International Journal of Multidisciplinary Research and Development
www.allsubjectjournal.com
ISSN Online: 2349-4182 ISSN Print: 2349-5979
Received: 21-06-2024, Accepted: 22-07-2024, Published: 07-08-2024
Volume 11, Issue 8, 2024, Page No. 26-35

Effect of laser acupuncture on menstrual back pain: A randomized controlled trial

Mai Ali Galal[1], Afaf M Botla[2], Sameh Hussien Samir[3], Marwa M Ahmed Mahran[2]
[1] Department of Physical Therapy, El- Negelah Central Hospital, Marsa Matruh Governorate, Egypt
[2] Department of Physical Therapy, Woman's Health, Faculty of Physical Therapy, Cairo University, Giza, Egypt
[3] Professor in Department of Obstetrics and Gynecology, National Research Center, Giza, Egypt

Abstract
Menstrual low back pain (MLBP) is the most common complain of menstrual discomfort that responsible for highest number of absentees which results in work hours and economic loss for up to three days monthly. Laser Acupuncture (LA) is non-invasive technique used to activate pain-gate mechanisms without needles puncturing but with Laser.
Objective: To determine the effect of LA on MLBP, pain pressure threshold (PPT) and activities of daily living (ADL).
Methods: Thirty-two women suffering from MLBP were randomly divided into two equal groups: The intervention group (received LA) on the points (BL23, BL26, BL40, SP6) and the control group (received sham LA) on the same points (n = 16 each). Treatment was delivered 16 minutes per session, 3 sessions every menstrual cycle for 3 consecutive menstrual cycle. The severity of the pain was measured using a visual analogue scale (VAS). Also, the PPT was measured using pressure algometry. Additionally, person's ability to perform her ADL was assessed throughout instrumental activities of daily living (IADL) questionnaire.
Results: There were statistically significant improvements ($p < 0.05$) in VAS, PPT and IADL in the intervention group (Group A) post treatment compered to pretreatment ($p< 0.01$). Regarding group comparisons, there was a significant improvement in VAS, PPT, and IADL of group A compared with that of group B post treatment ($p = 0.001$).
Conclusions: LA is an effective complementary treatment for MLBP by improving pain intensity, PPT and ADL.

Keywords: Menstruation, dysmenorrhea, menstrual low back pain, laser acupuncture

Introduction

Menstrual LBP is the most common complain of menstrual discomfort [1]. It affects 46% to 56% of the population in southern Taiwan [2]. Another study reported by Banikarim *et al*. [3] found that the prevalence of back pain during menstruation among Hispanic female adolescents is about 56% and the proportion increases with age [4].

MLBP is defined as recurrent or continuous pain present in the lumbar spine with the menstrual cycle that begins somewhere between few hours before or several hours after the onset of menstrual bleeding and may last up to 24-72 hours [5, 6] and peaking within the first few days as menstrual flow increases [7].

MLBP may range from mild pain that does not interfere with sleep or normal day activities to severe excruciating pain that is capable of interrupting sleep and may be disabling; often resulting in school and work absenteeism [8].

Regarding the duration of MLBP, almost (37%) have pain duration for one day only, 39.8% reported 2 days, followed with 15.4% who stated pain for 3 days, moreover, 5.4% of girls have reported pain duration for 4 days and 2.3% reported even after cessation of menses according to a study that has been done in India for a period of 3 months [9].

MLBP is typically muscular in nature and thought to be caused by hormone changes. Hormones released during menstruation promote uterine contraction to shed the uterine lining. Certain hormone-like chemicals (prostaglandins) increase the uterine contractions and cause cramping during period. Right before period, the endometrial cells in uterus produce numerous prostaglandins. The buildup of prostaglandin can lead to cramping, and the higher the level of prostaglandins, the more painful the uterine contractions usually are [10]. For some women, this muscular contraction pain can also lead to LBP, as the pain can radiate from the lower abdomen into the low back. Typically, women with this condition experience pain when first starting their period [11].

The hormonal changes during menstruation also affect ligaments in the spine by influence collagen production, which can lead to ligament laxity and muscle become weak [12]. So, the instability of the spine gradually increases. The increased instability of the spine can lead to problems in the lower back causing LBP in some women during menstruation and increase the risk of injury [13]. LBP in general has disabling nature and makes dysmenorrhoea stressful and it can become an irritating factor in the life of females [14]. Studies have shown that not less than 10% of menstruating young women are incapacitated for up to three days monthly all because of MLBP [8].

For many years, several chemical remedies have been used to relief this disabling pain. Nonsteroidal anti-inflammatory drugs (NSAIDs) and hormonal contraceptives have been the main therapy of choice in women with primary dysmenorrhea; however, they are associated with many side effects, such as diarrhea, stomachache and nausea so women who use them need to be aware of the substantial risk of adverse effects [15].

On the other hand, alternative treatment options such as behavioral interventions, herbal medicines, yoga, exercise, acupuncture, topical heat, physiotherapy and Trans Cutaneous Electrical Nerve Stimulation (TENS) are used to reduce menstrual pain [16].

There are several methods to stimulate acupuncture points for the management of LBP, such as electro acupuncture (EA), acupressure and LA [17].

LA is considered as a successful method in the treatment of dysmenorrhea [18, 19] due to important role of laser in pain reduction in the short period through relieving the inflammation and stimulation of the endorphins production, in addition to inhibition of the synthesis of prostaglandin E and F which increased during menstruation causing menstrual pain [16]. Many previous studies and reviews proved that the complementary and alternative therapies have more effect than pharmacological interventions on reducing pain accompanied by primary dysmenorrhea with minimal adverse effects [20].

LA is the application of laser to acupuncture points [21]. Laser stimulation of acupuncture points, was a kind of phototherapy at acupoint similar to needle acupuncture with different kind of perturbation energy using laser emitter devices applied to skin as an alternative to needles for providing luminous energy, capable to produce photobiological induction that results in biochemical, bioelectric and bioenergetics effects [21-22]. It has been commonly used in the last years with minimal adverse effects and greater versatility [23].

The benefit of LA for relieving pain based on the mechanism of inducing peripheral neural blockade, suppressing central synaptic activity, modulating neurotransmitters, and reducing muscle spasm [24].

The stimulation of BL 23, BL 26, BL 40 and SP6 have an impact on decreasing pain in primary dysmenorrhea. The effect of acupuncture on point SP6 is an increase in ovarian blood flow via a reflex response and appears to be related to some of the analgesic benefits of acupuncture in primary dysmenorrhea [25]. Acupuncture on point BL 23 improves circulation to the local tissues and resolves myofascial dysfunction and promotes tissue recovery. Also, BL 26 is stimulated to relax the myofascia and free the nerves which are entrapped and irritated. BL 40 may improve circulation and nerve health by reducing myofascial tension caused by neurovascular compression [26].

LA has the additional benefit of not requiring any puncturing of the skin as there is no use of needles, so there is no pain which often inspires fear. It has the characteristics of its minimal sensation, short duration of treatment, easy to use, non-invasive, minimal risks of infection, trauma, and bleeding complications [21] and it can avoid the pain and psychological fear of traditional acupuncture [18].

Method

This study was be carried out at outpatient clinic in Alexandria gynecological Hospital, Egypt from February, 2023 to January, 2024 and approved by the Research Ethics Committee at the Faculty of Physical Therapy at Cairo University with approved number P.T.REC/012/004349. The clinical trial registration number of the current study is NCT06342791.

Study Design

The design of this study was a randomized, controlled clinical trial. This study was carried out on thirty-two women suffering from MLBP. They were be selected from outpatient clinic of (Alexandria gynecological hospital). Each participant signed a written consent form.

Participants

Thirty-two women suffering from MLBP participated in the study. They were be selected from outpatient clinic of Alexandria gynecological hospital, Alexandria, Egypt with the following criteria: - All females had back pain and limitations on activities as determined by VAS (Patients had mild pain from 5 on VAS) and IADL scale (Patients had mild limitation ≤ 15 from the total score on IADL scale) with an age ranged from 20 -30 years and BMI ranged between 20-30 kg/m^2. Patients who had any pelvic pathology such as endometriosis, adenomyosis, pelvic inflammatory disease, ovarian torsion, tuba-ovarian mass, adenomyosis, fibroids (Pelvic mass) or cyst and congenital anomalies of the pelvic reproductive organs which cause painful menstruation were excluded. Also, individuals with pelvic floor dysfunction, psychiatric disorders, lumber disc prolapse or any previous surgery on spine, tumor in lumbar spine and skin disease were excluded.

Randomization and blinding

All females were randomly divided into tow equal groups (A, B) by using sealed envelope methods. Written cards of LA therapy or sham LA therapy were put in closed envelopes and another researcher who blinded on the study procedure was asked to choose one card. According to which card was chosen, females were allocated to the study groups (Fig. 1): group A: LA therapy (n = 16) and group B: sham LA therapy (n = 16). No dropping out of participants after randomization.

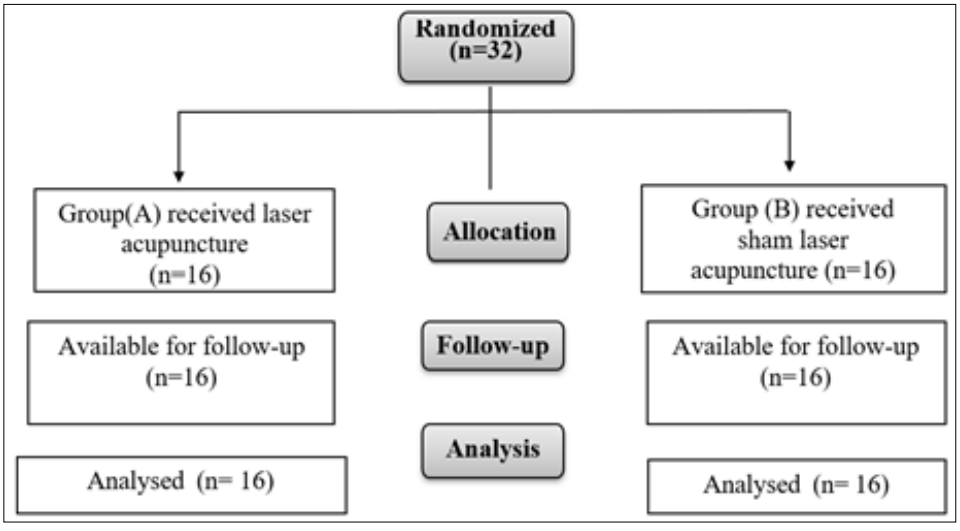

Fig 1: Diagram showing the recruitment of women and progression throughout the trial

Procedure

All participants were instructed about the objectives of the study as well as benefits of LA and its efficacy on reducing MLBP and agreed to participate before signing a written informed consent form.

For point identification, the patient was lying in a comfortable side lying position then the examiner determines the main points of assessment BL 23 (5 cm lateral to the spinous process of L3 bilaterally) **(**Figure 2*)*, BL 26 (5 cm lateral to the spinous process of L5 bilaterally) (Figure 3), BL40 (midpoint of the transverse crease between the biceps femoris and semitendinosus tendons on the popliteal fossa) (Figure 4), and SP6 (four finger above the prominence of the medial malleolus) (Figure 5).

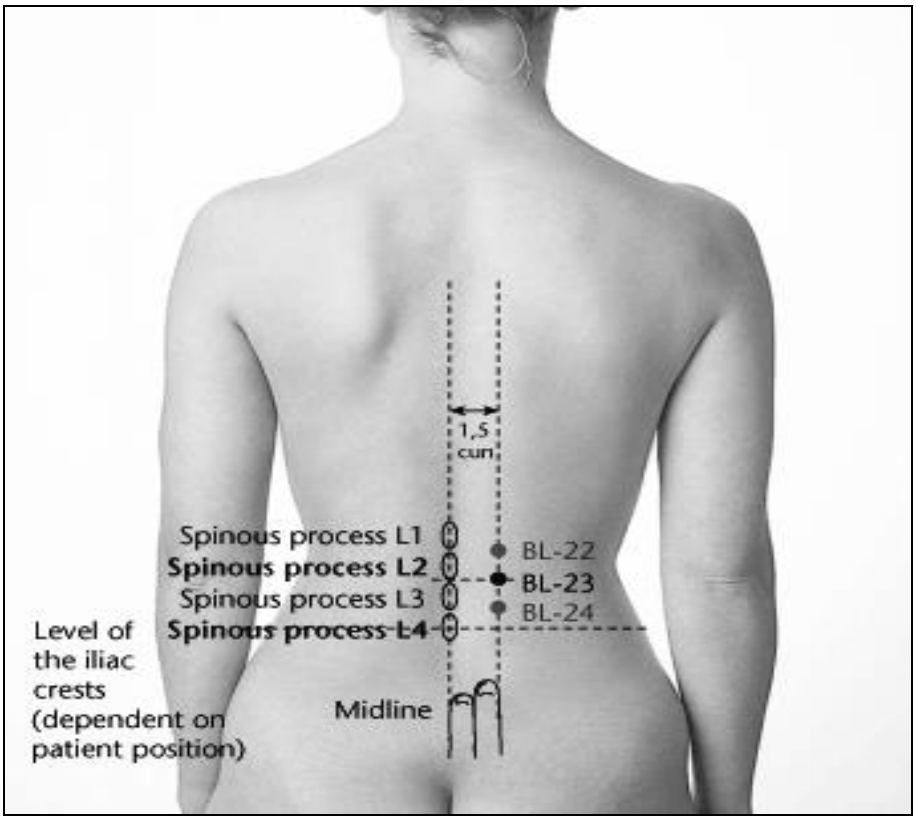

Fig 2: BL 23 acupuncture point for LBP [32]

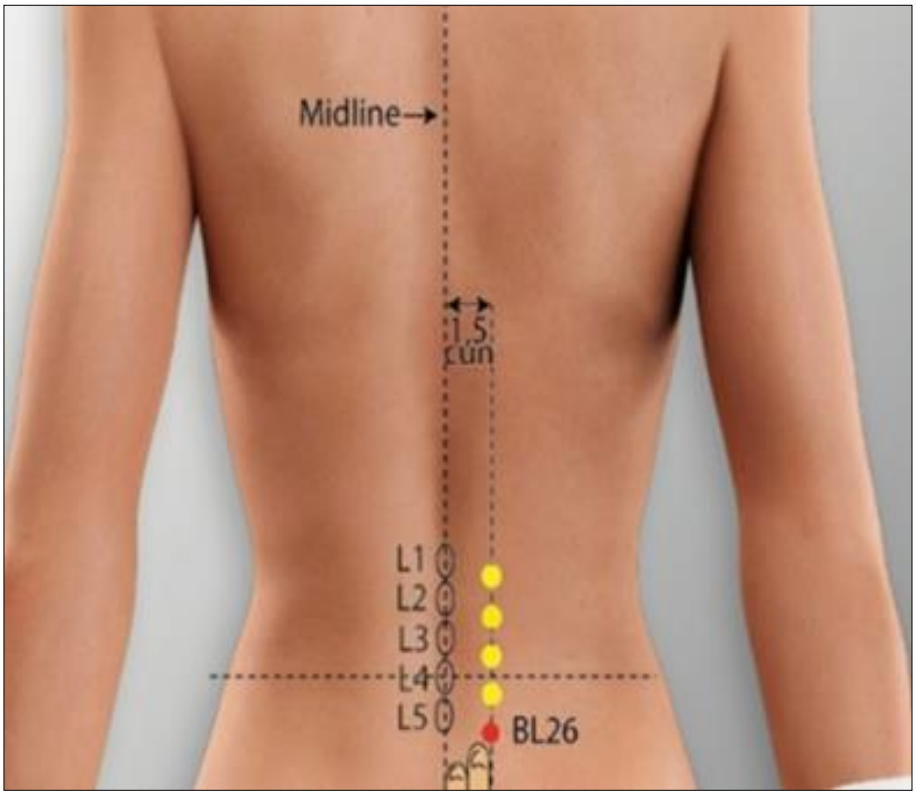

Fig 3: BL 26 acupuncture point for LBP [32]

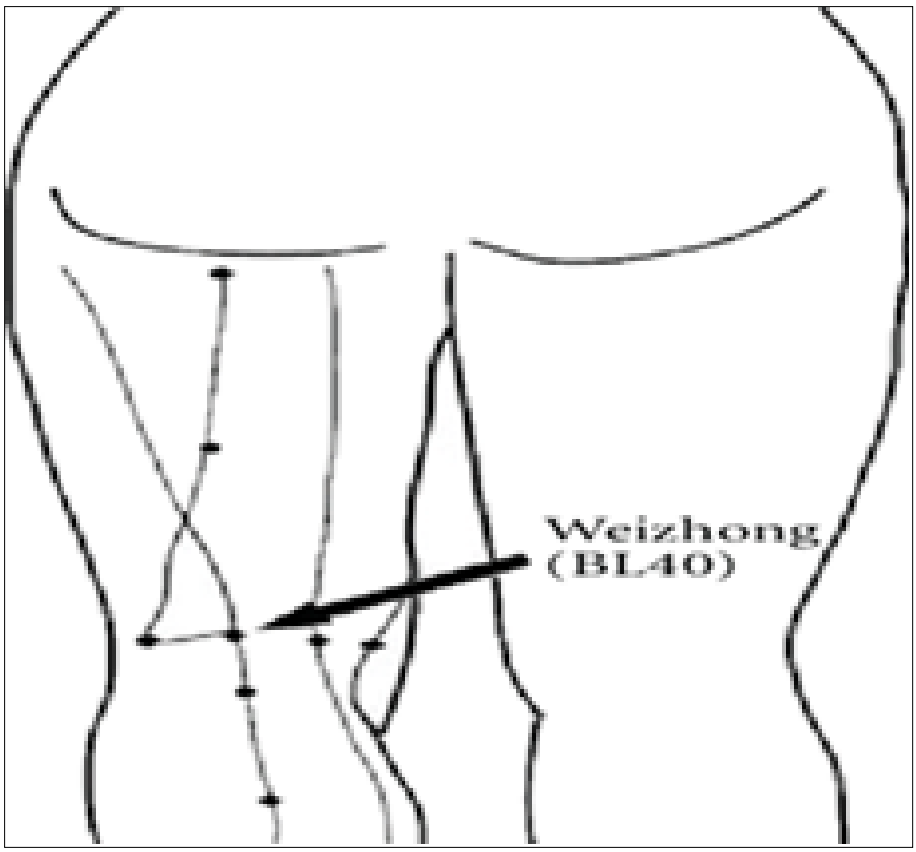

Fig 4: BL40 acupuncture points for LBP [33]

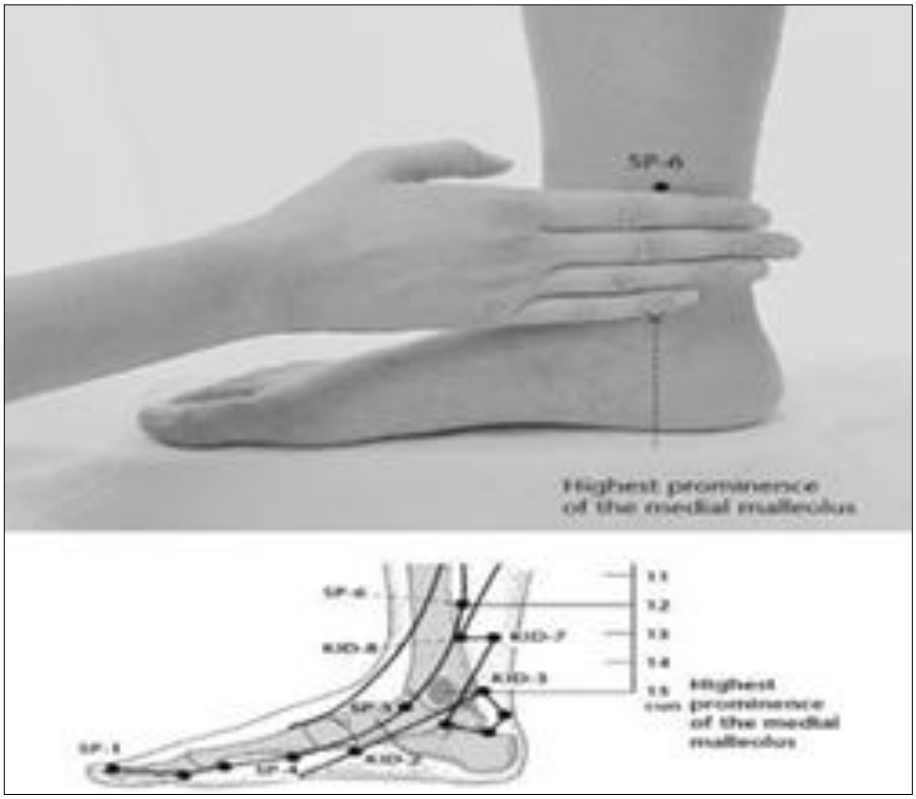

Fig 5: SP6 acupuncture points for LBP [5].

Interventions

All participants received the treatment protocol 3 session every menstrual cycle for 3 consecutive menstrual cycle. Each session lasted for 16 minutes on the points, BL23, BL26, BL40, SP6.

Group A: Laser acupuncture therapy (LA)

The device (Uniphy Phyaction CL.) Laser type: Infrared Gallium Arsenide, Wavelength: 904 nm. Protective eye glasses were used for the researcher & the patient to avoid permanent eye damage resulting from direct or indirect

exposure to the laser beam; the patient's position was prone. The laser probe was held firmly & pressed perpendicular on the points BL23, BL26, BL40, SP6 bilaterally, each point received 2 minutes for a total of 16 minutes/session, 3 sessions every menstrual cycle, for 3 consecutive menstrual cycles.

Group B: Sham LA

The patient was in prone position and received sham LA on the same points but the laser was not turned on for 16 minutes /3 sessions every menstrual cycle, for 3 consecutive menstrual cycles.

Outcome measures

1. Pain intensity

Pain intensity level was assessed by using VAS. Each woman in both groups (A, B) was guided to check a number to indicate the level of pain intensity from 1 to 10, before starting treatment (first record) then after treatment (as second record). VAS baseline typically falls at one end of the scale and is frequently denoted by the numbers "no pain" or "0," which indicate for the absence of the sensation being assessed. The other end of the line indicates "worst pain imaginable" or a high numerical value, such as 10. After that, participants make marks on the line to indicate their level of pain or other subjective experience [27]. VAS has sufficient validity and reliability for assessment of LBP [28].

2. Pain Pressure threshold

Assessment of PPT is a valid and reliable clinical tool to evaluate the subjective perception of pain in response to application of pressure. Pressure Algometry is used in manual therapy to quantify and document levels of tenderness via PPT measurement and pain sensitivity via pressure pain tolerance measurement before and after treatment and it was shown that a predictable variation exists across various spinal levels from cervical to lumbar levels. Objectivity of central postero-anterior pressure assessment on lumbar spine would thus be improved if physical therapy assessment is correlated with the spinal PPT [29].

Before beginning the measurement, the baseline of pressure algometer (12-0303 Push-Pull Force Gauge, Fabrication Enterprises, Inc.) is usually set at zero pressure. This means that the initial pressure applied by the algometer is zero, and then the pressure is gradually increased until the individual being tested starts to feel pain or discomfort. This baseline helps to establish a reference point for measuring pain thresholds or sensitivity to pressure [30].

The patient was lying in a comfortable side lying position then the examiner determines the main points of assessment BL23, BL26, SP6 and BL40. The force of pressure algometry was gradually increased at a rate of 1 kg/s, by silently counting seconds while increasing pressure, then the patient was asked to tell the examiner when the pressure became painful while the examiner applied the pressure on the assessment points [27]. Each point was assessed 3 consecutive measurements with 1 minute interval between two consecutive measurements to avoid tissue injuries and temporal sensitization. The examiner calculated the mean of the 2 last values to detect the PPT for each point. Then the examiner calculated the mean of PPT for the 8 points to determine the PPT for each patient [30].

3. Instrumental Activities of Daily Living (IADL)

It is consisted of 22 questions assessing the person's ability to make the task. The scale is easy to be directed as evaluation tool that offers self-reported history about activities talents essential to live between the public, this scale has been designed to be used to evaluate the person's ability to perform her ADL. It is designed to give information about how LBP has affected the ability to manage everyday life. This was measured before and after treatment. IADLs are scored based on what an individual can do rather than what she is doing. Ask patient to answer every section and mark in each section only the one box which most closely describes the condition at this time. There are 22 questions and rate them on the scale at right. IADLs should be scored based on how an individual usually performs a task [31].

The validity and reliability of an IADL instrument are crucial for ensuring that it accurately measures what it intends to measure and consistently produces reliable results. This can be established through statistical analyses, factor analysis, and comparisons with other established measures. Pashmdarfard and Azad [32] provided support for the use of this measurement tool for assessing the independent living status of patients. It provides the therapist with a measure that has had validation, reliability and has the potential for clinical using describing patients' ability and identifying areas requiring treatment intervention.

Calculating the size of the sample

The sample size was calculated using the G*Power software (version 3.0.10). Sample size calculation was done using pain intensity as main measured variable [33], with 90% power at $\alpha = 0.05$ level, number of measurements 2, for 2 groups and effect size = 0.62 using F-test MANOVA within and between interaction effects. The minimum proper sample size was 29 subjects adding 3 (10%) subjects as drop out, so total sample size is 32 subjects, 16 participants in each group.

Statistical analysis

Statistical analysis was performed through the statistical package for social studies (SPSS) version 25 for windows.

Unpaired t test was conducted for comparison of age, weight, height and BMI between groups. Mixed MANOVA was conducted to compare the effect of time (pre versus post) and the effect of treatment (between groups), as well as the interaction between time and treatment on mean values of VAS, PPT and IADL. The level of significance for all statistical tests was set at $p < 0.05$.

Results

Subject general characteristics

There was a non-significant difference between the intervention and control groups in the general characteristics ($P > 0.05$) (Table 1).

Table 1: General characteristics of participants in groups A and B

variable	Group A	Group B	t-value	p-value
Age (years)	26.50 ± 3.03	25.68 ± 2.67	0.8	0.42
Weight (kg)	65.06 ± 7.16	64.50 ± 7.17	0.22	0.82
Height (cm)	163.13 ± 5.08	164.06 ± 5.35	-0.51	0.61
BMI (kg/m^2)	24.49 ± 2.75	24.03 ± 3.03	0.45	0.65

p-value: probability value ***:** Significant

Impact of treatment on VAS

There was significant decrease (p = .0001) in the scores of VAS within study group (A). On the other hand, there was no significant difference in VAS of group B between pre and post treatment (p = 0.19). The percentage of change was 44. 82% and 2.98% respectivly. Comparing both groups, there was a significant decrease in VAS of group A compared with that of group B post treatment (p = 0.001) (Table 2).

Table 2: Comparison between mean values of VAS for groups A and B before and after treatment.

VAS	Pre-treatment	Post-treatment	% of change	P value
Group A	6.56 ± 0.81	3.62 ± 0.62	44.82	0.001
Group B	6.37 ± 0.95	6.18 ± 0.75	2.98	0.19
(P-value)	0.55	0.001	-	-

p-value: probability value ***:** Significant

Impact of treatment on PPT of BL23

There was a significant increase in PPT of BL23 of group A post-treatment compared with that pre-treatment (p = 0.001) but there was no significant difference in PPT of BL23 of group B between pre and post treatment (p = 0.13), and the percentage of change was 28.29% and 3.74% respectively. Comparing both groups, there was a significant increase in PPT of BL23 of group A compared with that of group B post treatment (p = 0.003) (Table 3).

Table 3: Comparison between mean PPT of BL23for groups A and B before and after treatment.

PPT of BL23	Pre-treatment	Post-treatment	% of change	P value
Group A	4.49 ± 0.57	5.76 ± 0.72	28.29	0.001
Group B	4.55 ± 0.73	4.72 ± 0.67	3.74	0.13
(P-value)	0.79	0.003	-	-

p-value: probability value ***:** Significant

Impact of treatment on PPT of BL26

There was a statistically significant increase in PPT of BL26 of group (A) post-treatment compared with pre-treatment (p = 0.001) but there was no significant difference in PPT of BL26 of group B between pre and post treatment (p = 0.11), and the percentage of change was 2.87% and 2.87% respectively, the mean values of PPT of BL26 post-treatment differed statistically significantly between groups (intervention and control) (p= 0.005) in favor of intervention group (Table 4).

Table 4: Comparison between mean PPT of BL26 for groups A and B before and after treatment.

PPT of BL26	Pre-treatment	Post-treatment	% of change	P value
Group A	4.63 ± 0.94	6.04 ± 1.08	30.45	0.001
Group B	4.88 ± 0.78	5.02 ± 0.77	2.87	0.11
(P-value)	0.42	0.005	-	-

p-value: probability value ***:** Significant

Impact of treatment on PPT of BL40

There was a statistically significant increase in PPT of BL40 of group (A) post-treatment compared with pre-treatment (p = 0.001) but there was no significant difference in PPT of BL40 of group B between pre and post treatment (p = 0.29), and the percentage of change was 19.36% and 1.59% respectively. There was a significant increase in PPT of BL40 of group A compared with that of group B post treatment (p = 0.001) (Table 5).

Table 5: Comparison between mean PPT of BL40 for groups A and B before and after treatment

PPT of BL40	Pre-treatment	Post-treatment	% of change	P value
Group A	4.39 ± 0.49	5.24 ± 0.54	19.36	0.001
Group B	4.40 ± 0.56	4.47 ± 0.59	1.59	0.29
(P-value)	0.97	0.001	-	-

p-value: probability value ***:** Significant

Impact of treatment on PPT of SP6

There was a statistically significant increase in PPT of SP6 of group (A) post-treatment compared with pre-treatment (p = 0.001) but there was no significant difference in PPT of SP6 of group B between pre and post treatment (p = 0.17), and the percentage of change was 31.60 and 4.81%, the mean values of PPT of SP6 post-treatment differed statistically significantly between groups (study group and control group) (p = 0.001) in favor of study group (Table 6).

Table 6: Comparison between mean PPT of SP6 for groups A and B before and after treatment

PPT of SP6	Pre-treatment	Post-treatment	% of change	P value
Group A	4.62 ± 0.41	6.08 ± 0.58	31.60	0.001
Group B	4.57 ± 0.57	4.79 ± 0.66	4.81	0.17
(P-value)	0.75	0.001	-	-

p-value: probability value ***:** Significant

Impact of treatment on IADL

There was a statistically significant increase in IADL of group (A) post-treatment compared with pre-treatment (p = 0.001) but there was no significant difference in IADL of group B between pre and post treatment (p = 0.28), and the percentage of change was 34.36 and 3.25% respectively, there was a significant increase in IADL of group A compared with that of group B post treatment (p = 0.001) (Table 7).

Table 7: Comparison between mean values of IADL for groups A and B before and after treatment

PPT of SP6	Pre-treatment	Post-treatment	% of change	P value
Group A	12.37 ± 1.58	16.62 ± 1.36	34.36	0.001
Group B	11.68 ± 1.74	12.06 ± 1.65	3.25	0.28
(P-value)	0.25	0.001	-	-

p-value: probability value ***:** Significant

Discussion

The findings of the current study showed significant improvements in the pain intensity, PPT, and ADL in the intervention group (Group A) post treatment compered to pretreatment (p< 0.01).

Role of LA in stimulating endorphins release can explain the relieving pain effect which result in improving function due to the own body's natural painkillers. This can lead to a reduction in pain perception and an overall sense of well-being. Another mechanism of pain relieve is the anti-inflammatory effect of LA and blood flow enhancement via stimulate specific acupuncture point by using laser. Improved blood flow may contribute to tissue healing and pain reduction [34]. Also, LA activates the pain-gate

mechanisms as mentioned by Ibrahim *et al*. [35] and Cheng *et al*. [36, 43], they reported that treatment with LA were effective in reducing pain level, functional disability and improving back ROM in study.

The observed improvement in pain reduction, and improved function in this study was supported by Thabet *et al*. [37] who reported that high-intensity laser therapy (HILT) and pulsed electromagnetic field (PEMF) are effective modalities in the treatment of menstrual pain (dysmenorrhea) with HILT being more effective modality in pain reduction through alleviating the inflammation and improving disability So, it can be used as an alternative conservative therapy rather than medication that have numerous side effects.

Our results are supported by the result of Xu *et al*. [38] who found that acupoint-stimulation can relieve pain effectively in the treatment of primary dysmenorrhea with some obvious advantages in opposing to treatment by NSADIs. These advantages are that acupoint-stimulation can alleviate the symptoms of dysmenorrhea, reduce the level of peripheral blood PGF2α and has fewer side effects, so it can be used to treat patients with primary dysmenorrhea. Especially individuals with NSADIs contraindication.

Also, the results of this study were agreed by Woo *et al*. [39] who stated that stimulation of common acupuncture points by using electro-acupuncture activates the parasympathetic nervous system and activates the responses of the gate control mechanism and hyperstimulation analgesia. When stimulated, these points trigger decrease prostaglandin levels and descending pain modulation hypothesis so it plays an important role in pain relief in primary dysmenorrhea.

Another extra support addition, this study came in line with those of Shin *et al*. [40] which investigated the efficacy of LA for the alleviation of LBP and showed that LA may be a reasonably safe procedure that helps to improve the quality of life of patients with LBP and relieve pain through relieving the inflammation and reduce the production of prostaglandin synthesis.

larger positive effects of laser on pain can be found on showing the results of the study reported by Glazov *et al*. [23, 24] who showed that low level laser therapy (LLLT) produced decrease in pain for up to three months in Chronic non-specific LBP (CNLBP) with few adverse effects. This meta-analysis summarized RCTs that compared the effect of LLLT with sham controls for the treatment of CNLBP. While combining data from all clinically heterogeneous studies demonstrated a small benefit, subgroup analyses showed improvements in pain, global assessment and disability present up to 12 weeks after treatment, particularly in trials with higher laser dose interventions.

Our findings also insured by study for Lin *et al*. [41] which indicated that LA combined with Chinese cupping at the BL40 and Ashi acupoints can alleviate LBP symptoms. The plasma cortisol levels were more affected within the LA group (11.41 ± 4.57 to 8.90 ± 3.78) than within the control (10.57 ± 4.74 to 8.38 ± 3.64) group and there was a statistically significant decrease in VAS in LA group (6.75 ± 1.46 to 4.20 ± 1.88) than control group (6.84 ± 1.41 to 5.80 ± 1.41). Likewise, Abouzied *et al*. [42] investigated the effect of laser acucupping on chronic mechanical LBP in elderly women on a randomized controlled trial and they concluded that there was a significant decrease in cortisol level, VAS and Oswestry disability index (ODI) post treatment compared with that pre-treatment in both groups ($p < 0.001$) with favorable results in group receiving LA plus Chinese cupping rather than the control group.

Another clarifying to these results is the study of Cheng *et al*. [36, 43] who showed that the positive effect of LA therapy on reducing limitations of daily activities and physical activity could be ascribed to the greater amelioration of LBP.

The result was consistent with Liu *et al*. [44] who reported that acupuncture on the Weizhong (BL40) acupoint can improve qi and blood circulation and reduce LBP. Moreover, De Carvalho *et al*. [45] continue the agreement to the results of this study, they studied the effects of one or multiple sessions of electroacupuncture (EA) (2 Hz, 30 minutes, bilaterally at the SP6, BL23, BL31, BL32, BL33, and BL60) in patients with CLBP. They concluded that patient with CLBP have pain reduction after 3 weeks of treatment with electro-acupuncture with consequent improvement in the functional parameters of the lumbar spine.

On comparing electro acupuncture to acupuncture as a study by Qorbanalipour *et al*. [46], it came in agreement with the results of this study that showed electro acupuncture treatment can be an effective method for treating symptoms of primary dysmenorrhea than acupressure as it has long-term effects for at least 1 month. In the same line, Sanzarello, *et al*. [47] showed that electro acupuncture relieves LBP during menstruation and improves function.

Also, LA was valuable in comparison to Ibuprofen as extra agreement with the result of this study, as described by Embaby *et al*. [48] who demonstrated that there was a significant improvement in pain level and functional ability after treatment in each group in favor of the group who treated with LA and foot reflexology through stimulating nerves and circulation via reflex points that correspond to specific body parts, structures, and organs in addition to the effect of laser acupuncture which alleviation of inflammation and decreases prostaglandin E and F secretion, besides lowering prostaglandin synthetase production.

The results were also in agreement with Toroski, *et al*. [49] who imply that non-pharmacologic interventions represented by LA are considered as first-line options in patients with CLBP because fewer harms are associated with these types of therapies than with pharmacologic options which associated with many side effects, such as diarrhea, stomachache and nausea.

On the other side, the results of this study stand in contrast with those of Torres *et al*. [50] & Yeganeh *et al*. [51] and De Oliveira *et al*. [52] as they concluded that EA has no effect on LBP. Discrepancies in its application and the low methodological quality of the studies produce inconsistent results and lead to it not being recommended according to the current clinical practice guidelines for patients with non-specific LBP.

The study's findings were incongruent with those of Abdelaziz, *et al*. [2] who determine core stability exercises more effective than EA on LBP during menstruation at young female. This contradiction can be explained that core stability exercise was effective in normalization of physical activity and reduction of pain experience. Basic muscle strength reflects the foundation of every other training phase and can be provided by neuronal adaptation (common phenomenon of decaying neuronal activities in response to repeated or prolonged stimulation. So Proper training stimuli lead to optimal physiological performance achieved through neuronal adaptation.

Strengths and Limitations of the Study

No adverse effects were noticed during the trial period in the current series of patients. Non-invasive LA technique, painless and without adverse effects, could be considered an effective treatment for menstrual low back pain.

Limitations of the study were that it took a long time to establish a trusting environment due to the beliefs and attitudes of the patients towards the nonpharmacological processes, that some patients wanted to withdraw from the application during the study.

Conclusion

From the obtained results, it can be concluded that laser acupuncture is effective in improving back pain and functional disability due to menstruation. So, they can be used as an effective complementary treatment on menstrual low back pain.

Acknowledgment

The authors would like to express their appreciation to all participants who contributed in this study.

Conflict of authors

There are no conflicts of interest among the authors.

Reference

1. Shah S, Makwana K, Shah P. Menstrual characteristics and prevalence of dysmenorrhoea among female physiotherapy students. International Journal of Medicine and Health Research,2015:1(1):1-8.
2. Abdelaziz K S, Botla A M, El Badeea B A, Abo El Eneen M F. Effect of Core Stability Exercises versus Electro-Acupuncture on Treatment of Low Back Pain in Primary Dysmenorrhea: A Randomized Clinical Trial. European Journal of Applied Sciences,2020:12(3): 81-88.
3. Banikarim C, Chacko MR, Kelder SH. Prevalence and impact of dysmenorrhea on Hispanic female adolescents. Archives of pediatrics & adolescent medicine,2015:154(12):1226-9.
4. Chen H M, Hu H M. Randomized Trial of Modified Stretching Exercise Program for Menstrual Low Back Pain. Western Journal of Nursing Research,2019:41(2):238-257.
5. Chen H M, Wang H H, Chen C H, Hu H M. Effectiveness of a stretching exercise program on low back pain and exercise self-efficacy among nurses in Taiwan: A randomized clinical trial. Pain Management Nursing,2014:15:283-291.
6. Mohamed M A, Elmekawy H E, El Nahas E M, Gabr A A. Relation between core muscles strengthening exercises and menstrual back pain: A Randomized Controlled Trial,2016, 4915-4916.
7. Armour M, Parry K, Manohar N, Holmes K, Ferfolja T, Curry C, *et al*. The prevalence and academic impact of dysmenorrhea in 21,573 young women: a systematic review and meta-analysis. J Womens Health (Larchmt),2019:28(8):1161-117.
8. Adegbite O A, Omolaso B, Seriki S A, Akpabio N. Prevalence of dysmenorrhea and menstrual bleeding in relation to packed cell volume among female students of Bingham University. International Invention Journal of Medicine and Medical Sciences,2016:3(2):21-31.
9. Kural M, Noor N N, Pandit D, Joshi T, Patil A. Menstrual characteristics and prevalence of dysmenorrhea in college going girls. J Family Med Prim Care,2015:4(3):426-31.
10. Swierkosz S, Nowak Z. Low back pain in adolescents. An assessment of the quality of life in terms of qualitative and quantitative pain variables. Journal of Back and Musculoskeletal Rehabilitation,2015:28:25-34.
11. Steffens D, Maher C G, Pereira L S, Stevens M L, Oliveira V C, Chapple M, *et al*. Prevention of low back pain: A systematic review and meta-analysis. JAMA Internal Medicine,2016:176:199-208.
12. Jeon S H, Kim K, Lee I S, Lee Y T, Kim G C, Chi G Y, *et al*. Pulse wave variation during themenstrual cycle in women with menstrual pain. BioMed research international,2016:7:1083208.
13. Julian R, Hecksteden A, Fullagar H, Meyer T. The effects of menstrual cycle phase on physical performance in female soccer players. Journal PloS One,2017:12(3):e0173951.
14. Laxmi V R, Kumar G M, Veena S K, RAMALAKSHMI K. Effectiveness of core strengthening exercises and stretching program for young female physiotherapy students with primary dysmenorrhoea. International Journal of Physiotherapy and Occupational Therapy,2016:2(1):27-32.
15. Marjoribanks J, Ayeleke RO, Farquhar C, Proctor M. Nonsteroidal anti-inflammatory drugs for dysmenorrhoea. Cochrane database of systematic reviews, 2015, (7).
16. Elshikh H, Kassab A, Bandrawy A, Hussein H. Effect of laser puncture versus microcurrent on primary dysmenorrhea, 2019, 6773-6774.
17. Lim T K, Ma Y, Berger F, Litscher G. Acupuncture and neural mechanism in the management of low back pain—an update. Medicines,2018:5(3):63.
18. Saffarieh E, Pazoki R. Low Level Laser Therapy in the Relief of Primary Dysmenorrhoea. Advances in Environmental Biology,2015:9(3):871-873.
19. Emara H M, Khalil H A, Abo Elainin M F, Osman D A. Effect of Low-Level Laser Therapy Versus Pulsed Electromagnetic Field on Cortisol Levels in Primary Dysmenorrhea: A Randomized Controlled Trial. EJPT,2022:9:15-20.
20. Igwea SE, Tabansi Ochuogu CS, Abaraogu UO. TENS and heat therapy for pain relief and quality of life improvement in individuals with primary dysmenorrhea: a systematic review. Complementary therapies in clinical practice,2016:24:86-91.
21. Chon T Y, Mallory M J, Yang J, Bublitz S E, Do A, Dorsher P T. Laser acupuncture: a concise review. Medical acupuncture,2019:31(3):164-8.
22. Elattar M M, Osman D A, Kamel H E, Hasanin M E. Effect of laser acupuncture on female chronic pelvic pain,2021:13(1):18-21.
23. Glazov G, Yelland M, Emery J. Low-dose laser acupuncture for non-specific chronic low back pain: a double-blind randomised controlled trial. J.Acupunct Med,2014:32(2):116–123.
24. Glazov G, Yelland M, Emery J. Low¬Level Laser Therapy for Chronic Non¬Specific Low Back Pain: A Meta¬Analysis of randomised Controlled Trials. Acupuncture in Medicine,2016:34(5):328¬341.

25. Smith C A, Armour M, Zhu X, Li X, Lu Z Y, Song J. Acupuncture for dysmenorrhoea. Cochrane Database Syst Rev,2016:4(4):CD007854.
26. Robinson NG. Interactive Medical Acupuncture Anatomy; Tenton NewMedia: Jackson, MS, USA. Section 3, Channel 1, 2016.
27. Martins P C, Thalita E C, Ana C C. Auditory-perceptual evaluation of the degree of vocal deviation: correlation between the visual Analogue scale and Numerical Scale. Codas. Sociedade Brasileira de Fonoaudiologia,2015:27(3):279-284.
28. Imamura M, Alfieri F M, Filippo T R, Battistella L R. Pressure pain thresholds in patients with chronic nonspecific low back pain. Journal of Back and Musculoskeletal Rehabilitation,2016:29(2):327-36.
29. Torad A A. validity of the newly developed Egyptian algometer.18th conference of faculty of physical therapy, Cairo University. Egypt. Pront, 2016.
30. Balaguier R, Madeleine P, Vuillerme N. Is one trial sufficient to obtain excellent pressure pain threshold reliability in the low back of asymptomatic individuals? A test-retest study. PloS one,2016:11(8):e0160866.
31. Mahran M M, Elkosery S M, Mustafa M H, Yousef A M. Effect of cryotherapy and ultrasonic in postural kyphosis in pre- versus post-menopausal women: A Randomized Controlled Trial,2022:27:141-142.
32. Pashmdarfard M, Azad A. Assessment tools to evaluate Activities of Daily Living (ADL) and Instrumental Activities of Daily Living (IADL) in older adults: A systematic review. Medical journal of the Islamic Republic of Iran,2020:34:33.
33. Shin J Y, Ku B, Kim J U, Lee Y J, Kang J H, Heo H, *et al*. Short-Term Effect of Laser Acupuncture on Lower Back Pain: A Randomized, Placebo-Controlled, Double-Blind Trial. J Hindawi Publishing Corporation Evidence-Based Complementary and Alternative Medicine,2015:8:ID 808425.
34. Hung Y C, Lin P Y, Chiu H E, Huang P Y, Hu W L. The effectiveness of laser acupuncture for treatment of musculoskeletal pain: a meta-analysis of randomized controlled studies. Journal of Pain Research,2021:14:1707-1719.
35. Ibrahim A B, Atia A, El Sayyad M M, Lenghi M. Effect of Laser puncture on mechanical low back dysfunction,2015, 4562-4563.
36. Cheng H Y, Wu B Y, Tung T H, Shieh C, Liu C T. Laser acupuncture analgesia on postpartum low back pain: A prospective randomized controlled study. Pain Management Nursing,2023:24(1):89-95.
37. Thabet A A, Elsodany A M, Battecha K H, Alshehri M A, Refaat B. High-intensity laser therapy versus pulsed electromagnetic field in the treatment of primary dysmenorrhea. Journal of Physical Therapy Science,2017:29(10):1742-8.
38. Xu Y, Zhao W, Li T, Bu H, Zhao Z, Zhao Y, Song S. Effects of acupoint-stimulation for the treatment of primary dysmenorrhoea compared with NSAIDs: a systematic review and meta-analysis of 19 RCTs. BMC complementary and alternative medicine,2017:17(1):1-2.
39. Woo H L, Ji H R, Pak Y K, Lee H, Heo S J, Lee J M, *et al*. The efficacy and safety of acupuncture in women with primary dysmenorrhea: a systematic review and meta-analysis. Medicine, 2018, 97(23).
40. Shin J Y, Ku B, Kim J U, Lee Y J, Kang J H, Heo H, *et al*. Short-Term Effect of Laser Acupuncture on Lower Back Pain: A Randomized, Placebo-Controlled, Double-Blind Trial. J Hindawi Publishing Corporation Evidence-Based Complementary and Alternative Medicine, 2015, 8, ID 808425.
41. Lin M L, Wu J H, Lin C W, Su C T, Wu H C, Shih Y S, *et al*. Clinical effects of laser acupuncture plus Chinese cupping on the pain and plasma cortisol levels in patients with chronic nonspecific lower back pain: a randomized controlled trial. Evidence-Based Complementary and Alternative Medicine, 2017, ID 3140403.
42. Abouzied M A, Said A A, Abd El ghaffar H A, Mousa M A. Effect of Laser Acu-Cupping on Chronic Mechanical Low Back Pain in Elderly Women: A randomized controlled trial. Fizjoterapia Polska,2021:21(2):48-54.
43. Cheng H Y, Wu B Y, Tung T H, Shieh C, Liu C T. Laser acupuncture analgesia on postpartum low back pain: A prospective randomized controlled study. Pain Management Nursing,2023:24(1):89-95.
44. Liu L, Skinner M, McDonough S, Mabire L, Baxter G D. Acupuncture for low back pain: an overview of systematic reviews. Evidence-Based Complementary and Alternative Medicine, 2015, ID 328196.
45. De Carvalho R C, Parisi J R, Prado W A, De Araújo J E, Silva A M, Silva J R, Silva M L. Single or Multiple Electroacupuncture Sessions in Nonspecific Low Back Pain: Are We Low- Responders to Electroacupuncture? Journal of Acupuncture and Meridian Studies,2018:11(2):54-61.
46. Qorbanalipour K, Ghaderi F, Jafarabadi M A. Comparison of the Effects of Acupressure and Electroacupuncture in Primary Dysmenorrhea: A Randomized Controlled Trial. International Journal of Womens Health and Reproduction Sciences,2018:6(4):471-476.
47. Sanzarello I, Merlini L, Rosa M A, Perrone M, Frugiuele J, Borghi R, Faldini C. Central sensitization in chronic low back pain: a narrative review. Journal of back and musculoskeletal rehabilitation. 2016; 29(4):625-33.
48. Embaby H, Mostafa MS, Elgendy SR, Abdelkhalek MM, El Nahas EM. Effect of Low-Intensity Laser Acupuncture and Reflexology in Relieving Dysmenorrhea: A Randomized Control Trial. Revista iberoamericana de psicología Del ejercicio y el deporte,2022:17(6):437-40.
49. Toroski M, Nikfar S, Mojahedian M M, Ayati M H. Comparison of the cost-utility analysis of electroacupuncture and nonsteroidal antiinflammatory drugs in the treatment of chronic low back pain. Journal of acupuncture and meridian studies. 2018; 11(2):62-6.
50. Torres S F, Macedo A C B, Antunes M D. Effects of electroacupuncture frequencies on chronic low back pain in older controlled trial. Trials, 2019:20(1):762.
51. Yeganeh M, Baradaran H R, Qorbani M, Moradi Y, Dastgiri S. The effectiveness of acupuncture, acupressure and chiropractic interventions on treatment of chronic nonspecific low back pain in Iran: A systematic review and meta-analysis. Complementary therapies in clinical practice,2017:27:11-8.

52. De Oliveira R F, Goldman R S, Mendes F M, de Freitas P M. Influence of electroacupuncture and laser-acupuncture on treating paresthesia in patients submitted to combined orthognathic surgery and genioplasty. Medical Acupuncture,2017:29(5):290-9.