Clinical Question: 66 y.o male patient with pmh of osteoarthritis presents with continued pain despite conservative treatments including medication, physical therapy, and steroid injections. He is interested in other forms of non-surgical treatment as he has had surgery in the past with complications.

PICO Question: In patients with osteoarthritis, does acupuncture provide reduction in pain and physical function improvement compared to standard treatment?

Search Strategy:

Population	Intervention	Comparison	Outcome
Patients with osteoarthritis	Acupuncture	Standard care	Reduced pain
Patients with degenerative joint disease		Pharmacotherapy	Functional improvement
Patients with O.A		Physical therapy	Range of motion

PubMed

- Patients with osteoarthritis acupuncture pain and function - 332
- Patients with osteoarthritis acupuncture pain and function (within 5 years) - 129
- Patients with osteoarthritis acupuncture pain and function (within 5 years, randomized controlled trials, systematic reviews, meta-analysis) - 60

Google Scholar

- patients with osteoarthritis does acupuncture improve pain and function compared to standard treatment - 24,100
- patients with osteoarthritis does acupuncture improve pain and function compared to standard treatment (since 2020, sort by relevance) - 13,700

Science Direct

- patients with osteoarthritis acupuncture treatment vs standard treatment pain and function - 721
- patients with osteoarthritis acupuncture treatment vs standard treatment pain and function (since 2020, review articles) - 64

For the selection of articles for my Mini-Cat, I wanted to find high levels of evidence that were also studies performed within recent years. This is why my filters were for specific types of research and since 2020. With different types of alternative western medical therapies (such as acupuncture) becoming increasingly popular it was important to try to find recent articles. As acupuncture originated in China,

finding all appropriate articles that were based in USA was very difficult so I included systematic reviews/meta analysis from other nations as I felt this was the best option.

Articles Chosen:

Citation Selfe, T. K., & Taylor, A. G. (2008). Acupuncture and osteoarthritis of the knee: a review of randomized, controlled trials. *Family & community health*, *31*(3), 247–254. https://doi.org/10.1097/01.FCH.0000324482.78577.0f
Abstract: Osteoarthritis of the knee is a major cause of disability among adults. Treatment is focused on symptom management, with nonpharmacologic therapies being the preferred first line of treatment. Acupuncture is considered a potentially useful treatment for osteoarthritis. The objective of this article is to review the English-language articles, indexed in MEDLINE or CINAHL, describing randomized, controlled trials of the effects of needle or electroacupuncture on knee osteoarthritis. Ten trials representing 1456 participants met the inclusion criteria and were analyzed. These studies provide evidence that acupuncture is an effective treatment for pain and physical dysfunction associated with osteoarthritis of the knee.
PDF LINK:

Citation: Susilo, F. E., Kristiyanto, A., & Prasetya, H. (2021). Meta analysis The Effect of acupuncture therapy on pain reduction in osteoarthritis patients. *Indonesian Journal of Medicine*, *6*(1), 95–103. https://doi.org/10.26911/theijmed.2021.06.01.10
Abstract: Background: Osteoarthritis (OA) is the most common joint condition and is characterized by progressive erosion of the articular cartilage. Based on data from Basic Health Research (2018) the prevalence of joint disease in Indonesia is recorded at around 7.3% and osteoarthritis (OA) or arthritis is a common joint disease. As the two main non-surgical methods, physiotherapy and acupuncture have been shown to be safe and effective in the therapy of osteoarthritis. Subjects & Methods: This was a systematic review and meta-analysis study. The articles used in this study were obtained from several databases including PubMed, Google Scholar, and Springer Link. The articles used in this study were those published from 2000-2020. The article search was carried out by considering the eligibility criteria defined using the PICO model. The population in the study were patients with osteoarthritis complaints with intervention in the form of acupuncture therapy, the comparison was the sham acupuncture outcome in the form of pain reduction. The keywords for finding articles are as follows: "Acupuncture" OR "Osteoarthritis" AND "Randomized Controlled Trials". The articles included in this study are full text articles with an observational study design. Articles were collected using PRISMA flow diagrams. Articles were analyzed using the Review Manager 5.3 application. Results: A total of 9 articles were reviewed in this study. A meta-analysis of 9 randomized control trials showed that acupuncture therapy reduced pain in osteoarthritis patients (SMD= -0. 49; 95% CI= -0.88 to -0.10; p= 0.01) Conclusion: Acupuncture therapy reduces pain in osteoarthritis patients.
PDF LINK:

Citation:

Manheimer, E., Linde, K., Lao, L., Bouter, L. M., & Berman, B. M. (2007). Meta-analysis: acupuncture for osteoarthritis of the knee. *Annals of internal medicine*, *146*(12), 868–877. https://doi.org/10.7326/0003-4819-146-12-200706190-00008

Abstract:

Background: Knee osteoarthritis is a major cause of pain and functional limitation.

Purpose: To evaluate the effects of acupuncture for treating knee osteoarthritis.

Data Sources: Cochrane Central Register of Controlled Trials, MEDLINE, and EMBASE databases to January 2007. No language restrictions were applied.

Study Selection: Randomized trials longer than 6 weeks in duration that compared needle acupuncture with a sham, usual care, or waiting list control group for patients with knee osteoarthritis.

Data Extraction: Two authors independently agreed on eligibility, assessed methodological quality and acupuncture adequacy, and extracted outcome data on pain and function measures.

Data Synthesis: Eleven trials met the selection criteria, and 9 reported sufficient data for pooling. Standardized mean differences were calculated by using differences in improvements from baseline between patients assigned to acupuncture and those assigned to control groups. Compared with patients in waiting list control groups, patients who received acupuncture reported clinically relevant short-term improvements in pain (standardized mean difference, -0.96 [95% CI, -1.21 to -0.70]) and function (standardized mean difference, -0.93 [CI, -1.16 to -0.69]). Patients who received acupuncture also reported clinically relevant short- and long-term improvements in pain and function compared with patients in usual care control groups. Compared with a sham control, acupuncture provided clinically irrelevant short-term improvements in pain (standardized mean difference, -0.35 [CI, -0.55 to -0.15]) and function (standardized mean difference, -0.35 [CI, -0.56 to -0.14]) and clinically irrelevant long-term improvements in pain (standardized mean difference, -0.13 [CI, -0.24 to -0.01]) and function (standardized mean difference, -0.14 [CI, -0.26 to -0.03]).

Limitation: Sham-controlled trials had heterogeneous results that were probably due to the variability of acupuncture and sham protocols, patient samples, and settings.

Conclusions: Sham-controlled trials show clinically irrelevant short-term benefits of acupuncture for treating knee osteoarthritis. Waiting list-controlled trials suggest clinically relevant benefits, some of which may be due to placebo or expectation effects.

PDF LINK:

Citation:

Suarez-Almazor, M. E., Looney, C., Liu, Y., Cox, V., Pietz, K., Marcus, D. M., & Street, R. L., Jr (2010). A randomized controlled trial of acupuncture for osteoarthritis of the knee: effects of patient-provider communication. *Arthritis care & research*, *62*(9), 1229–1236. https://doi.org/10.1002/acr.20225

Abstract:

Objectives: There is conflicting evidence on the efficacy of Traditional Chinese Acupuncture (TCA), and the role of placebo effects elicited by acupuncturists' behavior has not been elucidated. We conducted a 3-month randomized clinical trial in patients with knee osteoarthritis to compare the efficacy of TCA to sham acupuncture and examine the effects of acupuncturists' communication style.

Methods: Acupuncturists were trained to interact in one of two communication styles: 'high' or 'neutral' expectations. Patients were randomized to one of 3 groups: waiting list, 'high' or 'neutral', and nested within style, TCA or sham acupuncture over 6 weeks. Sham acupuncture was performed in non-meridian points, with shallow needles and minimal stimulation. Primary outcome measures were: Joint-specific Multidimensional Assessment of Pain (J-MAP), Western Ontario McMaster Osteoarthritis Index (WOMAC), and satisfaction.

Results: 455 patients who received treatment (TCA or sham) and 72 controls were included. No statistically significant differences were observed between TCA or sham acupuncture, but both groups had significant reductions in J-MAP and WOMAC pain compared to the waiting group (-1.1, -1.0, and -0.1, $p<0.001$; -13.7, -14, -1.7, $p<0.001$). Statistically significant differences were observed in J-MAP pain reduction and satisfaction, favoring the 'high' expectations group. Fifty-two percent and 43% in the TCA and sham groups thought they had received TCA (kappa=0.05), suggesting successful blinding.

Conclusion: TCA was not superior to sham acupuncture. However, acupuncturists' style had significant effects on pain reduction and satisfaction, suggesting that the analgesic benefits of acupuncture can be partially mediated through placebo effects related to the acupuncturist's behavior

PDF LINK:

Citation:
Chen, H., Shi, H., Gao, S., Fang, J., Yi, J., Wu, W., Liu, X., & Liu, Z. (2024). Durable Effects of Acupuncture for Knee Osteoarthritis: A Systematic Review and Meta-analysis. *Current pain and headache reports*, 10.1007/s11916-024-01242-6. Advance online publication. https://doi.org/10.1007/s11916-024-01242-6

Abstract:

Purpose of review: Knee osteoarthritis (KOA) is a degenerative joint disease which can result in chronic pain and disability. The current interventions available for KOA often fail to provide long-lasting effects, highlighting the need for new treatment options that can offer durable benefits. Previous studies have suggested the efficacy of acupuncture for knee osteoarthritis (KOA) with its durability remaining uncertain. In this review, we aimed to investigate the durability of the efficacy after completion of treatment.

Recent findings: We performed thorough searches of PubMed, EMBASE, Web of Science, and Cochrane Central Register of Controlled Trials from inception to November 4, 2023. The outcomes were assessed at all available time points after completion of treatment. Primary outcomes were changes from baseline in pain and function measured using the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) pain and function subscales. Secondary outcomes included response rate, overall pain, the WOMAC stiffness subscale, total WOMAC index, and physical and mental health components of 12/36-item Short-Form Health Survey. A total of 10 randomized controlled trials (RCTs) involving 3221 participants were included. Pooled estimates suggested that 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. For acupuncture versus no treatment, one trial with large

sample size indicated that improvements in pain and function persisted for 3 months post-treatment, while 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. However, 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. 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. 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.
PDF LINK:

Summary of the Evidence:

Author (Date)	**Level Of Evidence**	**Sample/Setting (#of subjects/studies, cohort definition etc.)**	**Outcome Studied**	**Key Findings**	**Limitations and Biases**
Selfe D.C, PhD, Gill Taylor EdD, RN, FAAN (2008)	Systematic Review of Randomized Controlled Trials	10 trials representing 1,456 participants were analyzed. (Medline and CINAHL databases utilized)	Outcomes measured included pain (10 studies), physical function (6 studies), and patient global assessment.	In 8 out of 10 studies, the acupuncture group experienced statistically significant pain reduction in comparison with the control group. 5 of the 6 studies deemed physical function improvement in the acupuncture group. It was deemed that acupuncture should be considered a viable adjunct or alternative	The article itself did not state any limitations within the study. Limitations that I concluded included that there was no reference to the degree of osteoarthritis each patient was suffering from (mild vs moderate vs severe). i thing the article did mention but didn't refer to it as a limitation is that acupuncture is heavily user

				treatment of knee pain and dysfunction associated with OA.	dependent. 5 of the studies the acupuncture was performed by trained professionals, and the other 5 did not report the skill level of the acupuncturist.
Susilo, Kristiyanto, Prasetya (2021)	Systematic Review & Meta Analysis	9 articles reviewed (all randomized control trials) obtained from PubMed, Google Scholar and Springer Link.	Outcome measured was pain reduction.	The results of the meta-analysis showed that acupuncture therapy could reduce pain in osteoarthritis patients by -0.49 times (CI 95% -0.88 to -10, p = 0. 01)	Limitations of this study in terms of my pico question is that it doesn't address the outcome of physical function. There is also no addressing of who is performing the acupuncture or sham acupuncture. There is a lack of uniformity in this study. The article also admits to publication bias as a limitation.
Manheimer, MS; Linde, MD, PhD;	Meta Analysis	11 randomized controlled trials found on MEDLINE, EMBASE, and Cochrane.	Outcomes measured are pain and	Both acupuncture and sham	The sham controlled trials had

Lao, PhD, LAc; Bouter, PhD; Berman, MD			function scores. (WOMAC)	control grouped acupuncture reported greater improvements than those receiving standard usual care and those on waiting list suggesting that acupuncture may issue a greater placebo effect as there was no significant difference in results when compared to sham acupuncture. The study states it is too soon to recommend acupuncture as a routine part of care for patients with osteoarthritis.	heterogeneous results that were most likely due to the variability of acupuncture and sham protocols, patient samples, and other settings. Another limitation stated in the article is the relatively small study bias.
Suarez-Almazor, M.D., Ph.D.; Looney, M.S., C.H.E.S.; Liu, M.D., L.Ac.; Cox, M.S.; Pietz, Ph.D., Marcus, M.D.; Street	Randomized Controlled Trial	527 patients- (455 received TCA or sham and 72 controls).	Outcomes measured included Joint-specific Multidimensional Assessment of Pain (J-MAP), Western Ontario	No difference in pain outcomes were observed between the sham and TCA groups and both groups	The study did mention various limitations. First being they cannot make infferences with respect to the use of less invasive

Jr., Ph.D. (2010)			McMaster Osteoarthritis Index (WOMAC), and patient satisfaction	showed improvement in outcomes compared to the waiting list group. Patients were also divided amongst acupuncturist communication styles either “high” or neutral expectations. Statistically significant differences were observed in J-MAP pain reduction and satisfaction, favoring the ‘high’ expectations group. Fifty-two percent and 43% in the TCA and sham groups thought they had received TCA (kappa=0.05), suggesting successful blinding.	placebo, such as non-penetrating needles, which could have resulted in different results. Second, there was no record of non-verbal communication between acupuncturists and patients. The only record of communication was audio recording this may play a large role in placebo responses. Lastly although efforts were made to completely blind the study some patients may have been aware of which treatment they were receiving (TCA or sham)

Chen, Shi, Gao, Fang, Yi, Wu. Liu, Liu (2024)	Systematic Review & Meta Analysis	10 Randomized Controlled Trials examined with a total of 3221 patients.	Primary outcomes measured include changes in pain and function using the WOMAC grading system and function subscales Secondary outcomes measured included response rate, overall pain, WOMAC stiffness subscale, and total WOMAC index. Outcomes were measured at various months post treatment.	Findings showed that acupuncture can provide pain and functional improvement in patients with KOA for a range of 3-6 months after treatment. It was found that acupuncture my provide pain relief and functional improvement up to 5 months post treatment vs usual care and up to 6 months vs diclofenac.	There were some limitations that the study did admit. First randomized controlled trial registries or ongoing studies were not considered, and only English-language publications were included. Second the assessment required subjective judgment which differs across individuals. The article mentions the results should be interpreted with caution as calculations were made using the mathematical formulas recommended by the Cochrane handbook instead of being directly extracted from the reports.

Brief Conclusions:

Article 1:

- The findings of the systemic review showed that most of the studies examined found pain and functional benefits that were deemed statistically significant with patients treated with acupuncture vs the control group although there were some important limitations of the systematic review. (acupuncture skill level, severity of OA).

Article 2:

- Results of this study concluded that acupuncture treatment can reduce pain in osteoarthritis patients. The study compared the efficacy of acupuncture vs sham acupuncture. Sham acupuncture mimics acupuncture but the needles are not actually inserted into the skin (control group). Results of sham acupuncture showed no reduction in pain.

Article 3:

- Results of this article differed from findings of other articles I used and even came across. The article states the likelihood of placebo effect from acupuncture as results in pain and function scores were similar between acupuncture and sham acupuncture but showed larger benefit then subjects on the waiting list and those who received usual standard care.

Article 4:

- Results showed that no differences were observed between the TCA and sham groups. Patients receiving either form of therapy showed improvement for most outcome measured compared to the waiting list group. Patients in the high expectations communication style had statistically significant improvements in pain and satisfaction compared to the neutral group. At the end of the study patients were asked which treatment they thought they had received with three possible responses (TCA, sham, not sure). 52% of those in TCA group thought they received TCA and 43% in the sham thought they had received TCA showing. This further strengthened the idea of placebo effect.

Article 5:

- Results of this systematic review/meta analysis showed that acupuncture could improve function and pain in patients with knee OA when compared to other forms of treatment (standard care, diclofenac, sham acupuncture, etc..). The study states that improvement is only short term between 3-6 months with little evidence of effects lasting 9 months post treatment.

Overarching Conclusion:

- Assessing the articles, I don't believe that there is enough evidence to definitively state that acupuncture provides improvements in pain and physical function amongst patients with osteoarthritis. Although some of the articles show signs of improvement in both pain and

function, other articles show evidence of placebo effects. There are also many other variables that play a factor that require the need of further testing to make definitive analyses of my PICO question. These include degree of OA, skill level of acupuncturist, methods of control group and consistency of control treatments.

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Clinical Bottom Line:

Weight of Evidence:

Article 4 : I felt that this article is my highest piece of evidence. It is a USA based randomized controlled study. I felt that 527 total participants was a large sample size for a RCT, and the results that were examined made it the strongest study in my opinion. The fact that many subjects were not able to tell if they received acupuncture or sham acupuncture helped me come to my conclusion about the PICO assessment. Other studies that I had included were not analyzing this component. The article also used another interesting component which further made me believe the placebo effect of acupuncture in osteoarthritis. This was the communication styles of the acupuncturist. Since the "high group" showed more improvement I felt more strongly about a potential placebo effect.

Article 3 : I felt that this is my 2nd strongest article. It is a meta-analysis of 11 randomized controlled trials. Outcomes were directly related to my PICO question (pain and function). The results of this study showed that there were no significant differences in improvement between sham acupuncture and acupuncture. There were improvements noted in both when compared to standard treatment but no significant differences between the two. This further strengthens the placebo effect acupuncture may have and the requirement for other studies to be performed.

Article 1 : The first article I chose is my 3rd strongest piece of evidence in my opinion. It is a systematic review of 10 randomized controlled trials. The outcomes measured were pain amongst all the articles and function only assessed on 6 of the 10. In 8 of the 10 RCT's acupuncture improved pain in patients with osteoarthritis and in 5 out of 6 studies function was improved. This article stated clear evidence that acupuncture should be a treatment method of osteoarthritis as it shows improved pain and function in patients. I felt this was a bit weaker as it didn't answer the placebo effect question that the other top articles pointed out.

Article 5 : I felt that this article is my 2nd weakest piece of evidence. It was a systematic review and meta analyses of 10 randomized controlled trials. The reason I felt this was a weaker study in reference to my PICO question was that a large component that the study was aiming to examine was the quantity (months) of benefit received from acupuncture. Long term vs short term. This was not included in my study. It did answer if there was pain and functional improvement in general but also aimed to put a reference of how long improvement was noted. Results found there to be 3-6 months of improvement in pain and function with acupuncture with little evidence of long term improvement.

Article 2: I felt this is the weakest level of evidence that I have trying to answer my PICO question. It is a systematic review and meta-analyses of 9 randomized controlled trials. The only outcome that was examined by this study was pain. The article concluded that acupuncture does indeed decrease pain but

it admits to limitations including publication bias. There was also no mention of who is performing the acupuncture. There is a lack of uniformity/ important detail in regards to the study carried out.

Although I concluded from my PICO research that there is no clear evidence that acupuncture reduces pain and improves physical function, I think that clinically if patients with osteoarthritis are interested it is worth a trial. Although it may be due to a placebo effect, it has shown it could potentially improve some patients suffering from osteoarthritis. The last resort to end stage osteoarthritis is total joint replacement which is an invasive procedure with long recovery and potential complications so if this could be avoided by acupuncture then it is worth a trial. Also, from the studies there is evidence of safety with acupuncture treatment.