SOUTH BAYLO UNIVERSITY

Acupuncture Treatment for Shoulder Pain: A Systemic Review and Meta-Analysis

by

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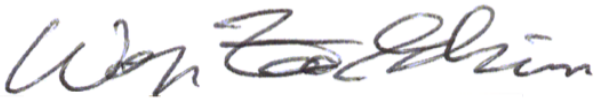

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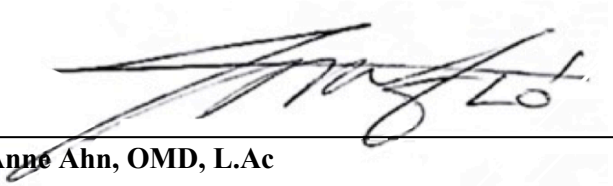

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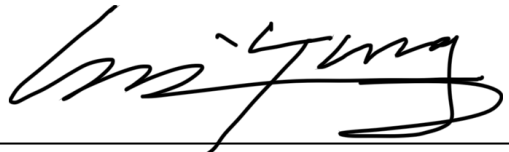

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ABSTRACT

The shoulder is a complex part of the human body affective people with pain and limited range of motion which effective patient's life quality. Various kind of Acupuncture treatment shows effective and no side effect for treatment of pain management. This systematic review and meta-analysis are aiming to evaluate the outcomes of the randomized controlled trials (RCTs) regarding the therapeutic effect of acupuncture on alleviating pain in patient with shoulder pain. The clinical studies included in this review are searched by using the database in Chinese such as Wan fang, CNKI, English database such as PubMed and Google Scholar. The selected RCTs articles are reviewed and analyzed including the involved subjects, method of treatment or intervention, outcomes measurement, statistical analysis, assessment of risk bias and the outcomes. The available data were synthesized in table format, interpreted and summarized from the evidences that support the effectiveness of the treatment. The 6 eligible studies published between 2010 to 2024. The primary outcomes of the review were Visual Analog Scale (VAS) pain score. Risk Ratio (RR) for dichotomous data,

mean difference (MD) and standardized mean difference (SMD) for continuous data were used with associated confidence intervals (CIs). The result from the statistical heterogeneity test, calculated chi-squire test score from the 6 studies was 24.20 [X_5^2= 24.2 ($p < 0.001$), I^2 = 79%], and the probability of these RCTs were homogenous was less than 0.1 %. The safety of acupuncture remains unclear due to insufficient reporting of adverse events in the majority of the included studies. Acupuncture appears to be similarly effective as other therapies in relieving shoulder pain. However, due to the low certainty of the evidence, our confidence in recommending acupuncture for clinical practice is limited.

Keywords: acupuncture, shoulder pain, randomized controlled trials (RCTs)

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I. INTRODUCTION

Shoulder pain is a common medical disorder in daily life, refers to any discomfort, soreness, or ache experienced in or around the shoulder joint. It can vary in severity and may be accompanied by other symptoms such as stiffness, weakness, limited range of motion, or swelling. Shoulder pain can be localized to a specific area or radiate to the surrounding areas, such as the upper arm, neck, or back. Shoulder pain can affect individuals of any gender or age group.

The reason causes shoulder pain had various condition, such as fracture of bones/joints in the shoulder, arthritis, tendon or muscle inflammation, over use or tear of tendons, etc. Shoulder pain can occur at any time, as it can be influenced by various factors and underlying causes. The timing of shoulder pain can vary depending on the specific condition or injury involved. Some individuals experience shoulder pain while at rest or during sleep. This can be particularly noticeable when lying on the affected side. Conditions such as rotator cuff tears, bursitis, or adhesive capsulitis (frozen shoulder) can cause discomfort or pain in these situations. affect patient daily life with limited range of motion also exhausted their energy.

Shoulder is a complex human body part, made by bones, joints and muscles. The shoulder joint consists of 4 joints, the glenohumeral joint, sternoclavicular joint, acromioclavicular joint, and scapulothoracic articulation, and the capsules, ligaments, tendons and muscles that are attached to these joints (Spindler, 2001)[1]. The complexity of the structure leads to the complexity of shoulder pain-related pathology. Atraumatic

shoulder pain is usually related to a variety of shoulder conditions, including rotator cuff tears, subacromial impingement, osteoarthritis, adhesive capsulitis, tendinitis, tendinopathy, tenosynovitis, and bursitis [2–6]. The clavicle, acromion, humerus and scapula around or connected with shoulder joints.

Nowadays, the primary goals of treating shoulder pain are to alleviate pain, improve shoulder function and mobility, and address the underlying cause or condition contributing to the pain. Here are the main treatment plans for the shoulder pain include a combination of the following: Nonsteroidal anti-inflammatory drugs (NSAIDs). Injection of an anti-inflammatory medicine called corticosteroid, Physical therapy. Surgery if all other treatments do not work. Patient might have persistent pain 1-2 years after shoulder replacement surgery [7] Acupuncture has a long history of being used to treat pain. Its origins can be traced back over 2,000 years to ancient China, where it was an integral part of traditional Chinese medicine. Acupuncture is commonly used as a complementary therapy to help manage pain in various conditions and less side effective. The last systemic review and meta-analysis close to acupuncture and the effective for shoulder pain is 2023 [8], in the review Jie Zhan focus on the effective between acupuncture and rehabilitation therapy in post-stroke shoulder pain, and the result is Acupuncture is similar to RT in relieving shoulder pain, improving upper limb motor function and ADL in patients with post -stroke shoulder pain. We want to focus more verity reason of shoulder pain with effective of acupuncture, Therefore, we conducted this systematic review for more evidence of acupuncture (including electro-acupuncture) as a main treatment therapy in varies reason caused shoulder pain.

OBJECTIVES

The purpose of this study is to evaluate the outcomes of the randomized controlled trials (RCTs) regarding the therapeutic effect of acupuncture on alleviating shoulder pain, and improving functional in patient with shoulder pain through the systemic review and meta-analysis.

The detailed goals for conducting this study are as follows.

1. Based on the randomized controlled trials (RCTs) evaluating acupuncture treatment, provide an overview of current practices in acupuncture for shoulder pain patients. It also seeks to assess the validity of the statistical evidence presented in these clinical trials.
2. Conducting a meta-analysis for the effectiveness of acupuncture treatment for Shoulder pain, report the summary effective.

LITERATURE REVIEW

Shoulder pain has been reported to be the third most common musculoskeletal problem in general practice and it accounts for around 1% of all consultations. Of the consultations for musculoskeletal pain, 16% are for shoulder pain (Mitchell C et al, 2005) The cumulative incidence in the age group 45–64 was 2.4%, and a lifetime prevalence was estimated as 70% [6].

Acupuncture has been using to treat patients for thousands of years, it is a traditional medicine practice that involves inserting thin needles into specific points on the body. Even through nowadays many ways to help relieve the pain in shoulder such as injection, physical therapy, chiropractor and surgery, etc. Acupuncture still the commonly used for pain management and has been studied for its effectiveness in relieving various types of pain with less side effective. When it comes to pain management, acupuncture is believed to work by stimulating the nervous system and releasing natural pain-relieving chemicals in the body, such as endorphins. It may also help improve blood flow to the affected areas, reduce inflammation, and promote overall relaxation. Traditional acupuncture can be an option for managing shoulder pain. Because of the diversity of the pathology causing shoulder pain, including muscle strains, rotator cuff injuries, tendinitis, bursitis, arthritis, and frozen shoulder. Acupuncture may help alleviate shoulder pain by promoting pain relief, reducing inflammation, improving blood circulation, and relaxing muscle tension without side effect.

Patient who had shoulder pain without treatment from acupuncture might choose Manual therapy, physical therapy, nonsteroidal anti-inflammatory drugs, analgesic agents, platelet-rich plasma injections, and glucocorticoid injections are among the treatments available. Some of these methods have been supported by evidence of low to moderate quality for specific shoulder conditions. Which also usually effective shortly or had to do the therapy or injection repeatedly. A systematic review conducted in Neil Smith et al, 2021 presented compelling evidence supporting the efficacy of Suprascapular nerve block for providing chronic shoulder pain relief [9]. Another review focused on the injection therapy for Hemiplegic Shoulder Pain in Stroke release and demonstrated significant and rapid improvements in shoulder pain and function over both short and long periods [10]. However, none of the studies included in this review incorporated a control group and related with acupuncture treatment. Typically, patients are recommended to using injection or nerve blocks effectively between 4weeks -24 weeks, then the best effective gone, patient might need another injection or regularly took nerve blocks [10].

Acupuncture, as an ancient, fully historical practice with less side effective, less expensive and more acceptable in whole world, had been treatment in muscular and joints pain, especially shoulder pain. Also, there are diverse array of acupuncture techniques used in clinical practice, including electroacupuncture, internal heat-type acupuncture, intradermal needle embedding therapy, warm needle acupuncture, fire needle acupuncture, auricular acupuncture, abdominal acupuncture, and floating needle therapy etc. Recently most of the articles focus on manual acupuncture, electroacupuncture, auricular acupuncture and abdominal acupuncture. Acupuncture itself also combined with other

treatment to ease the pain. In their review, Jain et al. cautiously recommended combining acupuncture with physiotherapy (PT) to manage FS. They found that acupuncture effectively reduces pain, enhances range of motion (ROM), and improves overall shoulder function in FS patients. Furthermore, Jain and Sharma concluded that electroacupuncture (EA) provides beneficial short-term pain relief [11]. However, a 2005 Cochrane review by S. Green et al. on "acupuncture for shoulder pain," which included nine studies, did not find significant results in favor of acupuncture due to limited sample sizes and overall study quality [12]. The most recent systematic review and meta-analysis, specifically focused on acupuncture as a treatment modality for shoulder pain for post stroke, was published in 2023 by Jie Zhan et al [8]. The shows that in this review, acupuncture for post stroke shoulder pain is similar to rehabilitation therapy (RT)in relieving shoulder pain, improving upper limb motor function and ADL. There was no difference for shoulder pain relief between electro acupuncture (EA) and RT, conventional acupuncture (CA) and RT. Either acupuncture or RT might be the optimal treatment of post-stroke shoulder pain [8]. However, it is important to note that the level of evidence supporting these results was relatively low and this review focus on the shoulder pain narrowing from post-stroke. Also, the results compared with acupuncture verses rehabilitation only, no comparison between CA plus RT verses RT only. To strengthen the evidence, further studies of higher quality and more variety of reason for shoulder pain are necessary.

Furthermore, previous reviews have explored the effectiveness of acupuncture for shoulder pain by focusing on specific acupuncture fields or techniques. Some of the technique or special acupuncture already illegal in California but with good effective for shoulder pain. A systematic review and meta-analysis conducted by Shen, Lei et al. in 2020

suggested limited evidence indicating that bee-venom acupuncture might have a superior effect on shoulder conditions compared to other interventions [13]

However, due to the limited number of studies available, previous reviews were only able to recommend specific acupuncture fields or techniques as effective treatments for parts of shoulder pain. A systematic review and meta-analysis conducted by Ben-Arie et al. in 2020 suggested limited evidence indicating that acupuncture might have great effect on frozen shoulder conditions compared to other interventions [14]. Therefore, it is important to produce an updated review that includes more recent of studies focusing on various acupuncture fields, cause of shoulder pain and acupuncture techniques. In our upcoming review and meta-analysis, our aim is to further examine the effectiveness of various kind of acupuncture in terms of reducing pain, improving range of motion (ROM), and enhancing overall shoulder function for individuals with shoulder pain.

II. MATERIALS AND METHODS

2.1 Data base and Search methods

Search Strategy: This review follows the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement. PubMed, Google Scholar, Wan fang, CNKI databases were searched in May 2024. the “keywords” were a combination of “shoulder pain,” “acupuncture,” and “electro acupuncture.” Original papers were searched and collected from Jan 2010 until May 2024. For PubMed and google scholar, search strategy limitations were as follows: clinical trial, randomized control trial, and English language. For Wan Fang database, search strategy limitations were as follows: clinical trial, randomized control trial, and Chinese language. For search strategy limitations were as follows: clinical trial, randomized control trial, and language unlimited. Full text article accessed for eligibility.

2.2 Selection and exclusion criteria

We included RCT studies and evaluated the effects of manual or electro-acupuncture combined with routine care or rehabilitation as the experimental intervention in this review. The patients included in the review are shoulder pain patients in all
condition without any limitations of age or demographics. Any type of shoulder pain (such as rotator cuff tendinopathy, impingement syndrome, and subacromial bursitis post-stroke patients).

Interventions may include common acupuncture interventions including manual acupuncture (MA), EA. Control interventions included are PT intervention (such as

Interferential Current stimulation (IFC), transcutaneous electrical nerve stimulation (TENS), shoulder exercises), and sham acupuncture (sham needles or sham acupoints). The outcome measurement is pain reduction (critical): through visual analogue scale (VAS)score.

In this review, we excluded studies for duplication, cases in which the abstract or full text is not available, studies that include other acupuncture technique forbidden in USA (such as bee venom acupuncture, bleeding acupuncture and Acupoints injection) or dry needle, studies that include other shoulder conditions (such as traumatic, shoulder pain radiation from neck), and also studies that are not in English or Chinese.

2.3 Method

In this study, 6 RCT studies were gathered applying the inclusion and exclusion criteria stipulated above. After arranging the gathered RCT data in MS Excel form, R version 4.0.4 statistical software with the "meta" package was run for the result of meta-analysis. R language's "Dmetar" package for p curve plot, and "Robvis" package for risk of bias plot were also utilized.

2.4. Statistical Analysis.

A meta-analysis was done using the for VAS score for pain. Only studies comparing acupuncture to other interventions were included in the meta-analysis. We used the R-Studio 4.3.3 version for meta-analysis. Continuous data were shown as mean difference

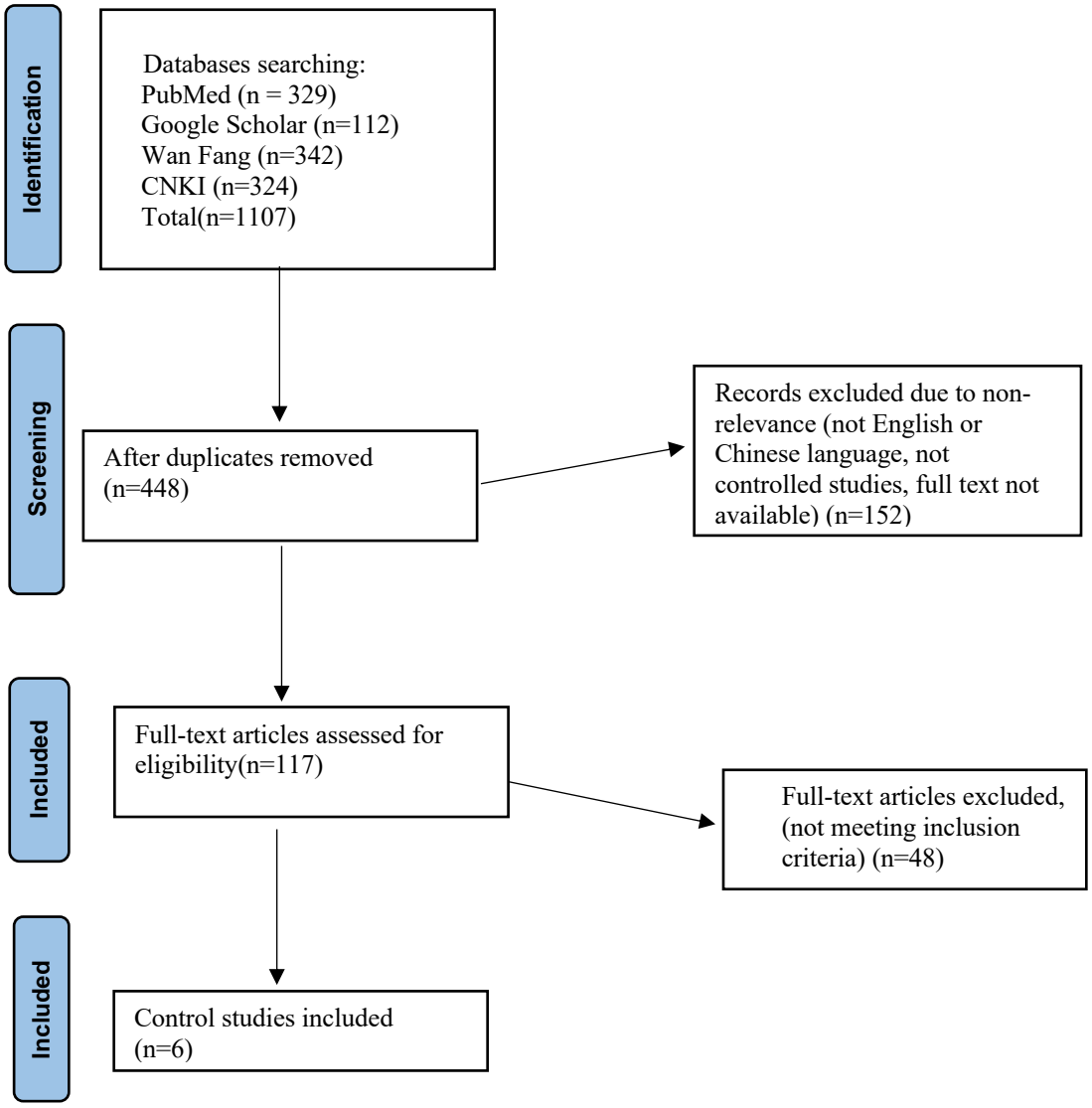

Figure 1. RCT data selected Diagram of Study Design

(MD) ± standard deviation (SD) with 95% confidence interval (CI). P value<0.01.

III. RESULTS

A total of 1107 studies were found initially in the databases. After removing duplicates (659 duplicates), reviewing abstracts, and removing nonrelevant studies such as not English or Chinese language, not controlled studies, full text not available and unrelated topic (296 were removed), 117 full-text articles were assessed for eligibility. Out of the 117 full-text articles, 69 articles were excluded due to not meeting the inclusion criteria. 6 publications were eventually included from January 2010 to May 2023 (Figure 1). A total of 496 shoulder pain patients from 6 publications were included in this review. All of the 6 studies are clinical controlled trials. studies were double-blind clinical trials.

Table 1 represents the main characteristics of the 6 included clinical trials. From shoulder pain duration, four of the six studies choose patient had chronic shoulder pain [15,17,18,20], one of the studies choose patient had shoulder pain in 6 weeks [16] and one of the studies choose patient had shoulder pain from 15days until 6 months [19]. One study compared Elec- acupuncture compared to Therapeutic exercise and ESWT [18]. Two studies compared Manuel acupuncture and sham-acupuncture [15,17], one is sham point [15], the other is non-insert [17]. Four studies compared acupuncture to therapy [16,18, 19, 20]. Two studies compared acupuncture to orthopedic therapy [16,20].

Table 1: Main findings and characteristics of studies included in the systematic review

Study	Case	Intervention	Shoulder Pain Duration	Session/Weeks	Outcome Measurement	Results
[15]	68	1) TA (n =35): LI15, LI16, SJ14, SI9, ST38, LI4 (2) Sham Acu (n = 33): sham acupoints 1 cm linear to the actual points (LI15, LI16, SJ14, SI9)	More than 3 months	4 weeks(T1) 1 session per week. Follow-up 3 months (T2) no post session	VAS, UCLA questionnaire	significant decrease in VAS and an increase in ROM between the baseline and the follow-up periods, TA groups in VAS, ROM more infective than Sham group
[16]	289	1)Chinese acu(n=154): Ashi point, LU1, LU2, LI4, LI11, LI14, LI15, SJ5, SJ13, SJ14, SI3, SI9, ST38, GB34, UB58 2)orthopedic therapy(n-135) 50 mg diclofenac daily, physical therapy/exercise	More than 6 weeks	6 weeks(T1) 15 session. Follow-up 3 months (T2) no post session	VAS, ROM	significant decrease in VAS and an increase in ROM between the baseline and the follow-up periods,
[17]	30	1) TA (n =15): LI10, LI15, LI16, LU2, LU5, SI9, SI11, SJ14, SJ15 and SP19 (2) Sham Acu(non-penetrating) (n = 15): LI16, SI9, SI11, SJ14, SJ15, BL12, BL13, BL14, BL15 and BL16	chronic shoulder pain in 1 or both shoulders for a period of 3 to 12 months	6 weeks for total 15 sessions Follow-up 4weeks no post session	NRS, ROM, SPADI, EQ-5D, PSQI, and PGIC scores	No statistically significant differences between the 2 groups for NRS, ROM, EQ-5D, SPADI, or PSQI scores.

[18]	46	1) group A (n =23): therapeutic exercises+4 electrodes on deltoid muscle (2) Elec Acu (n = 23): GB21, GB 20, SJ15, SI11, SI12, LI14, LI11, LI10, LI4, DU14, DU20	More than 1 month to 1 year	5 weeks,2 sessions per week	VAS, SPADI, and goniometry	significant improvement in pain severity, some shoulder joint free active and passive ROMs and SPADI score following treatment with EAC
[19]	50	1) control group (n =25): rehabilitation training (RT) (2) observation group (n = 25): CV12, CV10, CV6, CV4, ST24, ST26, KI17 Bo's abdominal acupuncture AB1 and AB2+RT	15days-6 months	2 weeks, 5 session per week	VAS, ROM ADL, and swelling volume	The VAS scores of the two groups at 2 weeks were significantly lower than those at baseline ($P < 0.01$). In addition, the VAS score at 2 weeks in the observation group decreased more than that in the control group
[20]	80	1) MA (n =38): SJ3, SI3, LI11, ST38, GB34, SP6, BL62 (2) control group (n = 42): conventional orthopedics therapy	Chronic	4 weeks,5 session per week	VAS, Jobe test, the Constant-Murley (CM) score, DASH, Health Survey (SF-36).	the VAS scale, differed significantly between the contralateral acu puncture and control groups

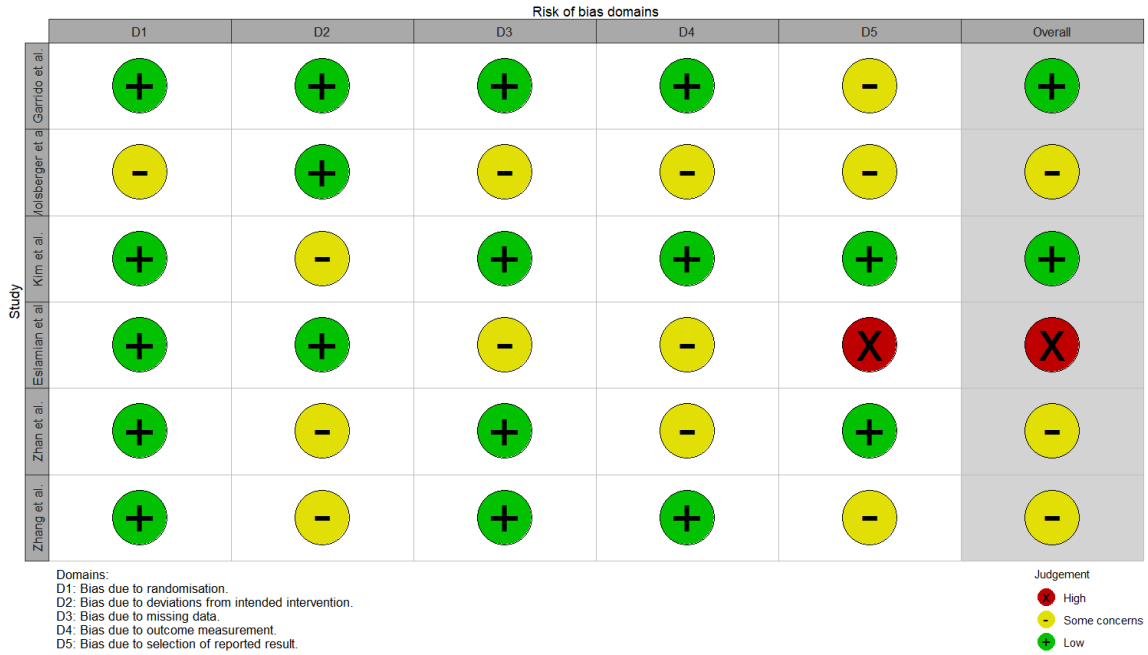

Figure 2(a) Risk of bias assessments of included studies

All of the eligible trials compared body acupuncture with other kind of rehabilitation therapy or sham acupuncture. Of all, one study applied electrical stimulation with acupuncture [18]. The most commonly used acupuncture points Five studies using LI channel and SJ channel for treatment [15,16,17,18,20].

3.1. Quality Assessment.

For quality assessment, the Cochrane Collaboration's risk of bias tool and the quality of evidence grading can be found in Figures 2(a) and 2(b). In the segment of random sequence generation, one studies were rated high risk of bias due to missing data and outcome measurement unclearly [18] and one study did not report the randomization clearly [16].

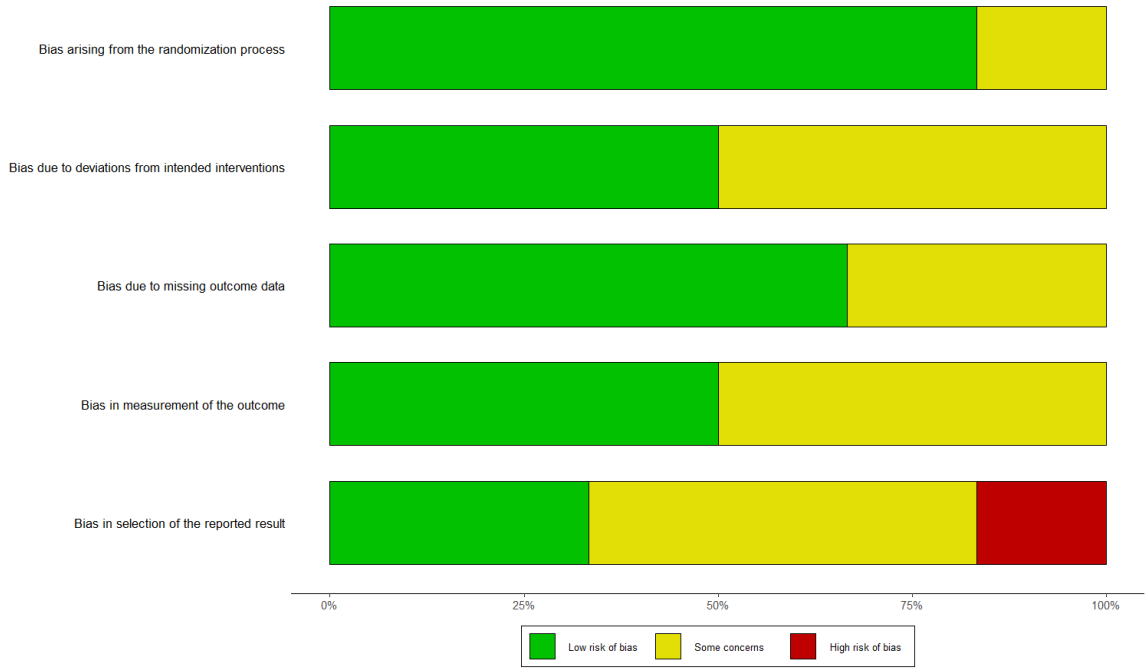

Figure 2(b) Summary bias for included studies

3.2. Pain in VAS evaluation.

One of the most common symptoms of shoulder pain is chronic or acute pain. The most popular way to measure pain is by the VAS. Figure 3 presents the statistical results of the meta-analysis. 6 RCTs (with 496 patients) were included in the study to get the summary effect for the acupuncture treatment group against control group. For the statistical heterogeneity test, calculated chi-squire test score from the 6 studies was 24.20 [X_5^2= 24.2 (p < 0.001), I^2 = 79%], and the probability of these RCTs were homogenous was less than 0.1 %. The forest plot reveals that the intervention had a significant negative impact compared to the control in the studies reviewed. However, there's a lot of

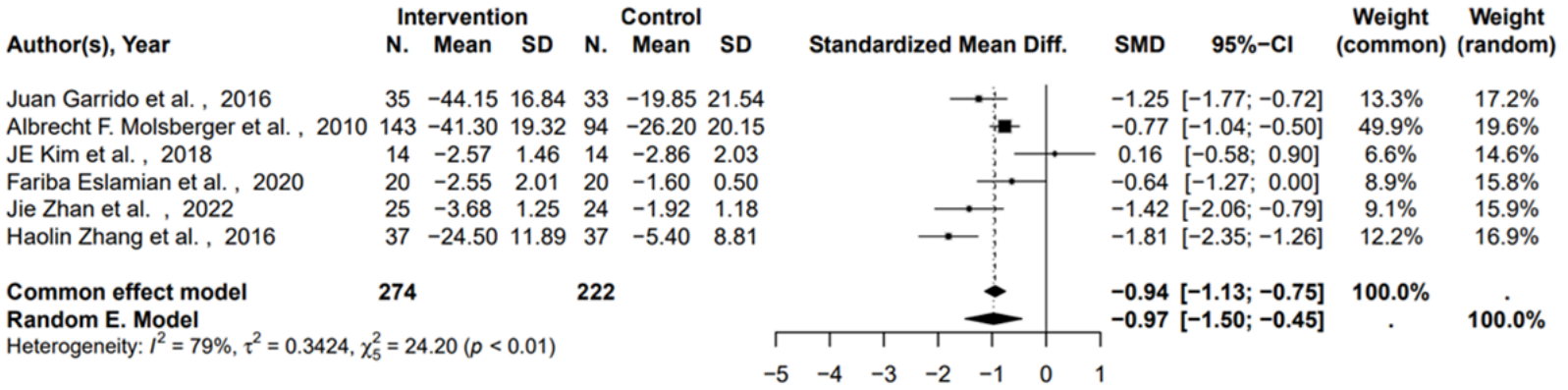

Figure 3. Forest plot with summary effect of meta-analysis

variability between these studies (I^2 = 79%), suggesting that the results are not consistent. This could be due to differences in study design and how the intervention was carried out.

3.3 Funnel plot

The provided funnel plot is a graphical tool used in meta-analyses to detect and assess potential publication bias among included studies. In Figure 4, the asymmetric shape of the funnel plot, derived from six RCT studies, suggests possible publication bias. However, it is important to note that asymmetry in the funnel plot can be caused by factors other than publication bias. One significant factor is quantitative heterogeneity, which refers to the statistical variability among study results. In this analysis, the observed heterogeneity [X^2_5= 24.2 (p < 0.001)], could also contribute to the funnel plot's asymmetry. Differences in the study designs (qualitative heterogeneity) might be a key

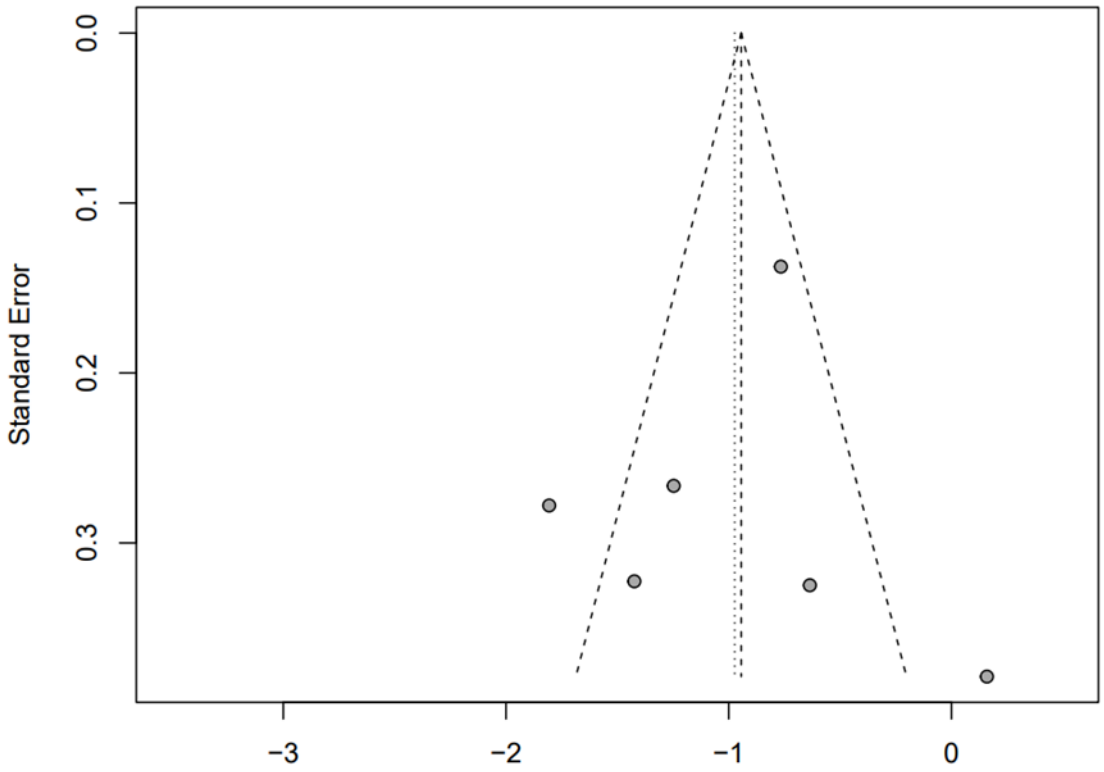

Figure 4. Funnel plot of the included RCTs

factor causing the asymmetry in the funnel plot. Furthermore, the presence of publication bias could distort the overall estimated effect size.

IV. DISCUSSION

Shoulder pain significantly impacts one's quality of life. With limited understanding of its causes and ineffective treatments, patients endure prolonged suffering, highlighting the need for further research into alternative therapies. This review and meta-analysis aim to assess the efficacy of acupuncture and electroacupuncture (EA) in alleviating shoulder pain. This review and meta-analysis include six control studies on different methods of acupuncture including MA and EA for the treatment of shoulder pain. the studies compared acupuncture versus sham acupuncture, PT, orthopedics exercises, and rehabilitation training. Results indicate that neither acupuncture nor electroacupuncture shows significant advantages over other treatments for shoulder pain. This aligns with previous findings. However, because none of these six studies mentioned the side effects of acupuncture treatment, safety considerations for acupuncture therapy can be addressed in future discussions. Additionally, not all studies in this set covered Range of Motion (ROM), so we did not design subgroups for this article.

The most common points used to treat shoulder pain in the review are Jian Yu (LI15) and Jian Zhen (SI9) (3 studies). Those points are located in key positions around the shoulder capsule, Jian Yu (LI15) is located in the anterosuperior joint capsule and in close proximity to the coracohumeral ligament, and the Jian Zhen (SI9) is located on the posterior aspect of the shoulder, 1 cun superior to the posterior axillary crease when the arm hangs in the adducted position. Those local points can improve blood circulation in the shoulder and reduce pain. The results of this systematic review and meta-analysis suggest that both EA and MA in local and distal acupoints can activate the acupoint

therapeutic ability and generate this beneficial effect. In Jie Zhan et al 2022, manual acupuncture on abdominal area also had significant difference between the two groups (abdominal manual acupuncture plus RT VS RT only) ($P < 0.001$). The combination of acupuncture with RT proves superior to RT alone in enhancing shoulder pain, swelling, and activities of daily living (ADL) in post-stroke shoulder pain patients [19].

In this meta-analysis, we found that the intervention had a statistically significant negative effect compared to the control across the included studies. However, the substantial heterogeneity observed ($I^2 = 79\%$) suggests that the results varied considerably between studies.MA and EA can be successful treatments for shoulder pain in regard to pain reduction in five RCT papers. One of six RCT paper shows there almost no difference between acupuncture with other group, which involve with sham-acupuncture with non-penetrating, could we consider that penetrating the skin is a necessary condition for the effectiveness of acupuncture treatment? Compared to placebo acupuncture, which uses non-acupoint locations and still shows therapeutic effects, this hypothesis could be proposed. However, more comprehensive data are required to explore this possibility fully.

This analysis has several limitations. The wide variety in the included studies affects the generalizability of the findings, as differences in study design, populations, and interventions make it challenging to apply the results broadly. Moreover, there's a potential for publication bias, where studies with significant results are more likely to be published, which could have exaggerated the overall effect size, suggesting that acupuncture is more effective than it might be. Finally, the analysis includes only six studies, which might not reflect the full range of the intervention's effects, thus affecting

the robustness and representativeness of the conclusions.

V. CONCLUSION

In this systematic review and a meta-analysis indicates that acupuncture or electroacupuncture, compared to routine rehabilitation or other therapies, did not demonstrate improvement in clinical outcomes (measured by pain on the Visual Analog Scale) for individuals with shoulder pain. However, the evidence was evaluated as 'low' primarily due to methodological limitations and heterogeneity among the included studies; only 2 out of 6 articles had low risk of bias. Consequently, our confidence in recommending acupuncture for this condition in clinical practice is limited. Given the limited number of included studies and methodological constraints within these studies, there is a need for more large-scale, high-quality randomized controlled trials (RCTs) to establish a robust conclusion. Future research endeavors should focus on comparing acupuncture with other treatment modalities as well as sham acupuncture to further elucidate its efficacy in range of motion improves, safety and potential benefits.

REFERENCES

1. Spindler, K. P., Dovan, T. T., & McCarty, E. C. (2001). Assessment and management of the painful shoulder. *Clinical Cornerstone*, 3(5), 26-34.

2. Bayam, L., Arumilli, R., Horsley, I., Bayam, F., Herrington, L., & Funk, L. (2017). Testing shoulder pain mapping. Pain Medicine, 18(7), 1382–1393.

3. Andrews J. R. (2005). Diagnosis and treatment of chronic painful shoulder: review of nonsurgical interventions. Arthroscopy: the journal of arthroscopic & related surgery: official publication of the Arthroscopy Association of North America and the International Arthroscopy Association, 21(3), 333–347.

4. Bayam, L., Ahmad, M. A., Naqui, S. Z., Chouhan, A., & Funk, L. (2011). Pain mapping for common shoulder disorders. American journal of orthopedics (Belle Mead, N.J.), 40(7), 353–358.

5. de Winter, A. F., Jans, M. P., Scholten, R. J. P. M., Deville, W., van Schaardenburg, D., & Bouter, L. M. (1999). Diagnostic classification of shoulder disorders: Interobserver agreement and determinants of disagreement. Annals of the Rheumatic Diseases, 58, 272–277.

6. Mitchell, C., Adebajo, A., Hay, E., & Carr, A. (2005). Shoulder pain: Diagnosis and management in primary care. BMJ, 331(7525), 1124.

7. Bjørnholdt, K. T., Brandsborg, B., Søballe, K., & Nikolajsen, L. (2015). Persistent pain is common 1-2 years after shoulder replacement. Acta orthopaedica, 86(1), 71–77.

8. Zhan, J., Luo, Y., Mao, W., Zhu, L., Xu, F., Wang, Y., Chen, H., & Zhan, L. (2023). Efficacy of acupuncture versus rehabilitation therapy on post-stroke shoulder pain: A systematic review and meta-analysis of randomized controlled trials. Medicine, 102(29), e34266.

9. Smith, N., Liew, Z., Johnson, S., Ellard, D. R., Underwood, M., & Kearney, R. (2021). A systematic review of the methods and drugs used for performing suprascapular nerve block injections for the non-surgical management of chronic shoulder pain. British Journal of Pain, 15(4), 460–473.

10. Chiu, Y. H., Chang, K. V., Wu, W. T., Hsu, P. C., & Özçakar, L. (2021). Comparative Effectiveness of Injection Therapies for Hemiplegic Shoulder Pain in Stroke: A Systematic Review and Network Meta-Analysis. Pharmaceuticals (Basel, Switzerland), 14(8), 788.

11. Jain, T. K., & Sharma, N. K. (2014). The effectiveness of physiotherapeutic interventions in the treatment of frozen shoulder/adhesive capsulitis: A systematic review. Journal of Back and Musculoskeletal Rehabilitation, 27(3), 247–273.

12. Green, S., Buchbinder, R., & Hetrick, S. (2005). Acupuncture for shoulder pain. The Cochrane database of systematic reviews, (2), CD005319.

13. Shen, L., Lee, J. H., Joo, J. C., Park, S. J., & Song, Y. S. (2020). Bee Venom Acupuncture for Shoulder Pain: A Systematic Review and Meta-analysis of Randomized Controlled Trials. Journal of pharmacopuncture, 23(2), 44–53.

14. Ben-Arie, E., Kao, P. Y., Lee, Y. C., Ho, W. C., Chou, L. W., & Liu, H. P. (2020). The Effectiveness of Acupuncture in the Treatment of Frozen Shoulder: A Systematic Review and Meta-Analysis. Evidence-based complementary and

alternative medicine: eCAM, 2020, 9790470.

15. Rueda Garrido, J. C., Vas, J., & Lopez, D. R. (2016). Acupuncture treatment of shoulder impingement syndrome: A randomized controlled trial. Complementary Therapies in Medicine, 25, 92–97.

16. Molsberger, A. F., Schneider, T., Gotthardt, H., & Drabik, A. (2010). German Randomized Acupuncture Trial for chronic shoulder pain (GRASP) - a pragmatic, controlled, patient-blinded, multi-centre trial in an outpatient care environment. Pain, 151(1), 146–154.

17. Kim, J. E., Kim, S. P., Kim, A. R., Park, H. J., Kwon, O., Jung, S. Y., Cho, J. H., Kim, J. H., & Choi, S. M. (2018). Acupuncture treatment of adhesive capsulitis of the shoulder: A randomized controlled pilot trial. Journal of Acupuncture Research, 35, 120–128.

18. Eslamian, F., Farhoudi, M., Jahanjoo, F., Sadeghi-Hokmabadi, E., & Darabi, P. (2020). Electrical interferential current stimulation versus electrical acupuncture in management of hemiplegic shoulder pain and disability following ischemic stroke-a randomized clinical trial. Archives of physiotherapy, 10, 2.

19. Zhan, J., Ai, Y., Zhan, L., Pan, R., Wang, Y., Dong, C., Wang, Q., Chen, H., Lu, L., & Li, M. (2022). Effect of abdominal acupuncture combined with routine rehabilitation training on shoulder-hand syndrome after stroke: A randomized controlled trial. Integrative Medicine Research, 11(2), 100805.

20. Zhang, H., Sun, J., Wang, C., et al. (2016). Randomised controlled trial of contralateral manual acupuncture for the relief of chronic shoulder pain. Acupuncture in Medicine, 34(3), 164–170

21. Lee, S. H., & Lim, S. M. (2016). Acupuncture for Poststroke Shoulder Pain: A Systematic Review and Meta-Analysis. Evidence-based complementary and alternative medicine: eCAM, 2016, 3549878.

22. Wilson, C. (2021). Shoulder pain diagram. Shoulder Pain Explained. Retrieved from https://www.shoulder-pain-explained.com/shoulder-pain-diagram.html

23. Paley, C. A., & Johnson, M. I. (2019). Acupuncture for the Relief of Chronic Pain: A Synthesis of Systematic Reviews. Medicina (Kaunas, Lithuania), 56(1), 6.