



Review Article

Effectiveness of massage therapy on the range of motion of the shoulder: a systematic review and meta-analysis

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Abstract. [Purpose] This study was conducted to identify and analyze the degree of effect of massage therapy on the range of motion of the shoulder. [Subjects and Methods] The database search was conducted using PubMed, CINAHL, Embase, PsycINFO, RISS, NDSL, NANET, DBpia, and KoreaMed. The meta-analysis was based on 7 studies, covered a total of 237 participants, and used a random-effects model. [Results] The effect size estimate showed that massage therapy significantly improved the shoulder range of motion, especially the flexion (SMD: 18.21, 95% CI 1.57–34.85) and abduction (SMD: 22.07, 95% CI 5.84–38.30). [Conclusion] The review findings suggest that massage therapy is effective in improving the shoulder flexion and abduction.

Key words: Massage, Shoulder, Range of motion

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INTRODUCTION

The reduced range of motion (ROM) of the shoulder is a common and disabling problem for patients with shoulder pain¹⁾. Shoulder pain and reduced ROM do not improve over time and are persistent or repeated in many cases²⁾. Therefore, it is important to provide appropriate interventions in the early stage. Massage therapy is one of the complementary and alternative intervention for improving the functional status for patients who had impaired shoulder function in physical therapy clinics³⁾. It relieves the muscle hardness by applying mechanical pressure on the affected area using the hands, and improves the ROM of the joints⁴⁾. In addition, it improves the excitability of the nerves in the muscle fiber and inhibits muscle pain⁵⁾. Massage therapy is also known to improve edema by promoting blood circulation within the muscle, and helps remove fatigue substances⁶⁾.

Massage therapy is frequently used as a method of improving the shoulder ROM, but there have not been many studies that comprehensively investigated its effect on the shoulder ROM. Only Van den Dolder et al.⁷⁾ conducted a meta-analysis of the effect of soft-tissue massage and exercise on the shoulder ROM. The aim of this study, therefore, was to conduct a systematic review and meta-analysis assessing the effectiveness of massage for the shoulder ROM.

SUBJECTS AND METHODS

According to the data inclusion criteria based on the PICOS (participants, interventions, comparisons, outcomes, and study design) format, a systematic literature review description format, the participants (P) in this study consisted of adults aged 18 years or older with shoulder pain. The intervention (I) was massage therapy given alone or in combination with another treatment. The comparisons (C) included the control groups that did not receive any intervention or that received placebo or another intervention. The outcomes (O) were studies that measured the Shoulder flexion, extension, abduction,

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internal rotation, and external rotation using a standardized instrument. The study design (S) was a randomized controlled or non-randomized controlled trial. The languages that were used were limited to English and Korean. The exclusion criteria for data analysis were studies including participants diagnosed with infection, neoplasm, fracture, instability, dislocation, hemiplegia, or postoperative or perioperative shoulder pain, and studies in which the mean and standard deviation could not be calculated.

In the data search, the studies that had been published until June 2016 were targeted, without imposing any limit on the publication year. The databases that were used for the search were Pubmed, CINAHL, Embase, PsycINFO, RISS, NDSL, NANET, DBpia, and KoreaMed. The keywords that were used for the search were “shoulder,” “flexion,” “extension,” “abduction,” “internal rotation,” “external rotation,” “range of motion,” “functional status,” “muscular function massage,” “therapeutic touch,” “reflexotherapy,” “reflexion,” “manual,” “manipulative,” “clinical trial,” “random,” and “placebo.” The available data were extracted and coded according to the information on the author, publication year, study design, participants, intervention contents, and outcomes measured. The risk of bias was assessed using the GRACE (grades of recommendation, assessment, development, and evaluation) system recommended by the Cochrane Back Review Group, where a higher score means a lower risk of bias⁸).

For the selected papers, the effect size and homogeneity of the studies were analyzed using the RevMan 5.3 program of the Cochrane Library. The effect size was presented using the mean difference and the 5% significance level. The homogeneity of the studies was assessed using Higgins’s I^2 . If homogeneity was ensured, the effect size was calculated with the fixed-effect model, whereas if homogeneity was not ensured, the effect size was calculated with the random-effect model.

RESULTS

The first literature search yielded a total of 925 papers, and of these, the 471 duplicate papers that had been obtained in more than two different databases were removed, leaving 454 papers. After that, the titles and abstracts of the papers were checked. Consequently, of the 454 selected papers, the 377 papers that did not meet the inclusion criteria were excluded, and 77 papers thus remained. Lastly, based on the review of the full texts of the 77 remaining papers, 7 papers finally met the inclusion criteria based on the PICOS for meta-analysis (Fig. 1). The total number of study participants was 237 (experimental group: 120; control group: 117), and the risk-of-bias scores ranged from 5–11 points out of 12 points ($M \pm SD$, 8.4 ± 2.14) (Table 1). The quantitative duration of massage ranged from 10–45 minutes ($M \pm SD$, 27.5 ± 13.61) (Table 1). The effect size for flexion was 18.21 (95% CI 1.57–34.85) (Fig. 2), that for extension was 6.29 (95% CI –2.23–14.82), that for abduction was 22.07 (95% CI 5.84–38.30) (Fig. 3), that for internal rotation was 10.10 (95% CI –10.29, 30.48), and that for external rotation was 9.54 (95% CI –2.78, 21.85).

DISCUSSION

Even though massage therapy is the commonly used treatment program for improving the shoulder ROM in the clinic, little is known about its efficacy. This study performed a systematic literature review with a meta-analysis of seven studies with a total of 237 participants to determine the effect of massage therapy on the shoulder ROM.

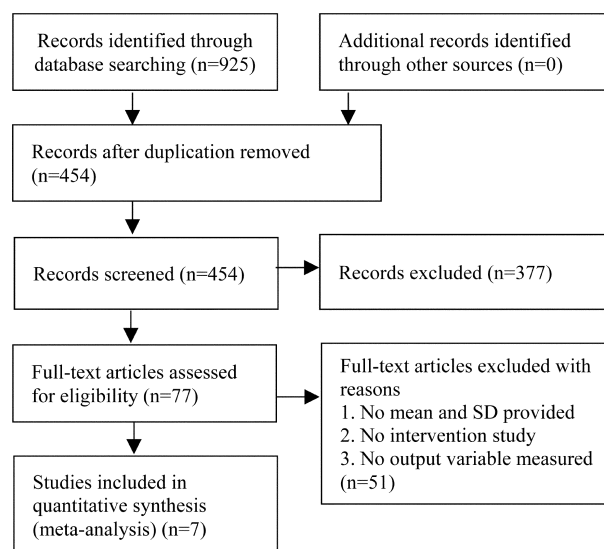


Fig. 1. Flow diagram of the study selection

Table 1. Characteristics of included studies

First author and year	Study design	Participants			Interventions				Comparisons	Outcomes/Method	Total risk-of-bias score
		Total N (eN/cN)	Mean of age	% of female	Type	Location	N. of session/Min.	Follow-up			
Choi 2004	NRCT	58 (30,28)	75.2	74.1	Kyongrak massage	Cervical spine	5/10	-	No treatment	Flexion, abduction, external rotation/ Goniometry	5
Dyson-Hudson 2001	RCT	18 (9,9)	45.1	22.2	Manual pressure release	Shoulder, upper extremities	10/45	5 wk	Acupuncture	Flexion, abduction/ Goniometry	9
Kim 2016	RCT	6 (3,3)	50.0	0.0	Sports massage, hot pack	Neck, shoulder, back	36/20	-	Hot pack	Flexion, extension, abduction, internal rotation, external rotation/ Goniometry	7
Park 2016	NRCT	30 (15,15)	49.6	100.0	Sports massage	Shoulder	12/30	-	No treatment	Flexion, extension, abduction, internal rotation, external rotation/ Goniometry	7
Son 2013	NRCT	16 (8,8)	56.5	NR	Sports massage, physical therapy	Shoulder	36/40	-	Physical therapy	Flexion, extension, abduction, internal rotation, external rotation/ Goniometry	6
van den Dolder 2003	RCT	29 (15,14)	64.0	31.0	Soft tissue massage	Shoulder	6/15-20	-	No treatment	Flexion, abduction/ Photography	10
van den Dolder 2015	RCT	80 (40,40)	62.6	52.5	Soft tissue massage, exercise	Shoulder, back	7/10-15	12 wk	Exercise	Flexion, abduction/ Photography	11

RCT: randomized controlled trials; NRCT: non- randomized controlled trials; NR: not reported; eN: experimental number; cN: control number; Exercise: an individualized shoulder exercise program

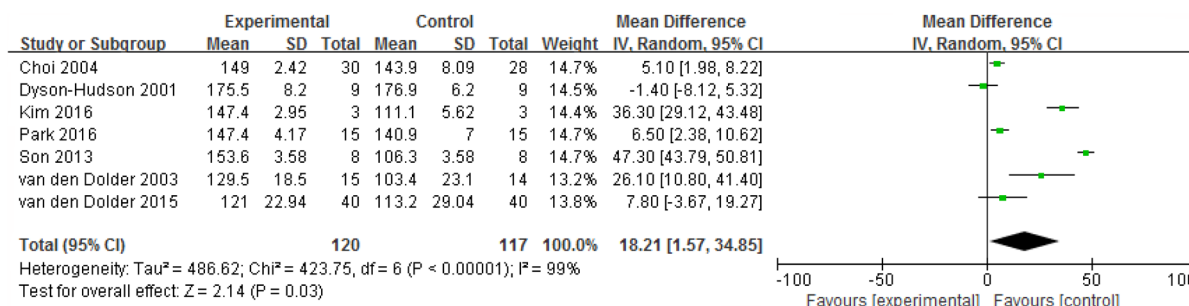


Fig. 2. Forest plot of effect size of massage therapy for flexion

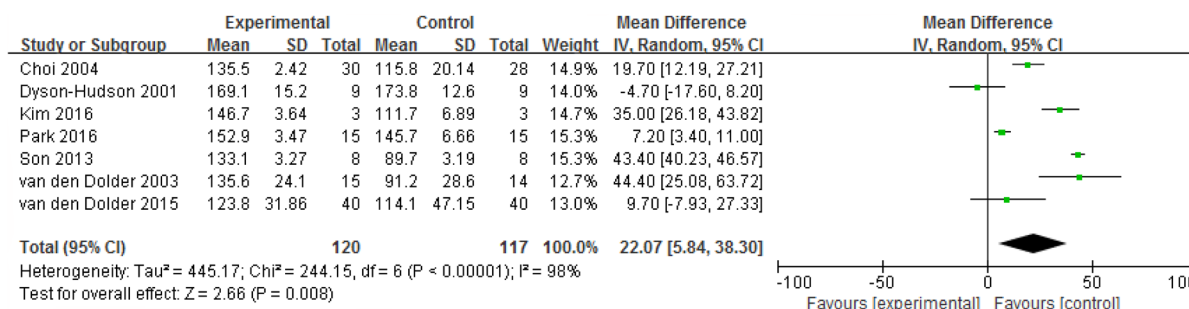


Fig. 3. Forest plot of effect size of massage therapy for abduction

The study results suggested that there is evidence of the efficacy of massage therapy for improving the shoulder ROM, especially flexion and abduction. The effect sizes for flexion and abduction were large and robust. When the massage therapy group was compared with the no-treatment group in the subgroup analysis, the massage therapy group showed a larger effect size in increasing the flexion and abduction of the shoulder joint, but it showed no statistically significant difference in this regard from the acupuncture, hot pack, or physical therapy group. This study result is similar to those of previous studies. Van den Dolder et al.⁷⁾, who conducted a meta-analysis of 4 papers, found that soft-tissue massage had low-quality evidence in moderately improving the flexion and abduction ROM compared to no treatment, but it showed no statistically significant difference in this regard from the other intervention groups.

Sports massage showed the largest significant effect in all the outcome variables. It includes techniques like effleurage, petrissage, and friction⁹⁾. Effleurage is rubbing the skin lightly from the distal site to the proximal site using the extremities. It reduces edema and promotes muscle relaxation by facilitating the flow of the lymph nodes. Petrissage is performed for the purpose of increasing the movability of the muscle, by twisting the area between the muscle and the skin after holding the soft tissue. Friction is pressing the skin soft tissue deeply using a thumb, by putting it on the bone or on the fascia of the muscle¹⁰⁾. These techniques smoothen scar tissue and loosens the deep adhesion in the tendons, ligaments, joint capsules, etc¹⁰⁾. Of seven studies examining the effectiveness of massage therapy, two measured the effectiveness of soft-tissue massage^{11, 12)}. Soft-tissue massage stimulates the trigger points, which are hyperirritable spots in skeletal muscle and are characterized by pain appearing at muscle contraction. The typical trigger points around the shoulder include the rotator cuff, latissimus dorsi, teres major, deltoids, and pectoral muscles¹³⁾. Soft-tissue massage has also been reported to reduce shoulder pain¹⁴⁾.

In three out of seven papers, the mean age of the participants was 60 years or older. Physiological aging of the musculo-skeletal system and joints is one of the important factors of shoulder pain and causes lowered physical activity and exercise ability as well as chronic pain¹⁵⁾. In particular, shoulder pain and shoulder ROM limitation causes independent competence disability, including in dressing or hygiene management, which elderly people must conduct by themselves in their everyday lives. Elderly people's inability to manage themselves without the help of another person causes their shrinkage and depression, and may have a significant impact on their quality of life¹⁶⁾. Therefore, it is thought that massage therapy that increases the shoulder ROM can improve the quality of life of elderly people.

This study provided insight into the current stage of massage therapy on the shoulder ROM, and is a first step in the development of evidence-based intervention recommendations. Nevertheless, this study had several limitations. First, as there have not been many randomized controlled trials (RCT), the quality of the studies that were included in the analysis was not high. Later, if more papers that conducted RCT are collected, meta-analysis will need to be performed. Second, the homogeneity of the papers that were included in the analysis was low, and the papers that were included in the analysis were not many; thus, subgroup analysis for the intervention moderators could not be performed. In the future, the basis of massage therapy that is more effective in improving the shoulder ROM needs to be suggested by conducting an analysis of the intervention moderators.

ACKNOWLEDGEMENT

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