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CURRENT THERAPEUTIC TRENDS OF CUPPING THERAPY IN MUSCULOSKELETAL DISORDERS-A SYSTEMATIC REVIEW

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ABSTRACT

BACKGROUND AND AIMS
Cupping Therapy is an ancient form of alternative medicine for treating variety of musculoskeletal disorders. Number of researches revealed the effectiveness of cupping therapy on neck, back or shoulder in decreasing pain intensity within short duration and improves quality of life.

DATABASES AND ELIGIBILITY CRITERIA
The experimental studies were searched on the MEDLINE, PubMed, Google Scholar and Physiotherapy Evidence and PEDro databases from June 2015 to December 2019. It was ensured that all articles were full-text in English language whereas screening was executed on relevant titles and abstracts, evaluated on the basis of cupping therapy and its effects on musculoskeletal pain.

RESULTS
A total of eight out of ten experimental studies showed significant decrease ($p<0.05$) in spinal pain in result of cupping therapy except for the two studies that demonstrated no significant pre-post group differences ($p>0.05$).

CONCLUSION
Cupping therapy is an effective method for the treatment of musculoskeletal pain. However, the high heterogeneity and quality of RCTs has limited the findings. Further trials are recommended to validate the treatment protocol for better understanding of the treatment outcomes.

KEYWORDS
Low back pain, Neck pain, Prevention, Rehabilitation, Spine, Disease, Therapeutic.

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INTRODUCTION

Cupping Therapy is an ancient form of alternative medicine or practice for treating variety of musculoskeletal, neuromuscular and visceral disorders[1]. It is a part of ancient healing systems such as Chinese, Unani, Korean, Tibetan, and Oriental medicine however; its particular origin remains unclear[1,2]. Cupping therapy officially came in 1950s among hospitals in China considering it to be as a pseudoscience[3]. The therapy is applied by the therapists using special cups onto some points over the skin in order to create suction that may apparently help to reduce skin surface temperature, inflammation and pain that may increases deep-tissue blood flow, induces relaxation and promotes healing[3].

Cupping therapy has number of types consisted of mainly four, in particular to wet, dry, massage and flash cupping[4]. The term cupping is commonly known as Hijama, described by detoxification process by removing waste matter from the blood in order to bring vital energy within the body[4,5]. The dry cupping method involves a plastic or silicon cup that is placed on the skin and suctioned the drawing blood whereas in wet cupping, the blood is drawn from lacerated skin into the cup although, wet cupping is not applicable for people of all ages[6]. In addition to this, variety of methods have been most commonly used in Asian and Middle Eastern Countries such as quick cupping, with holding, cupping with fire, moving or shaking etc[7]. Evidence stated that momentarily attaching rounded and inverted cups to definite parts of the body using a vacuum effect results in drawing of the skin inside the cups that increases blood flow and flexibility to the area[8]. This mechanism increases the lactate-pyruvate ratio after 160 minutes thereby leads to an anaerobic metabolism in the surrounding tissue with instant increased pressure pain thresholds[9]. Moreover, it leads to the detoxification of blood and extract it from the body that is beneficial to treat variety of problems and enhance immune system[9]. Therefore, cupping therapy has been widely used due to its beneficence as it is an inexpensive, noninvasive and low-risk modality compared to the other pharmacological treatments[9].

Musculoskeletal disorders such as low back or neck pain have been increasing rapidly, affecting every third person worldwide affecting quality of life[10]. According to World Health Organization (WHO), 70% to 80% people suffers from spinal pain, most commonly with neck and low back pain in young and old aged people due to variety of factors including varying work load, bad posture, incorrect ergonomics of furniture, degenerative changes and trauma that may leads an individual to compromised quality of life, social activities, emotional changes and other problems[11]. People in chronic pain, tend to find different therapies to reduce pain and discomposure, even if those therapies have no enough scientific evidence[12]. Moreover, patients usually apply home remedies to reduce their pain and discomfort[12]. Despite of the facts, number of researches revealed the effectiveness of cupping therapy when placed on neck, back or shoulder in decreasing pain intensity within short duration and improves quality of life[13]. In addition to this, cupping therapy is further classified into light, medium and strong cupping[6]. The therapist used light cupping for children in which pressure is very light or low[6]. In medium cupping pressure is medium or bearable for patients, commonly applied on adults whereas strong cupping is relatively solid, uncomfortable and uncommonly used[6]. Furthermore, it has also evident that cupping therapy reduces muscle tenderness and swelling thereby decrease muscle pain, stimulates sleep, and promotes relaxation[14]. However, the evidence-based rationale for use of cupping therapy is yet to be understood therefore, the present review is aimed to assess current trends of cupping therapy in musculoskeletal pain through the review of experimental studies for better

understanding its effects on neck or back pain.

METHODOLOGY

The systematic review has followed Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.

Data Sources and Searching Strategies

The authors identified and searched studies on learning resource centers and electronic databases that included MEDLINE, PubMed, Google Scholar and Physiotherapy Evidence Database (PEDro). The databases were searched from June 2015 to December 2019 by using keywords such as "Dry Cupping", "Wet Cupping", "Pulsatile Cupping", and "Musculoskeletal Pain." Titles or abstracts were thoroughly reviewed and were excluded if not relevant to specified terms.

Eligibility Criteria of Studies

The experimental studies included "Randomized Controlled Trials" considering Three-Armed, Parallel, Single-Blinded, Mono-Center and Open-Label designs and "Quasi-experimental" that were selected from the tenure of 2015 to 2019 respectively. It was ensured that all articles were full-text in English language; however studies with a language barrier were excluded.

Data Extraction

Screening was executed on relevant titles and/or abstracts were included in the systematic review. All studies were evaluated on the following basis i.e. subjects with musculoskeletal pain, in particular neck or back pain, discriminate between acute and chronic phases. In addition, all types of cupping therapies were included either dry or wet cupping whereas and the type of cupping device was not limited whereas control groups included patients who underwent usual care such as physical therapy, medicine, acupuncture or no intervention.

Risk of Bias

The quality appraisal of the eligible studies was assessed and risk of bias was measured on six domains comprised of random sequence, allocation concealment, participants blinding, outcome assessment blinding, incomplete outcome data and selective reporting respectively.

RESULTS

Selection of Studies

A total number of 80 records analyzed from learning resource centers and databases. The articles relevant to context of objective were identified for screening on the basis of eligibility. Only 10 full-text experimental studies conducted during 2015 to 2019 were included as shown in Figure-1.

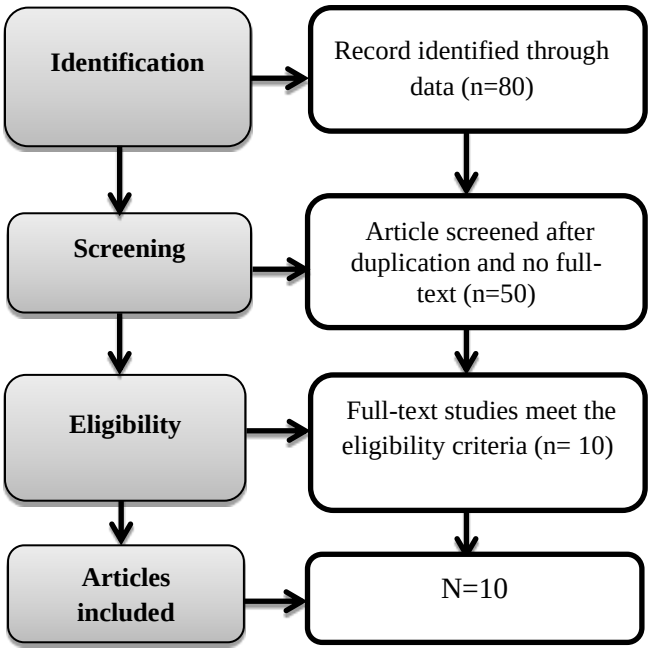

Figure-1 Flow diagram on identification and screening of eligible studies for inclusion

Study Characteristics

Total 10 experimental studies were included in the study based on the number of designs in randomized controlled trials, however only one study was qausi-

experimental respectively. The type of cupping therapy was identified in each study considering sample size, target population and intervention to determine the outcomes of the therapy.

Synthesis of Studies

A total of 10 studies were analyzed in direct comparison of the cupping therapy or comparing with cupping group with the control only group. Although, study of Gozubuyuk et al[18] and Sadek et al[22] who conducted trial on relatively small sample size as compared to other studies[15,16,17,19,20,21,23,24] whereas Teut et al[16] and Yazdanpanahi et al[19] included larger population. A number of studies represented participants with chronic or non-specific low back pain for $\geq$ 3 months due to varying occupations and factors such as childbirth or pregnancy. However, limited studies represented patients with non-specific neck pain persisted for $\geq$ 5 weeks[23] or at least 3 months[15,20]. The region of administration was typically the upper shoulder and neck while cupping was primarily administered to accupoints such as SI 15, GB 21, and LI 15[21] although only one study[18] included healthy volunteers without any presence of pain. Studies have demonstrated variety of cupping therapies i.e. dry, pulsatile, massages, at acupuncture points, dry moving respectively for a single session or several times in a week in alliance with medicine or acupuncture and control group with usual care or no intervention. Moreover, studies showed significant decrease in spinal pain in result of cupping therapy except for the Gozubuyuk et al[18] and Sadek et al[22] that demonstrated insignificant pre-post group differences. The characteristics of studies are depicted in Table-1.

RISK OF BIAS IN STUDIES

The risk of bias was calculated through Cochrane Risk of Bias Tool on following domains is based on author's perception as described in Table-2:

Random Sequence

All the studies[15,16,17,19,20,21,22, 23,24] showed low risk of bias except Gozubuyuk et al[18] that indicated unknown bias.

Allocation Concealment

Low risk of bias demonstrated in all studies.

Participants Blinding

Among ten studies, four[16,19, 22,23,24] cannot ensure bias; three[17,18,20] indicates high risk of bias whereas only two showed low bias[15,21].

Outcome Assessment Blinding

Out of 10 studies, six studies[15,16,17,18,19,20] revealed high bias whereas four[21,22,23,24] showed unknown risk.

Incomplete Outcome Data

Five studies showed low[16,19,20,21,23,24] and high[15,17,18,20,22] risk respectively.

Selective Reporting

Low risk of bias is assumed in all studies.

Table-1 Characteristics of included studies (n=10)

AUTHOR (YEAR)	SAMPLE SIZE	STUDY DESIGN	TARGET POPULATION Age (Mean±S.D)	INTERVENTION	RESULTS	P-VALUE
Stephens et al[15]. (2019)	30	Single-Blinded Randomized Controlled Laboratory Study	Patients with self-reported non-specific neck pain (22±2.6)	Single session of dry and sham cupping intervention for 8 minutes while control group received no intervention	Decrease in subjective pain intensity while hemoglobin levels significantly increased within the dry cupping group	.049
Teut et al[16]. (2018)	110	Three-Armed, Parallel, Participant Blinded Mono-Center Randomized Controlled Clinical Trial	Patients with the clinical diagnosis of non-specific chronic low back pain of at least 3 months (49±13.7)	Regular pulsatile cupping with 8 treatments plus paracetamol or the control group with paracetamol only	Pulsatile cupping showed significant effects compared to control after 12 weeks	<0.05
Sharma et al[17]. (2018)	60	Randomized Controlled Trial	Female students with chronic low back pain for 3 months (19±1.5)	Tens and Cupping therapy was given for the duration of 5 mins and 10 mins respectively	Cupping therapy is equally effective as compared to Tens in decreasing pain	<0.05
Gozubuyuk et al[18]. (2018)	20	Quasi-Experimental Study	Healthy volunteers (Not Specified)	The cupping was applied to one side (suctioned) and the other side served as a control (non-suction)	Groups were not different significantly in terms of thickness and stiffness	>0.05
Yazdanpanahi et al[19]. (2017)	100	Randomized Clinical Trial	Mother suffering from low back pain due to lordosis resulting from pregnancy and childbirth (25±4.2)	Cupping therapy for 15-20 mins sessions a week, while acupressure was applied for 20 minutes	Cupping group showed a significant difference in pain between the three follow-up periods	<0.05

Saha et al[20]. (2017)	45	Randomized Controlled Clinical Trial	Participants with non-specific neck pain for at least 3 months (52.6±10.3)	The intervention group received 5 cupping massages twice-weekly basis while the control patients continued their usual treatment	Cupping group reported significantly less neck pain post intervention	.047
Chi et al[21]. (2016)	60	Single-Blind Experimental Design	Subjects with diagnosed and self-perceived chronic non-specific pain (43.6±8)	The cupping group received therapy at SI 15, GB 21, and LI 15 acupuncture points whereas control group received no intervention	Skin surface temperature and neck pain differences between the groups were statistically significant	<0.001
Sadek et al[22]. (2016)	20	Randomized Control Trial	Athletes with low back pain for ≥3 months (23.45±2.4)	Cupping therapy was performed for two days in a week for one-week for experimental group while control group received no intervention	The experimental group showed improvement increase in lumbar spine flexion and extension but insignificant pre-post results	0.651
Arslan et al[23]. (2015)	40	Randomized Parallel-Group Trial	Office workers with neck pain for ≥ 5 weeks (44.6±1.9)	10 dry moving cupping therapy sessions over a 5 week period	Statistically significant reduction in pain in intervention group	0.002
AlBedah et al[24]. (2015)	80	Randomized, Controlled, Open-Label, Parallel Trial	Patients with non-specific low back pain for at least 3 months (36.48±9.3)	Six wet cupping sessions within 2 weeks done at two acupuncture points whereas only acetaminophen was allowed as a rescue treatment in both groups	Statistically significant differences in pain favoring the wet cupping group compared with the control group	0.0001

Table-2 Cochrane Summary for Risk of Bias (n=10)

Studies	Random Allocation	Allocation Concealment	Participants Blinding	Outcome Assessment Blinding	Incomplete Outcome Data	Selective Reporting
Stephens et al[15]. (2019)	+	+	+	-	-	+
Teut et al[16]. (2018)	+	+	?	-	+	+
Sharma et al[17]. (2018)	+	+	-	-	-	+
Gozubuyuk et al[18]. (2018)	?	+	-	-	-	+
Yazdanpanahi et al[19]. (2017)	+	+	?	-	+	+
Saha et al[20]. (2017)	+	+	-	-	+	+
Chi et al[21]. (2016)	+	+	+	?	+	+
Sadek et al[22]. (2016)	+	+	?	?	-	+
Arslan et al[23]. (2015)	+	+	?	?	+	+
AlBedah et al[24]. (2015)	+	+	?	?	+	+

−, indicates high risk of bias
+, indicates low risk of bias
? , indicates that cannot ensure risk of bias.

DISCUSSION

This systematic review demonstrated current trends of cupping therapy in management of musculoskeletal pain, in particular neck and low back pain. The analysis of ten randomized controlled trials evaluated in this study has shown positive results in decreasing neck and low back pain, in particular physiological parameters of pain in adults that contributed to the consolidation of use of cupping treatment in the clinical condition of the targeted population thereby improving quality of life.

A review conducted by Aboushanab et al[1] demonstrated cupping therapy as old and reliable therapy in patients with neck and back pain in which it reduces inflammation, enhance blood flow and leads to deep-tissue massage by creating a suction. Likewise, studies conducted by Stephen et al[15], Saha et al[20] and Arsalan et al[23] demonstrated significant decrease in neck pain intensity post intervention whereas other studies[16,17,18,19,21,22,24] was found to be significantly reducing low back pain after cupping sessions. In addition, a previous review analyzed the mechanism of cupping therapy that demonstrated positive effects of cupping regime[25]. Moreover, the hemodynamic mechanism facilitating muscle function was observed with elevated oxygen levels in surrounding tissues during cupping sessions[25]. Similarly, study of Stephen et al[15] also revealed increased hemoglobin levels that were significantly increased within the dry cupping group. Despite, it was also observed that however the most applied techniques among all types as dry cupping, applied particularly on the cervical and lumbar regions, often used with the stimulation of the accupoints on the cervical region, mainly on the bladder, gallbladder and small intestine as well as prevailed in the lumbar region over the bladder meridian, followed by trigger points in the similar way as acupuncture techniques although there was also no standardization in relation to the application points over the body for cupping therapy[25-26]. Number of studies also suggested that skin laceration and capillaries promotes by wet cupping act as nociceptive stimulus that leads to the activation of the descending pathways of pain control hence the technique is found to be beneficial for certain musculoskeletal disorders[1,23]. On the other hand, infection risk, scar formation and vasovagal attack may occur as the disadvantage of cupping[24]. Despite of the facts, many authors have emphasized on greater analgesic effect of dry cupping as compared to any other techniques since the use of lubrication can reduce the friction between the cup edge and the skin, often termed as cupping massage[1-4]. Furthermore, the analysis of cupping therapy methods showed that there is no standardization in the treatment protocol for the management of spinal pain[26]. Therefore, it has been concluded that appropriate technique, number of sessions, suction points, strength and duration of the session have not been determined specifically in the studies. Further, limited variables were identified with regard to nature of study and target population. However, variable suction strength was observed to be used in the studies whereas according to standardized protocols, light suction of 100 to 300 millibar with two manual pumping, medium suctions of 500 milllibar with five or more pumping or pulsatile pressure between 100 to 200 millibar every 2 seconds[20-25]. Among these, medium suction is indicated to be painful for musculoskeletal conditions however these methods were not sufficiently describe in the studies. Also, outcomes of the study showed substantial variation in application of cupping therapy type, in particular to the difference with the control group. Despite of the varying application of cupping therapy, the average session was impossible to identify although, in one study, cupping session was applied for 5 sessions around 8 minutes for the interval of 3-4 days[27]. Moreover, number of researchers concluded that at least 5 sessions are required to observe any

significant changes of intervention to ensuring the feasibility of the study[27,28]. Moreover, it has also been suggested that interval period between cupping sessions are crucial for re-establishment of tissues[29].

Further our analysis showed that in most studies the quality of evidence was found to be low, moreover the heterogeneity between studies was quite high however marked pain reduction was found to be associated with cupping that may be clinically relevant when compared with control groups. Moreover, only one variable was demonstrated in the extraction of data. Therefore, additional analysis is required for the clarity of difference between the study groups attributed to different cupping techniques. Although, the effectiveness of these techniques are still needed to be confirmed on the basis of subgroup analysis constitutes of different application techniques in intervention and control groups. Thus, meta-analysis should be performing to determine the heterogeneity of trials.

In recent years, number of clinical trials has been conducted to investigate the effectiveness of cupping therapy on various diseases such as stroke, herpes zoster, and cough or dyspnea etc[30]. In addition, a comprehensive systematic review investigated cupping therapy in associated to overall diseases[31], however this review included articles pertaining to musculoskeletal conditions only. Moreover, this review has several limitations as none of the study reported safety issues and side effects from the treatment. Further studies are required to apprehend whether different kind of cupping is effective for musculoskeletal disorders or in overall diseases as an alternative medicine although, its wider acceptance and practice in holistic health care departments is crucial. Moreover, these protocols are needed to be validated for future trails to evaluate the health-related outcomes in clinical conditions to determine the behavioral and physiological parameters of pain, disability, thresholds and quality of life.

CONCLUSION

It has been concluded that cupping therapy is an effective method for the treatment of musculoskeletal in adults, as it significantly decreases pain intensity scores when compared to control groups. Furthermore, besides the variability in application of cupping techniques, an average of 5 sessions of 8 minutes for 3-4 days is identified with the permanence of the cups in the skin. However, the high heterogeneity and quality of RCTs has limited the findings. Furthermore, treatment protocol needs to be validated for future studies.

REFERENCES

[1] Aboushanab TS, AlSanad S. Cupping therapy: an overview from a modern medicine perspective. J Acupunct Meridian Stud. 2018 Jun 1;11(3):83-7.

[2] Cooper R, Che CT, Mok DK, Tsang CW. Chinese and Botanical Medicines: Traditional Uses and Modern Scientific Approaches. CRC Press; 2017 Sep 6.

[3] Dalton EL, Velasquez BJ. Cupping therapy: An alternative method of treating pain. Public Health Open J. 2017;2(2):59-63.

[4] Qureshi NA, Al-Bedah AM, Abushanab TS. Cupping Hijama Therapy Skin Marks: What Should We Know About Them?. Int. J. Dermatol. 2017;43(9):664-5.

[5] Qureshi NA, Ali GI, Abushanab TS, El-Olemy AT, Alqaed MS, El-Subai IS, Al-Bedah AM. History of cupping (Hijama): a narrative review of literature. J Integr Med. 2017 May 31;15(3):172-81.

[6] Al-Bedah AM, Aboushanab TS, Alqaed MS, Qureshi NA, Suhaibani I, Ibrahim G, Khalil M. Classification of cupping therapy: a tool for modernization and standardization. J Altern Complement Med. 2016 Jun 23:1-0.

[7] Gold R. Seitai (Lymphatic) Shiatsu, Cupping and Gua Sha for a Healthy

Immune System. Singing Dragon; 2019 May 21.

[8] Stoner S, Petrizzo J, Wygand JW, Otto RM. The Effects of Acute Cupping Therapy on Balance, Flexibility and Muscular Power: 3728 Board# 175 June 3 930 AM-1100 AM. Med. Sci. Sports Exerc. 2017 May 1;49(5S):1070.

[9] Azizkhani M, Ghorat F, Soroushzadeh SM, Karimi M, Yekaninejad S. The effect of cupping therapy on non-specific neck pain: A systematic review and meta-analysis. Iran. Red. Crescent. Med. J. 2018 Jul;20(7).

[10] Jones C, Stephens J, Gatchel RJ. Musculoskeletal Pain and Disability Disorders. InHandbook of Rehabilitation in Older Adults 2018 (pp. 125-143). Springer, Cham.

[11] Brennan-Olsen SL, Cook S, Leech MT, Bowe SJ, Kowal P, Naidoo N, Ackerman IN, Page RS, Hosking SM, Pasco JA, Mohebbi M. Prevalence of arthritis according to age, sex and socioeconomic status in six low and middle income countries: analysis of data from the World Health Organization study on global AGEing and adult health (SAGE) Wave 1. BMC musculoskeletal disorders. 2017 Dec 1;18(1):271.

[12] Sherman A, Chin J. Cannabis and CBD for Health and Wellness: An Essential Guide for Using Nature's Medicine to Relieve Stress, Anxiety, Chronic Pain, Inflammation, and More. Ten Speed Press; 2019 Jun 4.

[13] Moura CD, Chaves ÉD, Cardoso AC, Nogueira DA, Corrêa HP, Chianca TC. Cupping therapy and chronic back pain: systematic review and meta-analysis. Revista latino-americana de enfermagem. 2018;26.

[14] Wang H, Hu Y. Traditional Chinese Medicine Cupping and Health. InInternational Conference on Health and Well-Being in Modern Society (ICHW 2019) 2019 Oct. Atlantis Press.

[15] Stephens, Stephanie Lynn. The Immediate Effects of Dry Cupping Therapy on Subcutaneous Hemodynamics and Pain Associated With Nonspecific Neck Pain, 2019.

[16] Teut M, Ullmann A, Ortiz M, Rotter G, Binting S, Cree M, Lotz F, Roll S, Brinkhaus B. Pulsatile dry cupping in chronic low back pain–a randomized three-armed controlled clinical trial. BMC Complemen Altern Med. 2018 Dec 1;18(1):115.

[17] Sharma M, Asif M, Rai RH, Akhtar Z, Hussain MS. Therapies over Medication: Comparing the Effect of Tens and Cupping Therapy to Enhance the Performance in Female College Going Students. EJPESS. 2018 Oct 21.

[18] Gozubuyuk OB, Devran S, Akikol M. The effects of dry cupping therapy on muscle thickness and elasticity of upper back muscles. J Bodyw Mov Ther. 2018 Oct 1;22(4):851.

[19] Yazdanpanahi Z, Ghaemmaghami M, Akbarzadeh M, Zare N, Azisi A. Comparison of the effects of dry cupping and acupressure at acupuncture point (BL23) on the women with postpartum low back pain (PLBP) based on short form McGill pain questionnaires in Iran: a randomized controlled trial. JFRH. 2017 Jun;11(2):82.

[20] Saha FJ, Schumann S, Cramer H, Hohmann C, Choi KE, Rolke R, Langhorst J, Rampp T, Dobos G, Lauche R. The effects of cupping massage in patients with chronic neck pain-a randomised controlled trial. J. Complement. Med. Res. 2017;24(1):26-32.

[21] Chi LM, Lin LM, Chen CL, Wang SF, Lai HL, Peng TC. The effectiveness of cupping therapy on relieving chronic neck and shoulder pain: a randomized controlled trial. Evid. Based Complementary Altern. Med. 2016;2016.

[22] Sadek TA. Effects of cupping therapy based on stabilization core exercises on low back pain for soccer players in state of United Arab Emirates. Ovidius University Annals, Series Physical Education & Sport/Science, Movement & Health. 2016 Jul 2;16.

[23] Arslan M, Yaman G, Ilhan E, Alemdag M, Bahar A, Dane S. Moving Dry Cupping Therapy Reduces Upper Shoulder and Neck Pain in Office Workers. Clin Invest Med. 2015. 38. 217-220.

[24] AlBedah A, Khalil M, Elolemy A, Hussein AA, AlQaed M, Al Mudaiheem A, Abutalib RA, Bazaid FM, Bafail AS, Essa A, Bakrain MY. The use of wet cupping for persistent nonspecific low back pain: randomized controlled clinical trial. J Altern Complement Med. 2015 Aug 1;21(8):504-8.

[25] Li T, Li Y, Lin Y, et al. Significant and sustaining elevation of blood oxygen induced by Chinese cupping therapy as assessed by near infrared spectroscopy. Biomed Opt Express 2017;8:223–9

[26] Nielsen A, Kligler B, Koll BS. Safety protocols for gua sha (press-stroking) and baguan (cupping) Complement Ther Med. 2012;20(5):340–344.

[27] Lauche R, Cramer H, Choi KE, Rampp T, Saha FJ, Dobos GJ, et al. The influence of a series of five dry cupping treatments on pain and mechanical thresholds in patients with chronic non-specific neck pain-a randomised controlled pilot study. BMC Complement Altern Med. 2011;18(6):327–334.

[28] Tham LM, Lee HP, Lu C. Cupping: From a biomechanical perspective. J Biomech. 2006;39(12):2183–2193.

[29] Markowski A, Sanford S, Pikowski J, Fauvell D, Cimino D, Caplan S. A Pilot Study Analyzing the Effects of Chinese Cupping as an Adjunct Treatment for Patients with Subacute Low Back Pain on Relieving Pain, Improving Range of Motion, and Improving Function. J Altern Complement Med. 2014;20(2):113–117.

[30] Cao H, Li X, Liu J. An updated review of the efficacy of cupping therapy. PLoS One 2012;7:e31793.

[31] Al Bedah AM, Khalil MK, Posadzki P, et al. Evaluation of wet cupping therapy: systematic review of randomized clinical trials. J Altern Complement Med 2016;22:768–77.