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Cupping therapy a treatment modality in knee osteoarthritis pain management

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Abstract

Osteoarthritis is a progressive degenerative disease and knee joint is most affected joint. Globally 100 million people suffer from osteoarthritis. A significant rise in the prevalence of Knee Osteoarthritis has a considerable negative impact on the economy of developing countries. Current treatments available in conventional medicine carry a significant burden of side effects. To overcome the pain in knee osteoarthritis, cupping therapy is most recommended therapy nowadays. It is a treatment modality used most frequently particularly in Asian and Middle Eastern countries, in which a glass or plastic cup is used to create suction pressure on the skin over a cupping point. It has been claimed to reduce pain and other symptoms. Based on literature review of previous clinical trials conducted on cupping therapy, we present a thorough review of cupping therapy to evaluate and summarize the evidence regarding the effectiveness of cupping for pain management in patients of knee osteoarthritis and to confirm cupping as a singular treatment option for pain relief in knee osteoarthritis.

Keywords: Dry cupping, knee joint, osteoarthritis, pain, wet cupping

Introduction

Osteoarthritis (OA) a degenerative arthritis or degenerative joint disease is a clinical syndrome in which low grade inflammation results in joints pain. Knee joint is most affected joint. It is one of the common causes of disability in the world. ^[1, 2] Knee OA is affecting one-third of elderly people. ^[3]

Pain is the most persistent reason for seeking therapeutic alternatives to conventional medicine. ^[4] Beyond pharmacotherapy, frequently used treatment options are acupuncture, massage and mind body therapies. Uses of such therapies increase with the increase in severity of pain. ^[5]

Cupping is a treatment modality used most frequently nowadays particularly in Asian and Middle Eastern countries, in which a glass or plastic cup is used to create suction pressure over the skin over a cupping point. It has been claimed to reduce pain and other symptoms.

The term "cupping" refers to different methods of cupping therapy which include dry cupping, wet cupping, fire cupping, gliding cupping and so forth.

Mainly two types Dry cupping and Wet cupping are in vogue. In Dry cupping vacuum is created inside cup through a mechanical pump hence drawing skin into the cup without bloodletting. In wet cupping the skin is scarified and blood is drawn into the cups through the same procedure. ^[6] Keeping in view the benefits of cupping, understanding its mechanisms of action has attained significance, which perhaps may be explained as follows.

This pulling of skin stimulates the baro receptors in the skin causing release of morphine like substances (Endorphins), Serotonin or Cortisol which can ultimately lead to pain relief and alter the physiological status of the individual. ^[7, 8] Yet another mechanism of analgesia is through diversification. The extravasated blood from the breached capillaries diversifies the metabolites and other chemical agents from the joint towards the skin and subcutaneous tissue (*Imala*) ^[9] According to the recent Taibah theory, ultrastructure of the skin (capillary) permits the skin act as a filter for removing and cleaning the blood and interstitial fluid from the causative pathological substances (CPS). ^[10]

Based on literature review of previous clinical trials conducted on cupping therapy, we present a thorough review of cupping therapy to evaluate and summarize the evidence regarding the effectiveness of cupping for pain management in patients of Knee osteoarthritis.

We compared two types of cupping with conventional treatment including drug therapy. Some suggestive evidence of superiority of cupping was found compared with conventional drug therapy in patients with knee joint pain. Reports of adverse events with cupping were limited and those reported are mild. The aim of this systematic review therefore, is to sum up and significantly evaluate the evidence for or against the effectiveness of cupping as a singular treatment for pain due to knee osteoarthritis.

Methods

Reputed Libraries and data bases such as Central Library, Jamia Hamdard, Library of CCRUM headquarters, Ministry of AYUSH, Govt. of India, Medline, Pubmed, Google Scholar, and Science direct, Springer were searched for the relevant material. Randomized clinical trials (RCTs) were included that used wet cupping alone or in addition to dry cupping therapy compared with no treatment or other active controls. Participants were without age or sex restrictions. Randomized clinical trials (RCTs) testing cupping in patients with pain of knee joint were considered. Trials testing cupping with or without drawing blood as individual or adjunctive treatment, in patients of both genders and any age diagnosed as having knee joint pain and assessing clinically relevant outcomes, were included. Trials published in forms of dissertation and abstract were included. Published results of RCTs in which cupping was performed with or without drawing blood as sole or adjunctive treatment, in patients of

either sex or any age diagnosed as having knee pain and assessing clinically relevant outcomes, were included.

Results and Discussion

The literature searches revealed 45 articles related to research studies using cupping therapy, of which 39 studies had to be excluded because most of the studies included different disease conditions (Nonspecific low back pain, Neck Pain Fibromyalgia syndrome, Primary Dysmenorrhea) while as our prime focus was on knee joint pain. Overall 10 studies met our inclusion criteria and their key data are listed in Table 1. Single experimental survey was from greater London, one pilot study was considered from western cape, two observational comparison study, two clinical trials and five RCTs from India and in all of them treated conditions were knee joint pain. The subjective outcome measures were the McGill pain questionnaire, 100 mm visual analogue scales (VAS), FLACC Pain Scale, NRS scale, pain faces questionnaire. Most of the trials employed dry cupping and in single trial wet cupping was used. The number of treatment sessions ranged from seven to eleven, with a duration of 15–20 min per session.

Details and limitations of all included RCTs are shown in Table 1. Language restriction was an important limitation because it led to the exclusion of a substantial number of publications, especially from China. Also there was not much data available related to cupping on knee joint.

Table 1: Summary of studies

S. No	First author (year), Country	Type of trial	Place of study	Sample size/condition	Intervention group-I	Group-II	Duration of treatment
1.	Zarnigar (2001)	Clinical trial	NIUM, Bangalore	32 (42-80yrs)	Dry cupping, biweekly 15 min	No cupping	2 months
2.	Nighat Anjum, 2004 Majeedia Hospital, Jamia Hamdard, New Delhi	Randomized controlled trial	Majeedia Unani hospital, Jamia Hamdard, Hamdard nagar, New Delhi	30/knee joint pain	Dry cupping, fire cupping	No cupping	4 weeks
3	Kullah (2006)	Experimental survey	Greater London region	26/anterior knee joint pain	Wet cupping	No cupping	3 week
4.	Rashid a bhikha Tibb Medical Centre, Langa, Cape Town, (2008)	Open, prospective pilot study	Western cape	18 (8 control) 42-70 yrs, 6F, 2M and(10 experimental) 46-80yrs, All females	Dry cupping, 15min	Dry cupping, Shoulder joint	4 weeks or 4 sessions in 3 months
5.	Ehsan ahmed (2011)	Randomized controlled trial	New Delhi	30 (15 in each group)	Dry cupping with colchicum oil	Diclofenac gel	6 weeks
6.	Mohd nayab (2011)	Clinical trial	NIUM, Bangalore	30-60 yrs, either sex	Dry cupping once weekly, 6sittings + habbe suranjan 2tabBD	Habbe suranjan TDS	35 days
7.	Michael Teut, 2012, Berlin, Germany	Parallel randomized controlled exploratory clinical study	Charity outpatient deptt, ambulatory surgical clinic, Berlin, Germany	40/knee joint pain	8 sessions of pulsatile dry cupping using cupping device (prvo2) for 10 min Total=21patients, 5 males	No Intervention Total=19 patients,8 male	4 weeks (2 session per week)
8.	Asim Ali Khan, 2013, India	Randomized controlled clinical trial	MajeediaUnani hospital, JamiaHamdard, Hamdard nagar, New Delhi	30/knee joint	Dry cupping	Acetaminophen 650 mg thrice a day orally with water.	8 months
9.	Abdul Kabir Dar, 2015 Srinagar J&K India.	Observational non-comparison study	Regional therapy unit, Govt Unani hospital Srinagar, J & K	75/knee pain	Dry cupping on affected joint (15-20min) 4 cups on both sides	NA	4 weeks
10.	Shaista urooj, 2016	Comparative open trial	RRIUM, Srinagar	90 (30 in each group)	Dry cupping for 20min Gp-1 Cervical OA Gp-2 Lumbar OA Gp-3 Knee OA		5 days

Only few rigorous trials have tested the effects of cupping on knee pain. The evidence from all reviewed RCTs of cupping seems positive. None of the reviewed trials reported severe adverse events. Favorable effects were also suggested for wet cupping as an adjunct to conventional drug treatment compared with conventional treatment. [11] Although the number of reviewed trials and their sample size are small but due to the consistency and reproducibility of results in subsequent trials, we can conclusively conclude that the cupping therapy effectively relieves the knee joint pain.

In study no. 1, cups of different sizes were used ranging from 2.54 to 7.62 cm in diameter and were simultaneously applied along with knee joints, over back in two parallel vertical columns midway between the spine and each edge of body and moderately significant beneficial effect was found in support of cupping on a 4-point pain intensity scale (0=none, 1=mild, 2=moderate, 3=severe). The beneficial effects of cupping therapy in osteoarthritis were attributed to removal of morbid matter from joint capsule, which is responsible for pain, swelling morning stiffness and loss of functions [12, 13] and cupping also causes tissue to release toxins, activate lymphatic system and clears the veins, arteries and capillaries. It locally stimulates nerves of the skin and exerts a general effect on circulatory system as well. In short, cupping improves circulation, activates vascular system, release toxins from tissues, thus the toxins and morbid matter is removed by lymphatic and venous drainage. [13]

In study no. 2, the efficacy was evaluated over a period of 4 weeks (28 days) on the basis of improvement in the clinical subjective parameters like pain, restriction of movement, morning stiffness, swelling above knee and swelling below knee were found 53%, 52%, 47%, 61% and 60% improvement respectively. Statistically significant ($p < 0.05$) results was found on applying paired t-test. This improvement in pain was correlated with the *Tanqiya* (evacuation) of the local humours caused by cupping [16, 14]

In study no. 3, by using paired sample t-test mean pain score dropped from 5.14 to 1.26 i.e. 75% change after the third week ($p < 0.05$) with statistically significant differences in support of cupping therapy. The reductions in pain scores was attributed to sound rationale as cupping therapy can elicit the release of morphine like substances (Endorphins), Serotonin or Cortisol which can ultimately lead to pain relief and alter the physiological status of the individual. Further at biological level, Cupping Therapy works by stimulating or activating (1) the immune system (2) enkephalin secretion (3) neurotransmitter release (4) vasoconstriction and dilatation and (5) the gates for pain in the CNS which interpret pain sensation. Finally, it is believed that stimulation of cupping points can lead to the pain gates to be overwhelmed by increasing frequency of impulses, therefore ultimately leading to closure of the gates and hence pain reduction. [15]

In study no. 4, cupping therapy is said to be a "safe, effective and relatively low-cost alternative and adjunctive therapy in the treatment of osteoarthritis". As all patients reported a marked reduction in pain intensity after cupping and after assessment by the pain faces questionnaire. There was an impressive fall found from "high" pain levels to "mild" levels in 50% of patients cupped, and a fall from "high" to "moderate" in a further 30% of patients. [11]

In study no. 5, it was concluded that cupping with oral medications in the form of tablet i.e. (habbe suranjan) is better for treating pain in knee osteoarthritis as pain decreased by 65.45%. Perhaps there is accumulation of morbid humours

especially synovial fluid, in the joint space, which exerts pressure on the capsule and creates the pressure symptoms. Dry cupping diverts the morbid humours away from the diseased tissues relieving the pressure symptoms. Blood circulation increases at the site, fulfilling the need of oxygen and other nutrients and kinetic energy of blood changes into thermal energy improving the local temperature. Once the local temperature is maintained the spastic condition gets rectified and the stiffness goes away or comes down. [16]

In study no. 6, improvements in disease-specific symptoms were observed after six weeks of regular treatment in patients receiving cupping therapy along with colchicum oil. This could be justified by decreased in pain level by 38.06%. The duration of study was short and sample size was also small, moreover mixed models were used for statistical analysis in this study and blinding was not feasible, therefore we emphasize the preliminary nature of this study. [17]

In study no. 7, when cupping over lumbo-sacral spine was done along with knee joint, mean pain intensity score had dropped from 2.2 ± 0.413 at baseline to 1.09 ± 0.5 after 2 months treatment thus relieving pain by 50.45%. In this study silicon cups were applied over knee joint for 10 minutes and plastic cups were applied over lower back region. Better outcomes was seen for pain intensity on VAS and after 4 weeks WOMAC global score improved significantly with a mean of 27.7 (95% confidence interval 22.1; 33.3) while After 12 weeks the WOMAC global score were still significantly different (31.0 (24.9; 37.2) vs. 40.8 (34.4; 47.3) $p = 0.032$). [18] The researchers summarized three potential mechanisms of actions as likely reason for effectiveness of cupping therapy. Firstly that reflex therapies may influence chronic pain locally by deforming or even injuring the skin which stimulates $\alpha\beta$ fibres in painful but also distal skin regions. Secondly, the level of the spinal cord may also be involved. Manipulations may stimulate inhibitory receptive fields of the multi-receptive dorsal horn neurons. Thirdly, therapeutic effects of the special naturopathic setting have a relaxing and social comforting effect. [19]

In study no 8, the study proved cupping to be a good analgesic and anti-inflammatory with efficacy better than acetaminophen as pain reduced by 46.37% in cupping group. The likely reason attributed to effectiveness of cupping therapy was because cupping superimposes acute inflammation on chronic inflammation. The chronic inflammation of cartilage that is deep seated has acute inflammation on the skin and muscles. The initial increase in pain in Grade 3 and Grade 4 must be because the pain of osteoarthritis had restricted the use of these muscles and thereby causing a loss in their elasticity hence the additional burden on the elasticity caused pain. Cupping also proved to be a good exercise to specific muscles besides improving their blood supply. The hemodynamic changes brought about through dry cupping are evident from ecchymosis and blister. These biochemical changes that resulted from vacuum are signs of imala (diversion of morbid matter). The vacuum pulls the muscle beyond its normal elastic limits and causes breeches in microvasculature of that area ensuring local hyperemia. Thus increasing the blood supply in the capillary system of that specific site. The metabolites that are diversified from the bony tissue towards muscle are taken up by the phagocytes from these capillary beds. The ecchymosis and blister formation are directly related to the duration and volume of negative pressure created by cupping. [20]

In Study no. 9, using Paired Student's t-test 60% reduction in

WOMAC score and 66% on VAS score ($P < 0.01$) was seen post cupping. The effectiveness of cupping therapy was again attributed to diversion and elimination of morbid humors present locally around the joints. [21] Cupping locally stimulates the sensory nerves of the skin improves the eliminative functions of wastes from the body which may cause disease. Cupping therapy was found to be safe and well tolerated as no adverse effects were noticed during and after the treatment and overall compliance to the therapy was good. [21]

In study no. 10, it was reported that 70% pain relief as per NRS scale and 90% change as per (FLACC) Pain Scale. They attributed this diversity in effect to various factors like: vascularity of the site. [22] As vascularity and degeneration are inversely proportional, hence the more vascular the area the faster are the relief with cupping, Localized fat hinders the effect of cupping [23], however, fat is more deposited in knee hence the effect in knee OA is relatively slow. Increased room temperature causes rapid dissemination of body fluids, excretion of unwanted metabolites and aid in relief. Effect of cupping was not pronounced if the muscles are very lax, as the volume of the cup is filled with the muscle without affecting the vasculature, thereby causing minimum effect. [23] Effect of season was also mentioned in this study as the effect of cupping was not that pronounced in the patients on whom cupping was done in early february but as the winters waned off the effect of the therapy was much pronounced. [9]

Reports of adverse events with cupping were rare and only very few side effects were observed. [20, 9, 13] Mild ecchymosis and blister formation on the anterio medial aspect of the knee was seen. [20, 9] Mild hematomas, light tingling sensation for few minutes in legs, increased chronic lower back pain and characteristic burning sensation seen on cupping area in a single study. [13]

Although strong efforts were made to retrieve all RCTs and surveys on the subject, we cannot be enormously convinced that we succeeded. Moreover, selective publishing and reporting are other major causes for bias, which have to be considered. Further limitations include the scarcity and in some cases suboptimal methodological quality of the primary data, as the design features such as placebo or blinding are difficult to integrate in studies of cupping. These are factors that influence both the quality and the quantity of research. In total, these factors limit the very firm conclusiveness of this systematic review.

Conclusion

As noticed in most studies the level of pain perceived by an individual reduced by half of its initial levels at the end which perhaps may be credited to cupping therapy which probably enhances the release of morphine like substances (Endorphins), Serotonin or Cortisol ultimately leading to pain relief. Another likely mechanism of analgesia may be through diversification as the extravasated blood from the breached capillaries diversifies the metabolites and other chemical agents from the joint towards the skin and subcutaneous tissues (*Imala*). Improvement in pain is also correlated with the *Tanqiya* (evacuation) of the local humours as per the traditional Unani concept. Hence, cupping is proved to be an effective treatment modality to treat knee joint pain. The results of our systematic review provide evidence suggestive for the efficacy of cupping in the management of knee joint pain. Future RCTs in multicentric settings are warranted to defeat the methodological shortcomings of the obtainable

data. Studies with longer duration and follow-up period with randomized standard controlled designs on large population need to be carried out for further exploration of efficacy and safety of cupping therapy. It is also suggested that as an intervention, cupping therapy needs to be used in regular practice and a record of the registered practitioners should be maintained.

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