific low back pain: secondary analysis of a randomised controlled trial.** *Acupunct Med.* 2022 Apr;40(2):123-132. doi: 10.1177/09645284211055747. Epub 2021 Nov 30. ²⁹⁴



- **Objective:** Researchers sought to determine cost-effectiveness of a single acupuncture treatment plus usual care for acute low back pain
- **Study:** Secondary analysis of a Norwegian randomized controlled trial involving 171 participants with acute low back pain for more than or equal to 14 days
- **Outcomes measured:** quality-adjusted life years (QALYs), health care costs and societal costs at days 28 and 365, incremental cost-effectiveness ratio (ICER), and net monetary benefit (NMB)
- **Treatment groups:** 86 participants (control); 81 participants (acupuncture)
- **Results:**
 - No QALY gain at day 28
 - **“At day 365, the incremental QALY of 0.035 was statistically significant.”**
 - Differences between “health care costs and societal costs were not statistically significant.”
 - Cost savings and positive net monetary benefits at 365 days:
 - incremental cost-effectiveness ratio: “USD -568 per QALY”
 - net monetary benefit: “USD 1265, with **95.9% probability of acupuncture being cost-effective**”
- **Conclusions:** *“This is the first cost-effectiveness analysis of acupuncture for [acute non-specific low back pain]” and “the findings indicate that acupuncture may be cost-effective [for acute non-specific low back pain] from a 1-year perspective.”*

Thomas KJ, MacPherson H, Ratcliffe J, Thorpe L, Brazier J, Campbell M, Fitter M, Roman M, Walters S, Nicholl JP. Longer term clinical and economic benefits of offering acupuncture care to patients with chronic low back pain. *HTA*. 2005;9(32):1-128. ²⁹⁵

- **Study:** Randomized controlled trial involving 239 participants ages 18-65 with non-specific low back pain 4-52 weeks in duration
- **Treatment Groups:** acupuncture + usual care group (N=159; 10 treatments) or usual care only (N=80) group
- **Outcome measures:** Short Form 36 (SF-36) Bodily Pain dimension (0–100 points) baseline, 3, 12, and 24 months, and cost-utility analysis at 24 months
- **Secondary outcomes:** McGill Present Pain Index (PPI), Oswestry Pain Disability Index (ODI), other SF-36 dimensions, medication usage, number of pain-free months in the last year, patient concern about back pain, patient satisfaction with care received, and safety/acceptability of acupuncture treatments



- **Results:** Acupuncture demonstrated **significant treatment effects** via the SF-36 pain dimension scale
 - 5.6 points at 12 months [95% confidence interval (CI) –1.3 to 12.5]
 - **9 points at 24 months** (95% CI 0.7 to 15.3)
 - no difference in treatment effects demonstrated amongst different acupuncturists performing the treatments
 - no life-threatening or serious health risks reported
 - Patients reported **reduced worry about pain at 12 and 24 months** vs usual care
 - **“At 24 months, the acupuncture care group was significantly more likely to report 12 months pain free and less likely to report the use of medication for pain relief.”**
 - Acupuncture demonstrated **cost-effectiveness at 24 months** with “estimated cost per quality-adjusted (QALY) of £4241 (95% CI £191 to £28,026) based on SF-36 responses and and £3598 (95% CI £189 to £22,035) based on EQ- 5D
 - NHS acupuncture costs were higher, but usual care costs were lower
 - **Satisfaction with care received (at 3 months):**
 - **“A higher proportion of patients in the acupuncture group reported being ‘very satisfied’ or ‘somewhat satisfied’ with their treatment and overall care.”**
 - **“Patients in the acupuncture group were significantly more likely to be ‘very satisfied’ with their treatment (p = 0.01) and their overall care (p = 0.04)”**
 - **“Similar proportions were satisfied with the information that they received about their low back pain.”** (not statistically significant, p=0.43)
 - No serious adverse events reported for the acupuncture group.
- **Conclusions:**
 - Acupuncture care was safe and acceptable for non-specific low back pain patients.
 - **Both acupuncture and usual care participants demonstrated “clinically significant improvement at 12- and 24-month follow-up.”**
 - Acupuncture was **“significantly more effective in reducing bodily pain than usual care at 24-month follow-up.”** The results did not show improvement in function or disability.
 - Acupuncture treatment is a **“cost-effective intervention for reducing low back pain over a 2-year period.”**

Martin BI, Gerkovich MM, Deyo RA, Sherman KJ, Cherkin DC, Lind BK, Goertz CM, Lafferty WE. The association of complementary and alternative medicine use and health care expenditures for back and neck problems. *Med Care.* 2012 December;50(12): 1029–1036. doi:10.1097/MLR.0b013e318269e0b2. ²⁹⁶



- **Study Design:** Analysis of the 2002–2008 Medical Expenditure Panel Survey involving > 17 years old with self-reported neck and back issues who either used complementary and alternative medicine (CAM) or did not.
- **Statistical Analysis:** survey-weighted generalized linear regression and propensity matching
- **Results:** 12,036 survey responses received, including 4,306 (35.8%) CAM users
 - CAM users:
 - significantly better “health, education, and comorbidity”
 - adjusted annual medical costs
 - spine care costs: \$424 lower (95%CI \$240, \$609; $p < 0.001$) based on weighted linear regression // \$526 lower ($p < 0.001$) based on propensity matching
 - total health care costs: \$796 lower (95%CI \$121, \$1470; $p = 0.021$) // \$298 lower ($p = 0.403$) based on propensity matching
 - “expenditure differences were primarily due to lower inpatient expenditures among CAM users.”
- **Conclusions:** CAM users had **lower medical costs** for spine (neck and back) care than non-CAM users.

Lind BK, Lafferty WE, Tyree PT, Diehr PK. Comparison of health care expenditures among insured users and nonusers of complementary and alternative medicine in Washington state: a cost minimization analysis. *JACM*. 2010;16(4):411-417. doi: 10.1089=acm.2009.0261.²⁹⁷

- **Design:** Insurance claims data (2000-2003) analyzed from Washington state (requires CAM care coverage). CAM-using patients with back pain, fibromyalgia, or menopause symptoms compared with non-CAM patients with similar symptoms and equivalent insurance “based on age group, gender, index medical condition, overall disease burden, and prior-year expenditures.”
- **Statistics:** Unadjusted tests and linear regression were used to analyze the data.
- **Results:**
 - **“CAM users had lower average expenditures** [higher outpatient expenses balanced by lower inpatient and imaging costs] than nonusers.”
 - Unadjusted: \$3,797 expenses for CAM users versus \$4,153 for non-CAM users ($p = 0.0001$)
 - β from Linear Regression -\$367 for CAM users
 - **CAM-using patients with high disease burdens spent an average \$1,420 less** than nonusers ($p < 0.0001$)



- **CAM-using patients with lower disease burdens had “slightly higher average expenditures of \$158”**
- **Conclusions:** Insured, CAM-using patients with back pain, fibromyalgia, and menopause symptoms will in general have **lower insurance costs** than non-CAM users, *especially if they have a high disease burden.*

c. Cost-Effectiveness of Acupuncture for Pelvic and Low Back Pain in Pregnancy

Nicolian S, Butel T, Gambotti L, Durand M, Filipovic-Pierucci A, Mallet A, Kone M, Durand-Zaleski I, Dommergues M. Cost-effectiveness of acupuncture versus standard care for pelvic and low back pain in pregnancy: a randomized controlled trial. *PLoS One*. 2019 Apr 22;14(4):e0214195. doi: 10.1371/journal.pone.0214195. eCollection 2019.²⁹⁸

- **Study design:** randomized controlled trial (RCT) involving 199 pregnant women with pelvic and low back pain
- **Treatment groups:** 5 acupuncture treatments (N=96) or standard care (N=103)
- **Outcomes:**
 - (1) self-assessed pain by Numerical Rating Scale (NRS) $\leq 4/10$ and Mean Oswestry Disability Index (MODI)
 - (2) cost-effectiveness: incremental cost per days with NRS $\leq 4/10$
 - (3) indirect non-healthcare costs (daily compensation for sick leave and productivity loss)
- **Results:**
 - **Acupuncture group**
 - **more days with NRS pain scores $\leq 4/10$** (61% vs 48%, $p = 0.007$)
 - **lower Mean Oswestry disability scores** (33 versus 38, $\Delta = 5$, 95% CI: 0.8 to 9, $p = 0.02$)
 - **slightly higher health system costs** (not including employer and out-of-pocket costs)
 - (€1512 versus €1452, $\Delta = €60$, 95% CI: -272 to +470)
 - [\$1,650.18 vs \$1,584.70]
 - **Control group**
 - **Higher total average costs** (€2947) [\$3,216.21] vs acupuncture group (€2635, $\Delta = -€312$, 95% CI: -966 to +325), [\$2,875.81]
- **Conclusions:**
 - **Acupuncture was the clinically most effective and cost-effective compared with standard care** when employer costs were factored into the equation.
 - Authors reported “a **100% probability of cost-effectiveness** was obtained for a willingness to pay of €100 [\$109.14] per [day] with pain NRS ≤ 4 .”



d. Cost-Effectiveness of Acupuncture for Chronic Neck Pain

Willich SN, Reinhold T, Selim D, Jena S, Brinkhaus B, Witt CM. Cost-effectiveness of acupuncture treatment in patients with chronic neck pain. *Pain*. 2006;125(1):p 107-113. | doi: 10.1016/j.pain.2006.06.006. ²⁹⁹

- **Study:** Randomized controlled trial involving 3,451 patients (31% men ages 53.5 ± 12.9 years; 69% women ages 49.2 ± 12.7 years) with chronic neck pain (≥ 6 months)
- **Treatment groups:** acupuncture (1,753) and control/routine care (1,698)
- **Outcomes measured:** baseline and 3 months:
 - Direct and indirect insurance costs (not including “private medical expenses such as over the counter medication”)
 - Incremental cost-effectiveness ratio (ICER)
 - Health related quality of life (SF-36) surveys
- **Results: Acupuncture “associated with significantly higher costs” ... “compared to routine care”**
 - In Euros: ($\text{€}925.53 \pm 1,551.06$ vs. $\text{€}648.06 \pm 1,459.13$; **mean difference: $\text{€}277.47$** [95% CI: $\text{€}175.71\text{--}\text{€}379.23$]).
 - In dollars: ($\text{\$}1,009.92 \pm \text{\$}1,692.49$ vs $\text{\$}707.15 \pm \text{\$}1,592.17$; **mean difference $\text{\$}302.77$** [95% CI: $\text{\$}191.73\text{--}\text{\$}413.81$]).
- The incremental cost-effectiveness ratio was $\text{€}12,469$ ($\text{\$}13,605.92$) per QALY gained and “proved robust in additional sensitivity analyses.”
- **Conclusions:**
 - “According to international cost-effectiveness threshold values, *[even though it may cost more]* acupuncture is a cost-effective treatment strategy in patients with chronic neck pain.”
 - **Persistence of effects:** “Beyond the 3 months study duration, acupuncture might be associated with further health economic effects.”

f. Cost-Effectiveness of Acupuncture for Headaches



Witt CM, Reinhold T, Jena S, Brinkhaus B, Willich SN. Cost-effectiveness of acupuncture treatment in patients with headache. *Cephalalgia*. 2008; 28:334–345. doi:10.1111/j.1468-2982.2007.01504.x.³⁰⁰

- **Objective:** “To assess costs and cost-effectiveness of additional acupuncture treatment in patients with headache compared with patients receiving routine care alone.”
- **Study:** Randomized, controlled trial involving 3,182 patients (77.4% women, mean age 42.6; 22.6% men, mean age 47.2) with at least two primary headaches per month, and condition duration greater than 12 months (1,613 acupuncture; 1,569 controls)
- **Outcome measures:** quality of life (Short Form 36), direct/indirect costs, the incremental cost-effectiveness ratio (ICER)
- **Results:** 3+ month costs higher in acupuncture group compared to control [€857.47; 95% confidence interval 790.86, 924.07, vs. €527.34 (459.81, 594.88), $P < 0.001$, mean difference: €330.12 (235.27, 424.98)] // ICER €11657 per QALY gained
- **Conclusions:** “According to international cost-effectiveness threshold values, *acupuncture is a cost-effective treatment in patients with primary headache*” when considering costs vs effectiveness outcomes.

Giovanardi CM, Cinquini M, Aguggia M, Allais G, Campesato M, Cevoli S, Gentili F, Matra A, Minozzi S. Acupuncture vs. pharmacological prophylaxis of migraine: a systematic review of randomized controlled trials. *Front Neurol*. 2020 Dec 15;11:576272. doi: 10.3389/fneur.2020.576272. eCollection 2020.⁵⁰

- **Study:** 9 randomized trials involving 1,484 patients pooled for meta-analysis
- **Results:** Acupuncture reduced the number of days per month with migraine, migraine response rate, moderately reduced migraine pain intensity, and greatly reduced dropout rate due to any reason and dropout rate due to adverse events.
- **Quality of evidence:** moderate for all outcomes.
- **Persistence of effects:** *treatment effects still present at longest follow-up*
- **Conclusions:** Acupuncture appears to be “mildly more effective and much safer than medication for the prophylaxis of migraine.”

g. Cost-Effectiveness of Acupuncture for Osteoarthritis



NIH. *Evidence Review for the Clinical and Cost-Effectiveness of Acupuncture for People with Osteoarthritis: Osteoarthritis in Over 16s: Diagnosis and Management*. NICE Evidence Reviews Collection. London: National Institute for Health and Care Excellence (NICE); 2022 Oct. Accessed November 16, 2023. <https://www.ncbi.nlm.nih.gov/books/NBK590294/>.

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- **Study:** 26 randomized controlled trials or systematic reviews of randomized controlled trials involving adults ≥ 16 years of age with osteoarthritis in any joint
- **Results:** “QALY for electroacupuncture versus usual care were below the NICE cost effectiveness threshold of £20,000 per QALY gained”
- Weighted average for pooled trials showed probabilistic cost-effectiveness for QALY gained was 97% at £20,000 (\$25,070.30) and 99% at £30,000 (\$37605.45)
- All individual trials “showed that **electroacupuncture was cost effective versus usual care**” for treating osteoarthritis pain.

Woods B, Manca A, Weatherly H, Saramago P, Sideris E, Giannopoulou C, Rice S, Corbett M, Vickers A, Bowes M, MacPherson H, Sculpher M. Cost-effectiveness of adjunct non-pharmacological interventions for osteoarthritis of the knee. *PLOS ONE*. March 7, 2017; :1-18. doi:10.1371/journal.pone.0172749. ³⁰²

- **Study:** Systematic review; 88 studies and 7,507 participants pooled for meta-analysis; analysis performed for all trials and then only for trials with “low risk of selection bias”
- **Results:**
 - TENS: most cost-effective per quality-adjusted life-year (QALY) in all studies.
 - **Studies with low risk of selection bias: acupuncture most cost-effective versus TENS.**
 - **Effectiveness varied among interventions based on TENS intensity modulation.**

Reinhold TR, Witt CM, Jena S, Brinkhaus B, Willich SN. Quality of life and cost-effectiveness of acupuncture treatment in patients with osteoarthritis pain. *Eur J Health Econ*. 2007 July 19;9:209–219. ³⁰³

- **Study:** 489 participants with chronic osteoarthritis knee or hip pain from 255 general medical practices in Germany were included in this randomized controlled trial.
- **Outcome measures:** baseline and 3 months: QoL and costs (health insurance funds data and standardized surveys)
- **Results:**
 - Compared with routine care patients, **acupuncture patients experienced improved QoL**



- “**significantly higher costs** over the 3 month treatment period”
 - mean cost-difference in euros: € [95%CI €135.80–€803.19]
 - mean cost-difference in dollars: \$ [95%CI \$512.31-\$876.42]
- Incremental cost-effectiveness ratios (ICERs): “€17,845 [\$19,472.11] per QALY gained.”
- Females experienced higher cost-effectiveness.
- **Conclusions:** “*Acupuncture was a cost-effective treatment strategy in patients with chronic osteoarthritis pain.*”

h. Cost-Effectiveness of Acupuncture for Chronic Non-Cancer Pain

Sutton D, McCormack S. *Acupuncture for chronic non-cancer pain: a review of clinical effectiveness, cost effectiveness and guidelines [Internet]. Ottawa (ON): Canadian Agency for Drugs and Technologies in Health; 2019 Oct 29. Accessed November 16, 2023. <https://www.ncbi.nlm.nih.gov/books/NBK551954/>.³⁰⁴*

- **Study Design/Methods:** Systematic review of existing health technology assessments, systematic reviews, meta-analyses, network meta-analyses, economic studies, and evidence-based guidelines
 - Strength of evidence and strength of recommendations rated using multiple rigorous, reliable methods
- **Studies included:** 33 publications included, including 23 systematic reviews (18 meta-analyses, 4 network meta-analyses, 1 economic study comprising 155 randomized controlled trials from 1975-2018), and 9 evidence-based guidelines
- **Outcome measures:** Visual Analog Scale (VAS), Numerical rating scale (NRS), Western Ontario and McMaster Osteoarthritis Index (WOMAC) pain score, National Institutes of Health – Chronic Prostatitis Symptom Index (NIH-CPSI); Utilities (quality of life) measured by the EQ-5D instrument, average cost-effectiveness ratio (ACER); quantity of adverse events
- **Results:**
 - Majority of studies “**suggested evidence of effectiveness**” of acupuncture when compared with sham acupuncture or medication, but “overall were variable depending on the patient population.”
 - *Electroacupuncture was shown to be more cost-effective than 6 different NSAIDs for treating chronic low back pain.*

i. Cost-Effectiveness of Acupuncture for Peripheral Neuropathic Pain



Zhao W, Huang H, Liu K, Wang S, Lin S, Long W, Li L, Zeng J, Lin G. Acupuncture and moxibustion for peripheral neuropathic pain: a frequentist network meta-analysis and cost-effectiveness evaluation. *Evid Based Complement Alternat Med.* 2022 Mar 16;2022:6886465. doi: 10.1155/2022/6886465. eCollection 2022. ³⁰⁵

- **Study:** 16 randomized controlled trials involving 1,308 participants with peripheral neuropathic pain (PNP) included for analysis
- **Treatments:** 7 acupuncture and/or moxibustion treatments and two pharmaceutical interventions
- **Results:**
 - All acupuncture and moxibustion treatments (except acupoint injection) “**showed superior improvements**” in peripheral neuropathic pain and “*were more cost-effective as compared to pharmaceutical treatments.*”
 - Most effective treatments were **warm needling, fire needling, and moxibustion.**
 - “Fire needling showed the lowest incremental cost per additional responder (ICPR) relative to the nonsteroidal anti-inflammatory drugs in the cost-effectiveness analysis of direct and indirect costs.”
- **Conclusions:** *Acupuncture and moxibustion clinically effective and cost-effective treatments for peripheral neuropathic pain.*

j. Cost-Effectiveness of Acupuncture for Dysmenorrhea

Witt CM, Reinhold T, Brinkhaus B, et al. Acupuncture in patients with dysmenorrhea: a randomized study on clinical effectiveness and cost-effectiveness in usual care. *Am J Obstet Gynecol.* 2008 Feb;198(2):166.e1-8. doi: 10.1016/j.ajog.2007.07.041. ³⁰⁶

- **Study:** randomized controlled trial with non-randomized cohort
- **Participants:** 201 participants with dysmenorrhea (mean age 36.1 +/- 7.1 years) randomized to 15 acupuncture treatments over 3 months or to a non-acupuncture control group. All received usual medical care as needed.
- **Outcome assessments:** average pain intensity (NRS 0-10) at baseline and 3 months
- **Results for acupuncture group:**
 - “**Lower average pain intensity**” at 3 months
 - (NRS 0-10) 3.1 (95% CI 2.7; 3.6) vs. 5.4 (4.9; 5.9), difference -2.3 (-2.9; -1.6); P<.001
 - **Higher quality of life; higher costs** (average ICER € 3,011 or \$3,285.54/QALY)



- **Conclusion:** Acupuncture vs usual care resulted in **reduced pain and improved quality of life** “and was **cost-effective within usual thresholds.**”

k. Cost-Effectiveness of Moxibustion for Turning Breech Baby

García-Mochón L, Martín JJ, Aranda-Regules JM, Rivas-Ruiz F, Vas J. Cost effectiveness of using moxibustion to correct non-vertex presentation. *Acupunct Med* 2015;0:1–6. doi:10.1136/acupmed-2014-010696. ³⁰⁷

- **Study:** observational study involving previously collected costs data largely from the Andalusian Public Health System and effectiveness data from “a previous clinical study” involving pregnant women receiving moxa on BL-67 to turn a breech baby vs conventional “knee-chest posture technique”
- **Results**
 - Baseline analysis
 - moxibustion vs conventional treatment “prevents 8.92% of deliveries with non-vertex presentation”
 - “average cost saving of €107.11 per delivery” often due to avoiding caesarean section (C-section)
 - relative risk of non-vertex presentation at due date 0.34 (95% CI 0.16 to 0.76).
 - moxibustion helped pregnant women avoid 0.34 caesarean sections (C-sections)
 - “incremental cost per delivery ranging from €68 to –€640 for moxibustion versus conventional treatment.”
- **Conclusions:** “**Moxibustion treatment applied at acupuncture point BL67 can avoid the need for caesarean section and achieve cost savings for the healthcare system in comparison with conventional treatment.**”

l. Cost-Effectiveness of Acupuncture for Mental Health Conditions

Yin X, Liang T, Lu , Yue H, Li S, Zhong VW, Zhang W, Zhou S, Mi Y, Wu H, Xu S. Effect of electroacupuncture on insomnia in patients with depression: a randomized clinical trial. *JAMA Netw Open*. 2022;5(7):e2220563. doi: 10.1001/jamanetworkopen.2022.20563. ²⁰⁶

- **Study:** 32-week blinded, randomized, sham-controlled clinical trial (8-week intervention with 24-week follow-up) conducted from September 1, 2016, to July 30, 2019, in China
- **Participants:** 270 (194 female; 76 male; ages 18-70 years) diagnosed with insomnia and depression
- **Treatment groups:** (1) electroacupuncture (EA) + standard care (SC); (2) sham acupuncture (SA) + standard care; (3) standard care
- **Number of treatments:** 3 treatments/week for 8 weeks = 24 sessions



- **Primary outcomes:** Pittsburgh Sleep Quality Index (PSQI) scores at baseline and after 24 treatments
- **Secondary outcomes:** Pittsburgh Sleep Quality Index (PSQI) scores at 12, 20, and 32 weeks; actigraphy recordings of sleep parameters; Insomnia Severity Index (ISI) scores; Hamilton Depression Rating Scale (HAM-D-17) scores; Self-rating Anxiety Scale (SAS) scores
- **Results:**
 - 247 (91.5%) participants completed all outcome measurements at week 32
 - **EA mean PSQI score differences** baseline-8 weeks: -6.2 (95% CI, -6.9 to -5.6)
 - **EA vs sham PSQI score differences** at week 8: -3.6 (95% CI, -4.4 to -2.8; $P < .001$) ($P < .001$)
 - **EA vs control groups PSQI score differences** at week 8: -5.1 (95% CI, -6.0 to -4.2; $P < .001$) ($P < .001$)
 - Actigraphy recordings baseline-8 weeks: **EA offered “significant improvement in total sleep time”** (29.1 [95% CI, 21.5-36.7] minutes) ($P < .001$)
 - **Electroacupuncture benefits showed persistence at week 24 post-intervention**
 - **“Significant improvement in the 17-item Hamilton Depression Rating Scale”** (-10.7 [95% CI, -11.8 to -9.7]), ($P < .001$)
 - **Significant improvement in Insomnia Severity Index** (-7.6 [95% CI, -8.5 to -6.7]) scores, ($P < .001$)
 - **Significant improvement in Self-rating Anxiety Scale** (-2.9 [95% CI, -4.1 to -1.7]) scores, ($P < .001$)
 - No differences amongst treatment groups for waking during sleep frequency
 - Zero serious adverse events
- **Conclusions:** *“Quality of sleep improved significantly in the EA group compared with the SA or control group at week 8 and was sustained at week 32.”*

Zhang J, He Y, Huang X, Liu Y, Yu H. The effects of acupuncture versus a acupuncture for insomnia: a systematic review and meta-analysis of randomized controlled trials. *Complement Ther Clin Pract.* 2020 Nov;41:101253. doi: 10.1016/j.ctcp.2020.101253. Epub 2020 Nov 1. ²⁵³

- **Study:** 15 studies involving 1,108 patients with insomnia pooled for meta-analysis
- **Primary outcomes:** Pittsburgh sleep quality index (PSQI) scores
- **Results:** **Acupuncture therapy significantly more effective than sham acupuncture** at improving the following scores:
 - Pittsburgh sleep quality index (PSQI)
 - Insomnia Severity Index (ISI)
 - Total Sleep Time (TST)



- Sleep-Onset Latency (SOL)
- Wake after Sleep Onset (WASO)
- Sleep Efficiency (SE)
- **Acupuncture more effective than other acupuncture modalities for PSQI scores** subgroup analysis:
 - **acupuncture superior to sham** (3RCTs, MD = -7.34,95% [-8.02,-6.66],I2 = 86%)
 - **acupuncture superior to minimal acupuncture** (5 RCTs, MD = -3.29,95% [-3.95, -2.63],I2 = 53%)
 - **auricular acupressure superior to sham** (1 RCT, MD = -4.16,95% [-6.57, -1.75])
 - **minimal acupuncture superior to electroacupuncture** (2 RCTs, MD = 0.70,95%CI [0.52, 0.87],I2 = 0%)
 - **no significant differences:** (1) auricular acupressure vs “minimal acupuncture,” (2) electroacupuncture vs sham, (3) electroacupuncture vs “minimal acupuncture”
- **Persistence of effects: During follow-up, acupuncture therapy was still significantly more effective than sham acupuncture on the PSQI**
- **Conclusion:** *Acupuncture more effective than placebo/sham acupuncture in the treatment of insomnia*

Hollifield M, Sinclair-Lian N, Warner TD, Hammerschlag R. Acupuncture for posttraumatic stress disorder: a randomized controlled pilot trial. *J Nerv Ment Dis.* 2007 Jun;195(6):504-13.doi:10.1097/NMD.0b013e31803044f8. ²⁸⁰

- **Purpose:** “to evaluate the potential efficacy and acceptability of acupuncture for posttraumatic stress disorder (PTSD)”
- **Participants:** 84 people diagnosed with PTSD
- **Study groups:** acupuncture treatment (ACU), group cognitive-behavioral therapy (CBT), wait-list control (WLC)
- **Primary outcome measure:** self-reported PTSD symptoms at baseline, end of treatment, and at 3-month follow-up
- **Results:**
 - **acupuncture demonstrated treatment effects for PTSD** (F [1, 46] = 12.60; p < 0.01; Cohen's d = 1.29)
 - **acupuncture results similar to cognitive behavioral therapy** (F [1, 47] = 12.45; p < 0.01; d = 1.42) (ACU vs. CBT, d = 0.29).
- **Persistence of effects:** “*Symptom reductions at end treatment were maintained at 3-month follow-up for both interventions.*”



- **Conclusions:** “Acupuncture may be an *efficacious and acceptable ... treatment option for PTSD.*”

m. Cost-Effectiveness of Acupuncture for Allergic Rhinitis

Reinhold T, Brinkhaus B, Willich SN, Witt CJ. Acupuncture in patients suffering from allergic asthma: is it worth additional costs? *Altern Complement Med.* 2014 Mar;20(3):169-77. doi: 10.1089/acm.2012.0719. Epub 2013 Nov 20. DOI: 10.1089/acm.2012.0719.³⁰⁸

- **Study:** randomized controlled trial involving 306 patients with allergic bronchial asthma
- **Treatment groups:** acupuncture immediately (n = 159) or a wait-list control (n = 147); mean age 46.5±13.11 years, female 57.2%; both groups allowed to access routine care
- **Outcomes:** resource consumption, costs (including direct and indirect costs and incremental cost-effectiveness ratio (ICER) values), and health-related quality of life at baseline, 3 months, and 6 months based on statutory health insurance information and standardized questionnaires
- **Results:** “significantly higher costs” for acupuncture vs control group
 - overall costs: €860.76 [\$1,096.98] [95% confidence interval (CI) 705.04-1016.47] versus €518.80 [\$661.18] [95% CI 356.66-680.93]; p=0.003
 - asthma-related costs: €517.52 [\$659.55] [95% CI 485.63-549.40] versus €144.87 [\$184.63] [95% CI 111.70-178.05]; p<0.001
 - “additional costs seem essentially driven by acupuncture costs” (€378.40 [\$482.25] [95% CI 367.10-389.69]).
 - acupuncture more beneficial for quality-adjusted life years (QALYs).
 - ICER range €23,231 [\$29,607.44] (overall) and €25,315 [\$32,263.46] (diagnosis-specific) per QALY
 - “Inserting German acupuncture prices for 2012, improved ICER to €12.810 [\$16.32] (overall) versus €14,911 [\$19,000.42] (diagnosis-specific) per QALY gained.”
- **Conclusions:** “*Treating patients who have allergic bronchial asthma with acupuncture in addition to routine care resulted in additional costs and better effects in terms of patients' quality of life. Acupuncture therefore seems to be a useful and cost-effective add-on treatment.*”

n. Cost-Effectiveness of Acupuncture to Address the Opioid Crisis

Wen H, Wei X, Ge S, Zeng J, Luo W, Chen R, Dong Y, Xiao S, Lai Y, Lu L. Clinical and economic evaluation of acupuncture for opioid-dependent patients receiving methadone maintenance treatment: the integrative clinical trial and evidence-based data. *Front Public Health.* 2021;9:1-12.¹⁹⁸



- **Study:** parallel arm randomized controlled trial (RCT) involving 123 patients receiving acupuncture and methadone maintenance treatment (MMT)
- **Results:** acupuncture + methadone maintenance treatment (MMT) **significantly improved daily methadone dosage, visual analog scores (VAS), and Pittsburgh Sleep Quality Index (PSQI).**
- Treatments shown to be **“economically efficient.”**
- **Quality-Adjusted Life Year (QALY)**, a generic measure that includes both quality and quantity of life, **and cost were higher for the treatment group** versus the control group.
- **Conclusions:** acupuncture serves as a **clinically effective, cost-effective** “adjuvant therapy” for MMT patients, **“reducing the dosage of methadone, improving drug cravings, and alleviating insomnia,”** as well as improving quality of life.

Fan Y, Miller DW, Bolash B, Bauer M, McDonald J, Faggert S, He H, Ming Y, Matecki A, Camardella L, Koppelman ML, Stone JAM, Meade L, Pang J. Acupuncture’s role in solving the opioid epidemic: evidence, cost-effectiveness, and care availability for acupuncture as a primary, non-pharmacologic method for pain relief and management - white paper 2017. *J Integr Med.* October 17, 2017;15(6):411-425. ³⁰⁹

“Acupuncture can address the national opioid epidemic as a medically effective, evidence-based, safe, cost-effective, non-pharmacological pain-management intervention.”

9. Patient Satisfaction with Acupuncture

Harbell MW, Barendrick LN, Pelkey MN, et al. Acupuncture as a complementary treatment modality in the post-anesthesia care setting: a feasibility study. *J Integr Complement Med.* 2024;30(8):776-782. doi:10.1089/jicm.2023.0168. ³¹⁰

- **Goals:** to “explore the utility and feasibility of acupuncture in the immediate postoperative setting.”
- **Design:** retrospective case-control study
- **Participants:** “22 patients who underwent elective surgeries and received acupuncture in the post-anesthesia care unit (PACU) were compared with 88 case controls. Indications for acupuncture therapy included persistent pain, nausea, or anxiety.”
- **Outcome measures:** Patient satisfaction, symptom improvement based on interviews with PACU nurses and patients, as well as “demographic data, perioperative opioid consumption, pain score in the PACU, incidence of postoperative nausea, PACU length of stay, and unintended hospital admission”
- **Results:**
 - Symptom improvement: “78.9% of patients receiving acupuncture”
 - **“94.7% of recovery nurses who cared for patients who received acupuncture felt that it was helpful”**
 - 78.9% of recovery nurses “did not believe [acupuncture] was disruptive.”



- “Patients who opted for acupuncture had a statistically significant higher overall median (interquartile range) pain score in the PACU” (7.0 [5.2, 9.5] vs. 5.0 [3.0, 7.0], $p = 0.009$)
- Patients who opted for acupuncture had a statistically significant higher postoperative opioid consumption (and higher pain levels) (22.5 [9.8, 44.8] vs. 15.0 [0.0, 30.0], $p = 0.03$).
- “There was no difference between total perioperative opioid consumption between groups ($p = 0.94$).”
- **Conclusions:** “Most patients who received acupuncture therapy in the PACU were satisfied with their therapy and would recommend it to future patients undergoing surgery. Most recovery nurses felt it was helpful, was not disruptive, and would like to see it utilized in the PACU. **Note:** patients with greater initial pain levels opted to try acupuncture.

Arumugam V, Balakrishnan A, Venugopal V, et al. Auriculotherapy for labour pain management: a systematic review and meta-analysis. *J Acupunct Meridian Stud.* 2024 Oct 31;17(5):158-164. doi: 10.51507/j.jams.2024.17.5.158. ¹²¹

- **Design:** systematic review and meta-analysis
- **Methods:** literature search of databases (PubMed, Scopus, ScienceDirect, and Cochrane Library) inception until December 2023 for randomized controlled trials (RCTs) involving auriculotherapy for labor pain intensity and maternal satisfaction
- **Study selection:** Two independent authors “based on predefined criteria”
- **Data Extraction:** Two independent authors extracted data
- **Meta-Analysis:** random-effects model to synthesize data from 5 studies involving 450 participants; “pooled mean difference (MD), with a 95% confidence interval (CI), was calculated to estimate the effect size.”
- **Primary Outcome:** labor pain intensity via Visual Analog Scale (VAS)
- **Results:**
 - “Significant reduction in labor pain following auriculotherapy compared with no treatment” (MD, -1.78; 95% CI, -2.62 to -0.93)
 - Study heterogeneity determined to be significant (I^2 , 87%; $p < 0.01$)
- **Conclusions and relevance:** “auriculotherapy holds promise as a non-pharmacological intervention for alleviating labor pain.”
- **Note:** Although **maternal satisfaction** was one of the search terms used by these researchers, they did not report on maternal satisfaction in the results or conclusion sections of this paper. As a reader, I interpret *pain reduction as equating with satisfaction.*

Smith CL, Mulcahy M. The impact of inpatient acupuncture on a mixed hospital floor: a pragmatic 3-month cost-effectiveness retrospective evaluation. *Med Acupunct.* 2024 Feb 1;36(1):27-33.doi: 10.1089/acu.2023.0009. Epub 2024 Feb 13. ²⁸⁷

- **Pilot comparison study** hospital cost of stay (COS), length of stay (LOS), and patient satisfaction patients receiving 3 months of acupuncture for pain vs non-intervention control group



- **Outcomes:** pre- and post-intervention scores, number of treatments, diagnosis related groups (DRGs)
- **Results:**
 - “Patients' pain significantly decreased each time they were treated.”
 - Consumer Assessment of Healthcare Providers and Systems scores: increased to 85, 99, and 97 during acupuncture intervention and then lowered to baseline levels after acupuncture treatments subsided.
 - “LOS [length of stay] was higher in the intervention group (+7.8 days), but acupuncture saved the hospital an anticipated \$125,770 in the projected COS during that 3-month time alone.”
- **Conclusions:** “Acupuncture was a potent pain-relief alternative for hospitalized patients, providing more satisfaction. Acupuncture resulted in longer LOS, but the aggregate COS was 86% less than expected. Acupuncture may be a financially viable, clinically impactful adjunct to hospital care.”

Coyle ME, Smith CA, Peat B. Cephalic version by moxibustion for breech presentation. *Cochrane Database Syst Rev.* 2023;5(5):CD003928. ¹⁵²

- **Systematic Review:** Literature search of Cochrane Pregnancy and Childbirth’s Trials Register (CENTRAL, MEDLINE, Embase, CINAHL, and conference proceedings), ClinicalTrials.gov, the WHO International Clinical Trials Registry Platform (ICTRP) through November 4, 2021, and MEDLINE, CINAHL, AMED, Embase and MIDIRS through November 3, 2021, plus reference lists, for published and unpublished randomised or quasi-randomised controlled trials involving the use of moxibustion with/without other techniques (acupuncture, posture) with control to change “the presentation of an unborn baby in the breech position, the need for external cephalic version (ECV), mode of birth, and perinatal morbidity and mortality.”
- **Data collection and analysis:** Two review authors independently determined trial eligibility, assessed trial quality, and extracted data.
- **Outcomes Assessed:** “baby's presentation at birth, need for ECV, mode of birth, perinatal morbidity and mortality, maternal complications and **maternal satisfaction**, and adverse events.”
- **Evidence Certainty Assessment:** GRADE approach.
- **Meta-Analysis:** 13 studies involving 2,181 women
- **Results:** See above section for moxibustion/breech presentation results
 - Not all of the included studies reported on maternal satisfaction
 - **“women found moxibustion acceptable, not painful, and with few side effects, although some said that was 'hard to judge'.”**
 - **“In the second study (Guittier 2009) women found moxibustion acceptable, and it was viewed favourably. Most women reported little or no pain (96%)”**



- **Overall completeness and applicability of evidence:** “In studies that assessed maternal satisfaction with treatment, **women found moxibustion to be acceptable**; however, there is limited evidence on maternal satisfaction.”

Du S-H, Guo W, Yang C, Chen S, Guo S-N, Du S, Du Z-M, Fei Y-T, Zhao J-P. Filiform needle acupuncture for allergic rhinitis: a systematic review and meta-analysis. *J Integr Med.* 2022 Nov;20(6):497-513. doi: 10.1016/j.joim.2022.08.004. Epub 2022 Aug 24. ¹⁸⁴

- **Design:** Systematic Review and Meta-Analysis
- **PROSPERO registration number:** CRD42020218745.
- **Methods:** Literature search of 8 electronic databases (PubMed, Embase, Cochrane Library, Web of Science, China National Knowledge Infrastructure (CNKI), Wanfang Data Journal Database (Wanfang), Chinese Science and Technology Journal Database (VIP), and Chinese Biomedical Literature Database (SinoMed)) from inception to October 14, 2021, for randomized controlled trials involving filiform needle acupuncture (FNA) treatment of allergic rhinitis (AR). “Additional studies were acquired from clinical trial registration platforms and reference lists.”
- **Treatment Groups:** filiform needle acupuncture (FNA), sham acupuncture, no treatment or conventional medication
- **Quality Control:** two researchers independently extracted data; results cross-checked
- **Primary Outcome:** symptom score (Total Nasal Symptom Score or Visual Analogue Scale)
- **Secondary Outcomes:** AR control questionnaire, quality of life (QoL) score (different versions of Rhinoconjunctivitis Quality of Life Questionnaire), medication score (use of rescue medication), mental health score, total IgE, adverse event rate, clinical economic indicators, and patient satisfaction scores
- **Quality Control:** Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)
- **Study Confidence:** GRADE approach
- **Statistics:** “Standardized mean difference (SMD) or mean difference (MD) with 95% confidence interval was used to calculate the effect size for continuous data, while risk ratio with 95% CI was used for dichotomous data.”
- **Heterogeneity:** I² statistic. “If I² ≥ 50%, the heterogeneity among studies was considered statistically significant.” When significant, sensitivity analyses used.
- **Publication Bias:** funnel plots and Egger’s test



- **Meta-Analysis:** 30 studies analyzed using ReviewManager 5.4.1 and Stata 12.0 software and qualitative methods
- **Results:**
 - 30 studies met inclusion criteria
 - “FNA significantly reduced the symptom score” vs sham acupuncture (SMD: -0.29 [-0.43, -0.15]), AR's impact on QoL (SMD: -0.23 [-0.37, -0.08]) and medication score (SMD: -0.3 [-0.49, -0.11])
 - “FNA dramatically reduced the symptom score” versus no treatment control (SMD: -0.8 [-1.2, -0.39]) and AR's impact on QoL (SMD: -0.82 [-1.13, -0.52]).
 - **Patient Satisfaction: improved with FNA (filiform needle acupuncture)**
 - Cost-Effective: FNA determined likely to be cost-effective
 - Evidence Levels: most were high confidence
 - Reduced Symptom Score: “FNA significantly outperformed conventional medication” (SMD: -0.48 [-0.85, -0.1])
 - Adverse Events: rates were similar among FNA, sham acupuncture, no treatment (rates lowest for FNA)
 - Evidence Quality: very low
- **Conclusions:** “FNA [filiform needle acupuncture] is an effective and safe intervention for AR and can help with symptom relief, QoL improvement, reducing medication usage, and ***increasing patient satisfaction***. Further studies are needed to verify its cost-effectiveness and superiority over conventional medication and the best therapeutic strategies.”

Zheng X-Z, Xiong Q-J, Liu D, Wei K, Lai Y. Effectiveness of acupuncture therapy on postoperative nausea and vomiting after gynecologic surgery: a meta-analysis and systematic review. *J Perianesth Nurs.* 2021 Oct;36(5):564-572. doi: 10.1016/j.jopan.2020.12.005. Epub 2021 Aug 14. ¹⁷⁹

- **Systematic Review:** review of databases (PubMed, EMBASE, Cochrane Library) through December 31, 2019, for randomized controlled trials (RCT's) or prospective cohort studies involving acupuncture therapy (AT) on postoperative nausea and vomiting (PONV) after gynecologic surgery (GS)
- **Meta-Analysis:** 9 RCT's and 1 prospective cohort study; total of 1,075 participants
- **Primary outcomes:** incidence of postoperative nausea (PON) and postoperative vomiting (POV)
- **Secondary Outcomes:** need for rescue antiemetics, side effects, patient satisfaction
- **Results:**
 - acupuncture “significantly reduced the risk” of developing postoperative nausea by 48% (relative risk = 0.52; 95% confidence interval, 0.44 to 0.61; P < .00001)



- acupuncture “significantly reduced the risk” of developing postoperative nausea and postoperative vomiting by 48% 42% (relative risk = 0.58; 95% confidence interval, 0.49 to 0.68; $P < .00001$)
- side effects: “no significant differences” ($P = .54$)
- rescue antiemetic usage: acupuncture group had lower usage ($P < .00001$)
- **satisfaction with postoperative recovery: acupuncture group had higher satisfaction ($P < .0001$)**
- “optimal therapeutic effect of AT on preventing PONV was achieved when the treatment time was controlled within 30 minutes and transcutaneous acupoint electrical stimulation was applied.”
- **Conclusion:** “AT is an effective and safe physical therapy for the prophylaxis of PONV in patients undergoing GS.”

Smith CA, Collins CT, Levett KM, Armour M, Dahlen HG, Tan AL, Mesgarpour B. Acupuncture or acupressure for pain management during labour. *Cochrane Database Syst Rev.* 2020;2:CD009232. ¹²⁶

- **Study:** Cochrane systematic review of Cochrane Pregnancy and Childbirth’s Trials Register (2/2019), Cochrane Central Register (2/2019), MEDLINE (1966 - 2/2019), CINAHL (1980 - 2/2019), WHO International Clinical Trials Registry Platform (2/2019), and ICTRP (2/2019) for randomized controlled trials (RCTs). Meta-analysis of 28 trials and 3,960 women receiving acupuncture, acupressure, placebo, no treatment, or non-pharmacological options for pain during labor.
- **General outcomes:** visual analogue scale (VAS) of 0 to 10 or 0 to 100
- **Results:**
 - 13 trials involved acupuncture and 15 involved acupressure
 - none were “at a low risk of bias on all domains”
 - **acupuncture vs sham acupuncture**
 - no statistical difference on labor pain (mean difference (MD) -4.42, 95% confidence interval (CI) -12.94 to 4.09, 2 trials, 325 women, low-certainty evidence).
 - **“acupuncture may increase satisfaction with pain relief compared to sham acupuncture”** (risk ratio (RR) 2.38, 95% CI 1.78 to 3.19, 1 trial, 150 women, moderate-certainty evidence)
 - likely reduction in pharmacological pain relief (RR 0.75, 95% CI 0.63 to 0.89, 2 trials, 261 women, moderate-certainty evidence).
 - “acupuncture may have no effect on assisted vaginal birth (very low-certainty evidence), and probably little to no effect on cesarean section (low-certainty evidence).”
 - **acupuncture compared to usual care**
 - uncertain reduction in pain levels vs usual care due to low certainty evidence (standardized mean difference (SMD) -1.31, 95% CI -2.14 to -0.49, 4 trials, 495 women, $I^2 = 93\%$).



- ***“acupuncture may have little to no effect on satisfaction with pain relief (low-certainty evidence)”*** or reduction in pharmacological use due to very low certainty evidence (average RR 0.72, 95% CI 0.60 to 0.85, 6 trials, 1059 women, I² = 70%)
- “acupuncture may have no effect on assisted vaginal birth (very low-certainty evidence), and probably little to no effect on cesarean section (low-certainty evidence).”
- acupuncture compared to no treatment
 - one trial demonstrating uncertain pain reduction with acupuncture (MD -1.16, 95% CI -1.51 to -0.81, 163 women, very low-certainty evidence)
 - low certainty evidence for acupuncture effects on assisted vaginal birth or cesarean section.
- acupuncture compared to sterile water injection
 - acupuncture has uncertain effects on use of pharmacological pain management options or “assisted vaginal birth or cesarean section due to very low certainty evidence
- acupressure compared to a sham control
 - uncertain reduction of pain intensity during labor with acupressure (MD -1.93, 95% CI -3.31 to -0.55, 6 trials, 472 women)
 - uncertain effects of acupressure on assisted vaginal birth due to low certainty evidence
 - “acupressure may have little to no effect on use of pharmacological analgesia (low-certainty evidence).”
 - acupressure likely reduces cesarean section rate (RR 0.44, 95% CI 0.27 to 0.71, 4 trials, 313 women, moderate-certainty evidence).
- acupressure vs usual care
 - uncertain whether acupressure reduces pain intensity in labor more than usual care (SMD -1.07, 95% CI -1.45 to -0.69, 8 trials, 620 women) due to very low certainty evidence
 - ***uncertain whether acupressure increases satisfaction with pain relief more than usual care*** (MD 1.05, 95% CI 0.75 to 1.35, 1 trial, 105 women) due to very low certainty evidence
 - “acupressure may have little to no effect on cesarean section (low-certainty evidence).”
- acupressure vs combined control
 - acupressure: slightly pain intensity reduction during labor vs combined control (SMD -0.42, 95% CI -0.65 to -0.18, 2 trials, 322 women, moderate-certainty evidence).
 - ***uncertain evidence for*** acupressure effect on use of pharmacologicals (RR 0.94, 95% CI 0.71 to 1.25, 1 trial, 212 women), ***childbirth satisfaction***, or assisted with vaginal birth or cesarean section due to very low certainty evidence.
- **Conclusions:** “Acupuncture in comparison to sham acupuncture ***may increase satisfaction with pain management*** and reduce use of pharmacological analgesia.



Acupressure in comparison to a combined control and usual care may reduce pain intensity.” ***Acupuncture versus acupressure produced uncertain results in terms of effects on pain intensity and satisfaction with pain relief*** (very low-certainty evidence). It is likely that acupuncture has “little to no effect on the rates of [cesarean] or assisted vaginal birth.” Acupressure likely reduces the rate of cesarean sections when compared to sham.

Gönenç IM, Terzioglu F. Effects of massage and acupressure on relieving labor pain, reducing labor time, and increasing delivery satisfaction. *J Nurs Res.* 2020;28(1):e68. ¹²⁸

- **Goal:** To compare the effects of massage and acupressure on labor-related pain, duration, and *delivery satisfaction*
- **Design:** Randomized controlled trial (RCT)
- **Participants:** n = 120
- **Treatment Groups:** 1) massage; 2) acupressure; 3) massage + acupressure) 4) control group (no massage or acupressure)
- **Outcomes Assessed:** personal information intake, Pregnant Watch Form, Visual Analog Scale (VAS)
- **Statistical Analysis:** Frequency and percentage calculations, Chi-Square test, Student's T-test, Tukey's test, and one-way ANOVA
- **Results:**
 - **latent labor phase:** “mean VAS scores of the massage-only group and massage + acupressure group were lower” (4.56 ± 1.36 and 4.63 ± 1.52 , respectively) vs control group (6.16 ± 1.46 ; $p < .01$)
 - **active and transition labor phases:** “mean VAS scores of the massage-only group, acupressure-only group, and massage + acupressure group were significantly lower than that of the control group” ($p < .01$ and $p < .001$, respectively).
 - **postpartum phase:** “mean VAS score of the massage + acupressure group was lower (2.30 ± 0.70) vs control group (2.96 ± 0.72 ; $p = .003$).
 - **time to cervical dilatation and 1- and 5-minute Apgar scores:** “similar among all of the groups” ($p > .05$).
 - **“Three intervention groups reported relatively more positive feelings than the control group, and all three of the interventions were found to be effective in improving satisfaction.”**
- **Conclusions:** “The dual application of massage and acupressure is relatively more effective than either therapy applied alone and that massage is more effective than acupressure.”

American Specialty Health Incorporated Health Services Department. *Acupuncture: does acupuncture provided within a managed care setting meet patient expectations and quality outcomes?* 2016;1–12. ³¹¹



- **Study:** annual outcomes survey involving CG-CAHPS questions plus “additional ASH proprietary questions” for patients 18+ years old seeing ASHn providers January - June in 2014 and 2015
- **Goals:** “to determine whether acupuncture services provided within a managed care setting could meet or exceed national CG-CAHPS [Clinician & Group Consumer Assessment of Healthcare Providers and Systems] benchmarks for patient satisfaction.”
- **Outcomes:** acupuncture patient satisfaction rates
- **Results:**
 - Willingness to Recommend Health Plan
 - 90.5% of participants (2015); 89% of participants (2014)
 - Willingness to Recommend Provider
 - 2014: 96.5% of participants (national survey); 93.2% of participants (CA survey)
 - 2015: 96.7% of participants (national survey); 96.2% of participants (CA survey)
 - Quality of Care and Service
 - 2014: 99% of national participants and 95% CA respondents rated quality of care/service “good to excellent”
 - 2015: 99% of national participants and 97% CA respondents rated quality of care/service “good to excellent”
 - Overall Treatment Success
 - 2014 + 2015: 93% of national participants and 93% of CA respondents indicated that their primary condition was successfully treated
 - Treatment Success: Medical Pain Clinic Referral Program
 - 2014: 84.8% of chronic pain patients “reported that the acupuncture provider was successful in treating their primary condition.”
 - 2015: 85.2% of chronic pain patients reported that acupuncture successfully treated their primary condition.
 - Overall Referral Rates
 - 2014: 24.1% of national respondents and 63.3% of CA respondents reported being referred to acupuncture by “another health care practitioner”
 - 2015: 24.4% of national respondents and 59.2% of CA respondents reported being referred to acupuncture by other healthcare providers
 - Safety
 - 2014: 98% of national participants and 97% of CA respondents “agreed or strongly agreed that the provider and staff ensured their safety.”
 - 2015: 98.3 – 98.4% of both national and CA respondents “agreed or strongly agreed that the provider and staff ensured their safety.”
- **Conclusions:** “*Patient satisfaction with acupuncture services can be maintained at or above national CG-CAHPS benchmarks in a managed care environment. High satisfaction levels were reported for care, safety, and effectively treating the primary presenting condition, as well as “high levels of willingness to recommend others to ASH*”



for benefits and to their individual practitioners.”

Zhang AL, Parker SJ, Smit DV, Taylor DM, Xu CCL. Acupuncture and standard emergency department care for pain and/or nausea and its impact on emergency care delivery: a feasibility study. 2014;32(3). doi: 10.1136/acupmed-2013-010501. ²⁸³

- **Study:** feasibility study involving 400 patients presenting to the Melbourne, Australia, emergency department with pain or nausea from January - August 2010. “To evaluate the feasibility of delivering acupuncture in an emergency department (ED) to patients presenting with pain and/or nausea.
- **Treatment Groups:** acupuncture + usual care (n=200) and usual care + “retrospective data closely matched from ED electronic health records” (n=200)
- **Outcomes:** Visual Analogue Scale (VAS) scores 0-10 and Morrow Index scores 1-6
- **Results:**
 - Acupuncture refusal rate: 31% (most common reason: symptoms abated by previous medical treatment (n=36))
 - **Willingness to repeat acupuncture (84.3%)**
 - “definitely, yes” = 52.5% of participants
 - “probably, yes” = 31.8% of participants
 - **Satisfaction score of 10 for acupuncture: 57%**
 - Most common conditions treated
 - musculoskeletal conditions were the (n=117, 58.5%)
 - abdominal/flank pain (n=49, 24.5%)
 - Adverse events (2%) rare and mild.
 - Reduced pain scores baseline (mean±SD of 7.01±2.02) to post-acupuncture (mean±SD of 4.72±2.62)
 - Reduced nausea scores baseline (mean±SD of 2.6±2.19) to post-acupuncture (mean±SD of 1.42±1.86)
- **Conclusions:** “Acupuncture in the ED appears **safe and acceptable for patients** with pain and/or nausea.” *Acupuncture plus usual care “may provide effective pain and nausea relief in ED patients.”*

Street RL, Cox V, Kallen MA, Suarez-Almazor ME. Exploring communication pathways to better health: clinician communication of expectations for acupuncture effectiveness. Patient Educ Couns. 2012 Nov;89(2):245-51. doi: 10.1016/j.pec.2012.06.032. ³¹²

- **Design:** Randomized Controlled Trial (secondary analysis from a 2-arm RCT)
- **Participant Numbers:** 311 patients with knee osteoarthritis
- **Number of Treatments:** 10-12 acupuncture sessions\
- **Outcomes:** degree of acupuncturist communication of optimism for treatment effectiveness (rated by coders) **patient satisfaction** with acupuncture 4 weeks into treatment; pain and function at 6 weeks post-treatment series
- **Results:**
 - “Patients experiencing **better outcomes** were **more satisfied** with acupuncture during treatment, were younger, and had better baseline pain and function scores.”



- ***“Satisfaction during treatment was greater*** when patients interacted with more ***optimistic clinicians*** and had ***higher pretreatment expectations*** for acupuncture efficacy.
- **Conclusion:** “Acupuncturists’ **communication of optimism about treatment effectiveness** contributed to pain and function outcomes ***indirectly through its effect on satisfaction during treatment***. Future research should model pathways through which clinician–patient communication affects mediating variables that in turn lead to improved health outcomes.”
- **Practical Implications:** “While clinicians should not mislead patients, communicating hope and optimism for treatment effectiveness has therapeutic value for patients.”

Gilbey P, Bretler S, Avraham Y, Sharabi-Nov A, Ibrgimov S, Luder A. Acupuncture for posttonsillectomy pain in children: a randomized, controlled study. *Pediatr Anesth*. 2014. doi: 10.1111/pan.12621. ¹¹⁶

- **Methods:** Randomized, controlled, single-blinded study
- **Population:** 60 children aged 3–12 years undergoing tonsillectomy
- **Treatment Groups:** acupuncture group and conventional postoperative analgesic treatment group
- **Outcome Assessment:** pain levels and presence of unwanted side effects
- **Results:** Acupuncture group: “**less pain, less analgesic drug consumption, and higher patient/parent satisfaction with analgesic treatment scores**. No adverse effects were recorded.”
- **Conclusions:** “*Acupuncture, in addition to conventional analgesic treatment, is an effective treatment for post-tonsillectomy pain. Acupuncture is safe and well received by children and their parents.*”

Thomas KJ, MacPherson H, Ratcliffe J, Thorpe L, Brazier J, Campbell M, Fitter M, Roman M, Walters S, Nicholl JP. Longer term clinical and economic benefits of offering acupuncture care to patients with chronic low back pain. *HTA*. 2005;9(32):1-128. ²⁹⁵

- **Study:** Randomized controlled trial involving 239 participants ages 18-65 with non-specific low back pain 4-52 weeks in duration
- **Treatment Groups:** acupuncture + usual care group (N=159; 10 treatments) or usual care only (N=80) group
- **Outcome measures:** Short Form 36 (SF-36) Bodily Pain dimension (0–100 points) baseline, 3, 12, and 24 months, and cost-utility analysis at 24 months
- **Secondary outcomes:** McGill Present Pain Index (PPI), Oswestry Pain Disability Index (ODI), other SF-36 dimensions, medication usage, number of pain-free months in the last



year, patient concern about back pain, *patient satisfaction with care received*, and safety/acceptability of acupuncture treatments

- **Results:** Acupuncture demonstrated **significant treatment effects** via the SF-36 pain dimension scale
 - 5.6 points at 12 months [95% confidence interval (CI) –1.3 to 12.5]
 - **9 points at 24 months** (95% CI 0.7 to 15.3)
 - no difference in treatment effects demonstrated amongst different acupuncturists performing the treatments
 - no life-threatening or serious health risks reported
 - Patients reported reduced worry about pain at 12 and 24 months vs usual care
 - “At 24 months, the acupuncture care group was significantly more likely to report 12 months pain free and less likely to report the use of medication for pain relief.”
 - Acupuncture demonstrated **cost-effectiveness at 24 months** with “estimated cost per quality-adjusted (QALY) of £4241 (95% CI £191 to £28,026) based on SF-36 responses and and £3598 (95% CI £189 to £22,035) based on EQ- 5D
 - NHS acupuncture costs were higher, but usual care costs were lower
 - **Satisfaction with care received (at 3 months):**
 - “A higher proportion of patients in the acupuncture group reported being ‘very satisfied’ or ‘somewhat satisfied’ with their treatment and overall care.”
 - “Patients in the acupuncture group were significantly more likely to be ‘very satisfied’ with their treatment (p = 0.01) and their overall care (p = 0.04)”
 - “Similar proportions were satisfied with the information that they received about their **low back pain**.” (not statistically significant, p=0.43)
 - No serious adverse events reported for the acupuncture group.
- **Conclusions:**
 - Acupuncture care was safe and acceptable for non-specific low back pain patients.
 - Both acupuncture and usual care participants demonstrated “**clinically significant improvement at 12- and 24-month follow-up.**”
 - Acupuncture was “**significantly more effective in reducing bodily pain than usual care at 24-month follow-up.**” The results did not show improvement in function or disability.
 - Acupuncture treatment is a “**cost-effective intervention for reducing low back pain over a 2-year period.**”

10. Addressing Sham and Placebo Effects

It is imperative that the acupuncture scientific literature be considered in light of the potential treatment effects produced by sham acupuncture research controls and how use of this type of



control can minimize the effect size measured and reported in sham-controlled studies.

a. An Important Note on Sham Acupuncture:

- Equivalent outcomes between verum and sham/minimal acupuncture^{2,6,7,52,60,102,114,118,126,131,135-137,152,160,166,167,202,204,210,213,228,237,252,258,268-270,290,313-317} may have created **“consistent underestimation of the true effect size of acupuncture interventions”**^{2,3,4,6,7} and **under-reporting in the early literature**^{3,4,6,7,313-317}
- These results have been used to debunk the credibility of acupuncture.
- Sham and placebo-controlled acupuncture **produce demonstrated treatment effects.**^{2,3,4,6,7,19,32,62,63,115,206,211,219,227,228,252,253,257,288,317}
- Many **newer, more carefully designed trials show stronger differences between acupuncture and sham**^{4,15,56,57,59,60,66,67,89,103,117,120,131,132,133,139,161,162,164,167,178,184,185,188,190,200,201,202,203,206,214,227,239,240,243,245,252,253,257,259,274}
- **Clinical effectiveness comparison outcomes** are emerging as the new standard in acupuncture research.
 - Both acupuncture and sham often have **clinically superior outcomes to standard of care**
^{1,6,7,11,13,27,30,36,39,40,41,44,45,46,47,49,50,53,54,56,61,63,67,75,76,85,86,87,92,97,99,102,103,112,124,126,130,131,132,134,137,140,145,146,148,149,155,164,165,166,168,170,184,187,199,207,208,209,211,213,215,224,226,227,228,231,232,235,242,245,247,249,250,255,256,258,259,261,269,270,271,272,274,276,277,280,281,295,298,301,304,305,306,307} and to **no intervention controls.**^{3,4,6,19,32,63,228,252,315,316}
 - Acupuncture often shows an **equivalent clinical effect to standard care**
^{56,61,85,131,132,133,197,203,204,213,235,270,271,295}
 - Often, a **combination of acupuncture plus standard of care emerges as most clinically effective.**
^{6,11,12,16,17,19,22,25,41,49,53,54,58,61,62,69,70,86,96,100,116,119,123,125,129,130,147,149,150,152,163,171,174,178,181,182,186,188,193,198,201,209,214,215,219,220,221,222,223,224,225,247,258,274,277,285,290,308}

b. An Important Note on Placebo Effect

- Discussions regarding whether the clinical results of acupuncture are due to the placebo effect have **led to some interesting and valuable research.**^{3,4,314,318-329}
- Research demonstrates that the **“placebo effect” may be a collection of treatment effects** such as:
 - the medical ritual³¹⁸⁻³²⁸ and symbolic importance^{325,328} of treatment
 - enhanced/augmented effect with more elaborate medical rituals^{325,326}
 - the patient-practitioner relationship^{318,322,325,327,328}
 - listening to and caring for the patient^{318,321,325,328}
 - encouragement,^{319,329} empathy,^{318,323,324,328} reassurance,⁶³ mutual respect,^{318,328} trust,^{318,325} honesty,³²⁵ touch³²⁵
 - practitioner and patient personalities and interaction of each³²³



- practitioner communication style ^{318,323,325,326}
 - practitioner appearance of competence ³²⁵
 - the treatment setting ^{323,324,328}
 - type of intervention ³²³
 - the practitioner's desire to help ³¹⁸
 - education: explaining likely benefits of a treatment ³²¹
 - the patient's desire to heal, ⁶³ expectations for treatment, ^{318,323,324,327-332} and hope ^{318,325}
 - the nature of the patient's illness (subjective symptoms, chronic pain) ³²⁷
 - reduced anxiety, ^{318,323,327} increased optimism, ^{318,323} improved coping ³¹⁸
 - "mental, social, and contextual factors" ³²⁴ embedded in medical encounters ^{324,325}
- The placebo effect **causes physiological change**,³²⁵ such as increased "endogenous opioids and cannabinoids, and low levels of cholecystokinin" and increased dorsolateral prefrontal cortex activity "leading to increased activity within the descending pain-modulatory pathway." ³²³
 - Patients have experienced **clinically measurable benefits** ^{321,325} for treatment of "irritable bowel syndrome, low-back pain, episodic migraine, cancer-related fatigue, allergic rhinitis, and menopausal hot flashes" from open-label (honest) placebo treatments ³²⁵
 - The **large body of evidence points to acupuncture's beneficial effects on pain management**, and questions surrounding placebo effect merely detract from this consideration.

11. Mechanisms of Acupuncture

1. Connective Tissue

- Ultrasound visualizations show collagen connective tissues winding and pulling around acupuncture needles upon insertion into tissue, stimulating matrix deformation, microstructural cellular changes, and mechanotransduction. ³³³⁻³⁴⁸

2. Biochemical, Bioelectrical, and Molecular

- Mechanical connective tissue forces trigger downstream physiological cascades involving biochemical, bioelectrical, and molecular expression pathways that produce tangible physiological effects: ^{26,38,51,333-370}
 - **Nociceptive/analgesic, pain-relieving actions** ^{333,349,352,354,358-360}
 - **Anti-inflammatory actions** ^{349,351-357,359,360,363}



- **Antioxidant effects** ^{351,352,356,357,363}
- **Autonomic vagus nerve regulation** ^{350,353,356,358,363}
- **Increased endogenous opioids** ^{350,352,354,357,359,360}
- **Action on cannabinoid CB2 receptors** ^{352,360}
- **Neuromodulation via neurotransmitter actions** ^{335,350,352,354,357,359,360}
- **Neuroendocrine actions** ^{350,352,354,357,359,360}
- **Neuroimmune regulation via mast cell activation** ^{333,352,356,361,363}
- **Neuroplastic brain changes visible on MRI/fMRI** ^{26,38,51,154,348,364-366}
- **Neural growth and /regeneration/apoptosis reduction** ^{351,352,354}
- **Whole-brain impacts via the default mode network** ^{356,365,368,369}
- **Microbiome changes** ^{352,356,370} (which affect mood and pain perception)
^{352,368}
- **Microcirculatory changes** ³⁵¹

3. Experience of Pain

- The changes that occur within the brain and body affect the psychological interpretation and experience of pain. ^{352,360,368}

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E. Supporting Documentation

Please find the full text included from the following letters/statements of support from Oregon healthcare institutions, as well as noteworthy research studies.



- a. **Letter of Support from Central City Concern, Portland, Oregon:** Letter to Governor Tina Kotek from Andy Mendenhall, MD, Central City Concern President/CEO, OR Kim Leathley, Central City Concern Vice President/Chief of Health Services, September 16, 2024, in support of expanding OHP insurance coverage for acupuncture services in Oregon
- b. **Letter of Support from Quest Center for Integrative Health, Portland, Oregon:** Letter to the OHA's HERC Medical Director Ariel Smith from David Eisen, Director of Quest Center for Integrative Health, January 2025, in support of expanding OHP insurance coverage for acupuncture services in Oregon
- c. **Clinical Effectiveness, Cost-Effectiveness, Patient Satisfaction:** Smith CL, Mulcahy M. The impact of inpatient acupuncture on a mixed hospital floor: a pragmatic 3-month cost-effectiveness retrospective evaluation. *Med Acupunct*. 2024 Feb1;36(1):27-33.doi: 10.1089/acu.2023.0009. Epub 2024 Feb 13.
- d. **Clinical Effectiveness, Dose-Response:** Yang C, Wu M, Luo Q, et al. Acupuncture for migraine: a systematic review and meta-regression of randomized controlled trials. *Complement Ther Med*. 2024;86:103076. doi:10.1016/j.ctim.2024.103076
- e. **Clinical Effectiveness, Dose-Response:** Liu C-Y, Duan Y-S, Zhou H, et al. Clinical effect and contributing factors of acupuncture for knee osteoarthritis: a systematic review and pairwise and exploratory network meta-analysis. *BMJ EBM*. 2024;0(0). doi: 10.1136/bmjebm-2023-112626.
- f. **Clinical Effectiveness, Patient Satisfaction, Safety:** Coyle ME, Smith CA, Peat B. Cephalic version by moxibustion for breech presentation. *Cochrane Database Syst Rev*. 2023;5(5):CD003928.
- g. **Clinical Effectiveness, Dose-Response:** Xu G, Lei H, Huang L, Xiao Q, Huang B, Zhou Z, Tian H, Huang F, Liu Y, Zhao L, Li X, Liang F. The dose-effect association between acupuncture sessions and its effects on major depressive disorder: a meta-regression of randomized controlled trials. *J Affect Disord*. 2022 Aug 1:310:318-327. doi: 10.1016/j.jad.2022.04.155. Epub 2022 May 2.
- h. **Clinical Effectiveness, Cost-Effectiveness, Supporting Agency:** NIH. *Evidence Review for the Clinical and Cost-Effectiveness of Acupuncture for People with Osteoarthritis: Osteoarthritis in Over 16s: Diagnosis and Management*. NICE Evidence Reviews Collection. London: National Institute for Health and Care Excellence (NICE); 2022 Oct. Accessed November 16, 2023. <https://www.ncbi.nlm.nih.gov/books/NBK590294/>.
- i. **Agency Guidelines:** Dowell D, Ragan KR, Jones CM, Baldwin GT, Chou R. CDC Clinical Practice Guideline for Prescribing Opioids for Pain — United States, 2022. *MMWR Recomm Rep* 2022;71(No. RR-3):1–95. doi: <http://dx.doi.org/10.15585/mmwr.rr7103a1>.
- j. **Clinical Effectiveness, Sham/Placebo:** Ots T, Kandirian A, Szilagyi I, DiGiacomo SM, Sandner-Kiesling A. The selection of dermatomes for sham (placebo) acupuncture points is relevant for the outcome of acupuncture studies: a systematic review of sham (placebo)-controlled randomized acupuncture trials. *Acupunct Med*. 2020;38:211–226.
- k. **Clinical Effectiveness, Cost-Effectiveness (Persistence of Effects), Sham/Placebo:** Vickers AJ, Vertosick EA, Lewith GL, MacPherson H, Foster NE, Sherman KJ, Irnich D, Witt CM. Acupuncture for chronic pain: update of an individual patient data meta-analysis. *J Pain*. 2018 May;19(5): 455–474. doi:10.1016/j.jpain.2017.11.005.
- l. **Patient Expectations, Safety:** American Specialty Health Incorporated Health Services Department. *Acupuncture: does acupuncture provided within a managed care setting meet patient expectations and quality outcomes?* 2016;1–12.
- m. **Clinical Effectiveness, Cost-Effectiveness, Foundational:** McDonald J, Janz S. The acupuncture evidence project: a comparative literature review. Australian Acupuncture and Chinese Medicine Association. January 2017.
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