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Massage/Tuina for Periarthritis of Shoulder: A Systematic Review and Meta-Analysis

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ABSTRACT

Background: Arthritis around the shoulder is more likely to occur in people around the age of 50, so it is commonly known as "fifty shoulders" or "frozen shoulders". The main symptom of shoulder periarthritis is pain around the shoulder joint, sometimes radiating to the upper arm. The pain is obvious at night, and the movement of the shoulder joint is limited, leading to contracture and adhesion of limited movement. Traditional Chinese medicine believes that physical weakness may be a factor in the occurrence of shoulder periarthritis, and many patients use massage (MS) to alleviate the symptoms of shoulder periarthritis.

Objective: To evaluate the effectiveness of MS in the treatment of shoulder periarthritis.

Methods: We searched 10 English and Chinese databases for randomized controlled trials (RCTs) of MS in the treatment of shoulder periarthritis. The PEDro scale was used to evaluate the methodological quality of randomized controlled trials. A meta-analysis of MS for shoulder periarthritis was Performed.

Results: The meta-analysis included fourteen high-quality studies. The results showed superior effects of MS on pain reduction (N=760; SMD, 1.21; 95% CI, 0.88 to - 1.54; P<0.00001, and shoulder Internal rotation (N=532; SMD, 8.11; 95% CI, 2.14 to - 14.08; P=0.008. But the meta-analyses did not show significant immediate effects of MS on shoulder abduction (N=171; SMD, -0.78; 95% CI, −2.23 to 0.68; P=0.30) and shoulder flexion (N=279; SMD, 0.34; 95% CI, −0.14 to 0.81; P=0.16.

Conclusion: MS may be effective in relieving shoulder pain and improving internal rotation in patients with periarthritis of shoulder, but it may not improve shoulder abduction and flexion. More high-quality and longer-term research is needed to prove the reliability of the evidence.

Introduction

Pain and limited mobility are the main symptoms of shoulder periarthritis, which is more likely to occur in people around the age of 50, so it is commonly known as "fifty shoulders", also known as "frozen shoulders"[1,2]. The symptoms of shoulder Periarthritis are sometimes radiating to the upper arm, obvious pain at night, limited shoulder joint movement, affecting face washing, back hand, combing hair and dressing, etc., then resulting in contractures with limited mobility [3] and adhesion [4], especially when abduction, lifting, and dorsal extension, and even the shoulder joint is incapacitated. Traditional Chinese medicine believes that physical weakness may be a factor in the occurrence of scapulohumeral periarthritis. Patients with scapulohumeral periarthritis may feel cold air entering the shoulder, and some patients may feel the cold air being expelled from the shoulder joint, hence it is also known as "shoulder leakage wind". According to the survey, the incidence of shoulder periarthritis ranges from 16% to 26% [5]. In Western countries, many employees take sick leave due

to shoulder periarthritis [6]. In the United States, the cost of this disease is approximately $7 billion, while in France, shoulder pain and shoulder periarthritis account for 26% of employees [7]. In China, the incidence rate of periarthritis of shoulder is 45% [8].

Due to shoulder joint pain, limited mobility, and difficulty in movement, it affects people's daily activities and work. Generalized periarthritis of the shoulder is a sterile specific inflammatory reaction caused by long-term chronic injury or degeneration of the joint capsule around the shoulder joint and surrounding tendons, muscles, ligaments and other soft tissues [9,10]. There are various forms of conservative treatment for scapulohumeral periarthritis, such as non-steroidal anti-inflammatory drugs, corticosteroids, and other physical therapies. Massage/Tuina is a technique used by doctors to press, roll, knead, and push a certain part of their hands or limbs onto a patient's relevant area to produce biochemical effects and improve certain clinical symptoms. Studies have shown that Tuina can reduce levels of inflammatory factors such as interleukins (IL-6 and IL-1) in the dorsal root ganglion (DRG) and blood β, Tumor Necrosis Factor-α (TNF-α)[11]. Tuina can enhance the function of the immune system, activate qi and blood, dredge meridians, and improve qi and blood flow. Traditional Chinese medicine Tuina has been widely recognized and applied in China and many other countries around the world and has made certain contributions to human health.

Methods

Search Strategy

We searched the literature from the beginning to August 2023 based on the following databases and keywords: pubMed, web of science, the Cochrane Library, Embase, EBASE, the China National Knowledge Infrastructure (CNKI), ICTRP, Wan-fang Data (WANFANG), and Chinese Biomedical Literature Database (CBM), Chinese Science and Technology Periodical Database (VIP). The search strategy based on the guidance of the Cochrane Manual provided. The main search terms were shoulder periarthritis, stiff shoulder, shoulder pain, frozen shoulder, shoulder cupsulitis, Shoulder osteodystrophy, Shoulder osteoarthritis, Chinese Tuina, Tuina, massge therapy, massage, Chinese massage, Chinese manipulative therapy, Manipulation, Chinese manipulation, and all possible spellings of Periarthritis of shoulder and massage. This meta-analysis is mainly based on the protocol (Tuina for periarthritis of shoulder- A systematic review protocol) [8]. The registration number is (CRD42019147445) registered in PROSPERO international prospective register of systematic review.

Study Selection

Randomized controlled clinical trials (RCTs) and quasi-randomized controlled clinical trials (quasi-RCTs) were included, comparison of massage with/without additional treatment with placebo or without treatment or sham treatment or the same form of additional treatment. Rejected designs of animal experiments, case reports, retrospective studies, etc. All patients were diagnosed with periarthritis of the shoulder regardless of sex, race, age, duration, or severity of the disease. Studies comparing surgical procedures, or two different types of MS were excluded. MS as the only experimental study. Other similar MS interventions, such as manipulation, massage, Traditional Chinese Tuina and so on. Trials evaluating massage in combination with other therapies are also included. The study also included multiple control interventions: drug therapy, physical therapy, and behavioral therapy. It also included acupuncture, placebo, and no treatment.

Data Abstraction

Data was extracted by reviewers independently from each study. Extracted data included lead author, year of publication, study site, intervention, duration of intervention, baseline participant Characteristics, randomization method, sample size and distribution concealment, blinding method, follow-up, adverse events, dropping out and exit, outcome measures. If there are other problems in the study, we consult an expert to resolve it. We resolve disagreements by consulting experts and reviewing original documents.

Methodological Quality Assessment

The researchers assessed the methodological quality of the randomized controlled trial independently on the Pedro Scale, which is based on the Delphi list. The scale consisted of 11 items:

1. Prescribed study eligibility criteria.
2. Concealment of allocation.
3. Randomization of subjects.
4. Measurement of similarity between groups at baseline.
5. Therapist blinding.
6. Subjects blinding.
7. Assessors blinding.
8. Intention-to-treat analysis.
9. Less than 15% dropout.
10. Point measurements and variability data.
11. Statistical comparisons between groups. The criterion (2)-(11) was used to calculate the Pedro score. Each criterion was rated 1 or 0. 0 is for not meeting the criteria, 1 is for meeting the criteria. The better the quality of methodology, the higher the score summary. The Pedro Scale, with a cut point of 6, is used to indicate high-quality research, and disagreements are resolved by consulting experts.

Data Synthesis and Analysis

In the study, differences between the experimental and control groups were assessed using mean changes between baseline and end-of-intervention outcomes. Standardized mean difference (SMD) assessment was used based on the results of different scales (e.g., Vas

0-10 and Vas 0-100). SMD and 95% confidence interval (CI) were calculated in the study analysis. For the literature on multiple control groups, the researchers analyzed only MS and the first control group. If there is one test result before and after treatment in the multi-period study, select the control group in the next period of treatment to be included in the study, using a random-effects model to ensure more accurate heterogeneity, the weights were adjusted and the variation factors between studies were used. The statistical heterogeneity assesses used I 2. If I 2 was above 75% heterogeneity was determined high. Meta-analysis was performed using Review Manager 5.3.

Results

Study Selection

We identified 10928 studies from 10 English and Chinese databases and get 3 studies from additional records identified through other sources. The total is 10931 abstracts. After records screened, we get 2227 abstracts, After initially screening 201 potentially relevant abstracts. We excluded 2026 because they did not meet the inclusion criteria (Not RCTs (n= 719), Not for MS(n= 624) . Other (e.g., duplicates, unable to obtain relevant data) (n=683). Because not RCT or RCT but exclude because: improper Intervention(n=187). We retrieved and reviewed 14 full articles [11-24]. 14 RCTs were eligible, including 10 English articles and 4 Chinese. The study selection process is summarized in Figure 1.

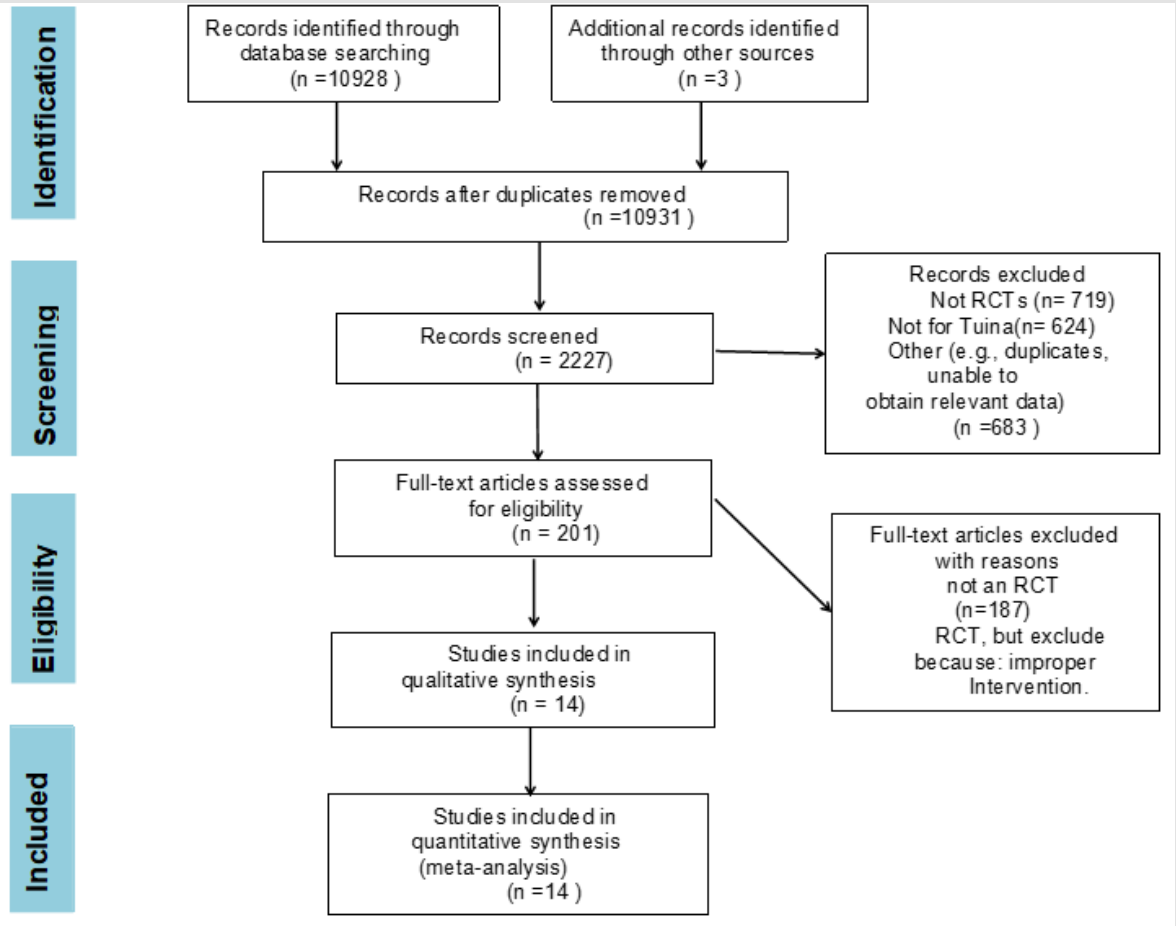

Figure 1: Flow chart of literature screening.

Study Characteristics

Fourteen eligible studies included 922 subjects, which, respectively, were conducted in US, Turkey, California US, Australia, Thailand, Hong China, Taiwan China, Spain, Netherlands and China between 1997 and 2023. The disease's duration ranged from 3 months to 5.8 years. The study duration lasted from 1 day to 30 weeks. The follow up time ranged from 3 day to 12 weeks.MS in the studies included spinal manual thai massage, soft tissue massage, manipulative therapy, massage, Tuina, manual therapy. The control therapies contained rehabilitation, intermediate frequency electrotherapy, acupuncture, waiting list, physiotherapy, thoracic sham, physical therapy, standard care, exercise, light Hand Touch, scapular mobilization, Sham-manipulation. The studies characteristics are shown in Table 1.

Table 1: Randomized controlled trials evaluating the effect of MS for periarthritis of shoulder.

First authors year country	pain duration	Sample size Age range	Duration weeks	Follow-up weeks	Main outcome assessment	Experimental group	Control group	VAS	Flexion (FL) Adduction (AD)	Internal rotation
Wang JM, China [12]	3 months	57 54.04	3	4 and 12	Pain VAS (0-10)	Tuina (TA) (30min/18sessions)	Intermediate Frequency electrotherapy (IFE) (30min/18sessions)	TA (2.61) > IFE (1.43)		
Li N, China [13]	NR	120 61.5	6	6	numeric pain rating scale (NPRS)	Massage+ Acupuncture+(MS+AC) (35min/30session)	Rehabilitation (RH)(40min/30session)	MS+AC (4.6)<RH(2.8)		
Vinuesa-Montoya, Spain [14]	12 months	40 NR	5	NR	Pain VAS (0-10) Flexion adduction Internal rotation	MP+ Exercise(EX)(30min/15sessions)	Exercise(EX) (30min/15sessions)	MP+EX (0.92)> EX (0.97)	FL MP+EX (13.49) < EX(11.21) AD MP+EX(6)<EX (9.63)	MP+EX (9.91) < EX (5.86)
Van den Dolder, Australia [15]	28 weeks	29 64	2	NR	Pain VAS (0-10) Flexion adduction	Soft tissue massage (STM) (15–20 min/6 sessions)	Waiting list (WL)	STM (26.60) > WL (0.10)	FL STM (15.1) > WL (-7.46) AD STM (33.4) > WL (-8.9)	
Naranjo-Cinto F, spain [16]	3 months	45 34.22	4	NR	Pain VAS (0-10) Flexion adduction Internal rotation	Real Manual Therapy (RMT) (1session)	Thoracic sharm(TS) (1session)	RMT (1.98)>TS (2.04)	FL RMT (8.73) <TS (1) AD RMT(7.13)<TS (6.67)	RMT (7.87) (T S (1.06)
Buttagat , Thailand [17]	39 months	20 25	3	2	Pain VAS (0–10)	Traditional Thai massage (TTM) (30 min/9 sessions)	Physical therapy (PT) (30 min/9 sessions)	TTM (4.50) > PT (1.60)		
Mok, Hong Kong China [18]	NR	102 73	1	3 days	Pain VAS (0–100)	Slow-stroke back massage (SBM) (10 min/7 sessions)	Standard care (SC)	SBM (14.60) > SC (7.61)		
Liu M, China [19]	NR	164 55	30	NR	Pain VAS (0-10) ROM score	Massage+Acupuncture+(MS+AC) (35min/30session)	AC (35min/30session)	MS+AC(1)< AC (4)		
Bergman, Netherlands [20]	NR	150 48.3	6	12	Pain VAS (0-10)	Manipulative therapy (MT)	usual medical care (UMC)	12w MT(12.1)>UMC (14.2)		
Winters JC, Netherland [21]	NR	58 49.3	1	NR	Pain VAS (0-100)	Manipulation (MP) (1session)	Physiotherapy (PH) (1session)	MP (4.9) <PH(2.4)		

Dys-on-Hudson TA, us [22]	5.8 years	18 45	5	5	Pain WUS-PI ROM	MS (45 min/10 sessions)	AC (20–30 min/10 sessions)	MS (28.80) > AC (26.70)	FL MS (2.7) (AC (5.0) AD MS (1.40) > AC (5.7)	
Duzgun I, Turkey [23]	3 months	54 51.5	1 day	NR	Flexion adduction Internal rotation	manual posterior capsule stretching (MPCS)(1session)	scapular mobilization (SM) (1session)		FL MPCS (3.5) <SM (7.4) AD IMPCS(7.5)<SM (6)	MPCS (3.6) <SM (-2.1)
Michener, California US [24]	NR	56 31.7	1 day	NR	Flexion Internal rotation	spinal manipulative therapy(SMT) (6min/6sessions)	Sham-manipulation (SHM) (6min/6session)		FL MP (1.07)> SHM (0.36)	MP (6.49)>SHM (2.23)
Yang, et al. , Taiwan China [25]	NR	52 NR	4	NR	Flexion Internal rotation	MA (21min/ 8sessions)	light hand touch (LHT) (10min/8sessions)		FL MA (7.2) >LHT (-0.9)	MPCS (23)>LHT (6.2)

Note: VAS: Visual Analog Scale; NPRS; Numeric Pain Rating Scale; MS: Massage, AC: Acupuncture; SBM: Slow-Stroke Back; SC: Standard Care; TA: Tuina; P: Manipulation; RMT: Real Manual Therapy; EX: Exercise; MPCS: Manual Posterior Capsule Stretching; RH: Physiotherapy; MPCS: Manual Posterior Capsule Stretching; TS: Thoracic; LHT: Light Hand Touch; IFE: Intermediate Frequency Electrotherapy; MT: Manipulativetherapy; UMC: Usual Medical Care; TTM: Traditional Thai massage; PT: Physiotherapy; SMT: Spinal Manipulative Therapy, Waiting List; SM: Scapular Mobilization; SHM: Sham-Manipulation; FL: Flexion; AD: Adduction

Methodological Quality

In this study, we used a score range of 0 to 10, with 10 being the highest score. Since all the included studies had a cut-off value greater than or equal to the pre-specified6, all the included studies were of high quality. However, seven of these articles had a cut-off value of just 6. The main defect was the blindness of the subjects and therapists (92.87% of the studies). But patient blinding was difficult, and therapists were unlikely to use blinding, which was not a disadvantage, and only 5 studies (35.71% of studies) using blinding assessors. All of the included studies used randomization methods, and only four of them used allocation concealment. Intention-to-treat analyses were included in the study. High methodological quality was included in studies such as dropout rates of less than 15%, between-group comparisons, measurement of baseline between-group similarity, variability data, and point measurements. A systematic literature review on clause-based quality assessment, quality tools for measuring risk of bias and evidence is presented in Table 2.

Table 2: PEDro scale of quality for included trials.

Study	Eligibility criteria	Concealed allocation	Random allocation	Similar at baseline	Therapists blinded	Subjects blinded	Assessors blinded	Intention-to-treat analysis	<15% dropout	Point measures and variability data	Between-group comparisons	Total
Wang JM, [12]	1	0	1	1	0	0	1	1	1	1	1	7
Li N, [13]	1	1	1	1	0	0	0	1	1	1	1	7
Vinuesa-Montoya, [14]	1	0	1	1	0	0	0	1	1	1	1	6
Van den Dolder, [15]	1	1	1	1	0	0	1	1	1	1	1	8
Naranjo-Cinto F,[16]	1	0	1	1	0	0	0	1	1	1	1	6
Buttagat, [17]	1	1	1	1	0	0	1	1	1	1	1	8
Mok, [18]	1	0	1	1	0	1	0	1	0	1	1	6
Liu M, [19]	1	0	1	1	0	0	0	1	1	1	1	6

Bergman, [20]	1	0	1	1	0	0	0	1	1	1	1	6
Winters JC, [21]	1	0	1	1	1	0	0	1	1	1	1	7
Dys-on-Hud-son,[22]	1	1	1	1	0	0	1	1	1	1	1	8
Duzgun I, [23]	1	0	1	1	0	0	1	1	1	1	1	7
Michen-er, [24]	1	0	1	1	0	0	0	1	1	1	1	6
Yang, et al, [25]	1	0	1	1	0	0	0	1	1	1	1	6

Note: 0= not meet the criteria; 1 = meet the criteria

Quality Assessment

For quality assessment, the quality and risk of bias tools for Cochrane Collaboration evidence grading are shown in Figures 2(a) & 2(b). In terms of randomization sequence generation, all of the studies have description of randomization [12-25]. To the terms of concealment of allocation, the group allocation of patients in four studies was concealed [13,15,17,22]. For participant blinding, none of the studies used participant blinding. Only five studies have used assessors for blind [12,15,17,22,23]. All studies have reported the outcome data. In terms of selective reporting, some studies were rated as at uncertain risk of bias due to the public publication of no study protocols before publication. Five studies reported the limitations, [12,14,16,23,25] and one study reported the believability [24]. Some studies were rated as unclear due to the unobjectivity of potential bias tools and measurement tools, which may be other sources of bias. Because masseuse blindness is extremely difficult, MS research is at an initial disadvantage in terms of risk and evidence of quality bias. For study evidence quality, seven studies with a very low initial score 6 [14,16,18,19,20,24,25], only three studies had a very high initial score 8 [15,17,22], four studies had a middle initial score 7 [12,13,21,23].

Effects of Massage on Pain: Eleven studies tested the effectiveness of massage for shoulder pain, compared with Rehabilitation, intermediate frequency electrotherapy, waiting list, standard care, acupuncture, physiotherapy, usual medical care, thoracic Sham, exercise, or physical therapy. The meta-analysis showed superior effects of massage on pain reduction. (N=760; SMD, 1.21; 95% CI, 0.88 to -1.54; P<0.00001; heterogeneity: X2 =164.57, P<0.00001, I2 = 94% (Figure 3).

Effects of on Abduction and Flexion Massage: Five studies tested the effectiveness of MS for shoulder abduction compared with acupuncture, exercise, scapular mobilization, light hand touch and waiting list. The meta-analyses did not show significant effects of MS on shoulder abduction (N=171; SMD, -0.78; 95% CI,-2.23 to 0.68; P=0.30), heterogeneity: X2 = 56.62,P<0.00001, I2 = 93%). Seven studies tested the effectiveness of MS for shoulder flexion compared with acupuncture, thoracic sham, exercise, sham-manipulation, scapular mobilization, light hand touch and waiting list. The meta-analyses did not show significant effects of MS on shoulder flexion (N=279; SMD, 0.34; 95% CI, -0.14 to 0.81; P=0.16; heterogeneity: X2 = 5, P=0.001, I2 = 73%) (Figure 4).

Effects of Massage on Internal Rotation: Five studies tested the effectiveness of MS for shoulder Internal rotation compared with thoracic sham, exercise, scapular mobilization, light hand touch and sham-manipulation. The meta-analyses showed significant effects of MS on shoulder Internal rotation (N=232; SMD, 8.11; 95% CI, 2.14 to 14.08; P=0.008; heterogeneity: X2 = 10.57, P=0.03, I2 = 75%) (Figure 5).

Adverse Events

All studies have not reported serious adverse events.

Evidence Strength

Compared with control intervention, evidence suggests that MS has a better effect on scapulohumeral periarthritis.

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Figure 2: Risk of bias from included studies.

(a) Risk of bias summary. Review authors' judgments about each risk of bias item for each included study.

(b) Risk of bias graph. Review authors' judgments about each risk of bias item presented as percentages across all included studies.

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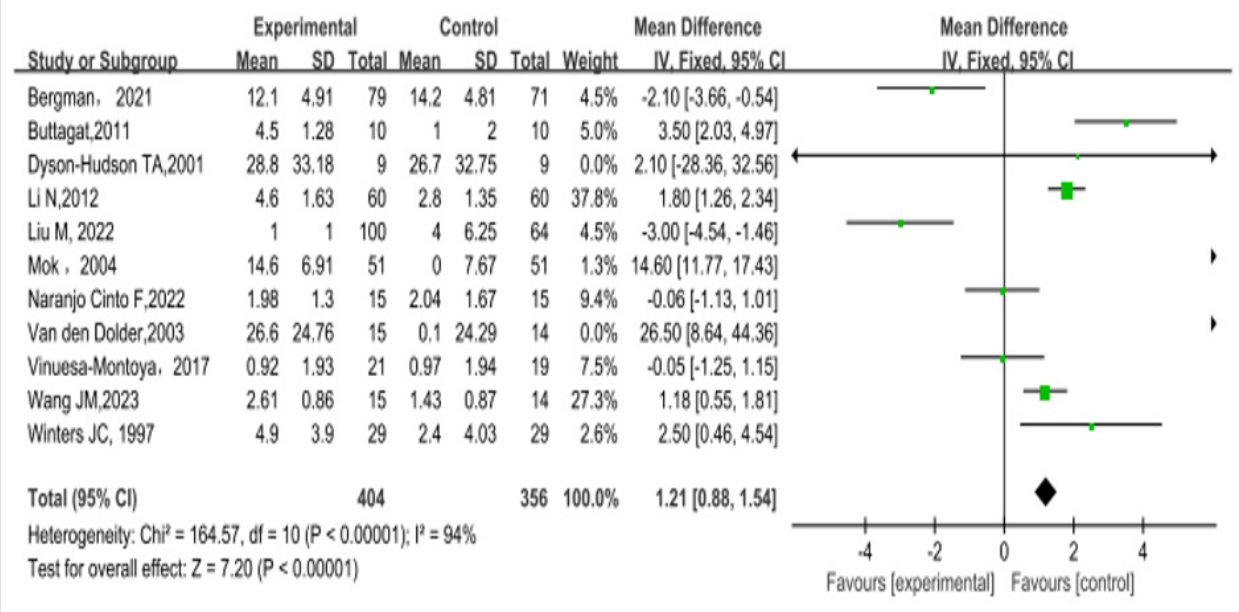

Figure 3: Forest plot of the effect of MS for shoulder pain.

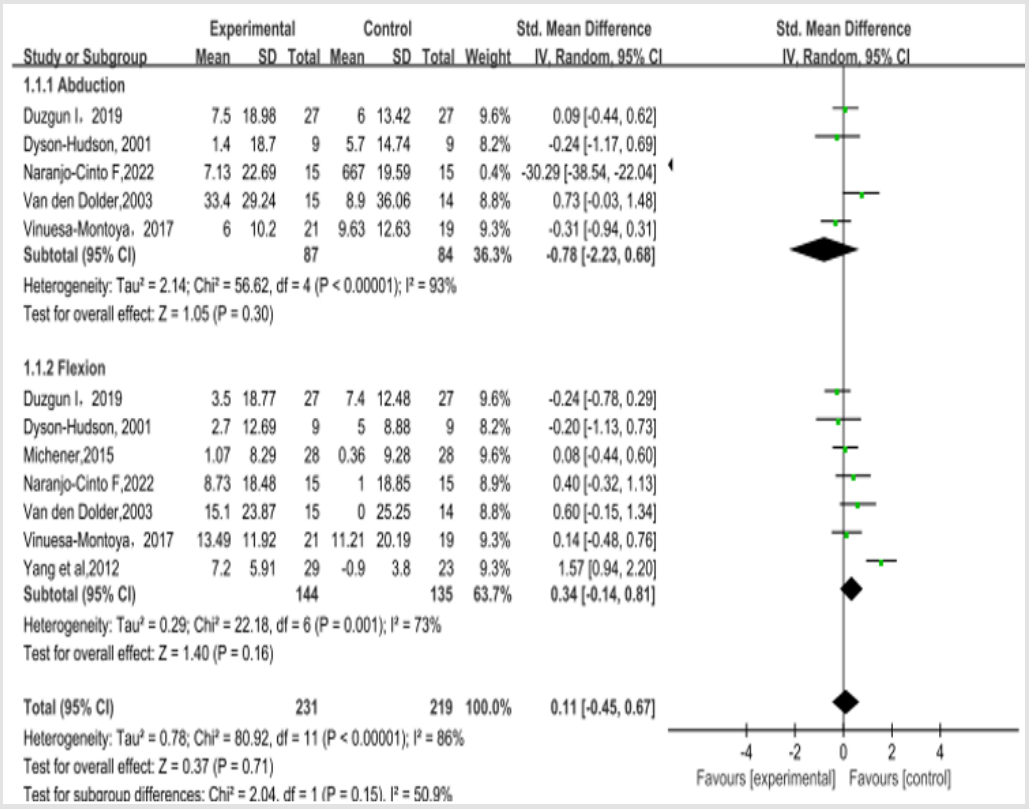

Figure 4: Forest plot of the effect of MS for shoulder Adduction and Flexion.

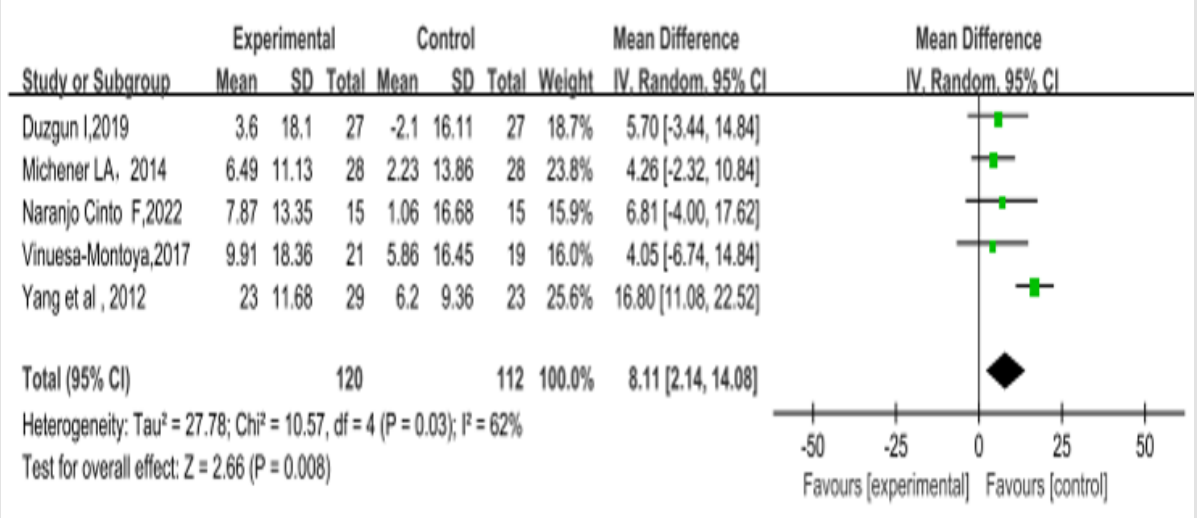

Figure 5: Forest plot of the effect of MS for shoulder Internal rotation.

Discussion

Shoulder pain is one source of distress. This disease has brought physical and psychological burdens to many people in all countries and brought great suffering. It has aroused more and more concern all over the world [26,27]. MS therapy is widely used in physical therapy for the treatment of shoulder pain [28,29]. Chinese massage has a long history as an effective natural therapy without side effects [30]. It has been recommended for the treatment of pain [31]. The molecular biology of the limitation of shoulder joint movement is mainly studied from the perspective of fibrosis process and pathological inflammation. Molecular biology research has proven that inflammatory fibrosis is a fundamental pathological change in freezing, and its factors may be immune responses, micro injuries, degenerative changes, and other inflammatory mediators, causing adhesion, pain, and edema, resulting in a decrease in shoulder joint mobility, further leading to thickening and fibrosis of the shoulder joint. Our research results are different from those of Kong LJ's research which indicate that Massage therapy may be more beneficial than non-active therapy in treating neck and shoulder pain, but Massage therapy is not different from other active therapies. In terms of follow-up effects, the research results only found that massage has a short-term therapeutic effect on shoulder pain [32]. Due to the inconsistent follow-up time of each RCT included in the study, no statistical study was conducted on the follow-up period in this study.

Effects of MS on Pain

The studies measure the pain with numeric pain rating scale, VAS (0-10), VAS (0-100). One of the studies found MS can relieve shoulder pain quickly and has a better therapeutic effect than medium frequency electrotherapy [12]. A study with Standardized acupuncture-massage therapy found that post treatment evaluation and 12 week follow-up both improved pain of shoulder compared to the rehabilitation group [13]. Vinuesa-Montoya Sclinicals trial showed that neck and chest manipulation therapy combined with exercise and exercise therapy can improve pain intensity more than individual home exercises [14]. The study showed soft tissue massage can effectively improve the pain of patients with shoulder pain, but the mechanism is still unclear [15]. A study used manual therapy, sham therapy, chest sham therapy, and therapeutic exercise in each group. The detection indicators include pain intensity, shoulder joint range, and disability, after treatment, follow up for 4 weeks and measure the results at 12 weeks. All groups reported improvement in indicators. However, there were no differences between groups in these indicators [16]. The adjusted post-test means values of each assessment time point for pain intensity was significantly lower in the traditional Thai massage group than those of the physical therapy group [17].

Research suggests that slow stroke back massage is effective in reducing shoulder pain in elderly stroke patients. It can provide an opportunity for home caregivers and nurses to provide comprehensive and personalized care [18]. The effectiveness of the massage acupuncture group was significantly higher than that of the acupuncture group [19]. Compared with usual medical care, manual treatment accelerates the recovery of detection indicator. After 26 weeks of randomized treatment, there was a difference in the improvement of shoulder pain between the two groups in terms of min complaints [20]. In a study that included pain indicators, it was found that manipulation is more suitable for treating shoulder girdle disease, manipulation seems to be the preferred treatment method. Corticosteroid injection is more suitable for synovial diseases [21]. Trager and acupuncture can reduce chronic shoulder pain in patients with spinal cord injury, the treatment effect of Trager is better than that

of acupuncture [22]. The 11 RCT articles included on the treatment of shoulder periarthritis pain with MS were compared with different control groups using different MS methods, and different conclusions were obtained. Based on the comprehensive analysis of all treatment results, it was found that the effectiveness of MS for shoulder pain score showed significant effects compared with the control therapies.

Effects of MS on Abduction, Flexion and Internal Rotation

The results showed that there were no differences between MS and other control therapies about shoulder adduction or flexion. A study found soft tissue massage group Compared with Waiting for treatment group, the abduction and flexion range of motion in the treatment group were significantly improved [15]. The addition of massage therapy to the therapeutic exercise program did not increase the efficacy in patients with nonspecific shoulder pain [16]. A clinical trial found that cervicothoracic manipulative plus mobilization and exercise treatment was more effective than home exercise alone in terms of range of motion such as adduction, flexion [14]. A study about manual posterior capsule interventions and Scapular mobilization for frozen shoulder showed the range of motion of scapular joint were significantly increased, but the internal rotation of shoulder joint was not increased, and there was no significant difference between the two groups [23]. Study about spinal manual therapy and sham spinal manual therapy showed no significant changes in shoulder flexion [24]. The long-term effect of massage on shoulder periarthritis is poor [25].MS therapy has been applied in China and many countries around the world for its unique efficacy and treatment methods. As a conventional external treatment for various diseases, its mechanism of action is similar to acupuncture therapy. By manually stimulating meridians and acupoints, using unique techniques such as MS and movement for external stimulation, the penetration of force and active passive movement can be achieved, which can release adhesion, control pain, increase pain threshold, and enable patients with scapulohumeral periarthritis to recover as soon as possible and resume functional activities [33].

Limitations and Problems

In this meta-analysis, the evidence strength was relatively low. Some studies have failed to provide detailed randomization, allocation, and measurement methods. There is an unknown bias in this study, and most studies have not published research protocols. Some papers were unable to contact the original authors, and in 14 randomized controlled trials, no further research was conducted on the follow-up period in the study due to inconsistent follow-up times in the research papers. The measurement tool for shoulder periarthritis has certain subjective factors. We recommend using reliable tools to measure shoulder joint function. In addition, due to the lack of large samples, multicenter randomized controlled trials, and limited data collection, for example, some documents are still in the hands of the original authors or the private sector and may not be published in electronic databases, this article may have some limitations and issues.

Conclusion

This meta-analysis indicates that MS can effectively alleviate the pain of shoulder periarthritis and improve certain functional activities. However, due to the insufficient number of articles included in this study and methodological limitations, more high-quality randomized controlled trials are needed for further validation. Future research still needs to improve evaluation tools and hide assignments to reduce bias. This study is based on all objective data currently available and should provide some guidance for future research.

Data Availability

When all data is publicly available, this manual is a review of published research.

Conflicts of Interest

The authors declare no conflicts of interest.

Authors' Contributions

J-Z and Y-X (Ying Xu) designed the project.

J-A and H-Y. W drafted the manuscript based on the opinions of all authors and conducted a meta-analysis.

Q-D. T collected included research data and conducted quality evaluations.

Y-X (Yong Xiang) provided guidance and supervision. All authors have read, commented on, and approved the final manuscript.

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