



The Effects of Wet Cupping Therapy on Fasting Blood Sugar, Renal Function Parameters, and Endothelial Function: A Single-arm Intervention Study

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ARTICLE INFO

Article history:

Received: 13 February 2019

Accepted: 21 May 2019

Online:

DOI 10.5001/omj.2020.26

Keywords:

Cupping Therapy; Blood Glucose; Fasting; von Willebrand Factor; Malaysia.

ABSTRACT

Objectives: Despite being recognized worldwide as an alternative therapy in treating various chronic diseases and pain, the mechanism of wet cupping is still not well understood. The purpose of this study was to evaluate fasting blood sugar (FBS), renal function parameters, and endothelial function changes following wet cupping in healthy individuals. **Methods:** We conducted a single-arm intervention study at the Clinical Lab of Community Medicine, Universiti Sains Malaysia, and included 31 healthy individuals aged between 30 and 60 years old. Wet cupping therapy was performed at five treatment points at the beginning of the study and repeated after three months. Health outcomes at baseline, one, three, and four months were assessed for FBS, renal function parameters (urea, creatinine, and uric acid), systolic blood pressure (SBP), and von Willebrand factor (vWF). **Results:** Forty-five percent of participants were female, and the mean age of study participants was 44.9 ± 6.4 years. Wet cupping therapy significantly reduced FBS, serum urea, and serum creatinine at one, three, and four months compared with baseline values. Serum uric acid and SBP showed a significant reduction at one and four months compared with baseline. The vWF (a measure of endothelial function) had a 4.0% reduction at four months compared to baseline, with a mean difference of 5.3 (95% confidence interval (CI): 2.20 = 8.55; $p = 0.002$). **Conclusions:** This study provides preliminary support that repeated wet cupping therapy enhances body health status; thus, it could be an effective complementary medicine in disease prevention.

Cupping has been used in both Eastern and Western countries through the ages. For example, bull-horn cupping has been practiced in China since the second century, and artifacts demonstrate its use in ancient Greece and Rome.¹ The two most common cupping practices are dry and wet cupping. Dry cupping is frequently practiced in countries in the Far East, whereas wet cupping is more favored in the Middle East and Eastern Europe.² Cupping is also known as *Al-Hijamah* in Arabic, meaning expansion, sucking, and bloodletting to return the body to its natural condition.³

According to Avicenna, a prominent Persian physician, wet cupping facilitates blood purification or clearance, especially for the skin and its adjacent organs.³ This assertion is further expanded in blood detoxification theory,⁴ which states that the practice

of wet cupping causes increased blood flow to the affected area. It induces blood purification or toxin clearance and improves the local nutrition state. The increase in blood flow to the affected area later will boost the body's metabolism and eliminates pathogenic factors.

In evidence-based medicine, wet cupping therapy is indicated for pain relief and the reduction of inflammation caused by, for example, musculoskeletal pain.^{2,5-8} It is also recommended to improve blood flow,⁹ to remove oxidants and oxidative stress,¹⁰ and even to treat infertility.¹¹ Earlier studies have investigated the physiological mechanisms of wet cupping that induce health benefits. Emerich et al,¹² assessed the effects of cupping in 12 volunteers and found that levels of lactate, pyruvate, glucose, and glycerin increased significantly in the surrounding tissues, suggesting anaerobe metabolism in the

subcutaneous tissues near the cupping site. Wet cupping was also found to reduce diastolic blood pressure and fasting blood sugar (FBS) in a study involving 16 healthy participants that assessed the short-term effects of cupping on blood pressure and FBS within 30 minutes and 48 hours, respectively.¹³ However, the study found no significant improvement in systolic blood pressure (SBP).

The Malaysian Ministry of Health acknowledges the use of traditional and complementary medicine (TCM) to treat disease and maintain health. In 2000, this ministry established the Herbal Medicine Research Centre. The Global Information Hub on Integrated Medicine launched a year later, followed by the formation of the Traditional and Complementary Division in 2004. Since, guidelines have been developed, including ‘Guidelines for Traditional & Complementary Medicine Practice: Cupping’ in 2013, indicating the successful integration of TCM into modern medicine. However, cupping is still not included among the seven modalities of TCM practices offered by the TCM units at Malaysian government hospitals.¹⁴

The increasing prevalence of metabolic syndrome in Malaysia heightens the need for promising and cost-effective preventive measures to curb this condition. While the prevalence of diabetes mellitus in Malaysia is 22.9%¹⁵, the reported prevalence of metabolic syndrome is 27.5%.¹⁶ There is insufficient evidence regarding the effectiveness of cupping for metabolic syndrome or cardiovascular risk prevention because few trials have assessed repeated outcomes. A clinical trial with a sufficient number of respondents and specific blood parameters measured at repeated intervals is warranted to fill this gap in scientific understanding. Therefore, our study aimed to evaluate the effects of wet cupping on FBS, renal function parameters, and endothelial function in healthy individuals. Our study thus provides preliminary support for the therapeutic outcomes of practicing wet cupping on the human body.

METHODS

We conducted a single-arm intervention study to evaluate the effects of wet cupping therapy on healthy individuals. The study was conducted from January to June 2012. We enrolled participants through advertisements in a local email group and telephone calls to university staff. Sample size

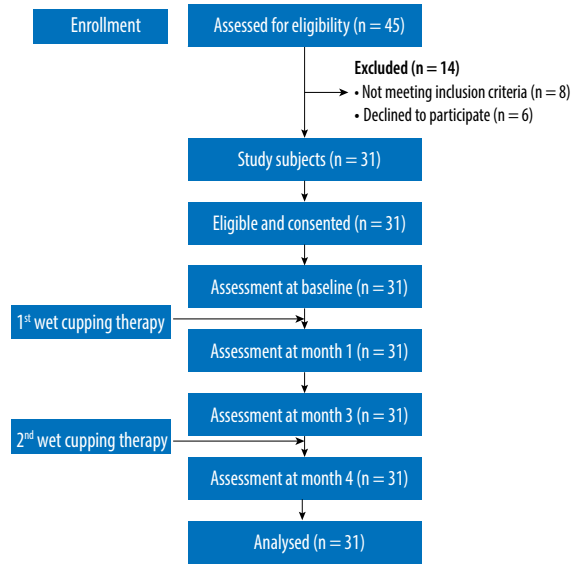


Figure 1: Flowchart of recruitment and study conditions.

calculations were based on repeated measures using STATA software. The required sample size was 31 based on the mean blood glucose parameter before the intervention (6.30±3.0 mmol/L)¹⁷ and a 20% drop-out rate. Individuals aged 30–60 years without a chronic disease, blood disorder, or history of dyslipidemia were eligible for inclusion. Figure 1 illustrates the participants’ recruitment patterns. The study protocol was approved by the Human Research Ethics Committee, Universiti Sains Malaysia (reference no. USMKK/PPP/JEPeM [243.3.(13)]). Signed informed consent was obtained from each participant before the start of the study.

Cupping was performed at the Clinical Public Health Laboratory, Universiti Sains Malaysia, by trained researchers with serial training from qualified cupping therapy personnel who were registered with the Traditional and Complementary Alternative Division, Ministry of Health, Malaysia. The participants received wet cupping therapy two times: at the start of the study and three months later. The researchers used 5 cm and 1.5 cm disposable plastic cups as well as disposable lancet needles for safety purposes. Five treatment points were located: both scapulas, both lumbar regions, and the vertex [Figure 2]. Before the procedure, the participants were asked to lie topless on a couch. Each wet cupping treatment procedure lasted approximately 20 minutes. The wet cupping procedure was applied according to the pre-defined aseptic technique^{18,19} delineated in Box 1.

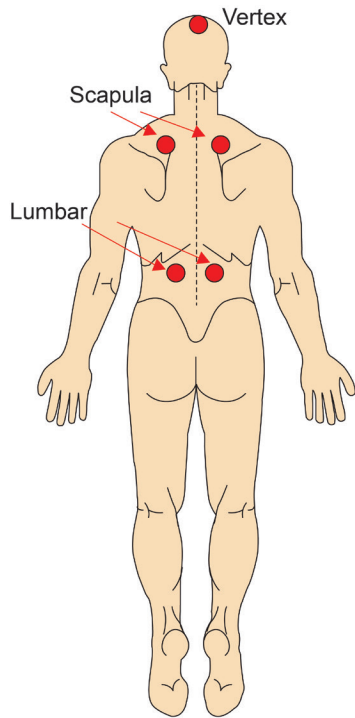


Figure 2: Five-point wet cupping site.

Demographic information was obtained at baseline. SBP and three types of blood analyses were also measured: FBS, renal function parameters (urea, creatinine, and uric acid), and von Willebrand factor (vWF). Ten millimeters of venous blood was taken from each participant following eight hours of overnight fasting; 4 mL of venous blood was inserted into a plain tube for renal function parameters and 2 mL into a tube with oxalate/fluoride for FBS testing

along with another 4 mL for the vWF ELISA test using an EDTA tube. The blood was transported within four hours to an accredited laboratory for analysis. The measurements were repeated at one, three, and four months of the study. However, the vWF test was only repeated at four months.

Statistical analyses were performed using SPSS version 19. The baseline characteristics were presented descriptively, while repeated-measures analysis of variance (ANOVA) was performed for the repeated measures of the same variables. The mean comparisons of the outcome measurements were assessed at baseline, and months one, three, and four. *P*-values < 0.050 were considered significant.

RESULTS

Out of the 45 healthy adults screened, eight did not fulfill the study protocols, and another six refused to participate [Figure 1]. Table 1 illustrates the descriptive analysis of respondents and the health benefits measurement at baseline. The mean age of respondents was 44.9 years, with slightly more males than females, and all the respondents were Malay. All the measured health outcome parameters were within the normal range. Throughout the study, no adverse events were noted like hematoma, bleeding, hypotension, or significant skin reactions.

A repeated measure of ANOVA within-group analysis was tested for underlying assumptions; normality of residuals, homogeneity of variance, and

Box 1: Aseptic wet cupping technique.

1. Researcher wears a plastic apron, sterile gloves, and face mask.
2. Swab the cupping point with povidone-iodine.
3. Place the cups on the cupping point and create suction using a manual pump until the skin is bulging. Retain the cups for five minutes.
4. Open the exhausting valve and remove the cups.
5. Prick the skin at the cupping area using a lancet pen at 15–20 different sites.
6. Re-apply the cups and suck the inner air with maximum negative pressure.
7. Retain the cup until the blood stops collecting or up to 10 minutes.
8. Open the exhausting valve and remove the cups.
9. Clean the cup area and discard the blood safely.
10. Repeat steps 6–9 three-times.
11. Let the participants rest for 15 minutes with food.
12. After the 15-minute rest, assess the participants for signs of hypovolemia.
13. Advise the participants on signs and symptoms of infection and to notify the researchers if needed.

Table 1: Respondents' characteristics and health outcome measurements at baseline (n = 31).

Measurements	Mean ± SD
Age, years	44.9 ± 6.4
Gender, female/male	14 ± 45.2/17 ± 54.8*
Race, Malay/non-Malay	31 ± 100/0 ± 0.0*
Fasting blood sugar, mmol/L	5.0 ± 0.4
Serum urea, mmol/L	4.2 ± 0.7
Serum creatinine, µmol/L	70.2 ± 13.2
Serum uric acid, µmol/L	371.8 ± 96.2
Systolic blood pressure, mmHg	127.2 ± 12.6
von Willebrand factor, IU/dL	111.0 ± 18.0

*frequency (percentage).
SD: standard deviation.

compound symmetry. Mauchly's test of sphericity showed the assumption of compound symmetry were violated for serum uric acid ($p = 0.005$), serum creatinine ($p = 0.007$), vWF ($p < 0.001$), and SBP ($p = 0.003$) that required the correction of a degree

of freedom using Huynh-Feldt estimates of sphericity. The univariate test for comparison within-group differences revealed significant differences in the mean of all health outcome parameters. Thus, pairwise comparison with confidence interval (CI) adjustment (Bonferroni) was conducted for the significant variables [Tables 2 and 3]. Results show FBS was significantly lower at one month (4.8 ± 0.4), three months (4.8 ± 0.4), and four months (4.7 ± 0.5) compared to baseline (5.0 ± 0.4). There was also a significant reduction of serum urea at one month (3.8 ± 0.8), three months (3.8 ± 0.6), and four months (3.6 ± 0.6) compared to baseline (4.2 ± 0.7). Similarly, serum creatinine following wet cupping therapy showed a significant reduction at one month (63.1 ± 11.0), three months (66.1 ± 14.7), and four months (63.3 ± 11.9) compared to baseline (70.2 ± 13.2). For the serum uric acid, there was a reduction at one month (322.8 ± 82.7), three months (338.5 ± 88.7), and four months (326.3 ± 87.1). However, a significant difference compared to

Table 2: Pairwise comparison of fasting blood sugar, renal function parameters, and endothelial function following wet cupping therapy based on time (n = 31).

Comparison	Wet cupping intervention	p-value*
	MD (95% CI)	
Fasting blood sugar, mmol/L		
Baseline – one month	0.1 (0.01, 0.36)	0.033
Baseline – three months	0.2 (0.06, 0.41)	0.004
Baseline – four months	0.3 (0.10, 0.59)	0.003
Serum urea, mmol/L		
Baseline – one month	0.3 (0.08, 0.69)	0.007
Baseline – three months	0.3 (0.03, 0.65)	0.030
Baseline – four months	0.5 (0.10, 0.94)	0.009
Serum creatinine, µmol/L		
Baseline – one month	7.1 (3.42, 10.84)	< 0.001
Baseline – three months	4.0 (0.83, 7.30)	0.008
Baseline – four months	6.8 (2.92, 10.82)	< 0.001
Serum uric acid, µmol/L		
Baseline – one month	48.9 (11.84, 86.03)	0.005
Baseline – three months	33.2 (-5.40, 71.98)	0.128
Baseline – four months	45.4 (0.44, 90.40)	0.047
Systolic blood pressure, mmHg		
Baseline – one month	5.4 (0.42, 10.48)	0.028
Baseline – three months	5.3 (-0.17, 10.95)	0.062
Baseline – four months	6.9 (1.87, 12.00)	0.003
von Willebrand factor, IU/dL		
Baseline – four months	5.3 (2.20, 8.55)	0.002

*Repeated measure of ANOVA within-group analysis was applied, followed by pairwise comparison.
MD: mean difference; CI: confidence interval.

Table 3: Health outcomes changes (%) following wet cupping therapy (n = 31).

Health benefits	Baseline, mean ± SD	Mean ± SD and percentage (%) of changes from the baseline		
		Month 1	Month 3	Month 4
FBS, mmol/L	5.0 ± 0.4	4.8 ± 0.4 (↓ 3.7)*	4.8 ± 0.5 (↓ 4.5)*	4.7 ± 0.5 (↓ 6.7)*
Serum urea, mmol/L	4.2 ± 0.7	3.8 ± 0.82 (↓ 9.3)*	3.8 ± 0.6 (↓ 8.1)*	3.68 ± 0.6 (↓ 12.4)*
Serum creatinine, µmol/L	70.2 ± 13.2	63.1 ± 11.0 (↓ 10.1)**	66.1 ± 14.7 (↓ 5.8)*	63.3 ± 11.9 (↓ 9.8)**
Serum uric acid, µmol/L	371.8 ± 96.2	322.8 ± 82.7 (↓ 13.2)*	338.5 ± 88.7 (↓ 9.0)	326.3 ± 87.1 (↓ 12.2)*
SBP, mmHg	127.2 ± 12.6	121.7 ± 13.5 (↓ 4.3)*	121.8 ± 9.2 (↓ 4.2)	120.2 ± 8.2 (↓ 5.5)*
vWF, IU/dL	111.0 ± 18.0	-	-	105.6 ± 13.9 (↓ 4.8)*

SD: standard deviation; FBS: fasting blood sugar; SBP: systolic blood pressure; vWF: von Willebrand factor; ↓: reduced.

*p < 0.050

**p < 0.001 using repeated measure of ANOVA within-group analysis.

baseline was found only at one and four months. Mean SBP was reduced throughout the measurements; however, significant reductions were found at one and four months with the respective mean difference of 5.4 and 6.9 compared to baseline. Finally, the vWF also showed a significant reduction at four months (105.6±13.9) compared to baseline (111.0±18.0), with a mean difference of 5.3. Overall findings indicate that wet cupping therapy significantly reduced serum FBS by 3.7–6.7%, renal functions by 8.1–13.2%, SBP by 4.2–5.5%, and vWF by 4.8%.

DISCUSSION

We investigated the effects of wet cupping therapy on biochemical and physiological body responses. The significant improvements in FBS, renal function parameters, SBP, and vWF indicated the substantial positive effects of wet cupping in improving the body’s physiological mechanisms. In a randomized, controlled trial of 60 healthy subjects, significant positive biochemical parameter changes were detected within 10 days of wet cupping.²⁰ Notably, FBS, blood pressure, and renal function were substantially improved. The results of this study support and confirm the short-term health benefits of wet cupping therapy.

Urea and creatinine levels represent the glomerular filtration rate. A high level of urea can play a role in predicting the development of hypertension and mediating the systemic inflammatory response that is linked to cardiovascular events.²¹ Increasing

serum creatinine levels indicate that the glomerular filtration rate has been compromised.²² Serum creatinine is used to estimate the glomerular filtration rate and classify the stage of chronic kidney disease to determine the required treatment options and modalities.²³ Thus, reductions in these parameters due to wet cupping may have beneficial health impacts by maintaining body health and preventing metabolic diseases.

The vWF is a glycoprotein that is released into the circulation from endothelial cells following vascular injury. It carries coagulation factor VIII, osteoprotegerin, galectins, and several other proteins to mediate platelet adhesion and aggregation.²⁴ vWF levels can be used as an indicator of cardiovascular events and stroke, especially in high-risk populations.²⁵ Therefore, a reduction in vWF following wet cupping may imply improvements in liver and spleen function for the clearance of vWF or indicate improvements in endothelial cell function through reductions in thrombotic formation. Findings from previous studies have shown that the positive effects of cupping include improvements in blood flow, especially underneath affected areas.^{2,9} This further explains and supports the possible mechanism involved in helping the body’s physiological clearance when wet cupping is applied.

The lack of adverse events in this study further validates the safety of wet cupping therapy. In an overview of systematic reviews on the effectiveness and safety of cupping therapy, hematoma, increased pain, and tingling following cupping treatment were only

reported in one of the eight reviews.⁶ Furthermore, Mahdavi et al,²⁶ also reported no serious health effects following cupping treatment. Additionally, a review of 16 studies related to cupping found that adverse events were rare, and most of them were avoidable if performed by trained cupping personnel.¹

A limitation in the interpretation of the results of this single-arm study design was the absence of a control group. Consequently, it was not possible to distinguish between the effects of cupping therapy, the placebo effect, and the effects of spontaneous improvement in the body's physiology. Uncontrolled factors such as exercise, sufficient rest, a balanced diet, and other healthy lifestyle habits could be potential confounders behind the positive outcomes rather than cupping therapy. However, our study established the baseline parameter measurements to reduce the bias in the interpretation of the efficacy data. The participation of the volunteers in this study was subject to selection bias, which limits the extrapolation of its findings to the general healthy population. However, the promising positive findings concerning cupping therapy support the need and rationale for further investigation through the application of a more robust study design.

CONCLUSION

Wet cupping therapy has short-term health benefits that can lead to improvements in renal function and the prevention of metabolic disease. These potential effects of wet cupping suggest new evidence and perspectives on the reduction and prevention of cardiovascular risks. Its low costs, non-invasiveness, and minimal need for training suggest the possibility of promoting wet cupping as complementary medicine to benefit human health in the future. However, support for these preliminary findings is needed via further research that includes a control group to ascertain the long-term therapeutic health benefits of cupping therapy.

Disclosure

The authors declared no conflicts of interest. The study was funded by the Ministry of Higher Education Malaysia who provided an Exploratory Research Grant Scheme (grant no. 203/PPSP/6730025).

Acknowledgements

We would like to thank the Universiti Sains Malaysia for supporting this study.

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