



Research Paper

Wet cupping therapy ameliorates pain in patients with hyperlipidemia, hypertension, and diabetes: A controlled clinical study

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ABSTRACT

Background: Cupping therapy has long been practiced in several cultures for the treatment of ailments and improvement of general well-being. Thus, the aim of this current study is to observe the clinical efficacy and safety of wet cupping treatments in relieving headache, chest pain and muscle ache in patients recently have diagnosed with hyperlipidemia, diabetes and high blood pressure.

Materials and methods: This study determines the effects of wet cupping on some blood parameters and pressure in 50 males and 50 female patients aged between 35 and 55 years undergoing wet cupping therapy at the Sheefa Cupping and Acupuncture Private Center after they have been diagnosed clinically to have hyperglycemia, diabetes and high blood pressure by a specialist at Department of Chronic Diseases, Sulaimani Teaching Hospital. Venous blood was obtained, and blood pressure taken from patients immediately before and 72 h after cupping therapy. The hematological parameters and serum lipid profile, fasting blood sugar, ferritin, urea, and creatinine concentrations were determined.

Results: Wet cupping significantly reduced the cholesterol, triglyceride, low-density lipoprotein, fasting blood sugar, ferritin, urea, and creatinine, lowered blood pressure but did not significantly affect the erythrocyte parameters, leukocyte or platelet counts in the patients. The normal hematological parameters in patients after wet cupping therapy showed that the treatment is not detrimental to health. The treated patients showed significantly reduced headache, chest pain and muscle ache verbally.

Conclusion: Wet cupping therapy is beneficial as a prophylactic and/or complementary treatment for hyperlipidemia, hyperglycemia, and hypertension and in prevention and control of diabetes mellitus and kidney disease, hence reducing the headache, chest pain and muscle ache.

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1. Introduction

Cupping is an ancient therapy practiced by several cultures for improvement of health and general well-being [1]. The technique involves the use of either a plastic, bamboo, earthen or glass cups placed on the desired acupoints on the skin to create suction. Currently, the mechanism of effect of cupping therapy remains

unclear, although proper cupping causes skin hyperemia or hemostasis that facilitates healing [2].

In Kurdish culture, cupping therapy is known as *Kalla-Shax*. Cupping in Arabic name is *Al-Hejamah*, which means to reduce size in order to return the body to its natural state [3]. *Al-Hejamah* has been part of the Middle-Eastern culture for thousands of years [4,5] with records of the practice in an Egyptian medical textbook, *Ebers Papyrus*, dating as early as 1550 BC [6]. The earliest records of cupping in China were in an ancient book, *Bo Shu*, which was discovered in an ancient tomb of the Han Dynasty (206 BC – 220

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AD) in 1973 [2]. Cupping therapy is now formally and widely practiced in hospitals throughout China [7].

Cupping therapy can be either dry or wet. Dry cupping therapy is more popular in the Far-East whereas wet cupping is favored in the Middle East and Eastern Europe regions [7,8]. Cupping is either used alone or in combination with acupuncture [9] to symptomatic treat a wide range of conditions such as pain, hypertension, stroke, cardiovascular diseases, hemophilia, inflammation, varicose veins, rheumatic arthritis, sciatica, back pain, chest pain, muscle ache, severe headache and migraine [4,7]. The therapy is also recommended as a form of deep tissue massage, and for mental and physical relaxation and infertility [10–12]. According to Islamic prophetic medicine, cupping therapy is best performed on the 17th, 19th, and 21st of the Islamic calendar and it is recommended that patient should not eat at least 2–4 h before cupping [13].

Although cupping therapy is a relatively safe form of complementary and alternative medicine, excessive cupping therapies, especially within short intervals, may cause weakness, drowsiness, and lighten head [14,15]. Bruising and skin discoloration are among the adverse effects of cupping while excessive cupping may also cause, ecchymosis, bleeding, anemia, blisters, skin pigmentation, abscesses, and wound infections if performed by unqualified therapist [6].

Although some clinicians remain skeptical about the effectiveness of cupping, growing evidence shows that the therapy has beneficial health benefits. Among the benefits of cupping are in the treatment of herpes zoster, cough, asthma, pain, high blood pressure [16–20] and primary infertility in male [9]. As well as, it might remove oxidants and heavy metals from the body, and increases sleep quality [19–22]. Thus, this study investigated the effect of wet cupping therapy on pathophysiological, hematological, and serum biochemical parameters in human patients with severe headache, chest pain and muscle ache with history of metabolic diseases.

2. Materials and methods

2.1. Materials

Disposable premium quality sterilized plastic cupping sets fitted with hand suction pumps were purchased from (Kangzhu 6-Cup Biomagnetic Chinese Cupping Therapy Set, Model B1, Kangzhu, Beijing, China).

2.2. Methods

The study was conducted from April to August 2017 on 50 male and 50 female patients aged between 35 and 55 years who consulted the Sheefa Cupping and Acupuncture Private Center, Kawa Street, Sulaimaniyah City, Northern Iraq after they have been enrolled to Department of Chronic Diseases, Sulaimaniyah Teaching Hospital and diagnosed clinically to have diabetes, hypertension and hyperlipidemia by a specialist clinician. All patients received based on their verbally complaints of a severe headache, breathing difficulties, muscle ache (especially shoulder, arm, and leg), chest pain, and depression. All patients were asked to sign informed consents forms, thereby agreeing to receive wet cupping therapy and to allow blood collection from them. Venous blood was obtained from patients immediately before and 72 h after cupping therapy. We followed the Consolidated Standards of Reporting Trials and Standards for Reporting Interventions in Clinical Trials of Wet Cupping guidelines for designing and reporting controlled trials. Our team strictly defended the patients' legitimate rights and interests, and we were totally responsible for the whole therapeutic process. Detailed questionnaires (Supplementary I) were obtained from all patients, including questions about socio-demographic characteristics, history of pain appearance and

Table 1
Socio-demographic features and anthropometric measures of the studied participants.

Parameter		Frequency (%)
Gender	Male	50
	Female	50
Ethnicity	Kurdish	95
	Arabian	5
	Turkmanian	0.0
	Others	0.0
Education level	No schooling	39
	Primary school	22
	Secondary school	18
	High school	14
	University and Post-graduate	7
Occupation	Employed	33
	Non employed	77
Residency	Urban	46
	Rural	54
Marital state	Single	38
	Married	59
	Divorced	3
Cigarette smoker	Yes	34
	No	54
Shisha smoker	X-smoker	12
	Yes	60
	No	40
Alcohol intake	X-smoker	0
	Yes	27
	No	63
Exercise	X-drinker	10
	Yes	7
Source of protein	No	93
	Red meat	70
BMI	Chicken	20
	Fish	10
	Normal	18
	Overweight	61
Appearance of pain	Obese	21
	1. Site	
	Head	62
	Chest	74
	Shoulder	65
	Limb	13
	Arm	11
	2. Onset	
	Sudden	47
	Gradual	53
3. Relieving	30.35 ± 1.6 min	
4. Severity		
Mild	28	
Moderate	60	
Severe	12	
Diabetes	Yes	100
	No	0
Hypertension	Yes	100
	No	0
Hypercholestermia	Yes	100
	No	0
Age (mean ± SD)		45.4 ± 3.1

diseases, detailed symptoms and duration of symptoms, as well as anthropometric measures (Table 1). The research proposal was approved by the ethical committee of College of Medicine, University of XXXXX, Northern Iraq with approval number of COM-UNIVSUL-2016-1010.

2.3. Exclusion criteria

Pregnant or lactating subjects and patients with severe heart, liver and kidney disorders or diseases, coagulation abnormalities, anemia, cancer, and severe bone fracture were excluded from the study. Additionally, patients who failed to complete the

questionnaires and were not able to follow medical orders were also excluded.

2.4. Patient allocation

Patients who were interested in participating in this trial were interviewed first to confirm the availability of severe headache, chest pain and muscle ache. After recruiting the participants, they were invited by the medical laboratory scientist to assign the participants to the treatment and decided to conduct the wet cupping to them. The patients were included in the study respective of whether or not they were undergoing any form of treatment for the pain.

2.5. Anatomical sites for cupping therapy

Generally, it is guided to put the sucking cups near anatomically as possible to the painful area to facilitate excretion of pain. Thus, we chose the following points during the wet cupping therapy (Fig. 1A) [11]:

1: At skin overlying the spinous process of 7th cervical vertebra. It is the most prominent vertebral spine at the lower aspect of back of the neck.

4 and 5: Between the upper part of the medial borders of the 2 scapulae i.e. about 3 cm lateral to the spinous process of 3rd thoracic vertebra.

20 and 21: At midpoints of skin covering trapezii. These points are beneficial in treating neck pain, shoulder pain and tingling of upper limbs.

2.6. Cupping therapy technique

The shoulder and the spine region were examined for abnormalities to ensure the correct application of cupping therapy. Each patient was separately treated in the therapeutic room and the chosen points on the back of the patients were thoroughly sterilized with alcohol. Designated skin acupoints on the shoulder and at both sides of the spine, using sterilized surgical blades, were nicked to a predetermined depth (0.1 cm) and width (2.0 cm) to cause bleeding. Vacuums were created in the cups with a pump, the cups firmly placed at the acupoints, and blood allowed to drain out for 3 to 5 times using multiple cups (Fig. 1B). Upon removal of the cups, the wounds were aseptically cleaned and covered with gauze and secured. Following the termination of the process, each

participant was offered a 200 mL of freshly prepared natural fruit juice.

2.7. Pathophysiological and blood parameters

The blood pressure of subjects, before and after cupping therapy was determined using a conventional mercury-based sphygmomanometer and a stethoscope (Equmed, Sdn. Bhd. Malaysia). The temperature of the therapeutic room was never below than 25 °C. Fasting blood sugar, serum cholesterol, triglyceride, low density lipoprotein, ferritin, urea, and creatinine concentrations were determined using Cobas c 311 (Roche Diagnostics, Germany). Additionally, total erythrocyte (RBC), leukocyte (WBC), platelet (Plt) count, hemoglobin (Hb), and hematocrit (PCV) were determined using a Coulter Counter (Beckman, USA).

2.8. Statistical analysis

The results of all experiments expressed as mean \pm SD and analyzed statistically using SPSS version 20.0 (SPSS Inc., Chicago, USA). Paired *t*-test were done to compare the pre and post treatment results. Probability values of $P < 0.05$ were considered statistically significant.

3. Results

There is no significant difference ($P > 0.05$) in the levels of hematological parameters in the patients between before and after cupping therapy. The blood total cholesterol, triglyceride, LDL, blood sugar, urea, and creatinine concentrations and blood pressure were significantly ($P < 0.05$) lower in both male and female patients at 72 post-cupping compared to the pre-cupping period (Table 2).

The questionnaire showed that 80% of male and 4% of female volunteer patients was smokers. The patients, particularly males, had diets high in protein and red meat. Most patients do not regularly exercise.

4. Discussion

Cupping therapy is an ancient traditional medical practice that has now become a treatment modality in many hospitals and local clinics throughout Asian countries including Iraq. The treatment method is primarily employed for the alleviation of pain and

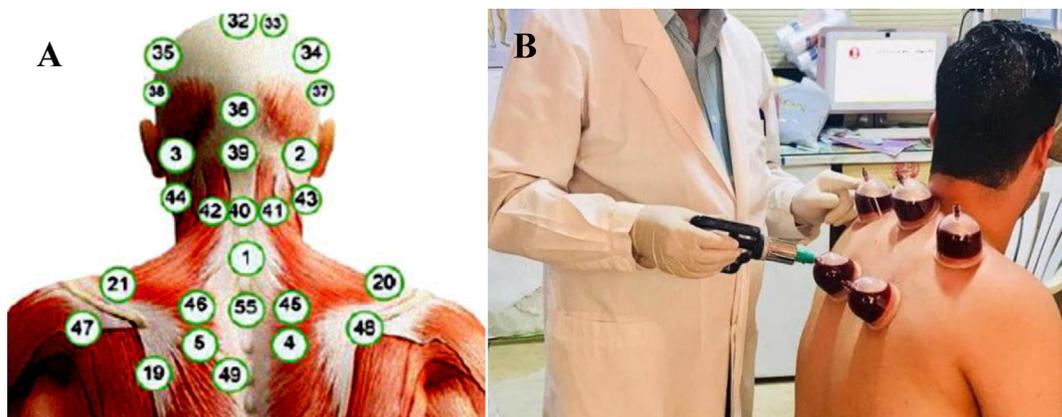


Fig. 1. Photographs showing various anatomical points for wet cupping therapy (A) and a hijamatologist performs a wet cupping at chosen points (1, 4, 5, 20, and 21) using a sterilized disposable premium quality plastic cupping set along with hand suction pumps. Cups were applied to the treatment region and the blood was carefully drained for 3–5 times.

Table 2
Patho-physiological and hemato-biochemical tests in both male and female before and after 72 h of cupping therapy.

Type of Experiment	Parameters	Normal Standard Level	Before Cupping		72 Hours After Cupping	
			Female	Male	Female	Male
Pathological	Total Cholesterol	<200 mg/dL	300.13 ± 2.0 ^a	401.13 ± 1.0 ^a	180.13 ± 2.8 ^b	193.14 ± 3.0 ^b
	Triglyceride	<200 mg/dL	349.34 ± 1.9 ^a	548.34 ± 1.1 ^a	191.15 ± 1.2 ^b	189.35 ± 1.2 ^b
	LDL	<130 mg/dL	175.84 ± 3.1 ^a	196.84 ± 4.1 ^a	125.88 ± 3.5 ^b	129.34 ± 4.1 ^b
	Fasting blood sugar	70–110 mg/dL	255.86 ± 1.75 ^a	301.86 ± 1.8 ^a	150.16 ± 2.5 ^b	155.26 ± 1.5 ^b
Physiological	Blood pressure	10-14/60–90 mm Hg	16.4 ± 0.76–10.2 ± 3.7 ^a	16.5 ± 0.8–10.33 ± 1.2 ^a	12.1 ± 2.1–10.2 ± 2.5 ^b	12.5 ± 1.5–10.33 ± 3.0 ^b
Hematological	WBC	4.0–11.0 × 10 ⁹ /L	9.32 ± 2.55	10.31 ± 1.7	9.12 ± 1.45	10.33 ± 1.9
	RBC	3.90–5.20 × 10 ⁶ /mm ³	4.02 ± 1.85 ^c	5.42 ± 1.55 ^a	4.0 ± 1.65 ^d	4.9 ± 1.0
	Hb	12.0–15.0 g/dL	13.07 ± 2.71 ^c	16.22 ± 1.61 ^a	13.01 ± 1.75 ^d	14.8 ± 2.4
	PCV	36.4–46.0%	43.15 ± 1.5 ^c	47.45 ± 2.5 ^a	42.15 ± 1.9 ^d	44.05 ± 2.1
	PLC	150 - 400 10 ³ /mm ³	365.11 ± 1.2	396.11 ± 2.49	359.17 ± 1.3	377.41 ± 1.6
Biochemical	Urea	16.0–49.0 mg/dL	49.67 ± 2.5	55.76 ± 1.5 ^a	35.66 ± 1.45 ^b	37.16 ± 2.3 ^b
	Creatinine	0.5–1.2 mg/dL	1.23 ± 1.4	1.35 ± 1.5 ^a	0.9 ± 2.33 ^b	1.19 ± 1.47 ^b
	Ferritin	Female: 13.0–150 ng/dL Male: 3.0–400 ng/dL	87.45 ± 2.6	415.11 ± 1.6 ^a	82.25 ± 1.56	275.15 2.8 ^b

Values are mean ± SD that have been analyzed using post hoc comparison test one way ANOVA. Data revealed. LDL: low-density lipoprotein, WBC: white blood cells, RBC: red blood cells, Hb: hemoglobin, PCV: packed cell volume, PLC: platelet count.

^a Indicating a significant increase in the level of tests in patients before cupping therapy in comparing to the normal standard level.

^b Indicating a significant lowering in the level of tests in treated subjects in comparing to the subjects before cupping therapy.

^c Indicating a significant decreasing in the level of tests in patients before cupping therapy in comparing to the normal standard level.

^d Indicating a non-significant lowering in the level of tests in treated subjects in comparing to the subjects before cupping therapy.



Fig. 2. Photographs showing a lipidemic blood indicating high lipid profile including either cholesterol or triglyceride or both in a male patient during cupping therapy.

depression [23]. The results of the study showed that the high lipid profile (Fig. 2) is more pronounced in males than females.

Based on the history of the patients, this phenomenon is suggested to be due to high intake of fat diet from consumption of mutton cooked in ghee for cooking. This is compounded by lack of exercise among the male patients [24]. High cholesterol diet is one of the leading causes of atherosclerosis that results in hypertension, especially among middle-aged to old patients [6]. In our study, the high blood pressure is significantly ($P < 0.05$) improved in both sexes after wet cupping therapy which is similar to the findings of another study that reported clear relationship between wet cupping therapy and the reduction and control of systolic blood pressure in patients with hypertension [25].

Cupping therapy did not cause the significant decrease in RBC count, indicating the blood loss due to the technique is marginal and not a health hazard. Similarly, no significant changes were seen in hematological data (Complete blood count) before and after cupping therapy for both sexes which is in the same line with the results of another study conducted in Iran [26].



Fig. 3. Photographs showing darkened and concentrated blood indicates high ferritin and hematocrit levels in a male patient during cupping therapy.

Male patients that volunteered for cupping therapy had higher serum ferritin concentrations than female patients. This is associated with males generally having higher total erythrocytes count than females. Additionally, there is an association between high serum ferritin and smoking [27]. Kurdish men are generally heavy smokers, thus, the higher serum ferritin in male than in female patients in the study is partially attributable to smoking habits.

In Kurdish culture, sugar is heavy consumed in the diet through drinking of tea, coffee, and soft drinks, sweets, and other confections [28]. There is no accurate report on the prevalence of diabetes mellitus in Iraq. However, one study suggested that in the Basrah city/Iraq, one in five adults is affected by the disease [29]. There is no known cure for type 2 diabetes, but the disease may be prevented with regular wet cupping therapy and adopting the healthy lifestyle. Our study on patients in the Kurdish region showed that wet cupping therapy might reduce blood glucose both in males and females which is in agreement with another study that suggested wet cupping can be introduced as the complementary treatment for diabetes [30].

Iron stores may predict the development of diabetes [31]. Iron overload (Fig. 3) is associated with insulin resistance and increased risk of development of type 2 diabetes mellitus [32]. We showed that cupping might decrease the ferritin levels, suggesting the procedure might decrease iron stores in male patients. The study indicates that wet cupping treatment may be an effective adjuvant therapy for patients with familial history of diabetes to adapt to prevent the development of the disease [33].

One abnormality in diabetes mellitus is dyslipidemia [34]. In diabetics, restoration of the lipid profile to normality may suggest disease remission. In our study, wet cupping therapy decreased total cholesterol, triglyceride, and LDL concentrations both in males and females which is in agreement with another study conducted by Ranaei-siadat et al. [26]. Thus, wet cupping may be one of the means to improve the lipid profile in diabetic patients while serving as an effective method to improve lipid metabolism and subsequently prevent the development of atherosclerosis.

However, Farahmand et al. indicated that wet cupping did not have a significant ($p > 0.05$) effect on lipid profile in a randomized controlled trial study on 63 patients [35] while Mahdavi et al. showed a significant ($p > 0.05$) improvement in lipid profile of a randomly selected group of healthy volunteers underwent wet cupping [36].

Dyslipidemia is a common manifestation of the patient with anxiety and depressive disorders [37,38]. The lowering of serum lipid parameters in patients in our study suggests that wet cupping may be used to alleviate symptoms of depression. This result is in agreement with the outcomes of another study which mentioned that cupping has been shown to benefit psychological well-being by alleviating anger, hostility, depression and anxiety in a group of patients with metabolic syndrome [39].

Serum creatinine and urea are indicators renal function that is used in the assessment, diagnosis, and monitoring treatment efficacy in kidney diseases. In this study, the levels of both creatinine and urea are relatively higher in patients before treatment, which may be directly related to the high protein and red meat consumption. After treatment, both analytes decrease in level, which is suggested improvement of renal function that might be associated with wet cupping [40].

5. Conclusion

In conclusion, wet cupping therapy is not detrimental to health, instead, it might be beneficial as a prophylactic and/or complementary for the treatment of hyperlipidemia, hyperglycemia, and hypertension and in prevention and control of diabetes mellitus

and kidney disease, and consequently effective to alleviate headache, chest pain and muscle ache in treated patients.

Ethical approval

Blood sample from patients were used.

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No fund is obtained for this manuscript.

Author contribution

Heshu Sulaiman Rahman: Resources, data analysis, Original draft preparation.

Govand Ali Ahmad: Supervision, lab works.

Baram Mustapha: Lab works.

Hisham Getta: Lab works.

Hemn Hassan Othman: Writing- Original draft preparation.

Rasedee Abdullah: Writing- Writing- Reviewing and Editing.

Conflict of interest statement

The authors declared that there is no conflict of interest to this manuscript.

Guarantor

Assistant Professor Dr. Heshu Sulaiman Rahman, E.mail: heshu.rhaman@univsul.edu.iq Tel: 009647726159590.

Registration of Research Studies

This is a clinical study and not a clinical trial.

Consent

Only blood samples were used from the patients after permission.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ijso.2020.07.003>.

References

- [1] Al Bedah AM, Khalil MK, Posadzki P, Sohaibani I, Aboushanab TS, AlQaed M, et al. Evaluation of wet cupping therapy: systematic review of randomized clinical trials. *J Alternative Compl Med* 2016;22(10):768–77.
- [2] Cao H, Han M, Li X, Dong S, Shang Y, Wang Q, et al. Clinical research evidence of cupping therapy in China: a systematic literature review. *BMC Compl Alternative Med* 2010;10(1):1–10.
- [3] Nimrouzi M, Mahbodi A, Jaladat A-M, Sadeghfard A, Zarshenas MM. Hijamat in traditional Persian medicine: risks and benefits. *J Evid Based Complementary Altern Med* 2014;19(2):128–36.

- [4] El Sayed SM, Al-quliti A-S, Mahmoud HS, Baghdadi H, Maria RA, Nabo MMH, et al. Therapeutic benefits of Al-hijamah: in light of modern medicine and prophetic medicine. *Am J Med Biol Res* 2014;2(2):46–71.
- [5] Ge W, Leson C, Vukovic C. Dry cupping for plantar fasciitis: a randomized controlled trial. *J Phys Ther Sci* 2017;29(5):859–62.
- [6] Refaat B, El-Shemi AG, Ebid AA, Ashshi A, BaSalamah MA. Islamic wet cupping and risk factors of cardiovascular diseases: effects on blood pressure, metabolic profile and serum electrolytes in healthy young adult men. *Altern Integ Med* 2014;3(1):151.
- [7] Cao H, Li X, Liu J. An updated review of the efficacy of cupping therapy. *PLoS One* 2012;7(2):e31793.
- [8] AlBedah A, Khalil M, Elolemy A, Hussein AA, AlQaed M, Al Mudaiheem A, et al. The use of wet cupping for persistent nonspecific low back pain: randomized controlled clinical trial. *J Alternative Compl Med* 2015;21(8):504–8.
- [9] Dane S, Welcome MO. A case study: Effects of wet cupping therapy in a male with primary infertility. *J Compl Med Res* 2019;10(4):155–61.
- [10] Lee MS, Choi T-Y, Shin B-C, Kim J-I, Nam S-S. Cupping for hypertension: a systematic review. *Clin Exp Hypertens* 2010;32(7):423–5.
- [11] Mahmoud HS, Abou-El-Naga M, Omar NAA, El-Ghazzawy HA, Fathy YM, Nabo MMH, et al. Anatomical sites for practicing wet cupping therapy (Al-Hijamah): in light of modern medicine and prophetic medicine. *Altern Integ Med* 2013;2(8):1–30.
- [12] Shekarforoush S, Foadoddini M, Noroozadeh A, Akbarinia H, Khoshbaten A. Cardiac effects of cupping: myocardial infarction, arrhythmias, heart rate and mean arterial blood pressure in the rat heart. *Chin J Physiol* 2012;55(4):253–8.
- [13] Lauche R, Langhorst J, Dobos GJ, Cramer H. Clinically meaningful differences in pain, disability and quality of life for chronic nonspecific neck pain—a reanalysis of 4 randomized controlled trials of cupping therapy. *Compl Ther Med* 2013;21(4):342–7.
- [14] Kim KH, Kim T-H, Hwangbo M, Yang GY. Anaemia and skin pigmentation after excessive cupping therapy by an unqualified therapist in Korea: a case report. *Acupunct Med* 2012;30(3):227–8.
- [15] Lee MS, Kim J-I, Ernst E. Is cupping an effective treatment? An overview of systematic reviews. *J Acupunct Meridian Stud* 2011;4(1):1–4.
- [16] Abdullahi F, Unal C, Welcome MO, Nwenendah E, Umar N, Muhammed A, et al. Beta and gamma EEG oscillatory waves of the frontal cortex increase after wet cupping therapy in healthy humans. *J Res Med Dent Sci* 2019;7(3):123–30.
- [17] Al-Bedah AM, Elsubai IS, Qureshi NA, Aboushanab TS, Ali GI, El-Olemy AT, et al. The medical perspective of cupping therapy: effects and mechanisms of action. *J Tradit Complement Med* 2019;9(2):90–7.
- [18] Mehta P, Dhapte V. Cupping therapy: A prudent remedy for a plethora of medical ailments. *J Tradit Complement Med* 2015;5(3):127–34.
- [19] Umar NK, Tursunbadalov S, Surgun S, Welcome MO, Dane S. The effects of wet cupping therapy on the blood levels of some heavy metals: a pilot study. *J Acupunct Meridian Stud* 2018;11(6):375–9.
- [20] Tagil SM, Celik HT, Ciftci S, Kazanci FH, Arslan M, Erdamar N, et al. Wet-cupping removes oxidants and decreases oxidative stress. *Compl Ther Med* 2014;22(6):1032–6.
- [21] Kazanci FH, Dane S. Is it possible to remove heavy metals from the body by wet cupping therapy (Al-hijamah)? *Indian J Tradit Knowl* 2016;15(4):700–4.
- [22] Cıkar S, Ustundag G, Haciabdullahoglu S, Yuksel S, Dane S. Wet cupping (hijamah) increases sleep quality. *Clin Invest Med (Online)* 2015;38(4):E258.
- [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 (Online)* 2015;38(4):E217.
- [24] Kratz M, Baars T, Guyenet S. The relationship between high-fat dairy consumption and obesity, cardiovascular, and metabolic disease. *Eur J Nutr* 2013;52(1):1–24.
- [25] Al-Tabakha MM, Sameer FT, Saeed MH, Batran RM, Abouhegazy NT, Farajallah AA. Evaluation of bloodletting cupping therapy in the management of hypertension. *J Pharm BioAllied Sci* 2018;10(1):1.
- [26] Ranaei-siadat S, Kheirandish H, Adibi Z, Agin K, Barshan Tashnizi M. The effect of cupping (hejamat) on blood biochemical and immunological parameters. *Iran J Pharm Res* 2010;(Supplement 2):31–2.
- [27] Lee CH, Goag EK, Lee SH, Chung KS, Jung JY, Park MS, et al. Association of serum ferritin levels with smoking and lung function in the Korean adult population: analysis of the fourth and fifth Korean National Health and Nutrition Examination Survey. *Int J Chronic Obstr Pulm Dis* 2016;11:3001.
- [28] Hu FB. Globalization of diabetes: the role of diet, lifestyle, and genes. *Diabetes care* 2011;34(6):1249–57.
- [29] Mansour AA, Al-Maliky AA, Kasem B, Jabar A, Mosbeh KA. Prevalence of diagnosed and undiagnosed diabetes mellitus in adults aged 19 years and older in Basrah, Iraq. *Diabetes Metab Syndr Obes: Targets Ther* 2014;7:139.
- [30] Vakilinia SR, Bayat D, Asghari M. Hijama (wet cupping or dry cupping) for diabetes treatment. *Iran J Med Sci* 2016;41(3 Suppl):S37.
- [31] Kunutsor SK, Apekey TA, Walley J, Kain K. Ferritin levels and risk of type 2 diabetes mellitus: an updated systematic review and meta-analysis of prospective evidence. *Diabetes Metab Res Rev* 2013;29(4):308–18.
- [32] Kim C-H, Kim H-K, Bae SJ, Park J-Y, Lee K-U. Association of elevated serum ferritin concentration with insulin resistance and impaired glucose metabolism in Korean men and women. *Metabolism* 2011;60(3):414–20.
- [33] Facchini FS. Effect of phlebotomy on plasma glucose and insulin concentrations. *DIABETES CARE-ALEXANDRIA VA-*; 1998. 2190–2190.
- [34] Ozder A. Lipid profile abnormalities seen in T2DM patients in primary healthcare in Turkey: a cross-sectional study. *Lipids Health Dis* 2014;13(1):183.
- [35] Farahmand SK, Gang LZ, Saghebi SA, Mohammadi M, Mohammadi S, Mohammadi G, et al. The effects of wet cupping on coronary risk factors in patients with metabolic syndrome: a randomized controlled trial. *Am J Chin Med* 2012;40(02):269–77.
- [36] Mahdavi MRV, Ghazanfari T, Aghajani M, Danyali F, Naseri M. Evaluation of the effects of traditional cupping on the biochemical, hematological and immunological factors of human venous blood. A compendium of essays on alternative therapy Croatia. In *Tech* 2012;6.
- [37] Liang Y, Yan Z, Cai C, Jiang H, Song A, Qiu C. Association between lipid profile and depressive symptoms among Chinese older people: mediation by cardiovascular diseases? *Int J Behav Med* 2014;21(4):590–6.
- [38] Sharma S, Shrestha L, Ojha SP, Jha B. Status of serum lipids in individuals with depression. *Ann Clin Chem Lab Med* 2016;2(1):24–7.
- [39] Farahmand SK, Gang LZ, Saghebi SA, Mohammadi M, Mohammadi S, Mohammadi G, et al. Does wet cupping on the interscapular region improve depression and anxiety? *Focus Altern Compl Ther* 2014;19(2):64–9.
- [40] Gür-Özmen S, Karahan-Özcan R. Iron deficiency anemia is associated with menstrual migraine: a case-control study. *Pain Med* 2016;17(3):596–605.