



# The Effect of Cupping Therapy on Non-specific Neck Pain: A Systematic Review and Meta-Analysis

Mohammad Azizkhani,<sup>1</sup> Fereshteh Ghorat,<sup>2</sup> Sayed Mohammad Ali Soroushzadeh,<sup>1</sup> Mehrdad Karimi,<sup>1,\*</sup> and Saeed Yekaninejad<sup>3,\*</sup>

<sup>1</sup>Department of Iranian Traditional Medicine, School of Traditional Medicine, Tehran University of Medical Sciences, Tehran, IR Iran

<sup>2</sup>Traditional and Complementary Medicine Research Center, Sabzevar University of Medical Sciences, Sabzevar, IR Iran

<sup>3</sup>Department of Biostatistics, School of Public Health, Tehran University of Medical Sciences, Tehran, IR Iran

\*Corresponding author: Mehrdad Karimi, Department of Iranian Traditional Medicine, School of Traditional Medicine, Tehran University of Medical Sciences, Tehran, IR Iran. E-mail: mehdadkarimi@yahoo.com

\*Corresponding author: Saeed Yekaninejad, Department of Biostatistics, School of Public Health, Tehran University of Medical Sciences, Tehran, IR Iran. E-mail: yekaninejad@yahoo.com

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## Abstract

**Context:** Neck pain is a prevalent complaint. Several clinical trial studies were conducted to evaluate the effects of cupping therapy on neck pain. The objective of this study was to assess the evidence for the effectiveness of cupping therapy as an intervention to conservative management of neck pain.

**Evidence Acquisition:** We performed a systematic search in PubMed, Ovid, MEDLINE, CINAHL, EMBASE, Cochrane Library, a web of science, and Iranian medical databases through March 2017 without time restrictions. All clinical trials were done on non-specific neck pain, where at least one of the therapies assessed pertains to cupping therapy, were included in the study. Outcomes were pain intensity (e.g., Visual Analogue Scale, VAS), disability (e.g., Neck Disability Index, NDI), quality of life on the SP36 questionnaire, and other outcomes due to neck pain. A meta-analysis was performed to assess the effectiveness of cupping in managing neck pain.

**Results:** Meta-analysis of five trials revealed significant differences in pain relief in favor of cupping therapy compared with the control group (VAS 100 cm, MD, -0.84 (-1.22, -0.46),  $I^2 = 54.7\%$ ). Furthermore, a meta-analysis of six studies revealed that cupping therapy was clinically superior to the control group in patients with neck pain (SMD = -0.60 (-0.86, -0.35),  $I^2 = 16.4\%$ ). Assessment of quality of life using the SP36 questionnaire showed that cupping therapy increased the quality of life in patients with neck pain compared with the control group (SMD = -0.56 (-0.20, -0.92),  $I^2 = 51.4\%$ ).

**Conclusions:** This study provides some evidence that cupping therapy may improve treatment of patients with neck pain.

**Keywords:** Complementary Therapies, Cupping, Medicine, Meta-Analysis, Neck Pain, Traditional

## 1. Context

Neck pain is a very common symptom and a major public health problem in all countries (1). Neck pain has been reported as prevalent in up to 50% of the general population (2, 3). This condition is associated with significant disability in daily activities and substantial work absenteeism (4). Neck pain can be induced by specific pathological disorders including infection, fracture, and degenerative processes. Despite this, a majority of patients suffer from non-specific neck pain. Although the pathogenesis of non-specific neck pain is not completely identified, some factors have been suggested to influence the development of it, such as a high physical load, poor posture, stress, and changes in connective tissues or muscles (5). Therapeutic options for simple neck pain are a combination of physi-

cal therapy, activity modification and rest, as well as anti-inflammatory and pain-relieving medications. These treatments demonstrate different efficacies as well as success rates, and in some cases, these typical treatments are ineffective (6-8).

Cupping therapy is a complementary therapeutic method for chronic pain conditions (9, 10). Cupping therapy is an old method of medical treatment with documented use relating to several cultures as well as Iranian traditional medicine (11). In medicine of Eastern countries, cupping has been employed to treat pain and many other complaints, especially the pain of musculoskeletal disorders (12). It is hypothesized that inducing a negative pressure attracts blood to the area of pain, thereby removing blood stasis and increasing blood and lymph circulation

locally to relieve tension and pain of the muscle (13).

Recently, interest in cupping therapy has increased. Many clinical trials (14-17) and various systematic reviews (18, 19) have demonstrated the efficacy of cupping in management of painful conditions. Moreover, several RCT have reported improvement of neck pain with cupping therapy including severity of pain, ability to move, and quality of life (14, 20-24). However, given the variety of studies, it is difficult to conclude on the consistency of the efficacy and the direction of causality. In addition, to the best of the authors' knowledge, there is no systematic review study that evaluates specifically the effectiveness of cupping therapy for the treatment of chronic non-specific neck pain. The purpose of the present study was to (i) systematically review all of the clinical trials published regarding cupping therapy for neck pain and (ii) to carry out a meta-analysis to evaluate whether the evidence supports the effectiveness of cupping as a conservative treatment for neck pain conditions.

## 2. Methods

### 2.1. Search Strategy

Electronic literature searches were carried out in Medline, Ovid, EMBASE, CINAHL, web of science, the Cochrane Library, and four Iranian medical databases (ISC, SID, Magiran, Iranmedex), through March 2017, without restrictions of time. The search was limited to human studies published in the English or Persian language. The Mesh and text words used in the English databases were based on two concepts, "cupping" and "neck pain." Due to the variation of subject headings between the databases, combinations of these text words were used. The Persian terms for neck pain and cupping therapy were used in the Iranian databases. Full text of all papers were obtained and read in full. The reference lists of all articles were also searched.

### 2.2. Study Selection Criteria

Any clinical trial study that meets the following PICO criteria (Population, Intervention, Comparison, Outcome) was included: P: the participants included were women and men with neck pain of any duration, without age limitation; I: cupping therapy; C: a comparison was accomplished between cupping therapy (dry or wet cupping) and other or no treatment; O: The pain intensity was assessed in one of the outcomes of study; the principal summary measures should be commonly used, such as pain intensity (e.g., Visual Analogue Scale, VAS; Numerical Rating Scale, NRS) or disability (e.g., Neck Disability Index, NDI) or other outcomes due to neck pain. The paper was published in

the English or Persian included in the study. Articles of neck pain related to specific pathology such as trauma, fibromyalgia, tumor, infection, or fracture of a vertebral neck were excluded. Primary outcomes included pain intensity (e.g., Visual Analogue Scale, VAS; Numerical Rating Scale, NRS). The secondary outcomes were the disability (e.g., Neck Disability Index, NDI) and quality of life on the SP36 questionnaire.

### 2.3. Data Extraction and Quality Assessment

Articles were selected by two authors (Ghorat and Soroushzadeh) based on the selection criteria of the study. The two reviewers studied the articles independently so that each reviewer was blinded with respect to the other review. Kappa measure of agreement was calculated and was 0.92 for our reviewer. Data was collected by a standard, valid, and reliable checklist (14). Quality assessment of selected articles was assessed according to the criteria from the Cochrane handbook for systematic reviews of intervention (25).

### 2.4. Data Analysis

Meta-analysis was performed based on the standardized mean difference (SMD) for each outcome variable. In addition, SMD, with 95% confidence interval, was reported for each study. Statistical heterogeneity between studies was determined by Cochran's Q test and Higgins I square. Heterogeneity was defined as  $P < 0.1$  or  $I^2 > 50\%$ . In the absence of statistically significant heterogeneity, a fixed effects model is used to combine the data. Otherwise, a random effects model is applied. For all analyses, a two-sided P value less than 0.05 was considered statistically significant. All analysis was performed with Stata Statistical Software, version 13 (StataCorp., College Station, Tx).

## 3. Results

### 3.1. Studies Description

In total, 436 papers were identified through database searches, and the titles and abstracts were screened. The full text of 37 articles was evaluated based on the eligibility criteria. A total of 27 studies were excluded, as they did not have sufficient data for inclusion. Of these, ten randomized trials were included in the systematic review and meta-analysis (23, 26-34). The search strategy and method of study selection are defined in Figure 1. All included clinical trials were in English. All studies adopted a two-armed parallel group design. Changes of VAS as the primary outcome of the study were reported in five trials (26, 28-30,

32). Six trials calculated the change in the Neck disability index (NDI) (23, 26, 28, 30-32). Five trials used the SF36 questionnaire to assess the quality of life (26, 28, 30-32). Also, a number of studies assessed other outcomes such as the numeric rating scale (NRS) for pain intensity (23, 28), mechanical-detection thresholds and vibration-detection thresholds (28), as well as body image (34). The main characteristics of the eligible studies are summarized in Table 1.

### 3.2. Study Characteristics

Ten articles involving 441 participants ranging from 20 to 57 years of age were included in this study. The majority of patients were females with chronic non-specific neck pain. Interventions included dry cupping (27, 28, 30, 33, 34), traditional cupping (26), massage cupping (29), and pulsating cupping (32). Two trials employed both dry and wet cupping in the intervention group (23, 31). Characteristics of clinical trials included the study summarized in Table 1.

Five RCT (n = 272) compared dry cupping with a wait list group or control group in nonspecific neck pain (26, 28, 31-33), and one study (n = 50) compared it with a standard medical care group (30). One RCT (n = 40) compared cupping with heating pad application (23). Another RCT compared dry cupping with muscle relaxation in patients with non-specific neck pain (n = 40) (29). In nine trials, the duration of treatment ranged from two to three in 13 weeks. The duration of one study was two years (31). One RCT assessed the effects of dry cupping on body image in patients with chronic neck pain (n = 6) and reported that the patients experienced distortions in apparent body image, which traditional cupping therapy appeared to improve (34). Another RCT assessed local metabolism and pain threshold after cupping therapy in patients with neck pain and in healthy subjects (n = 12). In this study, a microdialysis system was implanted subcutaneously above the trapezius muscle and lactate, pyruvate, glucose, glycerin, as well as pain thresholds were measured with algometry before and after cupping. This study reported that cupping creates lasting anaerobe metabolism in the subcutaneous tissue and also in some pain areas increases pressure pain thresholds (27). The strength of trials and evidence of study is presented in Figure 2 based on the Cochrane Collaboration's tool. Some of the trials did not achieve adequate information regarding if the blinding of the care provider was inapplicable.

### 3.3. Primary Outcome

Five trials (282 subjects) compared cupping therapy with the control group for neck pain intensity on the VAS

scale (0 - 100 mm) (26, 28, 30-32). The result of the meta-analysis revealed significant differences in pain relief in favor of cupping therapy compared with the control group (VAS 100 cm, MD, -0.84 (-1.22, -0.46),  $I^2 = 54.7%$ ) (Figure 3 and Table 2).

Two trials were found to have assessed cupping for neck pain intensity using the NRS scale (0 - 10 mm) (28, 32). One of them (28) (n = 50) compared cupping with a control group. Both of these studies showed that cupping therapy was clinically superior to the control group (95% CI -2.5 to -0.4;  $P < 0.05$ ). Another study (n = 48) compared cupping with standard medical care (33). The intervention group revealed significant superiority in the reduction of pain (MD, 1.72)-2.74, -0.70 ( $P = 0.0009$ ) (Table 1). One trial (27) (n = 12) studied the effects of cupping therapy on pain thresholds in neck pain patients and healthy subjects. This study reported that cupping increased the immediate pressure pain thresholds of some areas 280 minutes after cupping (Table 1).

Another study (33) (n = 40) assessed dry moving cupping therapy on neck pain in office workers. In this study, the pain intensity score decreased a statistically significant amount between the pre- and post-test times ( $t = 10.14$ ,  $P = 0.002$ ), however, the control group experienced no significant change ( $t = 0.326$ ,  $P = 0.748$ ) (Table 1).

### 3.4. Secondary Outcomes

Six trials (301 subjects) assessed the neck disability index (NDI) associated with neck pain (23, 26, 28, 30-32). The result of the meta-analysis of studies revealed that cupping therapy was clinically superior to the control group in patients with neck pain (SMD = -0.60 (-0.86, -0.35),  $I^2 = 16.4%$ ) (Figure 4 and Table 3). Five studies (261 subjects) assessed the quality of life in patients with neck pain using the SP36 questionnaire (26, 28, 30-32). The result of the meta-analysis for all of them showed that cupping therapy increased the quality of life in patients with neck pain compared with the control group (SMD = -0.56 (-0.20, -0.92),  $I^2 = 51.4%$ ) (Figure 5 and Tables 4 and 5).

## 4. Discussion

In this systematic review and meta-analysis study, published evidence from 13 RCTs that surveyed the effects of cupping therapy on neck pain, disability, and quality of life was evaluated. The main finding of this review showed that cupping therapy significantly reduced the pain intensity score and significantly improved NDI and SP36 compared with the control group. All studies detected evidence of positive effects compared with baseline measurements. None of the clinical trials reported serious side effects.

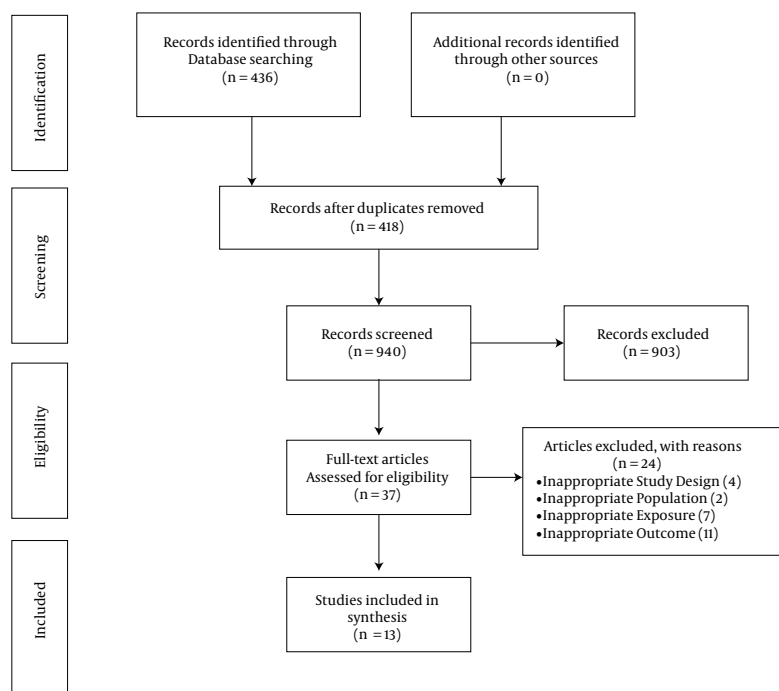


Figure 1. Study Flow Diagram

Table 2. Meta-Analysis of Cupping Therapy Versus Control Group for Neck Pain in Pain Intensity on the VAS<sup>a,b,c,d</sup>

Study	SMD	[95% Conf. Interval]		% Weight
Lauche et al. (2012)	-0.703	-1.274	-1.131	20.34
Lauche et al. (2011)	-1.186	-1.789	-0.583	19.07
Lauche et al. (2013)	-0.213	-0.717	-0.290	22.32
Schumann et al. (2012)	-1.039	-1.631	-0.447	19.41
Cramer et al. (2011)	-1.149	-1.749	-0.549	19.16
<b>D + I pooled SMD</b>	<b>-0.836</b>	<b>-1.217</b>	<b>-0.456</b>	<b>100.00</b>

<sup>a</sup> Heterogeneity Chi-squared = 8.83 (d.f. = 4) P = 0.065.

<sup>b</sup> I-squared (variation in SMD attributable to heterogeneity) = 54.7%.

<sup>c</sup> Estimate of between-study variance Tau-squared = 0.1028.

<sup>d</sup> Test of SMD = 0; z = 4.31; P = 0.000.

Table 3. Meta-Analysis of Cupping Therapy Versus Control Group for Neck Pain in Pain Intensity On<sup>a,b,c,d</sup>

Study	SMD	[95% Conf. Interval]		% Weight
Lauche et al. (2012)	-0.548	-1.114	-0.017	32.25
Lauche et al. (2011)	-0.758	-1.332	-0.183	31.70
Lauche et al. (2013)	-0.005	-0.507	-0.497	36.05
<b>D + I pooled SMD</b>	<b>-0.419</b>	<b>-0.872</b>	<b>-0.035</b>	<b>100.00</b>

<sup>a</sup> Heterogeneity Chi-squared = 4.14 (d.f. = 2) P = 0.126.

<sup>b</sup> I-squared (variation in SMD attributable to heterogeneity) = 51.6%.

<sup>c</sup> Estimate of between-study variance Tau-squared = 0.0830.

<sup>d</sup> Test of SMD = 0; z = 1.81; P = 0.070.

The evaluation of recent clinical studies demonstrated that cupping therapy is an effective modality for pain management (35, 36); however, the mechanism of action of this

method is unclear. Several theories might partially explain it. It seems that cupping therapy might play a potential role in increased blood flow to the skin and muscles and

**Table 4.** Meta-Analysis of Cupping Therapy Versus Control Group for Neck Pain in Disability on NDI<sup>a,b,c,d</sup>

Study	SMD	[95% Conf. Interval]		% Weight
Lauche et al. (2012)	-0.703	-0.856	0.259	17.31
Lauche et al. (2011)	-1.186	-1.181	-0.045	16.80
Kim et al. (2012)	-0.213	-0.919	-0.560	12.34
Lauche et al. (2012)		-0.875	0.137	20.26
Schumann et al. (2012)	-1.039	-1.399	-0.243	16.29
Cramer et al. (2011)	-1.149	-1.076	-0.051	17.00
<b>D + I pooled SMD</b>	<b>-0.836</b>	<b>-1.217</b>	<b>-0.348</b>	<b>100.00</b>

<sup>a</sup> Heterogeneity Chi-squared = 5.98 (d.f. = 5) P = 0.308.

<sup>b</sup> I-squared (variation in SMD attributable to heterogeneity) = 16.4%.

<sup>c</sup> Estimate of between-study variance Tau-squared = 0.0166.

<sup>d</sup> Test of SMD = 0; z = 4.64; P = 0.000.

**Table 5.** Meta-Analysis of Cupping Therapy Versus Control Group for Neck Pain in Quality of Life on sp36<sup>a,b,c,d</sup>

Study	SMD	[95% Conf. Interval]		% Weight
Lauche et al. (2012)	0.644	1.075	1.213	19.67
Lauche et al. (2011)	1.137	-0.418	0.692	20.16
Lauche et al. (2013)	0.251	-0.253	0.755	22.02
Schumann et al. (2012)	1.209	1.604	1.813	18.48
Cramer et al. (2011)	1.641	0.072	1.210	19.67
<b>D + I pooled SMD</b>	<b>0.559</b>	<b>0.201</b>	<b>0.918</b>	<b>100.00</b>

<sup>a</sup> Heterogeneity Chi-squared = 8.23 (d.f. = 4) P = 0.083.

<sup>b</sup> I-squared (variation in SMD attributable to heterogeneity) = 51.4%.

<sup>c</sup> Estimate of between-study variance Tau-squared = 0.0859.

<sup>d</sup> Test of SMD = 0; z = 0.06; P = 0.002.

	Random Sequence Generation	Allocation Concealment	Blinding of Participants and Personnel	Blinding of Outcome Assessment	Incomplete Outcome Data Addressed	Selective Reporting	Other Bias
Lauche et al (26)	Green	Green	Red	Green	Green	Green	Green
Emerich et al (26)	Yellow	Green	Yellow	Green	Green	Green	Green
Lauche et al (28)	Green	Green	Red	Green	Green	Green	Green
Kim et al (29)	Green	Green	Red	Green	Green	Green	Green
Lauche et al (30)	Green	Green	Red	Green	Green	Green	Green
Schumann et al (31)	Yellow	Green	Yellow	Green	Green	Green	Green
Lauche et al (32)	Green	Green	Red	Green	Green	Green	Green
Cramer et al (33)	Green	Green	Red	Green	Green	Green	Green
Arslan et al (34)	Yellow	Green	Yellow	Green	Green	Green	Green
Laughe et al (35)	Green	Green	Red	Green	Green	Green	Green

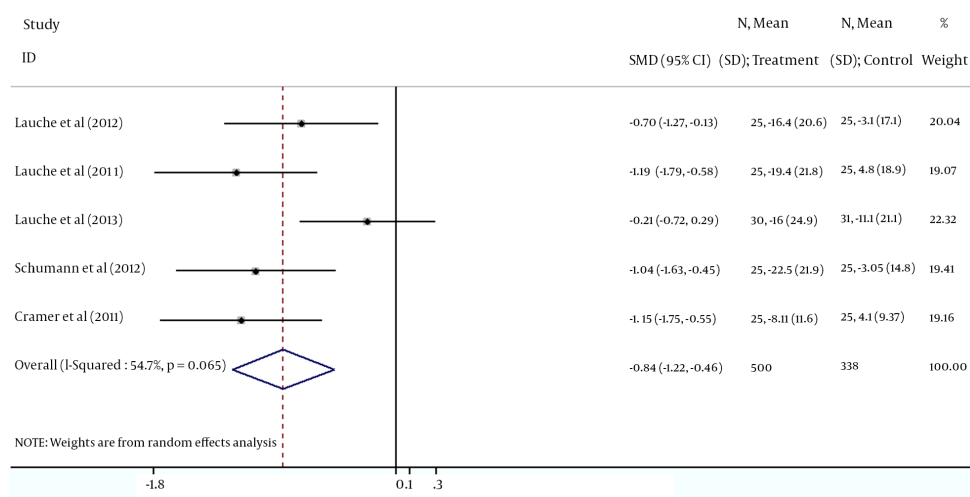
**Figure 2.** The Strength of Trials and Evidence of Study

stimulate the peripheral nervous system by draining extra fluids and moving connective tissue. In addition, cupping has been claimed to modulate neurohormonal systems, stimulate the autonomic nervous system, and im-

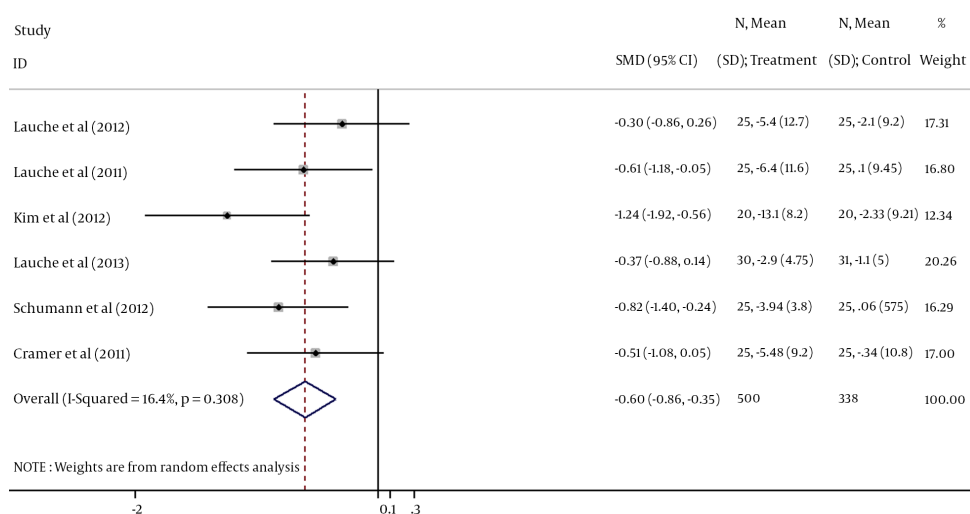
prove subcutaneous blood flow (37, 38). However, none of these opinions have been proven by scientific studies.

Several systematic reviews have assessed the effectiveness of cupping for pain management. Kwon et al. conducted a systematic review of clinical trials regarding the effects of cupping on the musculoskeletal disease. Their results indicated that cupping is effective in reducing lower back pain (39). One of the limitations of this study was its small sample size. This study included five trials (two randomized clinical trials and three controlled). Kim et al. conducted a systematic review to assess the use of cupping to decrease pain in many conditions. Their results provided some evidence for the effects of cupping therapy on pain management (36). Overall most studies reviewed demonstrate an appropriate effect of cupping for neck pain. Cupping therapy is one of the treatment methods that are emphasized in Iranian traditional medicine. Iranian traditional is a medical point of view with a long history (40). In this medical point of view, cupping therapy is used for managing musculoskeletal disorders and many other conditions. Furthermore, this method is often used as secondary treatment as well as the main therapeutic methods.

In the current overview, several limitations should be considered. First, the number of studies included in this review was somewhat small; therefore, more researches in



**Figure 3.** The Result of Meta-Analysis in Pain Relief Compared with VAS

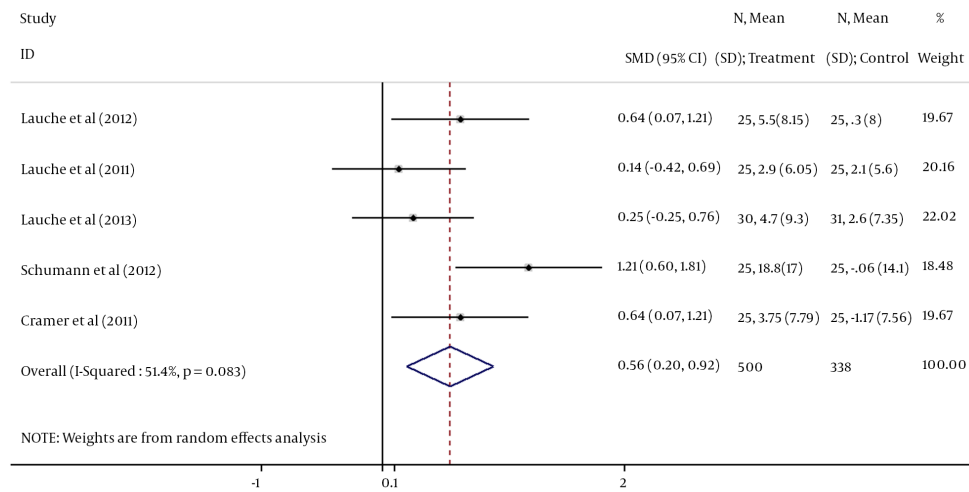


**Figure 4.** The Result of Meta-Analysis in Pain Relief Compared with NDI

these areas are required. Second, this study focused on papers published in English or Persian; studies published in other languages may affect the results. Third, the strength of the research was mainly moderate or low rather than high; therefore, results may change if more studies are reviewed. Finally, we could not use plots such as Funnel plot or indices for evaluation of publication Bias for the low number of studies we had for meta-analysis. Overall, these limitations obstruct the conclusiveness of the results. Thus, to confirm the effectiveness of cupping on relieving neck pain, further accurate studies are necessary.

## 5. Conclusions

This systematic review and meta-analysis provides some evidence that cupping therapy may partially provide pain relief to patients with neck pain. However, these results must be interpreted with caution due to the heterogeneity of evidence. Further studies are required to confirm the therapeutic value of cupping on neck pain, especially studies with sufficient sample sizes and the development of placebo cupping.



**Figure 5.** The Result of Meta-Analysis in Quality of Life Compared with SF36

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**Table 1.** Summary of the Clinical Trials Included

Study	Type of Study	Participant	Age, Mean, y	Control Group	Intervention	Duration of Follow-Up	Out Comes	Effect
Lauche et al. (26)	Between-group comparison with two groups: cupping group and control group	n = 50	54.8 ± 9.6 in cases group and 57.2 ± 9.4 in control group	✓	Intervention: Traditional Cupping Technique Control: no cupping	Three days after a cupping treatment	Pain at rest (VAS) (pre/post) (mean ± SD): Intervention: 44.9 ± 18.2/28.5 ± 23 Control: 45.7 ± 16.4/42.6 ± 17.8 Maximal pain related to Movement: Intervention: 53.9 ± 25.7/29.1 ± 20.9 Control: 65.6 ± 22.1/53.8 ± 26.1 Neck Disability Index (NDI): Intervention: 29.9 ± 11.8 / 24.5 ± 13.5 Control 31.1 ± 9.1/29.0 ± 9.3 SF-36 Physical Component Score: Intervention 37.8 ± 7.8/43.3 ± 8.5 Control: 38.7 ± 8.6/39.0 ± 7.4	Traditional cupping might be an effective treatment for improving pain, quality of life, and hyperalgesia in neck pain
Emerich et al. (27)	Individually controlled, randomized, explorative monocenter Study	n = 12	24.7 ± 1.0 in Healthy volunteer and 25.2 ± 1.3 in Neck pain patients	✓	A microdialysis system was implanted subcutaneously on both sides (left and right) above the trapezius muscle and lactate, pyruvate, glucose, glycerin and pain thresholds were measured before and after cupping with algometry.	-	Cupping resulted in a strong increase of lactate and the lactate/pyruvate ratio. Baseline pain thresholds were non-significantly lower in neck pain patients compared to healthy controls	Cupping induces lasting anaerobe metabolism in the subcutaneous tissue and increases immediate pressure pain thresholds in some areas.
Lauche et al. (28)	Between-group comparison with two groups: cupping group and control group	n = 50	48.6 ± 11.2 in cases group and 53.0 ± 11.4 in control group	✓	Intervention: five dry cupping Treatments Control: no cupping	25 d	Pain at rest (VAS) (pre/post) (mean ± SD): Intervention: 45.5 ± 20.9/26.1 ± 22.7 Control: 42.3 ± 18.0/47.1 ± 19.8 Pain at movement (PM): Intervention: 62.0 ± 31.2/29.0 ± 26.9 Control: 58.4 ± 22.2/45.5 ± 25.3 NDI: Intervention: 27.5 ± 12.1 / 21.1 ± 11.2 Control: 29.1 ± 10.5/29.2 ± 8.4 SF-36 Physical Component Score: Intervention 42.8 ± 5.7/45.7 ± 6.4 Control: 40.2 ± 5.1/42.3 ± 6.1	A series of five dry cupping treatments appeared to be effective in relieving chronic non-specific neck pain.
Kim et al. (23)	Between-group comparison with two groups: wet and dry cupping and heating pad application	n = 40	25.5 in cupping group and 28 in heating pad group	*****	six sessions of wet and dry cupping or heating pad application	7 w	NRS (numeric rating scale): (Baseline /3 weeks after/7 weeks after) (mean , SD): cupping group: 59.25, 16.33/28.55, 17.83/28.75, 21.87 heating pad group: 64.85, 14.89/48.3, 18.16/50.3, 21.26 NDI: cupping group: 23.33, 10.41/11.57, 8.17/10.19, 5.99 heating pad group: 22.96, 8.61/19.26, 10.95 /20.63, 9.82 FSS (fatigue severity scale): cupping group: 3.10, 1.29/2.61, 1.23/2.33, 1.09 heating pad group: 3.31, 1.41/3.04, 1.16/3.02, 1.35	Cupping therapy and an exercise program may be effective in reducing pain and improving neck function

Lauche et al. (29)	Between-group comparison with two groups: self-directed cupping massage or progressive muscle relaxation (PMR)	n = 61	54.1 ± 12.7 y	*	12 weeks of a partner-delivered home-based cupping massage, compared to the same period of progressive muscle relaxation in patients with chronic non-specific neck pain	12 w	Pain (VAS) (pre/post) (mean ± SD): cupping group: 55.8 ± 19.7/39.8 ± 30.0 PMR group: 56.3 ± 18.6/45.2 ± 23.5 Pain at motion (VAS): cupping group: 51.8 ± 23.5/43.3 ± 25.0 PMR group: 49.9 ± 19.2/41.5 ± 19.7 NDI: cupping group: 15.5 ± 4.3/12.6 ± 5.2 PMR group: 17.9 ± 4.9/16.8 ± 5.1 SF-36 Physical Component Score: cupping group: 38.8 ± 8.5/43.5 ± 10.1 PMR group: 37.2 ± 6.6/39.8 ± 8.1	Both therapies can reduce pain to a minimal clinically relevant extent. Cupping massage may however be better than PMR in improving well-being and decreasing pressure pain sensitivity
Schumann et al. (30)	Between-group comparison with two groups: cupping group and standard medical care group	n = 50	53.3 ± 10.4	✓	Intervention: five sessions of cupping Massage Control: standard medical care (SMC)	Unclear	Pain (pre/post) (mean ± SD): cupping group: 52.41 ± 20.9/29.94 ± 22.9 SMC: 45.89 ± 13.74/42.84 ± 15.83 NDI: cupping group: 14.47 ± 3.9/10.53 ± 3.7 SMC: 13.29 ± 6.1/13.35 ± 5.4 Physical health (SF36): cupping group: 35.35 ± 14.2/54.18 ± 19.8 SMC: 41.95 ± 14.24/41.89 ± 14.01	Cupping massage improved pain and increased subjective well being in the neck pain patients.
Lauche et al. (31)	Between-group comparison with two groups in three randomized waitlist controlled trials: wet cupping group and waitlist group; dry cupping group and waitlist group; pulsating cupping group and waitlist group	n = 133	51.2 ± 11.8	✓	Intervention: wet cupping, dry cupping and pulsating cupping Control: waitlist group	2 y	Pain (VAS) (Baseline/2-year follow-up): 44.0 ± 17.6/42.2 ± 26.1 NDI: 27.8 ± 9.8/24.3 ± 14.5 SF-36 Physical Component Score: 41.0 ± 7.2/44.0 ± 9.2	A series of cupping treatments did not influence neck pain intensity on the longer term, however significant increases were found for physical function and quality of life in patients with chronic nonspecific neck pain.
Cramer et al. (32)	Between-group comparison with two groups: pulsating cupping group and control group	n = 50	44.46 ± 10.79 in cupping group and 47.88 ± 13.50 in control group	✓	Intervention: five pneumatic pulsation treatments over a period of two weeks utilizing a mechanical device Control: standard medical care	2 w	Pain (pre/post) (mean ± SD) (VAS): cupping group: 24.84 ± 11.93/16.73 ± 11.57 control group: 22.05 ± 8.74/26.15 ± 10.00 Functional disability (NDI): cupping group: 25.92 ± 8.23/20.44 ± 10.17 control group: 29.17 ± 9.65/28.83 ± 11.94 SF-36 Physical Component Score: cupping group: 43.85 ± 7.65/47.60 ± 7.93 control group: 41.66 ± 7.09/40.49 ± 8.03	Pneumatic pulsation therapy appears to be a safe and effective method to relieve pain and to improve function and quality of life in patients with chronic neck pain.
Arslan et al. (33)	Between-group comparison with two groups: cupping group and control group	n = 40	Unclear	✓	Intervention: 10 dry moving cupping therapy sessions over a five week period Control: no cupping	5 w	Pain (pre/post) (mean ± SD) (VAS): cupping group: 5.55 ± 5.57/2.7 ± 0.27 control group: Unclear	Cupping therapy is a therapeutic application and it can be confidently used to reduce the neck pain.
Lauche et al. (34)	qualitative interview-based study was embedded in an RCT examining	N = 6	Unclear	✓	Intervention: Traditional Cupping Technique Control: no cupping	-	The patients' drawings showed apparent body image distortions with elements that were missing or deformed. The interviews showed that pain was the predominant perception, influencing patients' body perception.	Patients with neck pain experienced apparent body image distortions, which traditional cupping therapy appeared to improve.