

Original Article

Effect of neurogenic acupoint cupping on high sensitive C-reactive protein and pain perception in female chronic pelvic pain: A randomized controlled trial

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Abstract

Objectives: To determine the effect of neurogenic acupoint dry cupping therapy on high sensitive C-reactive protein (hs-CRP) level, pain perception & intensity, and life impact of pelvic pain in women with chronic pelvic pain (CPP), with regard to the biological and neurophysiological impacts of dry cupping on acupoint. **Methods:** Thirty women with CPP were randomly divided into two equal groups; the study group received dry cupping on neurogenic acupoints plus lifestyle modifications for 8 weeks (n=15), while the control group received only lifestyle modifications for 8 weeks (n=15). Women were assessed pre- and post-rehabilitation program with the hs-CRP blood test, the short-form McGill Pain Questionnaire (SF-MPQ), and the pelvic pain impact questionnaire (PPIQ). **Results:** Comparing both groups post-treatment revealed that there were significant reductions in levels of hs-CRP, and scores of SF-MPQ & PPIQ ($p < 0.05$) in the study group compared with the control group. Also, there were significant positive correlations between hs-CRP and both SF-MPQ "Visual Analogue Scale (VAS), Present Pain Intensity (PPI) index & Pain Rating Index (PRI)" and PPIQ ($p < 0.05$). **Conclusion:** Neurogenic acupoint cupping therapy had significantly improving effects on the degree of inflammation, pain perception & intensity, and life impact of pelvic pain in women with CPP.

Keywords: C-Reactive Protein, Dry Cupping, Female Chronic Pelvic Pain, Neurogenic Acupoint, Pain Perception

Introduction

Chronic pelvic pain (CPP) in females is a noncyclic, constant pain appears to be in organs & structures identified with the lower abdomen and pelvis that enduring more than six months¹. The CPP is a marked predominant disease with a negative effect on female's quality of life^{2,3}. There

are multifactorial causes of CPP, like pelvic inflammatory disease (PID) or gynecological pain⁴. The PID in females is an infection that leads to upper genital tract inflammation⁵, and CPP is considered a long-term complication of PID. The PID included visceral pain from pelvic organs, inflammatory changes, or thickening of the pelvic viscera and neighboring abdominal organ, irritation, adhesions from the infectious process, and scarring⁶.

The therapeutic cupping method is considered an important Complementary and Alternative Medicine (CAM) branch for the most painful cases⁷. The dry cupping leads to skin stimulation by suction, as it coordinates the bloodstream towards the skin and muscles, diminishes pain intensity, stimulates the peripheral nervous system & autonomous nervous system^{8,9}, it also can significantly decrease the quantity of lymphocytes in the local blood identified with the area of affection with an increased

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quantity of neutrophils, that decreases the pain level¹⁰.

Neurogenic acupoints might be identical to the skin overlying the referred pain that showed a neurogenic inflammatory spots, which are created by somatic afferents activation of the visceral organ in abnormal conditions with a higher electrical conductance than the surrounding tissue^{11,12}. Noxious sensory signals from instinctive visceral organs lead to mechanically hypersensitive spots on the skin (neurogenic spots), brought about by cutaneous neurogenic inflammation, in the dermatome that covers with instinctive visceral afferent innervations¹¹. Anatomically, the neurogenic spots correspond to traditional acupuncture points, and the referred pain at somatotopically distinct surfaces of the body is frequently due to noxious signals from viscera, which is mainly attributed to viscerosomatic combination at the spinal cord segments¹¹. The acupoints stimulation manually or electrically can treat the manifestations of the related visceral organs, because of the release of the endogenous opioid, with most of the neurogenic spots coincided the same with the acupoints area¹³.

Regarding the neurophysiological impact of dry cupping on neurogenic acupoint, it produces pain receptors stimulation, A-beta, A-delta, and C-fibers activation, a subsequent closure of the pain gates and reduction of the dorsal horn afferent input¹⁰, likewise the cupping-mediated pain relief contributes to the activation of mechanoreceptors in the periphery, leading to the endogenous anandamide and opioids release¹¹. The primary objective of neurogenic acupoint treatment is to bring the both nervous systems which are the sympathetic & the parasympathetic to a balanced point in their mechanism, the vasodilation leads to relaxation of the body muscles & improves the parasympathetic activity that advantage the patient and could likewise be related with the cupping after effects¹⁰. Mechanically, the cupping therapy leads to stimulation of the mechanosensitive fibers; physiologically, it expands the circulations of the blood and immunologically, it activates the immune system and regulates the immunoglobulins prompting a decrease in pain¹⁴.

The high-sensitivity C-reactive protein (hs-CRP) test is a blood test that discovers the minor levels of the C-reactive protein (CRP)¹⁵. The hs-CRP is a clinical marker in CPP syndrome patients, as the hs-CRP indicated a critical correlation with the intensity of pain score, which is believed to be identified with the increased cytokines activation in the inflammatory response¹⁶. Raised hs-CRP scores were seen in chronic pain syndrome¹⁷, various pain conditions, and musculoskeletal disorders¹⁸⁻²⁰.

Pain perception is the nociceptive input production that is modified progressively at the levels of spinal cord and brain to produce a high order conscious awareness of an unpleasant sensory perception, and the common measures of sensory perception of pain are the pain tolerance & threshold, as the threshold is the minimum amount of painful stimulation, or the least perceived stimulus intensity, while the tolerance is the maximum stimulus intensity tolerated by the patient, so the most valid measure of pain perception is the patients' self-

report, as Visual Analogue & Numerical Rating Scales, and multidimensional questionnaires or scales²¹.

Recent studies examined the efficacy of dry cupping on acupoints for various pain conditions and showed good results^{7,22}, however, no studies up to date have been evaluated the effect of dry cupping on neurogenic acupoints in women with CPP, therefore, this study was the first one which aimed to investigate the effect of neurogenic acupoint cupping therapy on hs-CRP & pain perception in women with CPP, as the CPP lowers the quality of life levels including physical, emotional, pain and mental health, so this study would expand the role of physiotherapy rehabilitation in CPP patients and the woman's health.

Materials and methods

Study design

The study was designed as a prospective, randomized, controlled trial, pre, and post-experimental design study. Women were assigned randomly into two equally matched groups, every group included 15 women as the study group received dry cupping on neurogenic acupoints plus lifestyle modifications for 8 weeks, while the control group received only lifestyle modifications for 8 weeks; the study was conducted in the 6th District Family Medicine Unit, Giza, from a period of April 2019 to January 2020.

Participants

Thirty women referred from gynecologists with a diagnosis of recurrent PID were randomly selected from the Gynecological Outpatient Clinic, Kasr Al- Ainy Hospital, Cairo University, Egypt, and the Gynecological Department of the 6th District Family Medicine Unit, Giza. To be included in the study, the participants were married women suffering from CPP caused by chronic PID. Their age ranged from 25 to 40 years old, with the maximum parity number was three, their body mass index (BMI) was 20:29.9 kg/m², they were non-smokers, their scores were less than 6 on the Interstitial Cystitis (IC) "Symptom Index and Problem Index" (The O'Leary-Sant), to exclude Interstitial Cystitis²³, while their pain score on Visual Analogue Scale (VAS) was above 4 cm²⁴, and their muscle strength grade was good to normal for the hip flexor, extensor, abductor, adductor, external rotator, and internal rotator muscles according to the group muscle test Oxford scale²⁵. The participants were excluded if they had any serious physical disorders such as vertebral problems, any other musculoskeletal or neurological disorders of spine or lower extremity, acute inflammation and deep venous thrombosis, any problems in the acupoints as fractures, ulcers, varicose veins, or skin disease, any history of cancer or congenital anomaly, the use of any kind of analgesic medications or contraceptive pills at least for one month before the intervention & during the treatment period, any participant suffering from CPP due to another cause except PID, and any muscle spasm in levator ani, also the exclusion criteria for hs-CRP^{16,26} were diabetes, hypertension, any auto

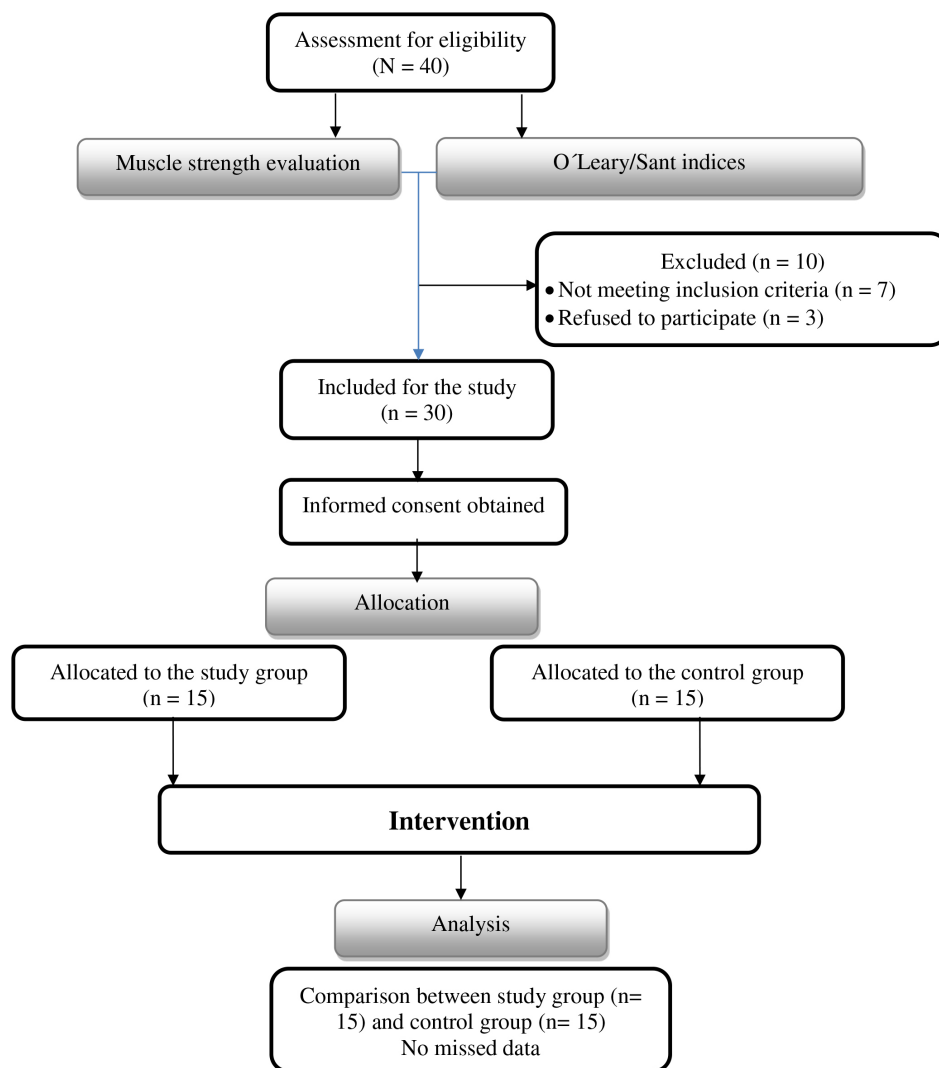


Figure 1. Flow chart showing the experimental design of the study.

immune disease as (rheumatoid, lupus), chest disease and cardiac disease.

Randomization

All participants read and signed a consent form before the beginning of the study, the anonymity and confidentiality were assured, and all the procedures were performed in compliance with relevant laws and institutional guidelines. Women were randomly assigned into 2 equal groups (study and control group) with the use of a computer-based randomization program. No dropping out of participants from the study was reported after randomization (Figure 1).

Ethical approval for the study

The study was approved by the Institutional Ethics Committee of the Faculty of Physical Therapy, Cairo

University, Egypt (No: P.T. REC/O12/OO2019), and clinical trials.gov ID NCT04436445.

Sample size

Overall, thirty participants satisfying the inclusion conditions were involved in the study, using G*POWER statistical software, a sample size calculation was done (version 3.1.9.2; Franz Faul, Universitat Kiel, Germany²⁷) and discovered that the suitable sample size was n=30.

Outcome measures

High sensitive C-reactive protein (hs-CRP) blood test

The level of hs-CRP was assessed pre and post-rehabilitation program, which is considered a valid and reliable assessment tool to assess the degree of

Table 1. Locations , clinical importance and desired neurological mechanism of pelvic pain neurogenic acupoints^{33,34}.

Acupuncture point	Location	Clinical importance	Desired neurological mechanism
Spleen (SP) 6	3 cun directly superior to the tip of the medial malleolus on the posterior border of the tibia.	Improve pelvic blood flow and relief pain. The cardinal point for gynecological conditions.	Closure of pain gates & reduction of dorsal horn afferent input.
Spleen (SP) 9	On the medial aspect of the lower leg, in the depression of the lower border of medial condyle of tibia.	It balances the blood flow and qi (vital energy) to the pelvis, & relief pain.	
Kidney (KI) 6	In the depression 1 cun directly below the prominence of the medial malleolus.	It maintains estrogen levels in order to assist the pelvic floor muscles.	
Conception Vessel (CV) 6	Two fingers width below the center of the belly button.	It increases the local blood flow in the pelvis.	
Gall Bladder (GB) 34	In a depression anterior and inferior to the head of the fibula.	It nourishes the blood.	
Bladder (BL) 23	1.5 cun lateral to the lower border of the spinous process of the second lumbar vertebra (L2).	The source point of qi (vital energy). It boosts the energy levels & strengthens the low back, resolves dampness, Pain relief, and nourishment of pelvic blood flow.	

inflammation, the severity of CPP and the response to treatment¹⁶. As a preparation before the test, participants were asked about the factors that possibly affect or associated with hs-CRP levels to avoid them, including use of therapeutic drugs, diuretics, analgesics or topical steroid injections, and alcohol consumption during the previous 24 hours¹⁹. Before drawing the sample from the participant, it was important to exclude the duration during menses or suffering any medical condition that might increase inflammation as cough or sneezing. Then, a random venous blood sample was drawn & analyzed by a medical laboratory professional doctor at a private specialized laboratory investigation, using turbidimetric assay technique on Roche cobas integra 400 plus, as the samples were drawn and separated at 3500 rpm for 10 minute, then the serum was stored at “-20°C” till assay¹⁹. The hs-CRP scores were as follow the low risk: less than 1.0 mg/L, the average risk: 1.0 to 3.0 mg/L and the high risk: above 3.0 mg/L²⁶.

Short-Form McGill Pain Questionnaire (SF-MPQ)

It is a valid & reliable evaluation that is quicker & simpler to use in clinical research; it was used to measure the pain sensory intensity²⁸. The SF-MPQ Arabic version was used in this study as it is reliable and valid among Arabic-speaking patients²⁹. It included 15 descriptors (4 affective & 11 sensory) which were rated as 0=none, 1=mild, 2=moderate or 3=severe on an intensity scale. The Present Pain Intensity (PPI) index of the standard McGill Pain Questionnaire (MPQ) and a Visual Analogue Scale (VAS) also were included in the SF-MPQ to quantify pain intensity perception³⁰. The questionnaire total score ranged from 0 to 45 on the Pain

Rating Index (PRI) including (Affective Subscore: 0/12 & Sensory Subscore: 0/33), from 0 to 5 on the PPI, and from 0 to 10 centimeters on the VAS²⁸.

Pelvic Pain Impact Questionnaire (PPIQ)

It was utilized to evaluate the pelvic pain effect on females, it included a 10-item questionnaire comprised of 8 questions with scores from 0-4, & a sum of 32, while questions 9 and 10 were ‘only if applicable’ and so not included in the final score, and the Test-retest reliability of the PPIQ was high³¹.

O’Leary-Sant Index

It was used to assess and determine the Interstitial Cystitis (IC) patients²³ to exclude women suffering from urinary problems. It consisted of a score range “0-20” points for the Symptom Index and a score range “0-16” points for the Problem Index. Scores were determined for both indices by summing the points for each item. A score <6 points on either index indicated absence of IC²³.

Group muscle test for hip muscles

Manual muscle test was done for all participants to exclude any woman suffering from musculoskeletal weakness problems, through assessment of hip flexor, extensor, abductor, adductor, external rotator, and internal rotator muscles. According to the Oxford group muscle test scale, the grading was either a numerical scale from 0 to 5 or a descriptive grades (zero, trace, poor, fair, good, and normal)²⁵.

Interventions

The study group received lifestyle modifications, in addition to dry cupping on neurogenic acupoints, using Vacuum Suction Pump, with sterile & disposable cups of different sizes from 3 cm to 6 cm in diameter (manufactured by OEM company, fabricated utilizing superb quality crude material)³², were applied on neurogenic acupoints that described in Table 1 as it concluded all the location, clinical importance and desired neurological mechanism of each neurogenic acupoint for the pelvic pain^{33,34}. The “cun” is a measurement that was utilized to localize acupoints, as the distance between the proximal & distal interphalangeal joints on the middle finger represents one cun³⁵. The position of the participant was prone lying for BL23 spinal acupoint as shown in (Figure 2) as a model for dry cupping application, while it was supine lying for SP6, SP9, KI6, GB34, and CV6 acupoints. Firstly, by alcohol, the participant’s skin was cleaned and lubricated with oil using a cotton swap then the cups were set on the neurogenic acupoints. Dry cupping on the neurogenic acupoints was done by manual handling and different sized cups (every size was appropriate for the treated area) by using safe plastic cups which gave the same result to other types but with fewer side effects, so dry cupping for SP6, SP9, KI6, and GB34 acupoints were applied by the small cups while dry cupping for CV6 and B23 were applied by the large cups, then with a manual handle (vacuum suction pump) a negative pressure was applied (Figure 3), and after 20 minutes the therapist released the pressure by opening the valves of the cups firstly then pressed one side of the skin to release the vacuum slowly, so an immediate visible vasodilation of the superficial capillaries produced a localized skin hyperemia (Figure 4).

The control group received lifestyle modifications in the form of dietary recommendations, sleep quality improvement & walking. The dietary recommendations included instructions about avoiding consumption of all kinds of coffee, spicy foods, pepper, chili, & alcohol beverages, following a correct diet comprising of 50% carbohydrates, 30% fats, and 20% proteins daily, and increasing intake of foods rich in natural fibers, vegetables & fruits. Also, participants were instructed to sleep at night nearly eight hours, with keeping on 40 minutes of walking, 3 times/week^{36,37}.

Statistical analysis

All statistical analyses were performed using IBM SPSS statistical package version 25 for Windows (IBM SPSS, Chicago, IL, USA). Mean and standard deviation or median and interquartile range were calculated for descriptive statistics. Statistical significance was defined as $P < 0.05$. The baseline characteristics were compared between groups using the t-test and Mann–Whitney test. Shapiro–Wilk test was used to check the normal distribution of data and Levene’s test for homogeneity of variances was conducted to test the homogeneity between groups. Within and between groups, comparisons were carried through mixed design MANOVA. Post-hoc tests using the Bonferroni correction were carried out for subsequent multiple comparisons.



Figure 2. Model for dry cupping application on bladder (BL23) spinal neurogenic acupoint located in 1.5 cun lateral to the lower border of the spinous process of the second lumbar vertebra (L2).

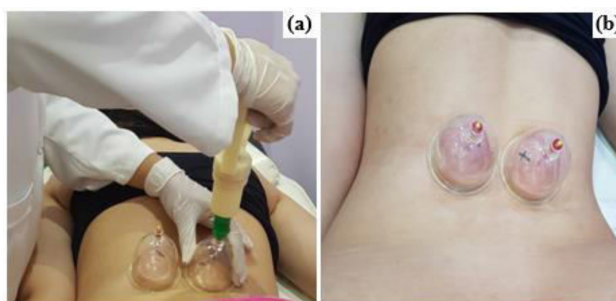


Figure 3. Model for dry cupping application on bladder (BL23) spinal neurogenic acupoint for L2: (a) a negative pressure application using the vacuum suction pump, (b) large cups placement para-spinal after vacuum suction.

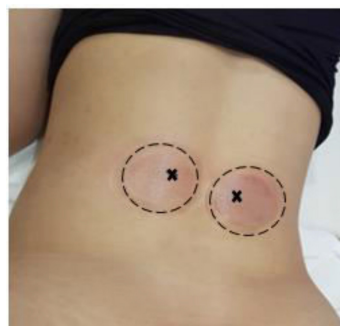


Figure 4. Model for dry cupping application on BL23 spinal neurogenic acupoint: a localized skin hyperemia after 20 minutes of dry cupping application.

Table 2. Basic characteristics of patients.

	Study group	Control group	p-value
		mean (SD)	
Age, years	35.4 ± 5.91	36.4 ± 5.87	0.64
BMI, kg/m ²	23 ± 2.85	23.6 ± 2.41	0.53
		median (IQR)	
O'Leary/Sant indices			
Symptoms index	2 (3-2)	2 (2-2)	0.13
Problem index	2 (3-2)	2 (2-1)	0.1
Parity	3 (3-0)	3 (3-0)	0.53
Muscle strength grade			
Hip flexors	5 (5-4)	5 (5-5)	0.24
Hip extensors	5 (5-5)	5 (5-5)	1
Hip abductors	5 (5-5)	5 (5-5)	1
Hip adductors	5 (5-4)	5 (5-5)	0.24
Internal rotators	5 (5-4)	4 (5-4)	0.28
External rotators	5 (5-4)	4 (5-4)	0.28

SD, standard deviation; p-value, level of significance; BMI, body mass index; IQR, interquartile range.

Table 3. Mean values of hs-CRP, SF-MPQ and PPIQ pre and post treatment of the study and control groups.

	Pre treatment			Post treatment			Repeated measures (study)	Repeated measures (control)
	Study group	Control group		Study group	Control group			
	$\bar{X} \pm SD$	$\bar{X} \pm SD$	P value	$\bar{X} \pm SD$	$\bar{X} \pm SD$	P value		
hs-CRP (mg/L)	2.2 ± 0.72	2.36 ± 0.82	0.5	1.32 ± 0.42	1.98 ± 0.78	0.008	0.001	0.01
SF-MPQ								
VAS (cm)	8.6 ± 0.82	8 ± 1.13	0.1	2.8 ± 0.77	4.6 ± 0.5	0.001	0.001	0.001
PPI	4.73 ± 0.45	4.8 ± 0.41	0.67	1.8 ± 0.77	3 ± 0.65	0.001	0.001	0.001
PRI	24.6 ± 4.06	25 ± 6.14	0.83	12 ± 4.72	19 ± 6.03	0.001	0.001	0.001
PPIQ	27.13 ± 3.88	26.93 ± 5.09	0.9	10 ± 3.44	18.8 ± 5.45	0.001	0.001	0.001

\bar{X} , Mean; SD, standard deviation; p-value, level of significance; hs-CRP, high-sensitivity C-reactive protein; SF-MPQ, Short-Form McGill Pain Questionnaire; VAS, Visual Analogue Scale; PPI, Present Pain Intensity; PRI, Pain Rating Index; PPIQ, Pelvic Pain Impact Questionnaire.

Results

Baseline characteristics

Thirty participants participated in this study and there was no significant difference in the baseline characteristics of participants between both groups pre-treatment ($p > 0.05$) as showed in Table 2.

Effect of treatment on hs-CRP, SF-MPQ, and PPIQ

Mixed MANOVA revealed that there was a significant interaction of treatment and time (Wilks' Lambda=0.16; $F=24.37$, $p=0.001$). There was a significant main effect of

time (Wilks' Lambda=0.02; $F=230.6$, $p=0.001$). There was a significant main effect of treatment (Wilks' Lambda=0.44; $F=5.94$, $p=0.001$). Table 3 showed descriptive statistics of hs-CRP, SF-MPQ and PPIQ as well as the significant level of comparison between groups and the significant level of comparison between pre and post-treatment in each group, as between groups comparison showed that: there was no significant difference in all parameters between both groups pre-treatment ($p > 0.05$), while post-treatment revealed significant decreases in hs-CRP, SF-MPQ, and PPIQ of the study group compared with that of the control group ($p < 0.05$), and within group comparison revealed that there

Table 4. Correlation between hs-CRP and both SF-MPQ (VAS, PPI & PRI) and PPIQ.

		r value	p value	Sig
hs-CRP (mg/L)	VAS	0.37	0.003	S
	PPI	0.51	0.0001	S
	PRI	0.28	0.02	S
	PPIQ	0.63	0.0001	S

r value, Pearson correlation coefficient; p value, Probability value; S, Significant; hs-CRP, high-sensitivity C-reactive protein; VAS, Visual Analogue Scale; PPI, Present Pain Intensity; PRI, Pain Rating Index; PPIQ, Pelvic Pain Impact Questionnaire.

was a significant decrease in hs-CRP, SF-MPQ, and PPIQ post-treatment compared with that pre-treatment in the study and control groups ($p < 0.05$) (Table 3).

Relationship between hs-CRP and both SF-MPQ (VAS, PPI & PRI) and PPIQ

The correlations between (hs-CRP and VAS), (hs-CRP and PPI) and (hs-CRP and PPIQ) were a moderate positive significant correlation ($p < 0.05$), while the correlation between (hs-CRP and PRI) was a weak positive significant correlation ($p < 0.05$) (Table 4).

Discussion

The chronic pelvic pain represents one of the most common gynecological problems, that is associated with increased levels of hs-CRP and sensory pain perception, therefore, the current study found that, in the study group that received dry cupping on neurogenic acupoints, there were significant reductions in hs-CRP levels, as well as SF-MPQ and PPIQ scores compared to control group, reflecting the effectiveness of the neurogenic acupoint cupping therapy on reducing inflammation, improving CPP state, lowering CPP perception & intensity, and decreasing pelvic pain impact in women with CPP. Regarding the study group of the current study, the results were consistent with Yazdanpanahi et al,²² who used dry cupping on the acupuncture point to reduce postpartum low back pain.

Akbarzadeh et al,⁷ assessed the using of dry cupping method at BL23 acupoint on low back pain in postpartum females and the results showed that the mean/ standard deviation intensity of low back pain using SF-MPQ were 31.8 ± 10.8 pretreatment, 9.0 ± 6.7 , 7.5 ± 6.6 , and 3.6 ± 4.1 immediately, 24 hours, and two weeks post-treatment, respectively, while the VAS scores were also respectively obtained as 7.8 ± 2.7 pretreatment & decreased to 3.7 ± 1.8 , 2.5 ± 1.7 , and 1.4 ± 1.4 . The results of SF-MPQ were quite in agreement with VAS scores, while these two instruments measure different criteria of pain perception, as SF-MPQ included the items that measured various sensory and

emotional aspects, while the VAS deals with the sensitive intensity of pain.

The dry cupping therapy at acupoint stimulates the autonomous nervous system, decreases the pain & stimulates the skin by a suction applied to increase the local blood and lymphatic circulation that causes the reduction of pain and sensitivity⁷. The acupuncture effects produced by the stimulation of neurogenic spots mediated by the endogenous opioid system, as a previous study by Kim et al,¹¹ showed that acupoints presenting the internal organs may be identical to neurogenic inflammatory spots on the skin that are associated with visceral disorders.

The central sensitization of the spinal cord and neurogenic inflammation considered the mechanism of the referred visceral pain. Acupoint sensitization emphasized that pathological alteration of internal organs' functional activity cause spinal center sensitization, as well as alterations of the function & size of neurogenic acupoints on body surfaces³⁸.

Inanmdar et al,³⁹ showed a resultant relief of the congestion in the pelvic area after dry cupping application through suppressing the prostaglandins and releasing beta-endorphins, producing endogenous analgesia. Similar to acupressure and acupuncture at the biological level, the dry cupping leads to vasoconstriction and dilatation with the neurotransmitter release activation and inhibits pain sensation by the closure of the pain gates in the central nervous system⁸.

Srinivasan et al,⁴⁰ and Honjo et al,⁴¹ both agreed that acupuncture therapy for treating CPP was effective to decrease pain & improve quality of life. Clinical diagnosis of blood circulation problem in different degrees was reported in many chronic PID patients, while the acupuncture leads to facilitate inflammation absorption, improve cellular membranes permeability & stimulate blood circulation⁴², therefore, it could be used for the management of chronic pelvic disorders⁴¹. Mitidieri et al,⁴³ studied the effect of acupuncture application on pain intensity for CPP in females through evaluating VAS and McGill questionnaire & the findings showed a significant sustained pain relief post acupuncture application.

The significant reductions in hs-CRP levels, as well as SF-MPQ and PPIQ scores of the control group were consistent with Macphail²⁰, who stated that the diet and lifestyle management could significantly inhibit hs-CRP in the treatment of chronic low back pain (CLBP) patients with elevated hs-CRP, so the hs-CRP was considered a useful clinical therapeutic target for the lifestyle and diet interventions. Additionally, Vural³⁷ found that the CPP conservative management could include personalized patient education, as dietary modifications to prevent overconsumption of coffee, acidic drinks, over-fat, spicy, gassy foods, and artificial sugars, and likewise an exercises program with diaphragmatic breathing that help in pelvic pain rehabilitation. Moreover, a previous study by Bonis et al,⁴⁴ demonstrated that the lifestyle modifications and a specific program of exercises can significantly reduce the chronic pain levels due to pelvic floor dysfunction.

In the present study, hs-CRP was significantly positively correlated to all components of SF-MPQ (VAS, PPI & PRI) and PPIQ. In line with the present findings, Afari et al,²⁶ found that there is a significant relationship between pain ratings & hs-CRP as the more hs-CRP levels were found with higher pain ratings at tolerance & threshold in female twins, these findings confirmed that both hs-CRP and pain sensitivity ratings considered potential biomarkers in chronic pain cases. Yoo and Shim,¹⁶ also revealed that the hs-CRP level had a clinically significant correlation with CPP syndrome, so evaluating hs-CRP could be able to determine the severity of CPP and to predict the treatment response. In addition, Stürmer et al¹⁸ found an association between pain as measured by VAS and hs-CRP values in patients with chronic low back pain and acute sciatic pain, as the hs-CRP mean level was elevated with a high pain scores. Moreover, Macphail²⁰ found that the hs-CRP was a useful clinical biomarker for chronic inflammatory conditions in musculoskeletal problems, as it was elevated in inflammatory CLBP and associated with pain perception thresholds, reduced function and weakness, likewise the elevated level of hs-CRP associated with the development and maintenance of CLBP through the peripheral nociception activating.

Conclusion

Based on the scope and findings of this study, it was concluded that the dry cupping therapy on cutaneous neurogenic acupoint spots was effective in treating women with CPP through decreasing their hs-CRP levels, as well as chronic pelvic pain perception, intensity, and impact on life, thus it should be considered as a potential rehabilitation program for the chronic pelvic pain conditions.

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