Original Article

The Effects of Dry Cupping on Primary Dysmenorrhea: A Randomized Clinical Trial

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Abstract

Background: Primary dysmenorrhea (PD) is one of the most common gynecologic problems. **Objectives:** The objective of this study was to determine the effects of dry cupping on PD severity and dysmenorrhea-associated systemic symptoms. **Methods:** In this randomized clinical trial, 150 young single students with PD were randomly allocated to either an intervention (n = 75) or a control (n = 75) group. Data collection tools were a demographic and menstrual characteristics checklist, Andersch and Milsom's Verbal Multidimensional Dysmenorrhea Severity Scoring System, and a Dysmenorrhea-associated Systemic Symptom Scale. In the intervention group, students were provided with daily sliding dry cupping therapy from 3 days before to 3 days after the onset of menstruation for three successive menstrual cycles. In each cupping therapy session, two cups were placed on the lower back on each side of the spine and another on the suprapubic area for 10–15 min. Students in the control group did not receive cupping therapy. Data were analyzed through the Chi-square and the independent-samples Student's t-tests, the repeated measures analysis of variance, and generalized estimating equation. **Results:** The mean scores of dysmenorrhea severity and systemic symptoms in the intervention group significantly decreased over time, while they did not significantly change in the control group. Thus, there were significant between-group differences respecting the variations of dysmenorrhea severity and systemic symptoms over time (P = 0.03). The odds of severe dysmenorrhea and the odds of severe dysmenorrhea-associated systemic symptoms in the intervention group were, respectively, 52% (odds ratio [OR]: 0.48; 95% confidence interval [CI]: 0.27–0.85) and 78% (OR: 0.22; 95% CI: 0.05–0.98) less than the control group. **Conclusion:** Dry cupping can significantly reduce the severity and the systemic symptoms of PD. Therefore, it can be used as an effective, inexpensive, and safe therapy for PD management.

Keywords: *Dry cupping, Primary dysmenorrhea, Systemic symptoms*

Introduction

Primary dysmenorrhea (PD) is one of the most common gynecologic problems.[1] The overall prevalence of PD among young girls ranges from 60% to 90%.[2,3] PD is associated with pain in the lower abdomen and also, in half of the cases, with systemic symptoms such as nausea, vomiting, diarrhea, fatigue, irritability, and dizziness.[2]

PD affects the quality of life and can cause disability and insufficiency.[4] Approximately 600 million working hours are yearly lost in the United States due to PD, which costs around two billion dollars.[5]

PD and its associated manifestations are usually managed using nonsteroidal anti-inflammatory drugs, oral contraceptives, and calcium channel blockers.[2,6]

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However, these medications have different side effects, and hence, researchers in some previous studies attempted to manage PD and its manifestations using complementary and alternative therapies such as cutaneous electrical stimulation and massage therapy.[7]

Cupping is one of the major therapies in complementary and alternative medicine.[8] It is performed as either dry cupping, dry cupping with olive oil, or wet cupping. Dry cupping is to create vacuum over the skin to draw blood to the area without any cutaneous incision. It can be applied to the different areas of the body.[9] During dry cupping, cups are placed over the skin, vacuum is created through suctioning the air in the cups, and then, the cups are removed after at least 5 min.[10]

Previous studies reported the positive effects of dry cupping on vomiting, insomnia, and different types of musculoskeletal and neural pains, such as low back pain, sciatica, headache, and migraine; and pain in the arms, shoulders, and stomach.[9,11] Moreover, cupping can be used to manage acne, facial paralysis, and cancer pain.[12] Cupping has also been used for PD management. A study on 66 Chinese women showed that cupping for 2–6 weeks significantly reduced PD.[13] Two other studies also confirmed the positive effects of cupping on PD.[9,14] However, these studies were conducted on small samples of women and used specific types of cupping. Therefore, there is no definitive evidence regarding the effects of cupping therapy.[13] In addition, there is no information about the effects of cupping on the systemic manifestations of PD. Thus, further studies are needed to provide authoritative information about the effects of cupping.

Objectives

The objective of this study was to determine the effects of dry cupping on PD severity and PD-associated systemic symptoms. The main study question was to determine whether cupping has any effects on PD severity and its PD-associated systemic symptoms.

Methods

Study design and participants

This randomized clinical trial was conducted from April 3 to December 19, 2016. The study population comprised all 1500 dormitory female students of Qazvin University of Medical Sciences, Qazvin, Iran. A total of 150 eligible students were recruited to the study through convenience sampling. We initially attended the study setting and invited students with moderate-to-severe dysmenorrhea to the study through hanging invitation posters and referring to their rooms. Then, they were asked to complete a self-report questionnaire on their symptoms. The results of the questionnaire were used to determine students with moderate-to-severe dysmenorrhea. Sampling was continued until 150 eligible students were recruited. Eligibility criteria were an age of 19–35, singlehood, regular menstrual cycle, absence of major stressful life events in the last 6 months (such as parental separation or death of close family members); no history of cardiovascular, liver, kidney, or mental disorders; and no history of smoking, hypothyroidism, diabetes mellitus, asthma, urinary tract infection, or gynecologic problems. Eligibility was assessed based on the data collected using the study questionnaires. Students were excluded if they were no longer willing to stay in the study. Recruited students were randomly allocated to either an intervention or a control group.

Sample size was calculated using the results of an earlier study which reported that the mean scores of pain immediately and 24 h after cupping were 3.7 ± 1.8 and 2.5 ± 1.7, respectively.[15] Sample size calculation formula was $n = \frac{\left(\left[Z_{1-\alpha/2} + Z_{1-\beta}\right]^2 \times \left[\sigma_1^2 + \sigma_2^2\right]\right)}{\left(\mu_1 - \mu_2\right)^2}$. This formula revealed that with an alpha of 0.01 and a beta of 0.1, 64 students were needed for each study group. Nonetheless, the sample size was increased to 75 in order to compensate a probable 10% withdrawal.

Data collection instruments

Data collection instruments were a demographic and menstrual characteristics checklist (DMCC), Andersch and Milsom's Verbal Multidimensional Scoring System (AMVMSS), and a PD-associated systemic symptom scale. The DMCC contained items on age; body mass index; age at menarche; age at PD onset; duration of menstrual cycle (days); duration of menstrual bleeding (days); pain severity; PD-associated systemic symptoms; history of cardiovascular, kidney, or liver diseases; history of hypertension or diabetes mellitus; and family history of PD. The content validity of the checklist was evaluated and confirmed by ten midwifery faculty members from Qazvin University of Medical Sciences, Qazvin, Iran. The AMVMSS[16] measures PD severity on a 4-point scale as follows: 0: "No menstrual pain;" 1: "Mild menstrual pain;" 2: "Moderate menstrual pain;" and 3: "Severe menstrual pain." The PD-associated systemic symptom scale contains ten items on fatigue, nausea and vomiting, weakness, diarrhea, headache, mood changes, faintness, backache, leg pain, and leg cramps. Each of these symptoms was scored from 0: "Absent" to 3: "Severe." The total score of PD-associated systemic symptom scale could range from 0 to 30. The content validity of the AMVMSS and PD-associated systemic symptom scales were assessed and confirmed by the same 10 faculty members, while the reliability of

both scales were examined using the test–retest method and the correlation coefficient was 0.8 for both.

Intervention

In the intervention group, students were provided with daily sliding dry cupping therapy from 3 days before to 3 days after the onset of menstruation for three successive menstrual cycles.[2] Accordingly, a midwife, who had passed Iranian Traditional Medicine courses, placed two cups (sized 5–7 centimeters) on the lower back on each side of the spine and another on the suprapubic area for 10–15 min once daily. Vacuum was created through warming the air in the cup before its placement over the skin by firing an alcohol swab in it. The intervention was performed for each student in a university dormitory while she was in the supine position on an examination bed and the cupping sites were exposed. The midwife also completed the PD severity assessment system and the PD-associated systemic symptom scale for each student in each menstrual cycle. Students in the control group did not receive cupping therapy; however, their PD severity and PD-associated systemic symptoms were assessed and documented monthly by the same midwife for three successive menstrual cycles. The midwife was blind to the intervention. Students suffered from no serious health conditions, and hence, took no medications. Besides, we asked them to avoid taking any analgesics for PD.

Ethical considerations

The study protocol was approved by the Research and Ethics Committee of Qazvin University of Medical Sciences (code: IR. QUMS. REC.1394.193) and was registered in the Iranian Registry of Clinical Trials (code: IRCT2015120125320N1). Data collection and study intervention were started after informing students about the objectives of the study, obtaining their verbal and written consents, and ensuring them that withdrawal from the study would be voluntary and the data would be treated confidentially.

Data analysis

Data were analyzed through the SPSS software version 16.0 (SPSS Inc., Chicago, IL, USA). The outcome variables were PD-associated systemic symptoms as a continuous variable and PD severity as an ordinal variable. Descriptive statistics parameters (such as frequency distribution tables, percentage, mean, and standard deviation) were employed for data presentation. Initially, the Kolmogorov–Smirnov test was performed to test the hypothesis of normality. Then, the Chi-square and the independent-sample Student's *t*-tests were conducted to compare the groups with each other concerning categorical and numerical variables, respectively. Moreover, the repeated measures analysis of variance was employed for the within-subject and between-subject comparisons respecting PD severity and PD-associated systemic symptoms across the four measurement time points. Accordingly, the sphericity of within-subject variances was tested through Mauchly's test of sphericity. Its result was statistically significant ($P < 0.001$), denoting that sphericity was not assumed. Therefore, the Greenhouse–Geisser correction was used to correct the degree of freedom. Besides, in order to estimate the effects of the intervention adjusted for possible confounders, a repeated measures regression with generalized estimating equation were employed. The link function for systemic symptoms was linear and for PD severity was ordinal logistic. Possible confounders to enter the regression model were those variables with a $P < 0.2$ at baseline comparisons. The statistical significance level was set at <0.05.

Results

The results of the independent-sample *t*-test and the Chi-square test illustrated no significant between-group differences concerning students' demographic and menstrual characteristics [$P > 0.05$; Table 1].

Baseline mean scores of PD severity in the intervention and the control groups were 1.44 ± 0.11 and 1.37 ± 0.13, respectively, with no statistically significant between-group difference ($P = 0.914$). The mean of PD severity in the intervention group significantly decreased across the four measurement time points, while the mean of PD severity in the control group did not change significantly. Thus, there was a statistically significant between-group difference respecting the variations of PD severity over time ($P = 0.03$). The adjusted mean scores of PD severity in the intervention and the control groups were 1.01 ± 0.09 (95% confidence interval [CI]:

Table 1: Between-group comparisons regarding demographic and menstrual characteristics

Characteristics	Groups[a]		*P*
	Intervention (*n*=75)	Control (*n*=67)	
Age (years)	23.16±3.70	22.41±4.10	0.260
Body mass index (kg/m^2)	21.54±3.12	21.35±2.82	0.712
Age at menarche (years)	13.10±1.45	12.95±1.40	0.528
Age at PD onset (years)	15.35±2.14	14.64±2.51	0.077
Duration of menstrual cycle (days)	29.08±8.84	27.39±4.06	0.161
Duration of menstruation (days)	6.76±3.24	6.41±1.91	0.451
Exercise (yes)	39 (52.0)	27 (40.3)	0.170
Family history of PD (yes)	64 (85.3)	59 (88.1)	0.677
Bathing during menstruation (yes)	68 (90.7)	62 (92.5)	0.887

[a]Data presented as mean±SD or *n* (%). PD: Primary dysmenorrhea, SD: Standard deviation

0.827–1.18) and 1.3 ± 0.11 (95% CI: 0.1.08–1.52), respectively [Table 2].

At baseline, the mean scores of PD-associated systemic symptoms in the intervention and the control groups were 12.92 ± 0.57 and 11.38 ± 0.66, respectively. The between-group difference was not statistically significant (P = 0.198). The mean scores of PD-associated systemic symptoms in the intervention group significantly decreased over time, while it did not significantly change in the control group. Therefore, there was a statistically significant difference between the groups concerning the variations of PD-associated systemic symptoms over time (P = 0.03). The adjusted mean scores of PD-associated systemic symptoms in the intervention and the control groups were 9.2 ± 0.47 (95% CI: 8. 25–10.15) and 10.96 ± 0.64 (95% CI: 9. 68–12.24), respectively [Table 2].

Table 3 shows the effects of the intervention and the possible confounders on PD severity and PD-associated systemic symptoms. There was a significant relationship between group and PD severity over time. The odds of severe dysmenorrhea in the intervention group were 52% less than the control group (odds ratio [OR]: 0.48; 95% CI: 0.27–0.85). However, none of the confounders had significant relationship with PD severity (P > 0.05). On the other hand, PD-associated systemic symptoms had significant relationships with group (P = 0.046) and duration of menstrual cycle (P = 0.001). Accordingly, the odds of experiencing severe PD-associated systemic symptoms in the intervention group were 78% less than the control group (OR: 0.22; 95% CI: 0.05–0.98). Moreover, the odds of experiencing severe PD-associated systemic symptoms among students with shorter menstrual cycle were 32% lower than those with longer menstrual cycle (OR: 0.68; 95% CI: 0.53–0.86).

Table 2: The adjusted mean scores of primary dysmenorrhea severity and primary dysmenorrhea-associated systemic symptoms

Group*	Time, mean (95% CI)				Overall mean (95% CI)	P^a
	Before	First months	Second months	Third months		
PD systemic symptoms						
Intervention	12.92±0.57 (11.77-14.07)	8.82±0.59 (7.63-10.02)	7.41±0.51 (6.39-8.44)	7.65±0.54 (6.56-8.74)	9.2±0.47 (8.25-10.15)	0.031
Control	11.38±0.66 (10.06-12.69)	10.77±0.66 (9.46-12.09)	10.85±0.65 (9.54-12.17)	10.84±0.66 (9.52-12.16)	10.96±0.64 (9.68-12.24)	
PD severity						
Intervention	1.44±0.11 (1.23-1.65)	0.88±0.11 (0.67-1.09)	0.92±0.11 (0.704-1.14)	0.77±0.09 (0.58-0.96)	1.01±0.09 (0.827-1.18)	0.030
Control	1.37±0.13 (1.11-1.62)	1.27±0.11 (1.03-1.5)	1.29±0.12 (1.05-1.53)	1.27±0.12 (1.03-1.52)	1.30±0.11 (1.08-1.52)	

*Means were adjusted for exercise, age at PD onset, and duration of menstrual cycle, [a]The results of the repeated measures analysis of variance. PD: Primary dysmenorrhea, CI: Confidence interval

Discussion

Results indicated a significant decrease in PD severity after dry cupping for three menstrual cycles. Similarly, a study in India found that cupping therapy significantly reduced PD.[17] Another study also reported the effectiveness of dry cupping in significantly reducing PD severity and duration.[18] Moreover, a systematic review into the effects of cupping therapy reported the potential effects of cupping on pain.[13] The positive effects of dry cupping on PD may be attributed to the promotion of local blood flow and oxygenation to the uterine and the reduction of inflammation and blood congestion in it. Some scholars also noted that the effectiveness of cupping in reducing pain may be due to its effects on the autonomic nervous system.[19,20] Moreover, blood vessels in the cupped areas are supposed to release

Table 3: The results of generalized estimating equation for the effects of the study intervention and possible confounders on primary dysmenorrhea severity and primary dysmenorrhea-associated systemic symptoms

Predictors	Pain			Symptoms		
	OR	95% CI	*P*	OR	95% CI	*P*
Group						
Control	1	-	-	1	-	-
Intervention	0.48	0.27-0.85	0.012	0.22	0.05-0.98	0.046
Age at PD onset (years)	1.03	0.94-1.11	0.546	0.96	0.75-1.23	0.763
Duration of menstrual cycle (days)	1.02	0.93-1.15	0.591	0.68	0.53-0.86	0.001
Doing exercise	0.78	0.44-1.36	0.377	0.88	0.20-3.89	0.875

PD: Primary dysmenorrhea, CI: Confidence interval, OR: Odds ratio

vasodilators such as adenosine, noradrenalin, and histamine to promote blood flow.[17] It is noteworthy that the two review studies still reported some uncertainties and controversies about the usefulness and the safety of cupping therapies for pain management.[13,21]

Another finding of the present study was the significant reduction of PD-associated systemic symptoms in the intervention group and no significant changes in the symptoms in the control group. We did not find any similar study for the sake of comparison. However, an earlier study reported that acupressure on the spleen six and eight acupoints significantly reduced PD severity.[22] Moreover, a review study reported that acupressure is effective in reducing PD-associated systemic symptoms such as nausea and back pain.[23] These two studies attributed the positive effects of acupressure on PD-associated systemic symptoms to its pain-reducing effects.[22,23] Like acupressure, dry cupping is also believed to positively affect the body; for instance, it can block pain transmission to the brain through promoting the release of endorphins, encephalin, and serotonin.[24,25]

One of the strengths of the present study was the follow-up assessment of participants over a 3-month period, that is, in three successive menstrual cycles. The other strength was the daily provision of cupping therapy from 3 days before to 3 days after menstruation onset. Alongside its strengths, this study also had some limitations such as the inclusion of only unmarried students and the application of a specific cupping technique. Future studies are recommended to compare different types of cupping therapy respecting their short- and long-term effects on PD severity and PD-associated systemic symptoms.

Conclusion

This study concludes that dry cupping can be effective in significantly reducing PD and its associated symptoms. Given its effectiveness, inexpensiveness, and safety, individuals with PD can refer to cupping technicians to receive dry cupping for PD management. Of course, more studies with larger samples are still needed to provide conclusive evidence about the effectiveness of dry cupping in reducing PD.

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Conflicts of interest

There are no conflicts of interest.

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