

Modernization of Traditional Medicine

The effect of hot intermittent cupping on pain, stiffness and disability of patients with knee osteoarthritis

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Highlights

This study shows that cupping therapy is effective in improving disability, stiffness and pain in patients with knee osteoarthritis.

Editor's Summary

Taking into account the side effects and complications resulted from many anti-inflammatory chemical drugs, cupping therapy is prone to become an effective and safe way for patients with knee osteoarthritis.



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Abstract

Objective: The aim of this study was to investigate the effect of hot intermittent cupping on pain, stiffness and inability of patients with knee osteoarthritis (KO). **Methods:** The present study was a clinical trial, which was performed on 38 patients with KO referring to Gonabad Rheumatology Specialty Clinic. Based on permutation block method, the research units were divided into cupping therapy and control groups. For the cupping therapy group, four sessions of cupping therapy were performed every four days. To collect data, the form of demographic information, Visual Analogue Scale (VAS) and the Western Ontario and McMaster (WOMAC) osteoarthritis scale were used, and the data were analyzed by SPSS software v. 16 using descriptive statistics and independent t-test, paired t-test, Chi-square test and Fishers exact test with a significance level of $P < 0.05$. **Results:** Findings showed that there was no significant difference between the cupping therapy and control groups in terms of demographic characteristics and they were homogeneous. Findings indicated that, based on VAS, the mean pain intensity in the left ($P < 0.001$) and the right knees ($P < 0.001$), as well as based on WOMAC, stiffness ($P = 0.006$), pain intensity ($P < 0.001$) and disability ($P < 0.001$) in the cupping therapy group significantly decreased compared to the control group. **Conclusion:** Findings showed that hot intermittent cupping therapy reduced the pain intensity, stiffness and disability in patients with KO.

Keywords: Disability evaluation, Hot intermittent cupping therapy, Knee osteoarthritis, Pain, Stiffness

摘要

目的: 本研究旨在探讨间歇性热拔罐对膝骨关节炎患者疼痛、僵硬及无力的作用效果。

方法: 对 Gonabad 风湿病专科门诊的 38 例膝骨关节炎患者进行临床研究。采用置换阻滞法, 将研究对象分为拔罐治疗组和对照组。拔罐治疗组每四天进行一次拔罐治疗, 总共四次治疗。为了收集数据, 采用人口统计信息形式, 使用 VAS 和 WOMAC 量表, 使用描述性统计、独立 t 检验、配对 t 检验、卡方检验和 Fishers 精确检验, 用 SPSS 软件 v16 对数据进行分析。

结果: 拔罐疗法与对照组在人口学特征方面没有显著差异, 而且是均质的。拔罐治疗后, 基于 VAS 量表的治疗组左、右膝平均疼痛强度 ($P < 0.001$) 以及基于 WOMAC 量表的僵硬度 ($P = 0.006$)、WOMAC 疼痛强度 ($P < 0.001$) 和残疾程度 ($P < 0.001$) 的平均得分均显著低于对照组。

结论: 热间歇拔罐治疗可降低 KO 患者的疼痛强度、僵硬程度和残疾程度。

关键词: 残疾评估; 间歇热拔罐疗法; 膝骨性关节炎; 疼痛; 僵硬

Abbreviations: KO, Knee osteoarthritis; WOMAC, Western Ontario and McMaster; VAS, Visual Analogue Scale.

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Background

Osteoarthritis is a joint disorder characterized by pain, joint swelling, impaired muscular stability and functional disability. Its main pathological symptom is the local destruction of the articular cartilage. Osteoarthritis often appears as an obscure and intermittent pain in a joint and usually appears after the use of that joint [1].

The disease is seen in a device that plays the major role in bearing the body's weight, and the knee joint is most commonly involved. Knee osteoarthritis (KO) is the leading cause of disability in older people in developed countries [2]. About 100,000 people in the United States are not able to get up from bed or to go to the toilet on themselves because of knee or hip arthritis, and the prevalence of KO in people over 65 is about 35% [3]. In Iran, the prevalence of KO is 15.3% in urban areas and 19.3% in rural areas [4].

Symptoms of KO are pain, stiffness in the morning, difficulty in articular movements, and tenderness in articular line. The main and most common symptom of KO is pain, which usually spreads to the leg muscles and thighs [5].

The second common symptom of KO is the difficulty of articular movements and its stiffness, and sometimes the patient states that knee movements are accompanied by sounds. The patients complain of stiffness, locking or joint dislocation, which results in reduced function and difficulty in the daily activities of life, including recreational activities, exercise, and occupations. A large number of patients will ultimately become disabled due to pain and stiffness of the joint in the morning [7].

There is currently no definite treatment for KO. Because the mechanism of disease development and its progress is still not fully understood, the main goal of the treatment is to reduce the symptoms of the disease. Therapeutic measures in this disease are classified into four categories: pharmacological, non-pharmacological, complementary medicine and alternative medicine. Drugs used are often non-steroidal anti-inflammatory drugs and analgesics [8]. Many non-pharmacological methods that are used today are among the complementary therapies [9]. The main methods used in complementary medicine include: acupuncture, herbal medicine, hypnotherapy, cupping, massotherapy, diathermy, cryotherapy, etc. In the Iranian traditional medicine, scholars such as Abu Ali Sina, Zakaria Razi and Jorjani have considered cupping as one of the pillars of treatment and one way to cure diseases [11]. The three most common types of cupping are: wet Hijama (phlebotomy), dry Hijama (cupping), and wet Hijama without cupping. Cupping is performed in three ways: fixed, alternating (intermittent) and sliding [12]. By making vacuum, cupping causes expansion of the superficial vessels, increased blood circulation, and increased calls of defensive cells and blood anti-inflammatory factors, resulting in increased oxygen and nutrition intake to the cells and decreased pain and fatigue [12].

According to the above, and considering that currently

the methods used to control and manage the complications of osteoarthritis are mostly based on oral and anti-inflammatory chemical drugs, which have many side effects, and taking into account that cupping therapy is a simple and safe way for patients, which can be performed even at home after training, this study was design to evaluate the effect of hot intermittent cupping on pain, stiffness and disability of patients with KO.

Methods

This is a clinical trial and was performed on 38 patients with KO referring to Gonabad Rheumatology Specialty Clinic. After approval of the project at the University's research committee with the ethical code of IR.GMU.REC.1396.150 and receiving the clinical trial code (IRCT20180719040529N1) from the Iranian Clinical Trial Center, the qualified subjects were included into the study after explaining the study objectives to them and taking informed consent from them. The inclusion criteria were: satisfaction and willingness of the patient to participate in the study, age range of 40-60 yr, KO based on the diagnosis of rheumatologist [based on patient records (crepitus, catching or locking of the knee), clinical symptoms (pain, joint stiffness, reduced knee joint range of motion, joint swelling), radiographic criteria (joint space narrowing, bone spur growth) and grading system (kellgren-lawrence)] [13] and physical examination (no history of psychological-mental disorders, coagulation problems, severe deformity and bone structure disorders, no history of knee replacement or intra-articular injection, no knee joint surgery, no history of intra-articular fracture according to the patient's self-report, no physiotherapy of the knee in the last six months, disease diagnosis at least three months ago, and no experience of intense pain during the last month). The exclusion criteria were: reluctance to continue the study, knee trauma during the study, intra-articular injections, physiotherapy and arthroscopy during the study.

Taking into account the data in similar study [13], the sample size was obtained to be 18 for each group using the formula for comparing the means for the variable of pain, and taking into account the 95% confidence interval and 80% test power.

$$n = \frac{(z_{1-\frac{\alpha}{2}} + z_{1-\beta})^2 (s_1^2 + s_2^2)}{(\bar{x}_1 - \bar{x}_2)^2} = \frac{(1.96 + 0.85)^2 (15.3^2 + 15.2^2)}{(25.8 - 40.2)^2} = \cong 18$$

In this research, a demographic questionnaire was first completed by the researcher. Also, in two periods (before and after treatment), the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) and the Visual Analogue Scale (VAS) were completed by the researcher in interviews. The WOMAC is a specialist collection of standardized questionnaires that was designed by health professionals in 1982 to assess the status of patients with knee and hip osteoarthritis,

including pain, stiffness and physical functioning of the joints. Validity and reliability of this questionnaire have been repeatedly confirmed in foreign studies [14-16]. In Iran, the validity and reliability of its Persian version has been confirmed in the study of Eftekharzadeh *et al.*, in which, the relative repeatability of all subscales in the optimum level of 0.7 [17].

After homogenization, the patients were randomly divided into control and cupping therapy groups based on per permutation block method according to their gender and drugs used. The patients of the cupping therapy group were treated by cupping therapy. Patients in control group received only medications prescribed by a rheumatologist and no intervention was performed.

Patients in both groups took medications related to osteoarthritis and the medications prescribed for them before (Table 1).

For cupping therapy, the patients referred to the traditional medicine clinic of Gonabad University of Medical Sciences and all of the therapeutic stages were performed by the researcher. Training in this area was previously carried out by the researcher and the assistant researcher under the supervision of a traditional Iranian medicine practitioner and for female patients, a female researcher was used.

To perform the cupping, the patient was made to be in the semi-Fowler's position and stretch out his legs. Then, after using a drop of chamomile oil, the alcohol pad (standard) was attached to the inside of the glass cup and ignited by a lighter and the cup was quickly placed on the skin around the knee. Four cups were fixed on the four sides of the kneecap. The cups were in vacuum position for 1-2min, and then they were detached by a slight pressure to their edge. This process was repeated four times. Each treatment session lasted 15-10 minutes. This was performed every four days, for sixteen days [13]. At the end of the 16th day, the pain, stiffness and disability of patients with KO were evaluated by a blind observer for intervention and control groups. Data were analyzed by SPSS v.16 software using Chi-square, independent t-test, paired t-test and Fishers exact test with a significance level of 0.05.

Results

The findings related to the consistency of the groups in terms of demographic variables including age, sex, weight, height, marital status, educational level, occupation, physical activity, type of insurance, having supplementary insurance, smoking, history of previous illness, duration of the diagnosis of knee osteoarthritis and drugs used showed that the groups did not have a significant difference in these variables. The findings showed that 58% of the 36 patients were female and 42% were male. The mean age of the patients was 58.02 ± 7.74 years. The demographic data of the samples are presented in Table 1.

Regarding the study objectives, comparing the left and right knees before and after the intervention in the cupping therapy group, the VAS scale indicated a

significant decrease in pain intensity in the left ($P < 0.001$) and the right ($P < 0.001$) knees after the intervention. Compared to the control group, the mean pain intensity in the left and the right knees based on the VAS scale after the intervention showed a significant decrease in the cupping therapy group (All $P < 0.001$) (Table 2).

Compared to before intervention, the WOMAC scale after intervention in the cupping therapy group showed a significant decrease in mean score of pain intensity ($P < 0.001$), stiffness ($P < 0.001$) and disability ($P < 0.001$). Compared to the control group, the mean score of pain intensity ($P = 0.005$), stiffness ($P = 0.006$) and disability ($P = 0.001$) after intervention in the cupping therapy group showed a significant decrease (Table 3).

For determining the effect of intervention, the mean differences of pain and disability scores in two groups were analyzed by independent t test as a new variable. The result showed that mean differences of pain and disability scores in cupping therapy group had significant difference compared with control group ($P < 0.001$) (Table 4).

Discussion

Findings of this study show that cupping therapy is effective in improving disability, stiffness and pain in patients with KO. Although further studies are needed, these findings are of critical clinical importance in nursing care, as reduced disability, stiffness and pain improves the quality of life in these patients and reduces the need for further medication and treatment. Therefore, according to the results of this study and since training nurses for this technique is easy, and also because of the high prevalence of osteoarthritis and the low cost of cupping therapy, this technique can be taught to the relatives of the patient himself to be performed at home in a self-help manner.

In a study aimed at investigating the effects of dry cupping on patients with KO, Teut *et al.* showed that pain score based on VAS, pain intensity based on WOMAC, severity of stiffness and disability score decreased significantly in the cupping therapy group compared to the control group, which was consistent with the results obtained in this study [13]. The results of the study by Ali Khan *et al.*, showed improvement in signs and symptoms of osteoarthritis, including pain, stiffness, edema and ecchymosis after cupping therapy intervention, which were consistent with the our results [18]. Shakeel Ansari *et al.*, in a study aimed at investigating the effect of cupping therapy on pain, stiffness and movements of the back, showed that cupping therapy significantly reduced the pain intensity, stiffness and movements of the back during one month of intervention, which was consistent with the results obtained from our study [19]. A study aimed at investigating the effect of cupping therapy on back pain in Iran showed that pain in the intervention group significantly lowered after one month compared to the control group. These results were consistent with the findings from our study [20]. A study concluded that the cupping therapy significantly reduced the pain in patients

Table 1 Comparison of the demographic characteristics in the two groups

| | | Cupping therapy group (Mean ± SD) | Control group (Mean ± SD) | P | t |
|--------------------------------------|-------------------------|---|------------------------------|-------|------------|
| Age (y) | | 58 ± 7.59 | 58.05 ± 8.10 | 0.98 | -0.02 |
| Weight (kg) | | 75.72 ± 7.12 | 78.66 ± 6.33 | 0.19 | -1.31 |
| Height (cm) | | 168.94 ± 9.99 | 170.61 ± 10.03 | 0.62 | -0.49 |
| Osteoarthritis diagnosis date (year) | | 2.38 ± 0.5 | 2.44 ± 0.51 | 0.74 | -0.32 |
| | | Number (%) | Number (%) | P | Chi square |
| Gender | Male | 7 (38.9) | 8 (44.4) | 0.73 | 0.11 |
| | Female | 11 (61.1) | 10 (55.6) | | |
| Marital status | Married | 15 (83.3) | 18 (100) | 0.07 | |
| | Widowed | 3 (16.7) | 0 (0.00) | | |
| Education | High school degree | 10 (55.6) | 6 (33.3) | 0.36 | 2.00 |
| | Diploma | 6 (33.3) | 10 (55.6) | | |
| | Bachelor of science | 2 (11.1) | 2 (11.1) | | |
| Job | Public | 1 (5.6) | 2 (11.1) | 0.92 | 0.47 |
| | Self-employed | 3 (16.7) | 3 (16.7) | | |
| | Retired | 4 (22.2) | 3 (16.7) | | |
| Physical activity | House keeper | 10 (55.6) | 10 (55.6) | 0.98 | 1.77 |
| | Very much | 2 (11.1) | 2 (11.1) | | |
| | Much | 7 (38.9) | 6 (33.3) | | |
| Complementary insurance | Average | 8 (44.4) | 9 (50.0) | 0.18 | 2.62 |
| | Low | 1 (5.6) | 1 (5.6) | | |
| | + | 11 (61.1) | 7 (38.9) | | |
| Smoking | - | 7 (38.9) | 11 (61.1) | 1.00 | < 0.001 |
| | + | 4 (22.2) | 4 (22.2) | | |
| Previous disease | - | 14 (77.8) | 14 (77.8) | 0.058 | 0.11 |
| | Nervous system | 4 (22.2) | 1 (5.6) | | |
| | Cardiovascular system | 2 (11.1) | 4 (22.2) | | |
| | Respiratory system | 6 (33.3) | 2 (11.1) | | |
| | Digestive system | 3 (16.7) | 2 (11.1) | | |
| | Other | 3 (16.7) | 3 (16.7) | | |
| Drugs used | NSAID | 5 (27.8) | 8 (44.4) | 0.29 | 1.08 |
| | - | 13 (72.2) | 10 (55.6) | | |
| | Nutritional supplements | 4 (22.2) | 5 (27.8) | 0.70 | 0.14 |
| | - | 14 (77.8) | 13 (72.2) | | |
| | Antioxidants | 1 (5.6) | 3 (16.7) | 0.28 | 1.12 |
| | - | 17 (94.4) | 15 (83.3) | | |
| Other | Analgesic | 10 (55.6) | 8 (44.4) | 0.50 | 0.44 |
| | - | 8 (44.4) | 10 (55.6) | | |
| | + | 2 (11.1) | 2 (11.1) | 1.00 | < 0.001 |
| | - | 16 (88.9) | 16 (88.9) | | |

Table 2 Comparison of pain intensity before and after the intervention in two groups

| Groups | Variable | Before intervention (Mean ± SD) | After intervention (Mean ± SD) | Paired t-test | | Independent t-test (after intervention) | |
|-----------------------|------------|------------------------------------|-----------------------------------|------------------|-----------|--|-----------|
| | | | | P | t | P | t |
| Cupping therapy group | Right knee | 8.27 ± 2.94 | 5.22 ± 1.35 | <i>P</i> < 0.001 | t = 5.94 | <i>P</i> < 0.001 | t = -4.40 |
| | Left knee | 7.22 ± 1.16 | 5.05 ± 0.99 | <i>P</i> < 0.001 | t = 14.86 | <i>P</i> < 0.001 | t = -4.81 |
| Control group | Right knee | 7.50 ± 1.09 | 7.16 ± 1.29 | <i>P</i> = 0.01 | t = 2.91 | | |
| | Left knee | 7.50 ± 1.61 | 7.22 ± 1.62 | <i>P</i> = 0.02 | t = 2.55 | | |

Table 3 Comparison of the mean score of the osteoarthritis before and after the intervention in two groups

| Groups | Variable | Before intervention (Mean ± SD) | After intervention (Mean ± SD) | Paired t-test | |
|-----------------------|------------|------------------------------------|-----------------------------------|------------------|-----------|
| | | | | P | t |
| Cupping therapy group | Pain | 31.61 ± 4.17 | 23.55 ± 4.70 | <i>P</i> < 0.001 | t = 16.06 |
| | Stiffness | 6.83 ± 0.98 | 4.49 ± 0.93 | <i>P</i> < 0.001 | t = 11.84 |
| | Disability | 57.94 ± 7.57 | 41.94 ± 6.67 | <i>P</i> < 0.001 | t = 22.55 |
| Control group | Pain | 28.38 ± 3.74 | 27.72 ± 3.57 | <i>P</i> < 0.001 | t = 2.91 |
| | Stiffness | 6.11 ± 1.45 | 6.05 ± 1.30 | <i>P</i> = 0.33 | t = 1.00 |
| | Disability | 52.33 ± 7.57 | 50.77 ± 7.22 | <i>P</i> < 0.001 | t = 7.16 |

| | Before intervention | | After intervention | | |
|--------------------|---------------------|-----------------|--------------------|------------------|-----------|
| | P | t | P | t | |
| Independent t-test | Pain | <i>P</i> = 0.02 | t = 2.43 | <i>P</i> = 0.005 | t = -2.99 |
| | Stiffness | <i>P</i> = 0.09 | t = 1.74 | <i>P</i> = 0.006 | t = -2.93 |
| | Disability | <i>P</i> = 0.03 | t = 2.22 | <i>P</i> = 0.001 | t = -3.81 |

Table 4 Comparison of mean differences of pain and disability scores in two groups

| Variable | Cupping therapy zgroup (Mean ± SD) | Control group (Mean ± SD) | Independent t-test | |
|------------|---------------------------------------|------------------------------|--------------------|-----------|
| | | | P | t |
| Pain | 8.05 ± 2.12 | 0.66 ± 0.48 | <i>P</i> < 0.001 | t = 14.36 |
| Disability | 16.00 ± 3.00 | 1.55 ± 0.92 | <i>P</i> < 0.001 | t = 19.49 |

and significantly improved knee joint function, which were consistent with the findings from our study [21]. The results of the study by Arsalan *et al.*, showed that cupping therapy significantly reduced pain intensity in patients after intervention, which were consistent with the findings from our study [22]. Li *et al.*, in a literature review of seven clinical trials on the effects of cupping therapy on KO, showed that cupping therapy could significantly reduce pain and stiffness and improve the function in patients with osteoarthritis, but further studies were needed with better procedures and these results are consistent with our study [23]. In a study aimed at comparing the effects of diathermy and cupping therapy on patients with carpal tunnel syndrome, Michalsen *et al.* concluded that cupping therapy significantly reduced the numbness and pain during resting, moving when pressure was applied. The results also showed that the disability and daily functioning of patients in the cupping therapy group were significantly improved, which were consistent with the results of our research [24]. The study by Ghaem Maghami *et al.* concluded that cupping therapy reduced the lower back pain compared to the acupressure and control groups that is consistent with the results of our study [25]. In a study aimed at investigating the effects of cupping therapy on fibromyalgia syndrome, Lauche *et al.* showed that pain intensity and quality of life significantly improved compared to the control group, but in the placebo group, despite a decrease in pain and an increase in the quality of life score, the difference was not statistically significant. These findings were consistent with the results of our research [26]. In a study aimed at evaluating the therapeutic value of cupping therapy on patients with non-specific back pain, Kim *et al.* found that the cupping therapy reduced the pain in these patients compared to the control group, while the difference between the two groups was not statistically significant. These different results pain measurement scales as well as the difference in sample size [27]. A study by AlBedah *et al.* showed that the cupping therapy significantly reduced the intensity and duration of the pain and disability in these patients, which corresponded to the findings of our study [28].

Limitations of the present study included that some patients were not able to get a cupping therapy due to skin allergies or the presence of ulcer at the knee. There were also other limitations due to the fact that the traditional medicine clinic of Gonabad University of Medical Sciences was closed at various time intervals.

Conclusion

Finding showed that the use of hot intermittent cupping significantly reduced the mean pain, stiffness and disability in patients with KO. It suggests that hot intermittent cupping therapy is prone to become an effective and safe way for patients with knee osteoarthritis.

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