JoP Journal of Pharmacopuncture
Journal of Pharmacopuncture 2024;27(3):177-189
pISSN: 2093-6966 • eISSN: 2234-6856
https://doi.org/10.3831/KPI.2024.27.3.177
Systematic Review
Check for updates

Cupping Therapy for the Treatment of Migraine Headache: a systematic review and meta-analysis of clinical trials

Bushra Mohandes[1†], Fatma Elsayed Ahmed Bayoumi[1†], Aisha Abdulkarim AllahDiwaya[1], Maryam Salah Falah[1], Leen Hesham Alhamd[1], Razan Abid Alsawadi[2], Yipeng Sun[1], Aidi Ma[1], Idris Sula[1], Muhammad Candragupta Jihwaprani[1]*

[1]Department of Clinical Sciences, Sulaiman AlRajhi University College of Medicine, AlBukayriyah, Qassim, Saudi Arabia
[2]Department of Medicine and Surgery, Alfaisal University College of Medicine, Riyadh, Saudi Arabia

Received May 13, 2024
Reviewed May 28, 2024
Accepted August 20, 2024

***Corresponding Author**
Muhammad Candragupta Jihwaprani
Department of Clinical Sciences, Sulaiman AlRajhi University College of Medicine, P.O. Box 777, Bukaryiah, AlBukayriyah, Qassim 51941, Saudi Arabia
Tel: +62-823-2567-5051
E-mail: candraguptajihwaprani@gmail.com

†The authors contributed equally to this work as co-first authors.

Objectives: Cupping therapy is a widely used complementary medicine for the treatment of migraine headaches globally. However, conflicting evidence exists on its effectiveness. To evaluate the safety and efficacy of cupping therapy in treating migraine headache disorder.

Methods: Seven databases were systematically searched: PubMed/MEDLINE, Clinicaltrials.gov, Cochrane CENTRAL, ScienceDirect, ProQuest, SinoMed, and the National Science and Technology Library. The primary endpoints are the treatment success and the pain intensity reduction. The secondary endpoints were adverse events (AEs) risk and improvement in quality of life (QoL), which was based on the Migraine Disability Scale (MIDAS). Subgroup analyses were performed based on the cupping techniques (wet and dry cupping) and adjunctive complementary treatments (i.e. acupuncture and/or collateral pricking).

Results: Eighteen trials out of 348 records were included, pooling 1,446 participants (n = 797 received cupping therapy). Treatment success was significantly higher among those with cupping therapy (risk ratio [RR] [95% CI] = 1.83 [1.52-2.21]); with significant improvement observed only with wet cupping (RR [95% CI] = 1.88 [1.53-2.30]). The adjunctive complementary therapy did not achieve a greater amplitude of treatment success compared to cupping therapy alone. Furthermore, cupping therapy showed significant pain reduction compared to baseline (standardized mean difference [SMD] [95% CI] = 0.55 [0.39-0.70]) and achieved fewer risks of AEs (RR [95% CI] = 1.88 [1.53-2.30]). However, cupping did not improve the overall QoL (MIDAS SMD [95% CI] = −0.79 [−3.55-1.98]).

Conclusion: Cupping therapy was an effective complementary modality to treat migraine headaches. However, it did not demonstrate improvement in QoL (PROSPERO: CRD42024514509).

Keywords: cupping, headache, hijamah, migraine, meta-analysis, systematic review

INTRODUCTION

Migraines are the sixth most common disease worldwide [1]. Recent research estimates that migraine headaches affect 14%-15% of the population globally, accounting for 4.9% of all global disabilities [2]. The main migraine characteristics include recurring episodes of unilateral throbbing headaches lasting 4 to 72 hours, photophobia, phonophobia, nausea, vomiting, and cutaneous allodynia [3]. Pharmacological migraine interventions are the standard therapy and include combination analgesics, non-steroidal anti-inflammatory drugs (NSAIDs), and ergotamine preparations [4]. However, the prolonged use of these

medications consequently predisposes patients to increased adverse effects, such as drug-induced rebound headaches and medication overuse. Due to these potential risks, non-pharmacological approaches are increasingly utilized in migraine management. These include non-invasive and invasive neuromodulation techniques, acupuncture, psychotherapy, and blood cupping. These interventions have demonstrated promising efficacy in alleviating migraine symptoms and improving patient outcomes [5].

Cupping therapy is a popular traditional Chinese medicine technique widely implemented in East Asian, South East Asian, and Middle-Eastern regions for centuries as a therapeutic modality to alleviate pain, reduce inflammation, enhance blood circulation, mitigate stress, and address respiratory ailments [6]. The technique involves applying suction on the skin over specific vessels, which creates a vacuum space that mobilizes the blood and endogenous healing substances to promote metabolic activity, improve immune function, and maintain the blood chemical equilibrium. Cupping therapy is classified into wet and dry cupping. Dry cupping is utilized solely for suction application, while wet cupping extracts blood and extracellular fluid through superficial skin incisions or abrasions [7].

Multiple studies have assessed the safety and efficacy of cupping therapy in relieving migraine headaches, specifically wet cupping techniques. One study showed a 66% reduction in headache severity following wet cupping compared to the baseline [8]. In contrast, another study found no significant difference between cupping therapy and conventional treatment in migraine treatment and prevention [9]. Studies on the effectiveness of blood cupping show conflicting results.

A systematic review and meta-analysis of randomized controlled trials (RCTs) assessing the use of cupping therapy for migraine headaches was published in 2021 [10]. This review measured the effectiveness of cupping therapy in treating migraine headaches and included only RCTs based on a wide variety of databases in English, Korean, and Chinese. However, the study was limited due to the inclusion of few RCTs and low sample size in both qualitative and quantitative analyses. Consequently, publication bias could not be assessed. These limitations justify the need for a more comprehensive meta-analysis incorporating more RCTs and non-randomized controlled trials. A larger sample size will provide more accurate estimates and allow a robust assessment of publication bias. We also plan to expand our search parameters by utilizing a variety of databases with no language limitations. Therefore, the main goal of our review is to thoroughly assess and compile the therapeutic effectiveness of cupping therapy for managing migraine headaches.

MATERIALS AND METHODS

This meta-analysis abides by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) protocol and is registered prospectively under PROSPERO (CRD42024514509).

1. Search strategy and study selection

We searched seven databases to identify relevant papers without language restriction: PubMed/MEDLINE, Clinicaltrials.gov, Cochrane CENTRAL, ScienceDirect, ProQuest, SinoMed, and the National Science and Technology Library. We used specified keywords to obtain all relevant records: "migraine" OR "migraine headache" to represent our population, and "cupping," "blood cupping" OR "hijama" OR "hijamah" to represent the intervention. Two authors (MJ and IS) conducted and scrutinized this process from inception to June 30th, 2024. Following the exclusion of identified duplicates, we screened the records in two consecutive stages. First, four reviewers (BM, FB, RA, and YS) independently screened all titles and abstracts for eligibility, followed by the full texts. Any potentially relevant studies from the references of identified records were also retrieved. The original authors who performed the primary search (MJ and IS) cleared any uncertainty about an article.

2. Eligibility criteria

This systematic review included studies that met the following criteria: (1) were RCTs or non-randomized controlled trials, (2) included participants diagnosed with migraine headaches either with or without aura in both the intervention and control arms, (3) had an intervention group using cupping therapy, and (4) included a control group not using cupping therapy. The exclusion criteria were: (1) observational and other non-clinical trial studies, and (2) included participants diagnosed with other types of headaches, including tension or cluster headache or headache due to a known secondary etiology. Furthermore, we only considered interventional studies with controlled arms for this meta-analysis.

3. Data extraction

Following the inclusion of eligible studies, we extracted relevant data in a predefined Google Sheet. The data incorporated the following variables: trial registry, principal author's name, publication year, study design and blinding status, study country, overall sample size, individual's arm sample sizes, gender distribution, mean age, migraine characteristics (migraine type, severity, pain score, duration of each episode in hours, duration of migraines in years), cupping characteristics (wet or dry, number of cupping sessions, cupping duration in minutes, body area being cupped), and follow up duration. We extracted relevant safety and efficacy endpoint data, including total adverse events (AEs) and treatment success. We recorded the pain score, attack duration, change in attack frequency per month, and change in quality of life (QoL) based on the Migraine Disability Scale (MIDAS) tool at baseline and follow-up.

4. Quality assessment

To assess the quality of the identified papers, six reviewers (LA, AD, MF, YS, AM, and RA) independently used the Cochrane Risk of Bias Tool for Clinical Trials to assess seven domains: random sequence generation, allocation concealment, selective reporting, other bias, blinding of participants and personnel, blinding of outcome assessment, and incomplete outcome data. Possible responses were low risk, high risk, or unclear risk of bias. Subsequently, the quality of the trial was classified into (1) good quality, if all criteria were met (i.e., low for each domain); (2) fair quality, if one domain was not met (i.e.,

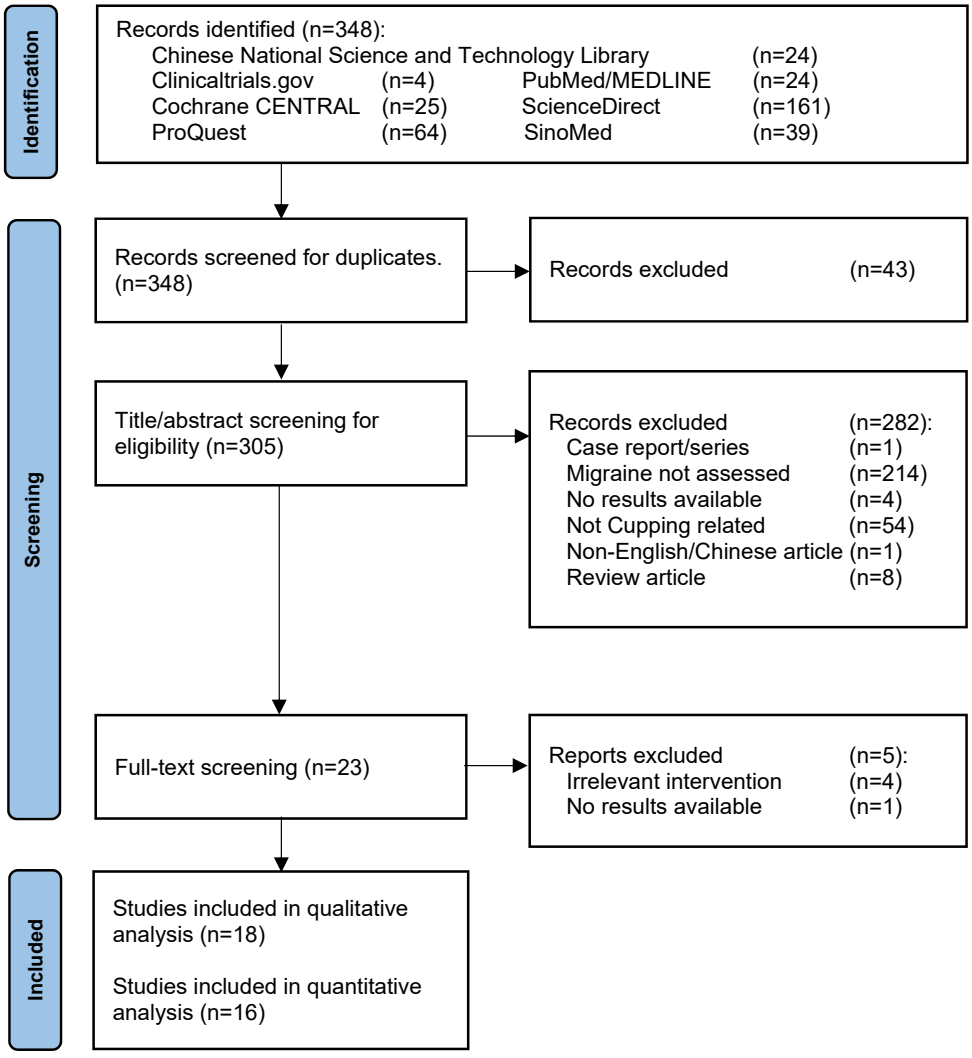

Figure 1. PRISMA flow chart of the study.

high risk of bias) or two domains had unclear risk of bias but were unlikely to have biased the outcome; and (3) poor quality, if two or more domains had high or unclear risk of bias and were likely to bias the outcome.

5. Data analysis and synthesis

Primary endpoints included treatment success, i.e., migraine cure, and mean change in pain intensity according to either the visual analog scale (VAS) or the equivalent comparative pain scale (CPS) tool. Secondary endpoints included assessing safety, measured by the incidence of adverse events (AEs), and enhancing quality of life (QoL) using the MIDAS tool. Treatment success and AEs were binary variables subjected to risk ratio (RR) analysis through a fixed effects model. We used the standardized mean difference (SMD) and mean difference to assess continuous variables, such as the mean change in pain intensity and MIDAS scores. We used a random effects model in both outcomes due to the moderate-high heterogeneity observed in the fixed effects model. We used I2 statistics to evaluate the degree of study heterogeneity and classify it as low (< 25%), moderate (25%-75%), or high (> 75%). We used 16 studies for the meta-analysis to assess publication bias using the funnel plot. We performed a subgroup analysis based on cupping methods (wet and dry) and supplementary therapies (adjunctive acupuncture and collateral pricking). We defined the statistical significance as a p-value < 0.05. We conducted all analyses using Revman 5.3 software.

RESULTS

1. Literature search results

Fig. 1 illustrates the PRISMA flowchart of process for identifying 348 studies from seven databases: the Chinese National Science and Technology Library (n = 24), ClinicalTrials.gov (n = 4), Cochrane CENTRAL (n = 25), ProQuest (n = 64), PubMed (n = 24), ScienceDirect (n = 161), and SinoMed (n = 39). In the first phase of screening, we removed 43 duplicates. After further title/abstract screening for eligibility, we excluded 282 studies: a case report (n = 1), studies that did not assess migraines (n = 214), research with no results (n = 4), studies unrelated to cupping (n = 54), non-English/Chinese articles (n = 1), and review articles (n = 8). After a full-text screening, we excluded five studies due to irrelevant interventions (n = 4) and no results (n = 1). We included a total of 18 studies for qualitative analysis. We excluded two single-arm studies from the meta-analysis and quantitatively analyzed 16 studies.

2. Characteristics of included trials

1) Study and participants' characteristics

We included 18 trials published between 2002-2024 (Table 1) [8, 9, 11-26], most of which were conducted in China (n = 12) [10-21], followed by Iran (n = 3), Turkey (n = 2) [22, 23], and Iraq (n = 1) [24]. Of these, 14 were open-label randomized controlled trials (77%). Two studies were single-arm trials. Approximately 55% of the total sample size of 1,446 participants received cupping (n = 797). The majority of participants were female (60%, n = 874). The mean age ranged from 31.7-42.5 years. The follow-up period varied between 1-12 months. The mean duration of migraine diagnosis was 2.34-9.2 years. The majority of studies did not report the type of migraine headache.

2) Intervention characteristics

Wet cupping was used in 16 trials, whereas two trials used dry cupping. Nine studies used cupping as the only intervention, four combined cupping and collateral pricking, three combined cupping with acupuncture, and two studies combined cupping, collateral pricking, and acupuncture. There was no placebo used as a control arm. The control arm was the standard medication therapy in 12 studies, including oral diclofenac sodium (n = 2), rizatriptan benzoate (n = 1), and oral flunarizine (n = 4), or combination therapy (n = 1). Four studies did not specify the drugs administered. Acupuncture was used as a control arm in two studies.

There were between 1-16 cupping sessions in the intervention arm, with one trial employing the intervention on an as-needed basis [12] and another trial not specifying the number of sessions [21]. Conversely, most trials did not utilize cupping therapy in the control arm, with only one trial administering three sessions [22]. The session duration varied from 5-30 minutes, and six trials did not specify the duration. Furthermore, the body areas subjected to cupping varied widely across trials, with most trials employing a combination of sites.

Regarding the quality of life assessment tools, most trials utilized the MIDAS tool (n = 5), followed by the International Classification of Headache Disorders II (ICHD-II) (n = 3). Other tools employed include the 6-point Likert scale, 24-Hour Migraine Quality of Life Questionnaire (24-hr-MQoLQ), and

 https://doi.org/10.3831/KPI.2024.27.3.177

Table 1. Characteristics of included trials

Author (year)	Country	Study design, blinding	Arm	Sample size (n)		Sex		Mean age ± SD	Intervention	Migraine duration in years (Mean ± SD)	FU	Cupping characteristics				Assessment tool used		
				Each arm	Σ	M	F					Type	No of sessions (n)	Duration/ session (min)	Body area cupped	QoL tool	Pain scale tool	Other tool
Zhang et al. (2002) [17]	China	RCT, open-label	Tx	32	64	18	14	36.45 ± 10.46	Cupping (lotus needling) + acupuncture & oral flunarizine	NA	1 mo	Wet	2	5	2 sites: scalp and temples on the side of headache	HSGS	NA	NA
			Con	32		17	15	38.15 ± 12.26	Oral flunarizine									
Wei (2002) [20]	China	RCT, open-label	Tx	34	68	18	50	NA	Cupping + CP & acupuncture	NA	1 yr	Wet	10	10	Temple area	NA	NA	NA
			Con	34				NA	Acupuncture									
Ahmadi et al. (2008) [8]	Iran	NRCT	Tx	70	70	35	35	38.77 ± 12.91	Cupping + serkangabin	NA	3 mo	Wet	3	20	Interscapular, opposite to T1–T3 scapular spine.	6-point Likert scale	NA	MQS, HSGS
			Con	0		0	0	NA	NA	NA								
Hao (2011) [19]	China	NRCT	Tx	31	62	12	19	NA	Cupping + CP	NA	3 mo	Wet	7	10-15	Liver shu point (T9 paravertebra)	ICHD-II	NA	NA
			Con	31		10	21	NA	Chinese native medicine decoction									
Qin and Song (2012) [18]	China	RCT, open-label	Tx	45	90	18	27	36.10 ± NA	Cupping (lotus needling)	NA	6 mo	Wet	8	10-15	GB20, GV14, BL11	ICHD-II	NA	NA
			Con	45		16	29	36.40 ± NA	Oral nimodipine, flunarizine, 5% glucose injection, acanthopanax inj									
Li et al. (2012) [25]	China	RCT, NA	Tx	50	100	12	38	36.50 ± NA	Cupping + acupuncture	9.2 ± NA	3 mo	Wet	15	30	GV20, GV24, ST8, temple, GB20, GB14, & TH5	NA	NA	NA
			Con	20		14	36	31.20 ± NA	Acupuncture	8.7 ± NA								

Table 1. Continued

Author (year)	Country	Study design, blinding	Arm	Sample size (n)		Sex		Mean age ± SD	Intervention	Migraine duration in years (Mean ± SD)	FU	Cupping characteristics				Assessment tool used		
				Each arm	Σ	M	F					Type	No of sessions (n)	Duration/ session (min)	Body area cupped	QoL tool	Pain scale tool	Other tool
Song et al. (2013) [14]	China	RCT, open-label	Tx	45	90	16	29	35.40 ± 3.14	Cupping (lotus-needling)	4.32 ± 2.2	1 mo	Wet	16	15	BL2, GB21, temple bilateral, GB20 bilateral, & GV14	NA	VAS	CCMS
			Con	45		18	27	36.10 ± 2.30	Oral flunarizine	3.5 ± 2.8								
Firoozabadi et al. (2014) [9]	Iran	RCT, open-label	Tx	30	60	12	18	31.70 ± 7.60	Cupping + serkangabin	NA	6 mo	Wet						
			Con	30		7	23	32.60 ± 12.70	Conventional treatment	NA		Wet	3 mo	NA	Midline ISC area at level T3-T5	ICHD-II	VAS	NA
Jin et al. (2015) [13]	China	RCT, open-label	Tx	35	70	12	23	34.00 ± NA	Cupping + CP & acupuncture	7.24 ± NA	2 mo	Dry	16	5	BSP	NA	VAS	NA
			Con	35		10	25	33.00 ± NA	Acupuncture	6.81 ± NA								
Jiang et al. (2015) [16]	China	RCT, open-label	Tx	30	60	7	23	NA	Cupping	NA	24, 48, & 72 hr	Wet	8	20	1.5 inch below & lateral to C7 (bilateral)	ICHD-II	NA	NA
			Con	30		9	21	NA	Oral flunarizine									
Liu and Li (2016) [12]	China	RCT, open-label	Tx	30	60	10	20	41.71 ± 13.51	Cupping + CP	5.13 ± 4.795	3 mo	Wet	During attack	NA	Temple area	NA	VAS	NA
			Con	30		12	18	42.47 ± 13.60	Oral diclofenac sodium	5.03 ± 4.685								
Benli and Sunay (2017) [23]	Turkey	NRCT, NA	Tx	85	85	40	45	40.59 ± 8.64	Cupping	NA	2 yr	Wet	3	20	5 sites bilaterally: at level C7, T3 ISC, & T7	MIDAS	VAS	NA
			Con	0		0	0	NA	NA	NA			NA	NA				
Li and Bi (2017) [15]	China	RCT, open-label	Tx	32	64	15	17	37.30 ± 9.50	Cupping + acupuncture	5.8 ± 1.7	1 mo	Dry	4	NA	GB20 to acromial end	MIDAS	VAS	CCS MS
			Con	32		14	18	36.90 ± 9.30	Oral flunarizine	5.9 ± 1.9								

Table 1. Continued

Author (year)	Country	Study design, blinding	Arm	Sample size (n)		Sex		Mean age ± SD	Intervention	Migraine duration in years (Mean ± SD)	FU	Cupping characteristics				Assessment tool used		
				Each arm	Σ	M	F					Type	No of sessions (n)	Duration/ session (min)	Body area cupped	QoL tool	Pain scale tool	Other tool
Zarei et al. (2019) [26]	Iran	RCT, NA	Tx	66	132	31	35	34.70 ± 10.20	Cupping + painkillers	NA	2 & 6 wk	Wet	3	NA	NA	NA	VAS	NA
			Con	66		31	35	34.70 ± 10.20	Painkillers	NA								
Chen et al. (2019) [21]	China	RCT, open-label	Tx	30	60	14	16	40.62 ± 3.55	Cupping + CP	2.34 ± 0.25	3 mo	Wet	NA	NA	Temple area	MIDAS	VAS	CCSMS
			Con	30		15	15	42.45 ± 3.64	Oral diclofenac sodium	2.62 ± 0.57								
Ersoy and Benli (2020) [22]	Turkey	RCT, open-label	Tx	56	109	28	28	41.00 ± 8.53	Cupping + Std treatment	NA	6 & 12 mo	Wet	12	20	5 sites bilaterally: lateral spines at C7, T2-T4, & T6-T8	MIDAS	VAS	NA
			Con	53		31	22	39.51 ± 9.71	Std treatment	NA		Wet	3 (stop)					
Zhang et al. (2020) [11]	China	RCT, open-label	Tx	65	130	28	37	31.84 ± 9.04	Cupping + CP & Rizatriptan benzoate	3.13 ± 1.82	2 & 24 hr	Wet	4		GV14, SJ5, bilateral temples, & suprascapular fossa	24-Hr-MQoLQ	VAS	
			Con	65		21	44	31.68 ± 8 .47	Rizatriptan benzoate	3.19 ± 1.77								
Abdulah et al. (2024) [24]	Iraq	NRCT, NA	Tx	31	72	10	21	33.39 ± 12.49	Cupping + Std therapy	4.50 ± 3.42	1 hr, 1 mo	Wet	1	20	4 sites: 2 ISC, 2 at the sides & back of neck)	MIDAS	CPS	OMMP
			Con	41		11	30	32.44 ± 9.01	Std therapy	6.10 ± 5.59								

24-Hr-MQoLQ, 24-Hour Migraine Quality of Life Questionnaire; BL, urinary bladder; BSP, Back Shu Point; CCSMS, cardinal and concomitant symptoms of migraine scores; Con, control arm; CP, collateral pricking; CPS, Comparative Pain Scale tool; GB, gallbladder; GV, governing vessel; hr, hour; HSGS, headache severity and grade scoring; ICHD-II, The International Classification of Headache Disorders II; Inj, injection; ISC, interscapular; min, minute; mo, month; MQS, medication quantification scale; NA, not available; NRCT, non-randomized controlled trial; OMMP, Orbach & Mikulincer Mental Pain Scale; QoL, quality of life; RCT, randomized controlled trial; SD, standard deviation; SJ, San Jiao; ST, stomach; Std, standard; TH, triple heater; Tx, treatment arm; VAS, visual analogue scale; yr, year.

Headache Severity and Grade Scoring (HSGS). The Visual Analog Scale (VAS) was predominantly utilized across most trials to assess pain. Only one trial employed the Chronic Pain Scale (CPS). However, eight studies did not specify the pain assessment tool used. Other studies employed other tools for outcome assessments, including the Orbach & Mikulincer Mental Pain Scale (OMMP), Medication Quantification Scale (MQS), and cardinal and concomitant symptoms of migraine scores (CCSMS).

3. Risk of bias and methodological design

We assessed the methodological quality of the included studies using the Cochrane tool for randomized controlled trials. As illustrated in (Table 2) [8, 9, 11-26], most included trials were of poor quality (n = 17).

4. Treatment success

In total, 11 studies reported successful migraine treatment (Fig. 2). Overall, there was a significant improvement of 83% in those who underwent treatment compared to controls (RR [95% CI] = 1.83 [1.52-2.21], I^2 = 37%). A subgroup analysis based on adjunctive therapy showed significant improvements with cupping alone and adjunctive treatments. Cupping alone achieved the greatest success (RR [95% CI] = 2.98 [2.00-4.46], I^2 = 68%). The cupping alone subgroup was the source of outcome heterogeneity (I^2 = 68%). Dry cupping did not improve treatment success (RR [95% CI] = 1.57 [0.97-2.55], I^2 = 0%).

5. Mean change in pain intensity

Overall, cupping therapy achieved greater migraine pain reduction compared to the control (SMD [95% CI] = 0.62 [0.20-1.04], I^2 = 86%); however, adjunctive therapy with collateral pricking did not achieve significant reduction (SMD [95% CI] = 0.62 [0.20-1.04], I^2 = 86%). Among other subgroups, one study found that the combination of cupping, collateral pricking, and acupuncture achieved the greatest pain reduction (SMD [95% CI] = 1.70 [1.15, 2.25]) [13]. The exclusion of Abdulah et al. [24], which used the CPS scale for pain scoring, revealed that cupping therapy reduced the VAS score by 2.23 compared to

Table 2. Methodological quality of included trials

Author (year)	Cochrane tool of randomized controlled trials							Overall quality of study
	Random sequence generation	Allocation concealment	Selective reporting	Other bias	Blinding of participants and personnel	Blinding of outcome assessment	Incomplete outcome data	
Zhang et al. (2002) [17]	High risk	Unclear	High risk	Unclear	High risk	Unclear	Unclear	Poor quality
Wei (2002) [20]	Low risk	Unclear	Low risk	Unclear	High risk	Unclear	Unclear	Poor quality
Ahmadi et al. (2008) [8]	High risk	Unclear	High risk	High risk	Unclear	Unclear	Low risk	Intermediate
Hao (2011) [19]	High risk	High risk	High risk	Unclear	High risk	Unclear	Unclear	Poor quality
Qin and Song (2012) [18]	High risk	Unclear	Low risk	Unclear	High risk	Unclear	Low risk	Poor quality
Li et al. (2012) [25]	High risk	High risk	Low risk	Unclear	High risk	Unclear	Unclear	Poor quality
Song et al. (2013) [14]	Low risk	Unclear	Low risk	Unclear	High risk	Unclear	Unclear	Poor quality
Firoozabadi et al. (2014) [9]	High risk	High risk	High risk	Unclear	High risk	Unclear	Low risk	Intermediate
Jin et al. (2015) [13]	Low risk	High risk	Low risk	Unclear	High risk	Unclear	Unclear	Poor quality
Jiang et al. (2015) [16]	High risk	Unclear	Low risk	Unclear	High risk	Unclear	Unclear	Poor quality
Liu and Li (2016) [12]	High risk	High risk	High risk	Unclear	High risk	Unclear	Unclear	Poor quality
Benli and Sunay (2017) [23]	High risk	Unclear	High risk	High risk	High risk	Unclear	High risk	Poor quality
Li and Bi (2017) [15]	Low risk	Unclear	Low risk	Unclear	High risk	Unclear	Low risk	Poor quality
Zarei et al. (2019) [26]	High risk	Unclear	Unclear	Unclear	Unclear	Unclear	Low risk	Poor quality
Chen et al. (2019) [21]	Low risk	Unclear	Low risk	Unclear	High risk	Unclear	Unclear	Poor quality
Ersoy and Benli (2020) [22]	Low risk	Unclear	Low risk	Unclear	High risk	High risk	Low risk	Poor quality
Zhang et al. (2020) [11]	Low risk	Unclear	Low risk	Unclear	High risk	Unclear	Low risk	Poor quality
Abdulah et al. (2024) [24]	High risk	High risk	Low risk	High risk	High risk	High risk	Low risk	Poor quality

 https://doi.org/10.3831/KPI.2024.27.3.177

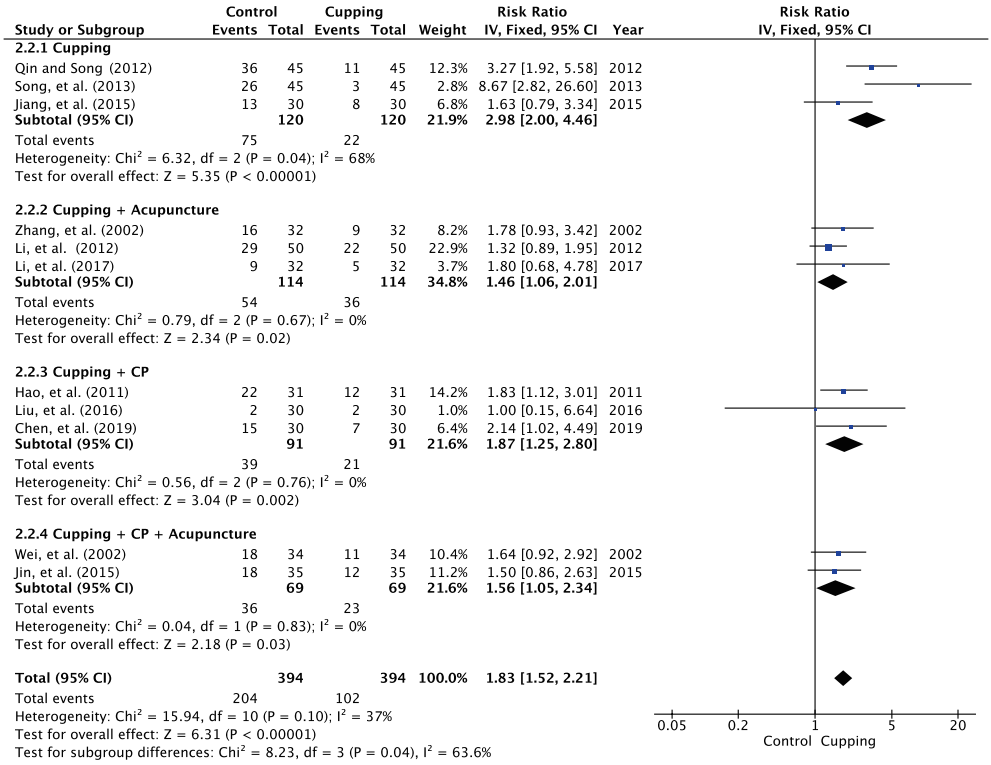

Figure 2. Forest plot of the risk ratio of treatment success.

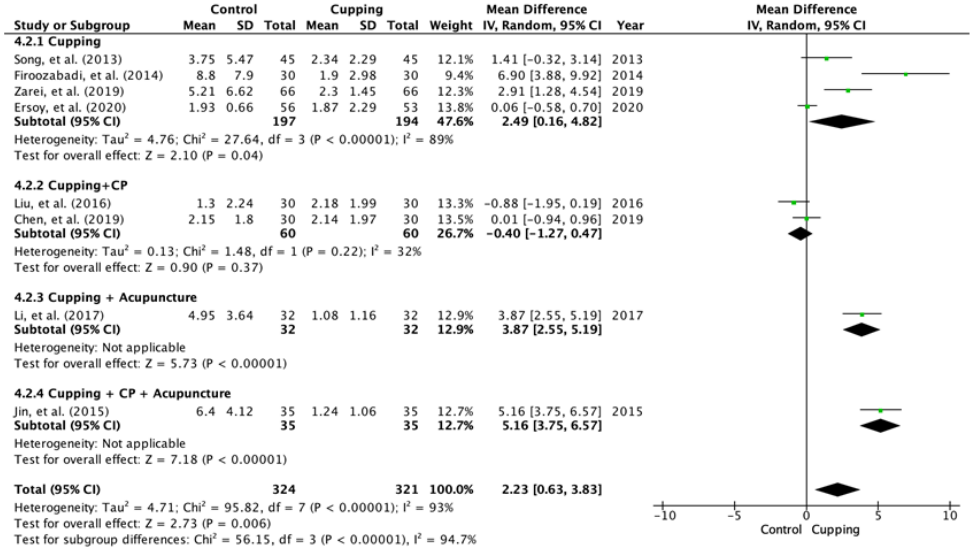

Figure 3. Standardized mean difference of change in pain scale compared to baseline.

the control (SMD [95% CI] = 2.23 [0.63-3.83], I^2 = 93%) (Fig. 3).

6. Risk of adverse events

As reported by three studies [12, 21, 22], the risk of AEs was 75% lower in patients receiving cupping therapy (RR [95% CI] = 0.25 [0.09-0.71], I^2 = 0%) (Fig. 4). Ersoy and Benli [22] reported no AEs in either arm. Liu and Li [12] reported one case of nausea in the cupping arm, whereas the reported AEs in the control arm included nausea (n = 2), vomiting (n = 1), abdomi-

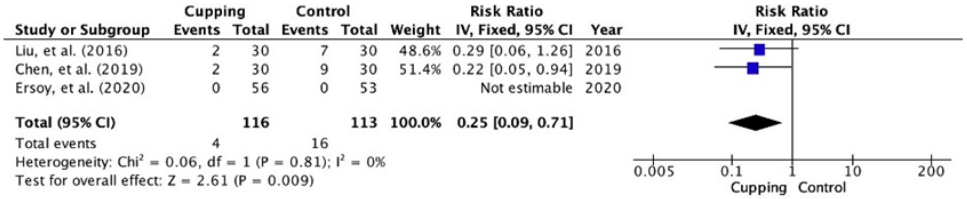

Figure 4. Risk ratio of the adverse events.

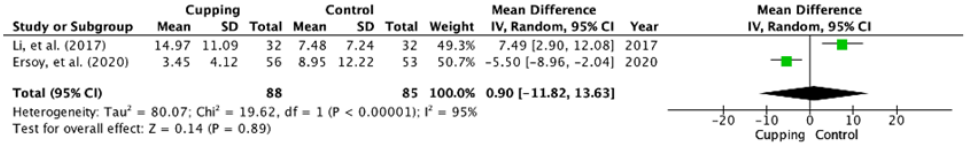

Figure 5. Mean difference of change MIDAS scale compared to baseline.

nal pain (n = 3), and vertigo (n = 1). Similarly, Chen et al. [21] reported dizziness (n = 1) in the intervention arm and dizziness (n = 1), abdominal pain (n = 4), vomiting (n = 2), and nausea (n = 2) in the control arm.

7. Quality of life

According to recent research, there was no significant change in QoL assessed by MIDAS in both arms (MD [95% CI] = 0.90 [−11.82-13.63], I^2 = 95%) (Fig. 5). One study reported a significant difference in MIDAS scale score compared to baseline in both arms, favoring cupping therapy (MD [95% CI] = −5.50 [−8.96-−2.04]) [22]. A trial by Benli and Sunay [23] was not included in the quantitative analysis because both arms received cupping therapy at different lunar phases. However, they found a significantly higher reduction in the MIDAS scale score when cupping was applied in the second half of the month compared to the first half.

8. Publication bias risk assessment

The funnel plot showed a symmetrical and balanced distribution of the included studies (Supplementary Materials). The Egger's regression test demonstrated a non-significant risk of publication bias (p-value = 0.09).

DISCUSSION

Cupping therapy is an essential, widely implemented complementary and alternative therapeutic modality in the treatment of migraine headaches. In Kuwait and Saudi Arabia, it is estimated that 40.0%-47.3% of patients with primary headache disorders, including migraine, sought cupping therapy [27, 28]. This systematic review and meta-analysis incorporated 18 trials to assess the therapeutic benefits of cupping therapy in migraine treatment Our study found significant treatment success with cupping therapy compared to controls. The benefits appeared to be significant only with the wet cupping technique. Cupping therapy significantly reduced pain intensity; however, adding acupuncture or collateral pricking did not improve overall treatment success compared to cupping alone. We found a 75% reduced risk of AEs with cupping therapy compared to controls. Nevertheless, cupping therapy did not improve the quality of life per the MIDAS scale.

To our knowledge, this is the largest and most recent meta-analysis to evaluate the effectiveness of cupping for migraine headaches, involving 1,446 participants. A previous meta-analysis by Seo et al. [10] evaluating the efficacy of cupping therapy for migraines involved six RCTs and pooled 510 participants. Dong et al. [29] evaluated the role of wet cupping for treating primary migraine disorders, such as tension-type, migraine, and trigeminal neuralgia, included 12 studies. Both studies reported a significant reduction in pain among patients receiving cupping therapy plus drugs compared to drugs alone and significant pain reduction with cupping and acupuncture compared to acupuncture alone.

However, a recent systematic review by Liu et al. [30], which analyzed two studies involving cupping and bloodletting as part of acupuncture-related therapy, suggested cupping resulted in insignificant pain reduction. Nevertheless, the study found

a significant reduction in migraine frequency and duration among those receiving cupping therapy [30]. Furthermore, Dong et al. [29] reported no significant difference in pain reduction with cupping alone compared to drugs.

The included studies were generally limited in reporting the impact of cupping therapy on QoL among migraineurs. The QoL based on the MIDAS scale was derived from only two trials, which contradicted each other [15, 22]. Our findings should be regarded with caution, and further studies examining the impact of cupping therapy in improving the overall QoL among patients with migraine headaches are warranted. Contrary to our findings, Seo et al. [10] reported significant improvements in quality of life among patients receiving cupping therapy.

We found a significant difference in the AE risk, favoring cupping therapy. This contradicted the work of Dong et al. [29], which reported insignificant differences in AE risks (RR = 1.33). This difference was because our study analyzed two trials specifically focusing on migraines. In contrast, Dong et al. [29] included other primary headache disorders, notably tension-type headaches, in their analysis.

Our study analyzed the combination of cupping with acupuncture and collateral pricking as adjunctive therapy compared to cupping alone. The role of collateral pricking in treating migraines has not been previously evaluated. In our study, despite the significant treatment success and reduction of pain achieved by combining cupping therapy with acupuncture, the addition of collateral pricking was not associated with substantial improvements in pain reduction. However, the improvement in efficacy outcomes was inferior to cupping alone or in combination with acupuncture. This suggests that adding adjunctive complementary therapy may not produce a more robust impact on efficacy outcomes compared to cupping alone. However, our findings revealed more improvement in efficacy outcomes when acupuncture is combined with cupping.

One major challenge in implementing cupping as an evidence-based practice is the uniformly low methodological quality of published trials. This was reportedly consistently in all studies assessing the risks and benefits of cupping, including the work of Seo et al. [10], Dong et al. [29], and Liu et al. [30], which focused on primary headache disorders. Our study similarly found that none of the available pooled studies were of good quality. Consequently, this phenomenon limits the certainty of cupping as an effective treatment method for migraines and other disorders.

STRENGTHS AND LIMITATIONS

Our study included 18 studies from multiple databases, 16 of which were included in the meta-analysis. We minimized the language restriction by including Chinese articles. We strictly followed the PRISMA guidelines. Our study incorporated the largest sample size among any previously published studies on the topic (n = 1,446 participants), with slightly more female participants than males (60%). We analyzed treatment success, reduction in pain intensity, quality of life, and AE risk of AEs. Our study also conducted subgroup analyses and leave-one-out sensitivity analyses of all outcomes whenever applicable. Furthermore, we demonstrated the effect of cupping therapy alone or combined with adjunctive complementary therapies, i.e., acupuncture and collateral pricking.

This analysis has several limitations. As discussed earlier, according to the Cochrane tool for RCTs all studies (n = 18) were regarded as poor quality with a high risk of bias. This low quality was partly due to the fact it is not feasible to blindly examine all studies, although the high risk of bias was also notable across other domains. Hence, we concluded that there was a low certainty of evidence based on the overall poor quality of the studies. We also suggest that future RCTs consider high methodological quality to eliminate avoidable biases (e.g., by rigorous randomization, standardized outcome assessment, and transparent reporting). In addition, we could not assess some important outcomes as the reported data was unavailable. These included the outcomes analyses based on various migraine severities and types, including the presence of aura. Similarly, the subgroup analysis based on wet and dry cupping techniques was limited to the treatment success outcome, as the majority of dry cupping studies had unreported outcomes.

CONCLUSION

This meta-analysis suggests that cupping therapy is efficacious and safe in treating migraine headaches. Cupping improved treatment success, reduced pain intensity, and demonstrated a low risk of adverse events. Existing trials on cupping therapy for migraine headaches were of poor methodological quality, which limits the certainty of the evidence due to possible biases. Future methodologically robust trials will improve the quality of evidence for this widely adopted migraine treatment modality.

AUTHORS' CONTRIBUTIONS

Conceptualization: AAAD and MCJ; Methodology: MCJ and IS; Software: BM; Validation: MCJ; Database searching: MCJ, and IS; Reports screening: BM, FEAB, YS, RAA, IS and MCJ; Quality: AAAD, MF, LHA, YS, and AM; Data extraction and analysis: BM,FEAB, AAAD, MF, LHA, and RAA; Writing—original draft preparation: BM, FEAB, AAAD, MF, LHA and RAA; Writing—review and editing: IS AND MCJ; Visualization: MCJ and IS; Supervision: MCJ; Project administration: MCJ. All authors have read and agreed to the published version of the manuscript.

ETHICAL APPROVAL

No ethical approval was required as this study did not involve human participants or laboratory animals.

DATA AVAILABILITY

The authors state that all information provided in this article can be obtained from the author on request.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest in this work.

FUNDING

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

SUPPLEMENTARY MATERIALS

Supplementary data is available at https://doi.org/10.3831/KPI.2024.27.3.177.

ORCID

Bushra Mohandes, https://orcid.org/0000-0002-4934-3763
Fatma Elsayed Ahmed Bayoumi, https://orcid.org/0009-0000-0819-5197
Aisha Abdulkarim AllahDiwaya, https://orcid.org/0009-0002-3739-1562
Maryam Salah Falah, https://orcid.org/0009-0003-0611-2679
Leen Hesham Alhamd, https://orcid.org/0009-0003-6115-8928
Razan Abid Alsawadi, https://orcid.org/0009-0007-6804-5968
Yipeng Sun, https://orcid.org/0009-0000-3862-4597
Aidi Ma, https://orcid.org/0009-0005-1595-7256
Idris Sula, https://orcid.org/0000-0002-9522-2786
Muhammad Candragupta Jihwaprani, https://orcid.org/0000-0003-0242-9452

REFERENCES

1. Puledda F, Silva EM, Suwanlaong K, Goadsby PJ. Migraine: from pathophysiology to treatment. J Neurol. 2023;270(7):3654-66.
2. Steiner TJ, Stovner LJ. Global epidemiology of migraine and its implications for public health and health policy. Nat Rev Neurol. 2023;19(2):109-17.
3. Pescador Ruschel MA, De Jesus O. Migraine headache [Internet]. Treasure Island (FL): StatPearls Publishing LLC.; 2024 [updated 2024 Jul 5; cited 2024 July 12]. Available from: https://www.ncbi.nlm.nih.gov/books/NBK560787/
4. Blair HA. Rimegepant: a review in the acute treatment and preventive treatment of migraine. CNS Drugs. 2023;37(3):255-65.
5. Han X, Yu S. Non-pharmacological treatment for chronic migraine. Curr Pain Headache Rep. 2023;27(11):663-72.
6. Abdulah DM, Mohammedsadiq HA, Mohammed AH. Effectiveness of wet cupping therapy on relieving pain in patients with chronic migraine: an observational study. J Complement Integr Med. 2021;18(3):569-77.
7. Al-Bedah AMN, Elsubai IS, Qureshi NA, Aboushanab TS, Ali GIM, El-Olemy AT, et al. The medical perspective of cupping therapy: effects and mechanisms of action. J Tradit Complement Med. 2018;9(2):90-7.
8. Ahmadi A, Schwebel DC, Rezaei M. The efficacy of wet-cupping in the treatment of tension and migraine headache. Am J Chin Med. 2008;36(1):37-44.
9. Firoozabadi MD, Navabzadeh M, Roudsari MK, Zahmatkash M. Comparative efficacy trial of cupping and serkangabin versus conventional therapy of migraine headaches: a randomized, open-label, comparative efficacy trial. J Res Med Sci. 2014;19(12):1134-9.
10. Seo J, Chu H, Kim CH, Sung KK, Lee S. Cupping therapy for migraine: a PRISMA-compliant systematic review and meta-analysis of randomized controlled trials. Evid Based Complement Alternat Med. 2021;2021:7582581.
11. Zhang Y, Chen J, Zhang G. Clinical efficacy of collateral pricking and cupping combined with rizatriptan benzoate in treatment of 65 patients with acute episode migraine. J Shandong Univ Tradit Chin Med. 2020;44(1):46-50.
12. Liu Y, Li P. Phlebotomy and cupping in the treatment of vene-

section: observation of 30 cases. J Clin Acupunct Moxibust. 2016;32(2):37-9.
13. Jin S, Du Y, Han L, Liao C, Gu W. Observations on the efficacy of acupuncture at point Shanzhong(CV17) plus cupping on Back-Shu points in treating migraine. Shanghai J Acupunct Moxibust. 2015;34(1):17-8.
14. Song N, Qin Z, Liang W, Huang X, Huang J, Su Q. Clinical observation of efficacy on treatment of Lotus-needling cupping of Zhuang medicine for migraine of blood stasis type. China J Tradit Chin Med Pharm. 2013;28(6):1904-6.
15. Li F, Bi D. Clinical observation on acupuncture at points of Shaoyang meridians plus moving cupping on the neck and shoulder for migraine. J Acupunct Tuina Sci. 2017;15:377-81.
16. Jiang H, Liu C, Jing K. Treatment of migraine by blood-letting puncture and cupping on Geshu. J Changchun Univ Chin Med. 2015;31(3):579-81.
17. Zhang G, Chen P, Yang Y, Zuo W, Liu A. Observation of the efficacy of scalp acupuncture, plum blossom needling, cupping, bloodletting, combined with oral sumatriptan in the treatment of migraines. Chin J Clin Rehabil. 2002;6(2):244.
18. Qin Z, Song N. Clinical observation of plum blossom needling combined with lotus needle, cupping, and blood stasis removal method in the treatment of migraines. J Youjiang Med Coll Natly. 2012;34(3):397-8.
19. Hao Z. Punctures the liver shu cupping to gather the matching acupoint law to treat migraine. Massage Rehabil Med. 2011;2(3):193-4.
20. Wei Y. Treatment of 34 cases of migraines with meridian massage therapy. Shaanxi J Tradit Chin Med. 2002;23(10):931-2.
21. Chen L, Chen Y, Tan Y. The difference between acupuncture and collaterals bloodletting and western medicine in treating migraine. Clin J Chin Med. 2019;11(27):26-7.
22. Ersoy S, Benli AR. Continue or stop applying wet cupping therapy (al-hijamah) in migraine headache: a randomized controlled trial. Complement Ther Clin Pract. 2020;38:101065.
23. Benli AR, Sunay D. Changing efficacy of wet cupping therapy in migraine with lunar phase: a self-controlled interventional study. Med Sci Monit. 2017;23:6162-7.
24. Abdulah DM, Younis HA, Mustafa ZR. Role of wet-cupping therapy in physiological and mental pains in patients with migraine: a quasi-clinical trial. Medicine (Baltimore). 2024;103(5):e37055.
25. Li X, Yang M, Yang S. Treating 100 cases of migraine in acupuncture plus cupping. Clin J Chin Med. 2012;4(1):67-8.
26. Zarei M, Tabatabaee A, Roshan Ravan M. The effect of wet-cupping on the severity of migraine headaches: randomized controlled clinical trial. Biomed Res Ther. 2019;6(2):2992-5.
27. Al-Qahtani SG, Alsulami BA. Prevalence and predictors of use of cupping among patients attending a primary care center in Riyadh, Saudi Arabia. J Family Med Prim Care. 2023;12(2):376-82.
28. Al-Hashel JY, Ahmed SF, Alshawaf FJ, Alroughani R. Use of traditional medicine for primary headache disorders in Kuwait. J Headache Pain. 2018;19(1):118.
29. Dong S, Wang YY, Li B, Liang SB, Cao HJ. Bloodletting therapy for primary headache: a systematic review and meta-analysis of randomized controlled trials. Eur J Integr Med. 2023;64:102312.
30. Liu Y, Wang Y, Mi C, Wang Z, Han Y, Qi X, et al. Efficacy of acupuncture-related therapy for migraine: a systematic review and network meta-analysis. J Pain Res. 2024;17:1107-32.