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Is Dry Cupping Therapy Effective for Non-Specific Chronic Neck Pain in Adults?

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A SELECTIVE EVIDENCE BASED MEDICINE REVIEW

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Abstract

Objective: The objective of this selective Evidence Based Medicine (EBM) review is to determine whether or not "Dry Cupping Therapy is effective for non-specific chronic neck pain in adults?"

Study Design: Review of 3 randomized controlled trials (RCT)

Data Sources: All studies were published in peer-reviewed journals found in PubMed or Cochrane Database.

Outcomes measured: Patients were divided into two groups, the experimental group or the control group. Patients in the experimental group received dry cupping therapy. Patients in the control group received no therapy at all, normal standard of care (physiotherapy, sports activities, analgesics), or progressive muscle relaxation.
The primary outcome measured was chronic neck pain intensity at rest via a 11-NRS scale in one study, or a visual analog scale (VAS) of 0 mm to 100 mm in the other studies with 0 equaling no pain and 100 equaling the worst pain. In one study, patients were asked if they had experienced relief from pain by answering 'yes' or 'no' using an Adequate Relief Scale. A secondary outcome included chronic neck pain related to motion (VAS). In Cramer (2011) the VAS was 0 – 10 cm. For both measures, a baseline was measured before and after treatment. In all three RCTs, there was no long-term follow-up.

Results: In two out of the three RCTs, (Cramer – 2011 and Lauche – 2011), results of dry cupping therapy vs control proved to cause a decrease in pain at rest and with motion and reached statistical significance ($p \leq 0.05$). In Lauche 2013, the results showed that for every 5 people treated 1 person experienced relief from pain with cupping. Additional results showed there was not a statistically significant decrease in pain between cupping and progressive muscle relaxation therapy, but that there was a change from baseline for both. The studies did not follow long-term treatments, so its unknown if pain relief is lasting.

Conclusions: Based off of the three reviewed RCTs in this paper, it is indeterminate whether or not dry cupping is effective for chronic non-specific neck pain.

Keywords: Dry Cupping Therapy, Non-Specific Neck Pain

INTRODUCTION

Non-specific neck pain is a chronic condition involving increased muscle tonicity, spasm, pain, and inflammation due to mechanical and psychological stressors such as anxiety, stress, poor posturing, or heavy loading.[1] This is the reason this type of neck pain is termed "non-specific", since it is not attributable to any type of previous medical condition like a degenerative disk disease or physical trauma. The pathophysiology is not quite yet figured out and is primarily based on theory as of now, but essentially poor posturing over the years, combined with poor health, and untreated stress leads to modified surrounding neck musculature that causes enhanced fibrosis and inflammation. Additionally, blood flow to the surrounding neck muscles, like the trapezius is impaired, further exacerbating the problem.[2] If there isn't proper blood flow, nerve damage can happen, causing extreme pain. In three to six months, most cases of non-specific neck pain should be gone, but in 14% of cases, neck pain persists, which is why it is considered chronic after this point in time.[2] This paper evaluates three randomized control trials (RCTs) looking at the effectiveness of dry cupping therapy in reducing chronic non-specific neck pain.

The average life-time prevalence for chronic neck pain is 48.5%.[2] In 2010, 16.3 million patient visits to either the hospital or outpatient office were for neck pain; 76% of these were physician visits, while 3% of patients with cervical/neck pain were hospitalized.[3] The condition most commonly affects middle-aged adults, and is seen most commonly in women. There is not an exact estimate for the total healthcare cost spent on non-specific neck pain, nor conservative treatments used to treat it, however, "numbers obtained from the United States (US) showed that in the period from 1997 to 2006, the US health care expenditures have increased 7 % per year for persons with spinal problems." [4]

Chronic non-specific neck pain not only impacts the individual, but financially affects society due to lost days from work and using high amounts of health cares services to manage pain and other symptoms.[4] Conventional services include physical therapy exercises, spinal manipulations, physiotherapy, and analgesics such as NSAIDs. There are complementary therapies, as well, and these include acupuncture, massage, and cupping. Cupping is a traditional eastern medicine practice that involves using a glass, bamboo cup, or a mechanical device (such as a vacuum), that creates suction on the surface of the skin, and ultimately stimulates blood flow to the affected areas.[1] This paper focuses on dry cupping therapy and its affect on chronic non-specific neck pain.

Dry cupping therapy is being proposed in this paper because it is a non-invasive and non-pharmacological technique for treating non-specific neck pain. Pharmaceuticals have revolutionized medicine and created solutions for a variety of ailments, but they also produce undesirable side effects. Additionally, for some patients with medical conditions such as drug addiction or complicated GI diseases, medications such as prescription narcotics or NSAIDs, may not be a reasonable solution for managing pain, therefore dry cupping is an alternative.

OBJECTIVE

The objective of this selective EBM review is to determine whether or not "Dry Cupping Therapy is effective for non-specific chronic neck pain in adults?"

METHODS

This paper reviews three RCTs. The selection criteria for these studies included participants aged 18-75 y/o with chronic non-specific neck pain for at least 3 previous months with a mean intensity of 40 mm on a 100 mm VAS, or at least a 4 on an 11-level numerical scale (NRS). Chronic neck pain was not due to another medical condition. Majority of patients were

female, however, anyone could participate. Exclusion criteria included neck pain caused by trauma, whiplash, a congenital deformity, inflammatory or malignant disease. All studies included dry cupping therapy. One study used no therapy at all as the comparison group. Another study used normal standard of care the patient was already using (physiotherapy, sports activities, analgesics), and the third study used progressive muscle relaxation (PMR). The main outcome measured was the reduction in chronic neck pain intensity at rest via a visual analog scale (VAS) or 11-NRS, in addition to whether or not patients noticed pain relief via the Adequate Relief Scale. The secondary outcome included reduction in chronic neck pain intensity with motion using a VAS.

All studies were published in peer-reviewed journals that were obtained using either PubMed or Cochrane Database. The key words used to search the articles included "chronic neck pain" and "cupping." All studies were published after the year 2007 and were selected based on patient oriented outcomes that were POEMs; in this case the primary POEM being chronic neck pain at rest. Additionally, articles were chosen based on the relevance to the clinical question. To be included in this paper, studies were randomized, controlled, and included the POEM of interest. An article was excluded from this paper if it was included in previous Cochrane reviews and systemic reviews submitted by previous students. To view more additional inclusion and exclusion criteria, as well as demographic information see Table 1. The statistics reported include p-values, between group difference values, changes from baseline, and NNT. Outcomes were considered statistically significant if p was $\leq$ to 0.05.

Table 1 – demographics and characteristics of included studies

Study	Type	#Pts	Age (yrs)	Inclusion Criteria	Exclusion Criteria	W/D	Interventions

Cramer[1] (2011)	RCT, un-blinded	50	TG: 44.46 (±) 10.79 years Control: 47.88 (±) 13.50 years)	Ages:18-75 years w/ nonspecific neck pain for at least previous 3 months. Minimum pain 4/10 on numerical rating scale	Radicular syndrome, congenital deformity of spine, spinal stenosis, inflammatory rheumatic disease, etc. Invasive tx in last 4 weeks.	TG: 3 C: 2 Missing data was carried forward with intention-to-treat analysis	Patients in TG received 5 pneumatic pulsation therapy treatments over course of 2 weeks, Pneumatic pulsation therapy is combo of dry cupping and massage
Lauche [2] (2011)	RCT	50	18-75	Ages: 18-75 w/ neck pain for minimum 5 days a week for at least 3 consecutive months with mean pain intensity of 40 mm on 100-mm VAS.	neck pain caused by trauma, whiplash, inflammatory or malignant disease, etc. Invasive surgery w/in last 4 weeks.	TG: 3 C: 1 Missing data was carried forward with intention-to-treat analysis	Dry cupping therapy stayed on patient's muscles for 10-20 minutes. A total of 5 tx were spread out over the course of 18 days. Each tx spaced every 3-4 days.
Lauche[5] (2013)	Single blind RCT	61	54.1 (±) 12.7 years	Ages: 18-75 years w/ neck pain for previous 3 months, 5 days of every week. Neck pain intensity at least 45 mm on 100 mm VAS	Neck pain caused by trauma, disc protrusion, whiplash, congenital deformity of spine, spinal stenosis, neoplasm etc.	TG: 3 C:4 Missing data was carried forward with intention-to-treat analysis	Two partner-delivered home-based cupping massage treatments per week lasting 10-15 minutes. Trial lasted 12 weeks.

OUTCOMES MEASURED

The main outcome measured in all three randomized controlled trials is the effectiveness of dry cupping therapy to reduce chronic neck pain at rest. In all three articles, perceived pain at

rest was measured using a either an 11-NRS or a VAS, where 0mm is no pain at all and 100 mm is the worst pain imaginable. Data was recorded as before and after treatment averages, where a group difference between experimental and control group, or a difference from baseline within groups was calculated. Additionally, 1 study asked patients to answer 'yes' or 'no' to having pain relief using an Adequate Relief Scale. The authors did not define numerical values in the VAS to mild, moderate, or severe, therefore the primary outcome contains continuous data. In addition to this, raw numbers were not reported, so it was impossible to determine original VAS scores. The secondary outcome included perceived neck pain with motion using a VAS where 0 mm is no pain and 100 mm is the worst pain. Again, a group difference between experimental and control group was calculated.

RESULTS

Cramer (2011) and co-authors conducted a RCT looking at the effects of pneumatic pulsation therapy for chronic neck pain. The duration of this study was approximately 25 days (7 days of no treatment prior to randomization where pain was recorded in a daily diary, a 2-week treatment phase and a 0.5 week follow-up phase, where no intervention was given.) The study included 24 people in the treatment group (TG) and 24 people in the control group (CG). Every 3-4 days for 2 weeks, patients in the TG received pulsating and stationary cupping therapy for a total of 5 treatments. Pain was measured 3 times a day (morning, noon, evening) on a 11-level NRS. The authors did not explicitly define the values they used for their 11-NRS, but it was assumed under general knowledge that 1-3 = mild pain, 4-6 = moderate pain, and 7-10 = severe pain. Participants in the CG continued their standard medical care, which included physiotherapy, sports activities, and analgesics. Baseline pain was the average pain recorded in the 7 days prior to randomization. Pain ratings during the 2-week treatment phase included the 3

ratings for each treatment day as well as on each day after. Three patients in the TG and 2 patients in the CG were lost to follow-up, however, the authors used the last observation to replace the missing data (intention-to-treat). At baseline, the TG and CG reported a mean intensity pain at rest of 4.12 ± 1.45 and 4.20 ± 1.57, respectively. Post treatment, the TG's mean pain intensity dropped to 2.72 ± 1.62 (-34.1%) while the CG pain intensity increased to 4.44 ± 1.96 (+ 5.7%), Cohen's d = 0.9; p = 0.0001. The authors of the paper never explicatively stated the percentage of people who fell into each category of mild, moderate, or severe pain, or if there was a 'yes' to relief versus a 'no' to relief, therefore, continuous data could not be converted to dichotomous data, and a NNT is not available. Without a NNT, its difficult to determine how many patients getting treatment actually got relief, making this study less credible. A secondary outcome measured was neck pain related to motion. For this, they assessed pain using a VAS this time rating pain of 0 cm = 'no pain' to 10cm = 'worst pain'. The mean baseline for pain related to motion in the TG and CG respectively was 24.84 ± 11.93 and 22.05 ±8.74. The mean pain related to motion post-intervention for the TG and CG respectively was 16.73 ±11.57 and 26.15 ± 10.00. Thus, mean pain intensity decreased by 32.7% in the TG and increased by 18.6% in the CG. Again, the authors did not categorize the subjective pain scale into mild, moderate, or severe pain, or state here if patients experienced a 'yes' or a 'no' to relief, and thus a NNT was not calculated.

Launche (2011) and co-authors conducted a RCT to assess 5 dry cupping treatments on pain and mechanical thresholds in patients with neck pain. The study randomized 50 participants, equally dividing up 25 into each group, however 3 from the TG and 1 from the CG did not follow through with all treatments. Missing data was filled in with the patient's previously recorded observation (intention-to-treat). Prior to treatments, participants filled out a

questionnaire asking them to rate their pain using a VAS from 0 – 100 mm, with 100 mm being the worst pain, to get a baseline. Patients received a total of 5 dry cupping treatments over the course of 2 weeks. After this time, patients were reassessed using the VAS. At baseline, mean pain intensity at rest for the TG and CG was 45.5 ± 20.9 and 42.3 ±18.0, respectively. After treatment, pain at rest for the TG and CG respectively, was 26.1 ± 22.7 and 47.1 ± 19.8. Thus, there was an estimated group difference of -22.5 mm, with a 95% CI (-31.9 to -13.1) and p = 0.00002, which is significant. This continuous data could not be converted to dichotomous data because the authors never assessed if patients felt 'excellent' or 'poor' after the treatments, and a NNT was not calculated. The secondary outcome measured was pain intensity at movement (PM). PM included pain provoked by neck flexion, neck extension, lateral neck flexion, and neck rotation. Again, pain was scored with a VAS the same way. At baseline, mean PM in the TG and CG respectively was 62.0 ± 31.2 and 58.4 ± 22.2. After treatment, average PM in the TG and CG respectively was 29.0 ± 26.9 and 45.5 ± 25.3. Thus the group difference was -17.8, 95% CI (-31.3 to -4.6) and p = 0.01, therefore a significant difference is noted. For each outcome, results were analyzed using analysis of covariance (ANCOVA).

Lauche (2013) and co-authors conducted a study to investigate if cupping massage (CM) was something patients could easily apply themselves, without needing a medical practitioner for assistance. In this study, CM was compared to progressive muscle relaxation (PMR), technique done independently that teaches patients to contract their muscles and hold tension, and then release all the tension and focus on the sensation of relaxation.[5] The study randomized 30 participants to CM and 31 randomized to PMR. Inclusion and exclusion criteria are listed in Table. 1. Participants and a partner together correctly learned how to perform cupping massage after they attended a one-hour workshop. An experienced teacher educated them how to correctly

place the cups. Participants had two treatment sessions lasting 10-15 minutes per week for 12 weeks. For PRM, an experienced psychologist taught the selected participants how to do the relaxing training during a one-hour training session. Patients were told to do this at home twice a week for 20 minutes a session for 12 weeks. Using a 100 mm VAS scale where 0 = 'no pain' and 100 = 'worst imaginable pain', patients recorded pain levels daily prior to randomization to get a baseline and after treatment. Additionally, patients answered an 'Adequate Relief Scale' in which they answered yes or no to getting adequate relief from neck pain during each week. They also assessed pain with motion with the same VAS. Motion included flexing, extending, laterally flexing and rotating their necks to the left and right. Mean ratings were recorded before and after treatment and a group difference was taken between the two groups. Results show after 12 weeks, there was only a -0.16 mm between group difference for neck pain, $p = 0.98$, 95% CI (-13.90; 13.55). This is not considered statistically significant. For PM, there was a between group difference of 2.4mm, $p = 0.67$, 95% CL (-8.69; 13.47). This also is not considered statistically significant. From the Adequate Relief Scale, the calculated NNT was 5. This means that 5 people are needed to treat in order for one more person to get relief of neck pain with cupping message, compared to control. Four patients in the cupping massage group and 3 patients in the PMR group were lost to follow-up. Intention-to-treat statistics were applied here.

DISCUSSION

In Cramer (2011), there is no NNT, however, a Cohen's $d = 0.9$ is reported, which shows significance to the data. Cohen's d is a calculation of the difference in the two groups' means divided by the average of their standard deviations. A cohen's d of 1 signifies the averages are different by 1 standard deviation. When $d = 0.2$, it is considered trivial and there is no real difference, however, $d = 0.5$ means a medium effect size, while a $d = 0.8$ means a large effect

size. In this RCT, the change in pain from baseline in average neck pain was supported by d = 0.9, meaning there is a large effect size. This change is considered noticeable and substantial. Clinically, however, a change from a score of approximately 4 to a little over 2.5 on a 10 point scale isn't that large. With that said, one patient may find this difference big and life changing, whereas another patient may not. Cramer (2011) and co-author's study included factors that may have affected the outcome. The 'standard of care' CG did not have all the same medication regimes within the group. Some patients used physiotherapy, while others used sports activities, or analgesics, therefore the CG was not standardized and thus there are possible confounding variables. Additional bias includes the fact that some of the patients included in the study had pain intensities lower than 4 but were included in the study because they exaggerated their pain level. Finally, there was a lack of long-term follow-up, making it difficult to conclude if cupping is effective for long-term management.

Lauche (2011) and co-authors study reported group differences between the TG and the CG for pain at rest and PM. The 95% CI for pain at rest shows that the difference in pain could be as big as a 31.9 point difference or as small as a 13.1 point difference. For PM, the 95% CI shows that pain could be reduced by 31.3 points or as little as 4.6 points. The CI are considered wide, so the estimate of the treatment effect is not very precise. Due to the wide CI, there is greater uncertainty as to how effective cupping is. A 31 point difference could mean the difference between severe or moderate pain, but a 13 point difference could really mean no change at all. The authors are 95% certain that the mean difference in pain is between these two numbers, but they don't know precisely. However, they also report a Cohen's D = 1.4 for pain at rest, which is considered a large effect size, meaning there is a noticeable and substantial difference in pain. It's difficult to say whether or not cupping is effective therapy. Since the

continuous data could not be converted, and given the fact that the CI are so large, it is not convincing enough to say cupping therapy is clinically effective. Despite, the results being significant ($p < 0.05$), clinically the scores are very small and it doesn't seem like such a difference. This study had a small sample size making it less generalizable, however its sample did include more females, which is true of the prevalence and incidence of neck pain in the population. It did not keep the patients blind to the cupping therapy, so participants knew they were having treatment, which might cause a psychological bias about feeling better. Assessors of the treatment were not completely blinded to who got cupping therapy since evaluators could see the cupping marks on patients, which lasted for 3-4 days.[2] Finally, TG and CG were allowed to continue to use non-steroidal medication and physiotherapy during treatment, a confounding variable not accounted for, however, the authors report that only a few of the patients used it, so it was insignificant.

Lauche's (2013) study did not find a significant difference between CM and PMR therapy when analyzing the VAS continuous data. However, looking at the dichotomous data from the Adequate Relief Scale, the NNT shows that for every 5 people treated, 1 gets neck pain relief. According to the calculated absolute risk reduction (ARR), a patient taking CM had 20% absolute decrease in pain compared to PMR, which is considered a large effect size. Additionally, the relative risk (RR) was calculated to be 2.11. This means that CM had a 2.11 times higher risk of relief than those taking PMR. Since this is > 1, it means that the probability of experiencing pain relief is higher in the CM than PMR. Overall, these calculated numbers demonstrate that cupping is an effective therapy for pain relief. Lauche's (2013) study had a high withdrawal rate before randomization causing a small sample size. There were differences in the way partners delivered CM treatment, therefore treatment was not completely standardized. It

was impossible to keep patients blinded from cupping because this is a physical procedure and they would be able to feel it. During Lauche's (2013) study, patients were taking additional medications and therapies (which may have been different for each individual participant), so there are confounding variables, despite the authors reporting no significance. Finally, due to lack of compliance (participants averaged about 1.5 treatments a week instead of the full 2 per week), the results do not show the full potential of the treatment.

Overall, dry cupping therapy does not have serious adverse events. The participants' biggest complaints included muscle soreness for a couple of days and minor bruising.[1]

CONCLUSION

From the best available EBM research, it still appears inconclusive whether or not dry cupping therapy is effective for chronic non-specific neck pain. All three studies report their primary outcomes with continuous data, with the exception of Lauche's (2013) study, where a NNT value could be calculated and showed a large effect size. Continuous data reduces the quality of these studies. Despite this one value, majority of this research doesn't prove definitively if dry cupping relieves pain. The data shows, for the most part, that there are significant changes in pain at rest from baseline, but when analyzing this from a clinical perspective a change in a VAS in approximately 20 mm doesn't appear to be that large. However, a reduction in 20 mm to one person might mean the difference between being able to do activities of daily living or not. It is very patient dependent.

The adverse effects of dry cupping are little to none. It is considered safe. In the short-term, it appears to be somewhat helpful for neck pain, but is not a long-term solution. Ultimately, it does not harm the patient, but further research studies are necessary to evaluate cupping's long-term effectiveness and are necessary for insurance approval of the treatment.

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