

Acupuncture of myofascial pain trigger points for the treatment of knee osteoarthritis

A systematic review and meta-analysis

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Abstract

Background: Osteoarthritis of the knee is one of the major disorders leading to social dysfunction, economic loss and social development. This study was conducted to systematically evaluate the efficacy and safety effectiveness of acupuncture inactivation of myofascial pain trigger points in the treatment of osteoarthritis of the knee.

Methods: Randomized Controlled Trials (RCTs) on the treatment of knee pain were searched by computer from PubMed, The Cochrane Library, China journal full-text database (CNKI), Chinese biomedical literature database (CBM), China academic journal database (Wanfang Data) databases from the date of creation to December 2021, and the data were analyzed by Reman 5.3 software for data analysis.

Results: A total of 724 patients from 9 RCTs were finally included, and the results of meta-analysis showed that the acupuncture myofascial pain trigger point group was better than the control group in terms of total effective rate, cure rate, VAS score, Lysholm score, and WOMAC score.

Conclusion: The efficacy and safety of acupuncture 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.

Keywords: acupuncture, knee osteoarthritis, meta-analysis, myofascial pain trigger points, systematic evaluation

1. Introduction

Knee osteoarthritis (KOA) is a chronic degenerative joint disease characterized by degeneration of articular cartilage.^[1–3] Degenerative changes in articular cartilage often involve synovial membrane, ligaments, and other tissues leading to decreased stability of the knee joint, resulting in biomechanical imbalance of the knee joint thus causing pain and activity dysfunction around the knee joint clinical

symptoms, which seriously affects the quality of life of middle-aged and elderly people, and is one of the main diseases that cause functional disability, economic loss and affect social development of the society.^[4,5] Therefore, the search for a reliable and affordable treatment has become a focus of our attention.

In recent years, some scholars around the world have begun to pay attention to the relationship between injury and repair of soft tissues around the knee joint, and proposed that “muscle dysfunction” is the key to the development of knee osteoarthritis and the course of the disease.^[6–9] The myofascial pain trigger point theory has become a hot topic of research for scholars, and numerous studies have shown that inactivation of myofascial pain trigger points around the knee joint can promote structural remodeling of the surrounding skeletal muscle to regulate the biomechanical balance, thus improving the clinical symptoms of knee osteoarthritis and providing a new direction for the conservative treatment of knee osteoarthritis,^[10,11] therefore, this study used an evidence-based approach to evaluate the efficacy and safety of acupuncture myofascial pain trigger points for the treatment of KOA. In this study, the efficacy and safety of acupuncture myofascial pain trigger points in the treatment of KOA were evaluated using an evidence-based approach to provide a scientific basis for the clinical efficacy of acupuncture myofascial pain trigger points in the treatment of KOA.

2. Materials and methods

2.1. Search method

We searched a total of 5 databases through a comprehensive search of PubMed, The Cochrane Library, the China Journal Full Text Database (CNKI), the China Biomedical Literature

Editor: Yasser Albadrany.

The study was funded by Training Programme for Young and Middle-aged Talents in Chinese Medicine in Jiangxi Province (2021.2), Science and Technology Plan of Jiangxi Provincial Health and Family Planning Commission (20197057).

The authors have no conflicts of interest to disclose.

All data generated or analyzed during this study are included in this published article [and its supplementary information files].

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How to cite this article: Lin X, Li F, Lu H, Zhu M, Peng TZ. Acupuncture of myofascial pain trigger points for the treatment of knee osteoarthritis: a systematic review and meta-analysis. *Medicine* 2022;101:8(e28838).

Received: 20 June 2021 / Received in final form: 14 January 2022 / Accepted: 26 January 2022

<http://dx.doi.org/10.1097/MD.00000000000028838>

Database (CBM), and the China Academic Journal Database (Wanfang Data), with self-built databases searched up to December 2021. We will use a combination of medical subject headings terms and free words to search the articles. Subject words include “acupuncture” or “acupuncture” and “myofascial pain trigger point” or “myofascial trigger point” or “myalgia” and “knee osteoarthritis” or “knee degenerative joint” or “patellofemoral joint pain” or “knee joint pain”. At the same time, references of included articles will be manually retrieved. We will adjust different search strategies for different databases.

2.2. Inclusion criteria

2.2.1. Study type. Clinical randomized controlled trials in Chinese or English only, whether take measures to use blinding and allocation concealment or not.

2.2.2. Intervention. The intervention of the experimental group use acupuncture to inactivate myofascial pain trigger points, The intervention of the control group was not limited

2.2.3. Participants. The included patients were diagnosed with osteoarthritis of the knee and patellofemoral osteoarthritis pain.

2.3. Exclusion criteria

- Duplicate articles.
- Unable to get data or data is incomplete.

- Nonrandomized controlled trials, case report, review article, and animal experiment.

2.4. Outcomes

Clinical efficacy (including total effective rate and cure rate), visual analog score (VAS score), Lysholm score, WOMAC score, and adverse effects.

3. Results

3.1. Study selection

We will filter the studies level by level by eliminating duplicates, reading titles and abstracts, and reading the full text. The study screening will be completed independently by 2 researchers, and the third researcher will be responsible for the judgment in case of differences. The literature screening flow chart is shown in Figure 1.

3.2. Data extraction

We will use a homemade table to collect the following data included in the article (Table 1).

- First author and time of publication, publish journals, and so on.
- Sample size, sex ratio, age, course of disease, course of treatment, country, etc of the experimental group, and the control group, among others.

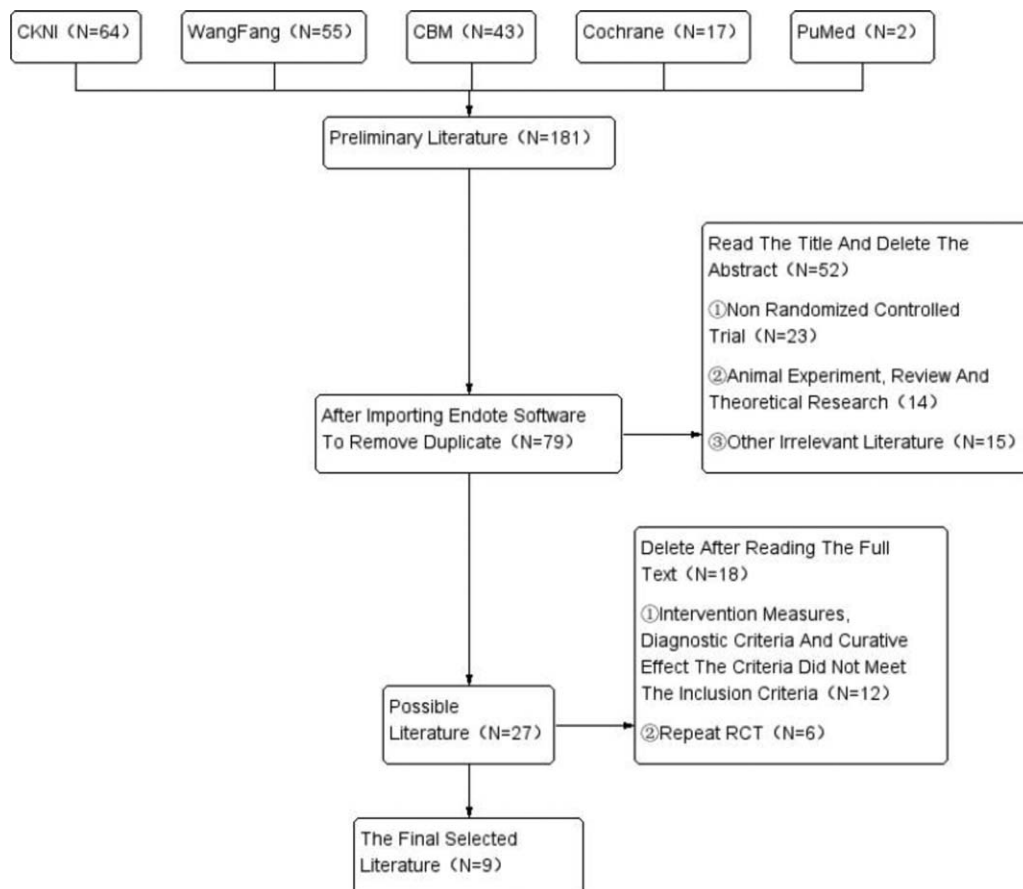


Figure 1. Flow chart of literature search. CBM = Chinese biomedical literature database, CKNI = China national knowledge infrastructure, RCT = randomized controlled trial.

Table 1
Basic characteristics of KOA studies with acupuncture myofascial pain trigger points for treatment.

Included literature		Sample size		Interventions			Drop out
Author	Particular year	T/C	Treatment group	Control group	Observation index	Treatment cycle	
Wu Yanbin ^[14]	2020	30/30	A+B	Electrotherapy of pain points +B	VAS, Lysholm, Q angle, clinical effective rate	Twice a week, 6 times	Nothing
Zeng Wenbi ^[15]	2019	30/32	A+B	Oral loxoprofen	VAS, Lysholm, clinical effective rate	6 times a week, 12 times	Nothing
Qin Weikai ^[16]	2020	38/38	A	Intra articular injection of sodium hyaluronate	VAS, tenderness value of the most obvious pain point in front of the knee, Lysholm, clinical effective rate	Treatment group: twice a week, 4 wks; control group: once a week, 5 times.	Nothing
Zhou You ^[17]	2018	66/65	A+B	Electroacupuncture+B	WHOQOL-BRIEF, WOMAC, VAS, Lysholm, clinical effective rate	Once a week, 3 times	Nothing
Zhang Wenjing ^[18]	2015	50/50	A	Acupuncture at traditional meridians	VAS, Lysholm, WOMAC, clinical effective rate	Once a day, 28 times, after 14 times, rest for 2 days	Nothing
Yin Jianhua ^[19]	2019	54/54	B+A	B+Computer medium frequency electricity	WOMAC, WHOQOL- BRIEF, VAS, Lysholm	Electrotherapy adjustment, once a week, 20 min" muscle stretching: 5 times a week, 3 wks	Nothing
Zhao Jiamin ^[20]	2018	25/23	A+B	Therapeutic instrument treatment	VAS, KOOS, WOMAC, clinical effective rate, 60°/s relative peak torque of extensor and flexor of knee joint, average power and total power	Acupuncture once a week for 6 wks Stretch 1 min/time, 3 times/d	2
Ma Yantao ^[21]	2018	25/23	A+B	False acupuncture at myalgia point+B	NPRS, knee joint ROM, Lysholm, isokinetic muscle strength test, surface electromyography test	Acupuncture once a week for 6 wks, Stretch 1 min/time, 3 times/d	2
Zhang Peng ^[22]	2016	46/45	A	Acupuncture at traditional meridians	VAS, WOMAC, efficacy evaluation	30 min/time, once a day, 5 days as a course of treatment, continuous treatment for 4 courses;	Nothing

A = Acupuncture at myalgia points

B = Muscle drafting

KOA = knee osteoarthritis, VAS = visual analog score.

- Specific interventions for the experimental and control groups, among others.
- Outcome indicators include primary outcome indicators and secondary outcome indicators

3.3. Risk of bias assessment

The 2 researchers will independently use Cochrane Risk of Bias Tool to assess risk bias in 7 areas: generation of random-allocation methods, allocation concealment, application of blind methods, completeness of outcomes, selective reporting, and other bias risks. The risk bias of included articles will be divided into 3 levels: high, unclear, or low. A third researcher will make the judgment if 2 researchers disagree on an assessment. Risk of bias assessment is shown in Figures 2 and 3.

3.4. Evidence assessed

We will use the internationally accepted Grades of Recommendations Assessment, Development and Evaluation (GRADE) to assess the quality of evidence for the article, which is divided into 4 levels: high, medium, low, and very low.

3.5. Total clinical efficiency

Figure 4 indicates that the 6 included RCTs reported the overall effectiveness of acupuncturing myofascial pain trigger points for KOA, with significant heterogeneity among the 6 RCTs ($P = .83$, $I^2 = 0\%$), and the random-effects model showed that the treatment group was superior to the control group in improving clinical outcomes in knee KOA (SMD = 2.53, 95% cl (1.45,4.41), $Z = 3.26$, $P = .83$).

3.6. VAS scores

Figure 5 indicates that the 9 included RCTs reported VAS scores for KOA treated with acupuncture myofascial pain trigger points, with significant heterogeneity among the 9 RCTs ($P < .00001$, $I^2 = 84\%$), and a random-effects model showed that the treatment group was superior to the control group in improving VAS scores for knee KOA (SMD = -0.83, 95% cl (-1.00, -0.67), $Z = 9.75$, $P < .00001$).

3.7. Lysholm scores

Figure 6 represents the 6 included RCTs reporting Lysholm scores for acupuncturing myofascial pain trigger points for KOA,

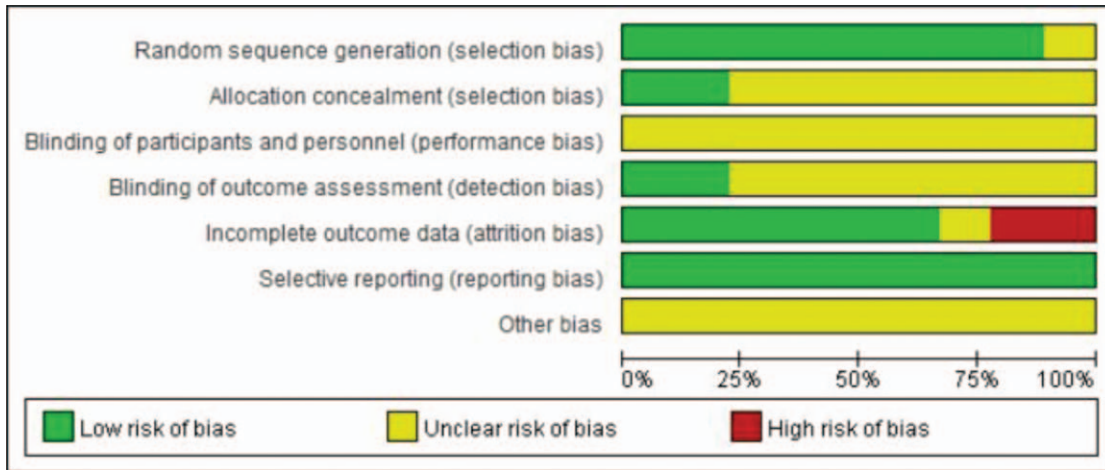


Figure 2. Risk bias analysis.

	Random sequence generation (selection bias)	Allocation concealment (selection bias)	Blinding of participants and personnel (performance bias)	Blinding of outcome assessment (detection bias)	Incomplete outcome data (attrition bias)	Selective reporting (reporting bias)	Other bias
Ma YT, 2018	●	●	?	●	●	●	?
Qin WK, 2020	●	?	?	?	●	●	?
WU YB, 2020	●	?	?	?	●	●	?
Yin JH, 2019	?	?	?	?	●	●	?
Zeng WB, 2019	●	?	?	?	●	●	?
Zhang P, 2016	●	?	?	?	●	●	?
Zhang WJ, 2015	●	?	?	?	?	●	?
Zhao JM, 2018	●	●	?	●	●	●	?
Zhou Y, 2018	●	?	?	?	●	●	?

Figure 3. Summary of bias analysis.

with significant heterogeneity among the 6 RCTs ($P=.13$, $I^2=41\%$) and a random effects model showing that the treatment group was superior to the control group in improving Lysholm scores for knee KOA (SMD=6.94, 95% cl (6.44, 7.45), $Z=26.90$, $P<.00001$).

3.8. WOMAC scores

Figure 7 represents the 4 included RCTs reporting WOMAC score for KOA treated with acupuncture myofascial pain trigger points, with significant heterogeneity among the 4 RCTs ($P<.00001$, $I^2=98\%$), and a random effects model showing that the treatment group outperformed the control group in improving knee KOA WOMAC score scores (SMD=-5.94, 95% cl (-6.75, -5.13), $Z=14.37$, $P<.00001$).

3.9. Risk of bias assessment

Figure 8 shows the funnel plot publication risk analysis based on the total effective rate, and the 6 RCTs show an asymmetric distribution on both sides of the center line of the funnel plot, indicating the existence of bias assessment.

4. Data analysis

The article will be conducted with Revman5.3.0 (<https://revman5.software.informer.com/>) recommended by Cochrane Collaboration. χ^2 test and I^2 will be used to analyze the heterogeneity differences among the included articles. When $P<.05$, $I^2>50\%$ the fixed-effect model is used; otherwise, the random-effect model is used. Dichotomous variables will be expressed as relative risk and their 95% confidence interval (95% CI), whereas continuous variables were expressed as mean difference or standardized mean difference and their 95% CI. We will conduct subgroup analysis or sensitivity analysis for studies with large heterogeneity to reduce the impact of heterogeneity differences.

4.1. Ethics

As the data source of this study is from the literature of major databases, it does not involve the recruitment of patients or the

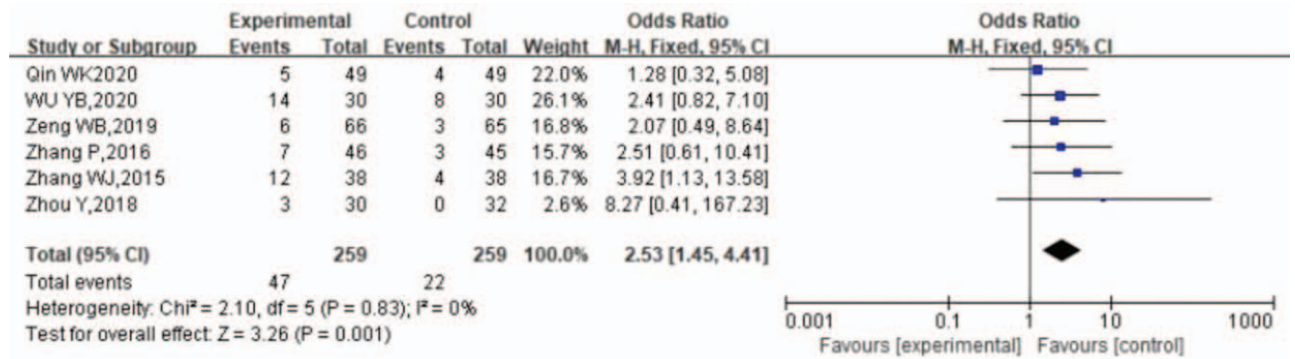


Figure 4. Meta-analysis of clinical efficacy of acupuncture myofascial pain trigger points for KOA. KOA = knee osteoarthritis.

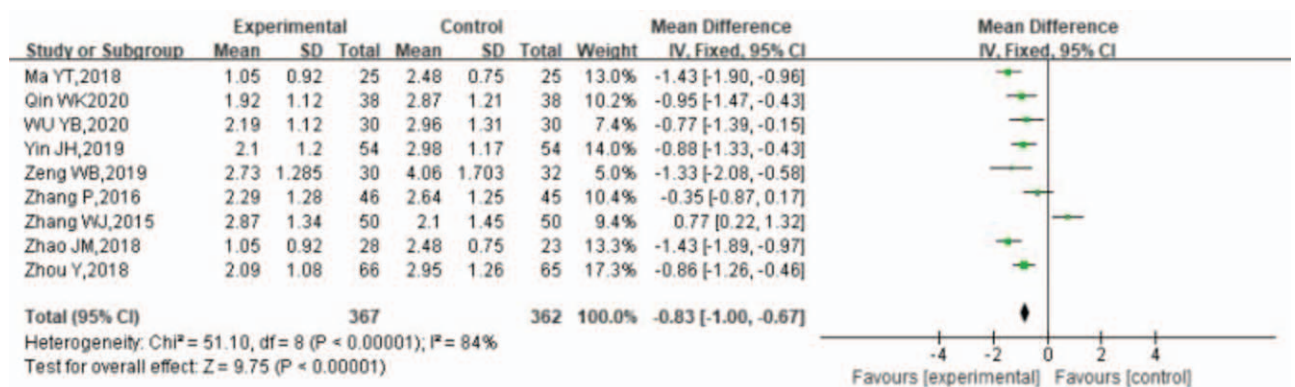


Figure 5. Meta-analysis of VAS scores for KOA treated with acupuncture inactivation of myofascial pain trigger points. KOA = knee osteoarthritis, VAS = visual analog score.

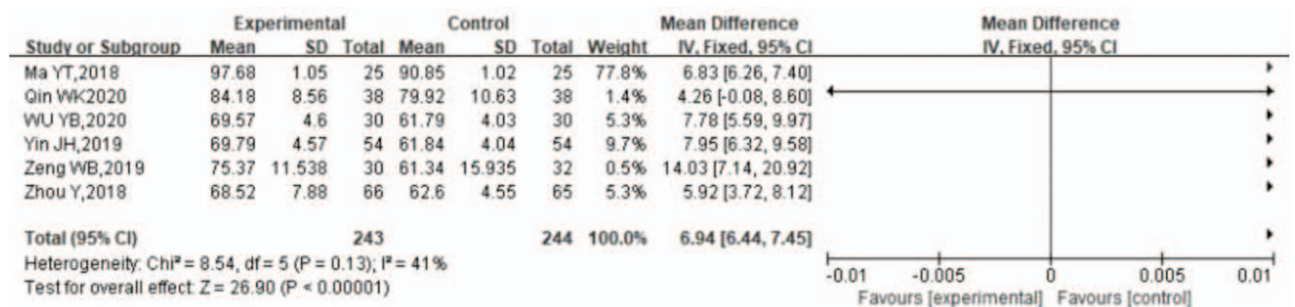


Figure 6. Meta-analysis of Lysholm scores of myofascial pain trigger points treated with acupuncture inactivation for KOA. KOA = knee osteoarthritis.

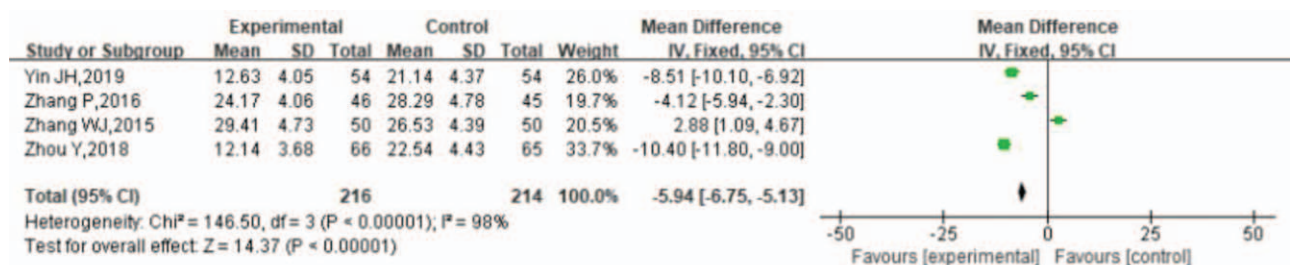


Figure 7. Meta-analysis of WOMAC scores for KOA treated with acupuncture inactivation of myofascial pain trigger points. KOA = knee osteoarthritis.

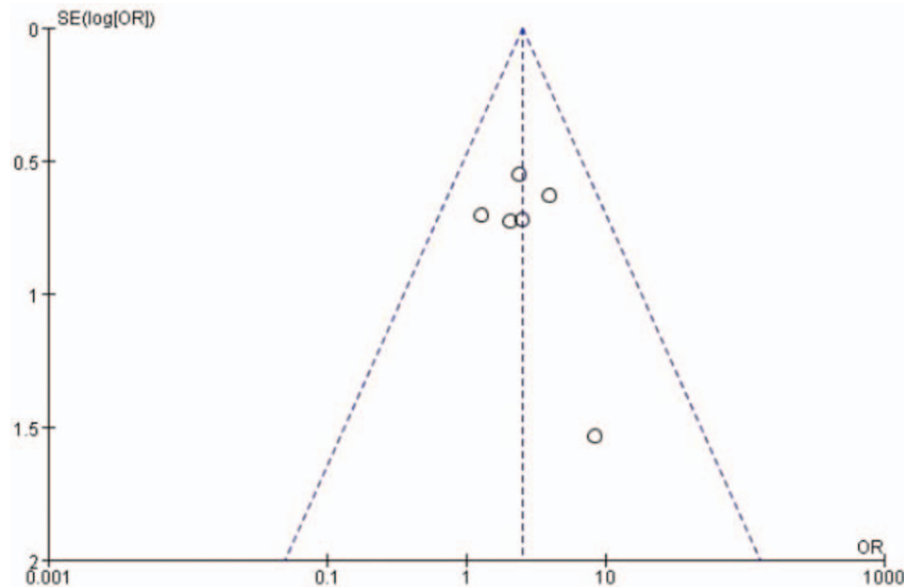


Figure 8. Funnel plot of publication bias based on total efficiency.

collection of personal information, so the sanction of the ethics committee is unnecessary.

5. Discussion

Osteoarthritis of the knee is a chronic degenerative osteoarthritic disease, which often brings about knee pain and limited joint movement, and in severe cases, the knee cannot be fully straightened; walking with a weak leg, which may be accompanied by knee inversion or knee valgus deformity, or in more severe cases, the inability to walk. In recent years, some scholars at home and abroad have begun to pay attention to the relationship between soft tissue injury and repair around the knee joint, and proposed that “muscle dysfunction” is the key to the development of knee osteoarthritis and its course,^[5] in which myofascial pain trigger points are often generated by soft tissue injury, resulting in an imbalance of skeletal muscle mechanics around the knee joint. A large number of studies have shown that inactivation of myofascial pain trigger points around the knee is the key to conservative treatment of knee osteoarthritis, and Professor Huang Qiangmin et al^[12,13] concluded that inactivation of myofascial pain trigger points around the knee can reduce intramuscular hypertension, relieve uneven skeletal muscle pull, and improve mechanical balance, thereby relieving Rahbar et al^[11] divided KOA patients into 2 groups, the control group was treated with 16 conventional physiotherapy treatments and the intervention group was treated with the same physiotherapy treatments for the area around the knee joint where MTrPs were present, the results showed that the recovery of knee KOA in the intervention group was higher than that in the control group. recovery was higher than that of the control group.

In this study, a total of 181 publications were finally obtained by means of Chinese and English database searches as well as manual searches. The results of the Meta-analysis showed that the treatment group had better overall clinical efficiency, cure rate, VAS score, Lysholm score, and WOMAC score than the control group in the treatment of knee osteoarthritis. In terms of

adverse events, there were only 2 cases of shedding for personal reasons in each control group in 2 RCTs, and no adverse reactions occurred in 7 RCTs, and the rest were not mentioned. This indicates that acupuncture inactivates periprosthetic myofascial pain trigger points for the clinical treatment of osteoarthritis of the knee with high safety. Based on this study, we concluded that acupuncture inactivation of myofascial pain trigger points is a clinically effective, rapid, precise, and safe treatment method for intervention of knee osteoarthritis. At the same time, this study has the shortcomings of low quality of included studies and small sample size, so high quality and large sample of RCTs are needed to validate it.

Author contributions

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Writing – review & editing: TianZhong Peng, Xingzhen Lin

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