

Effect of Acupressure on Fibromyalgia in Premenopausal Women

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Abstract: Objectives: It is well documented that acupressure has a beneficial effect on reducing pain severity of fibromyalgia; however, none of the previous studies had investigated the effect of acupressure on fibromyalgia in premenopausal women. This study aimed to investigate the effect of acupressure on fibromyalgia in premenopausal women. Methods: Forty premenopausal women diagnosed with fibromyalgia were randomized into 2 equal groups. Group (A) received medical treatment in the form of Cymbalta (duloxetine), 60 mg, once daily for 6 weeks. Group (B) received the same medical treatment in addition to acupressure daily for 6 weeks. The outcome measures, including revised fibromyalgia impact questionnaire (FIQR), visual analogue scale (VAS) and the mean values of pressure pain thresholds (PPT) at levator scapulae, trapezius and gluteus maximus muscles, were evaluated pre- and post- treatment. Results: Comparing both groups post-treatment revealed that there were significant reductions in scores of FIQR and VAS ($p < 0.05$), as well as a significant increase in mean values of PPT at all studied muscles ($p < 0.05$) in favour of group (B). Conclusions: Acupressure is effective in treating premenopausal women with fibromyalgia through reducing pain, increasing overall improvement and improving health-related quality of life.

Key words: Acupressure • Fibromyalgia • Premenopause

INTRODUCTION

Fibromyalgia is a disorder in which typical symptoms are chronic widespread musculoskeletal pain, tenderness with hyperalgesia to pressure over tender points and stiffness accompanying with fatigue, anxiety, sleep disorder and/or irritable bowel syndrome [1, 2]. It is regarded to be a disease of women as 80-90% of patients are women, with an increased incidence in premenopausal women having climacteric symptoms [3, 4].

Pharmacological therapy showed discouraging results in most of the treated patients, who therefore discontinued the prescribed medications because of either a lack of efficacy and/or tolerability problems [5]. The most recent fibromyalgia treatment guidelines highlight the change in attitudes regarding the overall approach to fibromyalgia, in particular with regards to the use of pharmacological agents. According to these guidelines, pharmacological therapy should be considered only as an adjunctive treatment to non-pharmacological interventions in fibromyalgia [6].

Acupressure is one of the known complementary and alternative medicines across the world [7]. It is a painless, easy-to-apply, safe, efficient and affordable method that originates from the traditional Chinese medicine. Like acupuncture, it is applied on meridians carrying energy in the body especially with fingers and palms, has no side effects, is easy to learn and apply and can be applied even by patients themselves after receiving proper training. It blocks pain gates, improves body's pain perception threshold and increases energy flow, helping the management of diseases [8].

It was reported that more than 90% of fibromyalgia patients experienced at least one kind of complementary and alternative medicines [9]. Previous studies had examined the effect of acupoint stimulation by acupuncture, cupping therapy, moxibustion and point injection on patients with fibromyalgia [1, 10-11]. However, none of them has examined the effect of acupressure on fibromyalgia patients. Therefore, this study was the first one which aimed to investigate the effect of acupressure on premenopausal women with fibromyalgia.

MATERIALS AND METHODS

Study Design: The study was designed as a prospective, randomized, controlled trial. Ethical approval was obtained from the institutional review board at Faculty of Physical Therapy, Cairo University. The study followed the Guidelines of Declaration of Helsinki on the conduct of human research. It was conducted between July 2019 and January 2020.

Participants: A sample of forty premenopausal women, suffering from fibromyalgia, was recruited from the Physical Therapy Outpatient Clinic, El-Mahalla El-Kobra General Hospital, ElGharbeya, Egypt. To be included in the study, the participants were chosen premenopausal women having the American College of Rheumatology criteria for the diagnosis of fibromyalgia which include widespread pain in combination with tenderness at 11 or more of the 18 specific tender point sites [12]. Their age ranged from 40 to 45 years and their body mass index

(BMI) ranged from 25 to 40 kg/m². All of them were non-smokers. The participants were excluded if they had bleeding diathesis, cardiovascular disease, high blood pressure, diabetes, hepatic or renal diseases or any painful medical condition other than fibromyalgia; taking medical treatment for fibromyalgia in the previous 15 days; having irregular menstrual cycles, pregnancy or lactation; or having any problems in the pressure point (such as fractures, ulcers, scars, varicose veins, skin disease, inflammation, swelling or numbness).

Randomization: Each woman was informed about the nature, purpose and benefits of the study, the right to refuse or withdraw at any time and the confidentiality of any obtained data. Women were randomly assigned into 2 equal groups (A and B) with the use of a computer based randomization program. No dropping out of subjects from the study was reported after randomization, Figure (1).

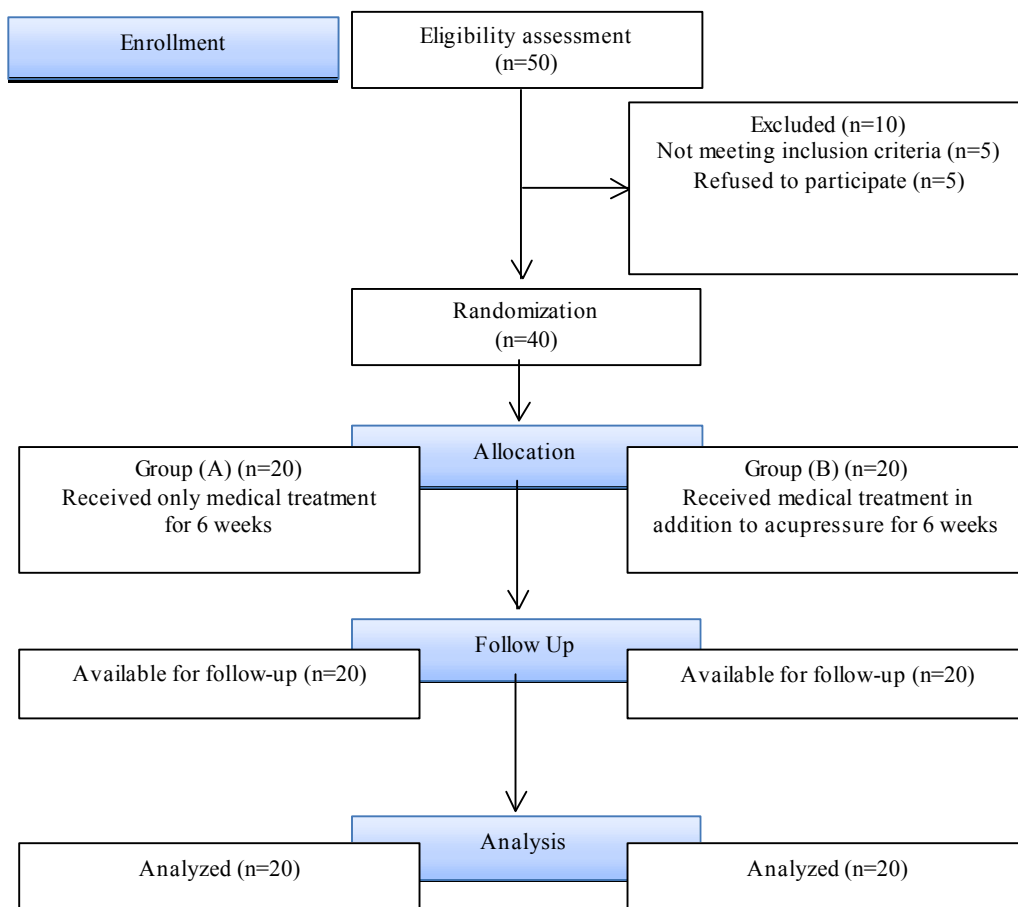


Fig. 1: Flow chart demonstrates the experimental design of the study.

Interventions: Group (A) included 20 premenopausal women who received medical treatment in the form of Cymbalta (duloxetine), 60 mg, once daily for 6 weeks, while group (B) included 20 premenopausal women who received the same medical treatment in addition to acupuncture daily for 6 weeks.

Medical Treatment: All premenopausal women in both groups (A & B) received medical treatment in the form of Cymbalta (Duloxetine), 60 mg, once daily for 6 weeks. Among the available treatments, Duloxetine is one of the most widely prescribed medications to patients with fibromyalgia and is one of the similarly approved drugs by both Food and Drug Administration and Health Canada organizations [6].

Acupressure: All premenopausal women in group (B) received acupressure, in a quiet environment, at Baihui (5 cun behind the anterior hairline), Large Intestine 11 (at the outside end of the crease on the elbow), Large Intestine 4 (at the midpoint on the radial side of the second metacarpal bone), Stomach 36 (on the lateral surface of the leg, 3 cun distal to the lower border of the patella, 1 finger-breadth lateral to the anterior crest of the tibia), Gall Bladder 34 (on the fibular aspect of the leg, in the depression anterior and distal to the head of the fibula), Liver 3 (2 cun above the distance between the first two metatarsal bones at the dorsal surface of the foot) and Spleen 6 (four finger widths above the medial malleolus and at the posterior tibial border) acupoints, daily for 6 weeks [13]. The position of the participants was sitting comfortably on a chair for Baihui, Large Intestine 11 and Large Intestine 4 acupoints, supine lying for Stomach 36, Gall Bladder 34 acupoints and crock lying for Liver 3 and Spleen 6 acupoints. Once each acupoint was located, the researcher applied pressure in a rotary fashion at the acupoint, on each side, for 1 minute with the dominant thumb, using a medium force, in small circles. If the pressure was applied correctly, the participants felt a sense of heaviness, numbness and warmth in the area [14].

Outcome Measures

Revised Fibromyalgia Impact Questionnaire (FIQR): It was used to assess the current health status for each premenopausal woman in both groups (A & B) before and after treatment program. It included 21 individual questions, covering three domains: function domain (9 questions), overall impact domain (2 questions) and symptoms domain (10 questions). All questions are

based on an 11-point numeric rating scale of 0 to 10, with 10 being worst. All questions are framed in the context of the past 7 days. The summed score for function domain (0-90) was divided by 3; the summed score for overall impact domain (0- 20) was not changed and the summed score for symptoms domain (0-100) was divided by 2. The total FIQR score was the sum of the 3 domain scores [15].

Visual Analogue Scale (VAS): It was used to measure pain intensity for each premenopausal woman in both group (A & B) before and after treatment program. The VAS is a 10-cm horizontal line on which the patient's pain intensity was represented by a point between the extremes of "no pain at all" and "worst pain imaginable". Its simplicity, reliability and validity, as well as its ratio scale properties, make it the optimal tool for describing pain intensity [16].

Assessment of Pressure Pain Threshold: It was measured by a pressure algometry with a probe size of 1.0 cm² for each premenopausal woman in both groups (A & B) before and after the end of the study. All women were given the same full instructions about the assessment procedures to be done. Each woman was requested to lie down prone on the examination table with her arms beside her body. Pressure was applied until women indicating a perception of pain in addition to pressure. PPT was measured unilaterally over the right thenar eminence for demonstration; and bilaterally at three predefined sites: over the levator scapulae muscles (medial to insertion on angulus superior scapulae), the trapezii muscles (midway between C7 and the acromion process) and the glutei maximi muscles (at the upper, outer quadrants of buttocks in anterior fold of muscles) [11]. Women were instructed to say "stop" as soon as the pressure sensation became painful and then that pressure level was recorded. Three measurements were taken at each site with 10 seconds in between; the average of them was calculated; the mean values of right and left PPT were calculated for each site to be used for analysis.

Statistical Analysis: Results were expressed as median (minimum-maximum) for FIQR and VAS, while they were expressed as mean±standard deviation for mean values of PPT at all studied muscles. Test of normality, Kolmogorov-Smirnov test, was used to measure the distribution of data measured pre-treatment. Accordingly, comparison between normally distributed variables in the two groups was performed using unpaired t test. Analysis

of covariance (ANCOVA) test was used to compare the post-treatment values of the two groups on controlling the effect of pre-treatment value. Bonferroni correction test was used to compare within group (pre- vs post-treatment) differences. In not normally distributed data, comparison between variables in the two groups was performed using Mann Whitney test. While comparison between pre- and post-treatment data in the same group was performed using Wilcoxon Sign Ranks test. Statistical Package for Social Sciences (SPSS) computer program (version 19 windows) was used for data analysis. P value ≤ 0.05 was considered significant.

RESULTS

At baseline, there were non-significant differences between both groups ($P > 0.05$) regarding age, BMI and all outcome measures (Tables 1-2).

The FIQR showed a statistically significant reduction within both groups (A and B) ($P < 0.05$). Also, the post-treatment comparison of both groups revealed a statistically significant reduction in FIQR ($P < 0.05$) in favour of group (B) (Table 2).

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The mean values of right and left PPT at levator scapulae, trapezii and glutei maxim showed a statistically significant increase within both groups (A and B) ($P < 0.05$). Also, the post-treatment comparison of both groups revealed a statistically significant increase in mean values of right and left PPT at levator scapulae, trapezii and glutei maximi ($P < 0.05$) in favour of group (B) (Table 2).

DISCUSSION

Fibromyalgia is a condition characterized by chronic pain that mainly prevails between the ages of 20-60 years and in females, with a negative impact on their functioning in physical, psychological and social spheres, cognitive performance, personal relationships (including sexuality and parenting), work and activities of daily life disorders [17, 18]. Therefore, this study was the first one which aimed to investigate the effect of acupressure on premenopausal women with fibromyalgia.

Table 1: Demographic data of females in both groups

	Group (A) (n = 20)	Group (B) (n = 20)	P value
Age (yrs.)	41.95±1.64	42.30±1.98	0.546 ^{NS}
BMI (Kg/m ²)	32.75±3.81	31.85±4.32	0.489 ^{NS}

^{NS} P > 0.05 = non-significant, P = Probability.

Table 2: The FIQR, VAS and mean values of PPT at levator scapulae, trapezii and glutei maxim for both groups

		Group (A) (n = 20)	Group (B) (n = 20)	P value*
FIQR	Pre-treatment	34.5 (26.0-46.0)	37.5 (25.0-47.0)	0.303 ^{NS}
	Post-treatment	27.5 (20.0-38.0)	24.0 (14.0-31.0)	0.038 ^S
	P value**	0.001 ^S	0.001 ^S	
VAS	Pre-treatment	7.0 (5.0-9.0)	7.0 (6.0-10.0)	0.343 ^{NS}
	Post-treatment	6.0 (4.0-8.0)	5.0 (3.0-7.0)	0.004 ^S
	P value**	0.001 ^S	0.001 ^S	
PPT at levator scapulae (lbs/cm ²)	Pre-treatment	10.95±1.47	10.50±1.70	0.376 ^{NS}
	Post-treatment	11.90±1.21	12.80±1.47	0.001 ^S
	P value**	0.001 ^S	0.001 ^S	
PPT at trapezii (lbs/cm ²)	Pre-treatment	10.55±2.04	9.70±1.84	0.174 ^{NS}
	Post-treatment	11.35±2.08	12.65±1.81	0.001 ^S
	P value**	0.001 ^S	0.001 ^S	
PPT at glutei maximi (lbs/cm ²)	Pre-treatment	13.10±1.59	12.75±2.22	0.570 ^{NS}
	Post-treatment	14.15±1.50	15.55±2.14	0.001 ^S
	P value**	0.001 ^S	0.001 ^S	

Data were expressed as median (minimum-maximum) for FIQR & VAS, while they were expressed as mean \pm standard deviation for mean values of PPT at all studied muscles.

* Inter-group comparison; ** intra-group comparison of the results pre- and post-treatment.

^{NS} P > 0.05 = non-significant, ^S P < 0.05 = significant, P = Probability.

Regarding group (A), the results of the current study showed statistically significant reductions in scores of FIQR and VAS, as well as a significant increase in mean values of PPT at all studied muscles between pre- and post-treatment, indicating that Duloxetine (60 mg/day) for 6 weeks had a positive effect on premenopausal women with fibromyalgia.

These results were consistent with a systematic review and a meta-analysis by Lian *et al.* [19] who assessed the analgesic efficacy of Duloxetine for fibromyalgia. They concluded that Duloxetine was a great choice for pain relief in fibromyalgia. Additionally, Bradley *et al.* [20] have demonstrated the efficacy of Duloxetine in improving pain and functional ability in fibromyalgia patients with similar improvements across the tiredness subgroups. Moreover, Scholz *et al.* [21] reported that Duloxetine has proven efficacy in managing pain and mood symptoms in adult fibromyalgia patients with and without major depressive disorder.

Considering the best dosage of Duloxetine for treatment of fibromyalgia patients, several studies recommended that the dosage for duloxetine in fibromyalgia is 60 mg administered orally once daily. Higher dosages do not confer additional efficacy and they produced more adverse reactions and higher rate of withdrawal than 60 mg/day [19, 22].

Patients with fibromyalgia have decreased concentration of serotonin and its precursor in serum and cerebrospinal fluid. The mechanism underlying the positive effects of Duloxetine on reducing pain, increasing the overall improvement and improving health-related quality of life in premenopausal women with fibromyalgia could be directly related to its influence on increasing the activity of noradrenergic and serotonergic antinociceptive pathways as it is a potent selective serotonin and norepinephrine reuptake inhibitor. It has a five-fold stronger effect on serotonin than on noradrenaline, resulting in increased levels of serotonin in the CNS and a subsequent improvement of fibromyalgia [6, 21].

Regarding group (B), the results of the current study showed statistically significant reductions in scores of FIQR and VAS, as well as a significant increase in mean values of PPT at all studied muscles between pre- and post-treatment, indicating that the combination of Duloxetine plus acupressure for 6 weeks had a positive effect on premenopausal women with fibromyalgia.

These results agreed with previous studies that reported the effectiveness of combination of medical therapy plus acupoint stimulation by acupuncture and

cupping in producing therapeutic effects as well as reducing pain and amount of tenderness point [23, 24].

Many studies recommended the use of Duloxetine as a beneficial adjunctive therapy to non-pharmacological measures [6, 21, 25]. In addition, researchers recommended a multimodal management of fibromyalgia through the combination of pharmacological and non-pharmacological therapies [26-28].

Regarding the comparison between both groups post-treatment, the results revealed that there were significant reductions in scores of FIQR and VAS, as well as a significant increase in mean values of PPT at all studied muscles in favour of group (B).

These findings came in line with Jang *et al.* [23] and Li *et al.* [24] who found that the therapeutic effect of combination of medical therapy plus acupoint stimulation by acupuncture and cupping was superior to that of medical therapy alone in fibromyalgia syndrome.

The beneficial effect of acupressure on reducing pain and improving quality of life in premenopausal women with fibromyalgia could be supported by a systematic review of randomized controlled trials by Cao *et al.* [1] who reported the effectiveness of acupoint stimulation by different methods in treating fibromyalgia and improving related symptoms such as pain, fatigue, depression or insomnia.

The traditional Chinese medicine considers pain as one of excess energy signs in areas where the flow of the vital energy is blocked along the meridian [29]. In the current study, the improvement of pain with acupressure could be caused by increasing the vital energy flow in the body, restoring the body harmony and health and improving balance in the body [8, 30].

The Western medicine considers central amplification as the underlying process for chronic widespread pain in fibromyalgia. The ascending and descending neural pathways involved in pain processing operate abnormally. Signals in these pathways are mediated by a number of neurotransmitters and neurochemicals [31]. The positive effect of acupressure on reducing pain in premenopausal women with fibromyalgia could be attributed to increased serotonin transmission to the brain and specific organs through nerves and meridians. Moreover, acupressure at specific point could deliver pleasurable impulses to the brain at a rate four times faster than painful stimuli according to the gate control theory of pain. Continuous impulses result in neural gates blocking, pain transmission slowing and thus increasing pain perception threshold [7].

Since fibromyalgia is considered as a stress-related disorder, it is associated with high levels of cortisol and adrenocorticotropic hormones, decreased heart rate variability and sympathetic overactivity [32, 33]. Therefore, the production of serotonin and endorphin, as well as the counteraction among hypothalamic-pituitary-adrenocortical axis caused by acupressure could reduce cortisol levels, induce relaxation and reduce stress levels [7]. Also, acupressure is effective in relaxing muscles, relieving fatigue, promoting body comfort and boosting mood [34].

The improved mean values of PPT at all studied muscles could be explained by the analgesic effects of acupressure already mentioned above and also by the increase of local microcirculation through mediating nitric oxide signal, allowing more oxygen and nutrients to reach body tissues. In addition, it helps muscle fibers elongation and relaxation, muscle tension reduction, tissue adhesion reduction, intramuscular temperature increase in conjunction with neuromuscular excitability reduction [35, 36].

In the present study, the significant improvement in FIQR scores with acupressure reflected the reduction in fibromyalgia symptoms impact on patients' health and confirmed the benefits of acupressure in this syndrome. This improvement could be related to the ameliorative impact of acupressure on relieving pain, lowering stress, anxiety and depression, reducing fatigue, improving sleep quality and enhancing cognition in premenopausal women with fibromyalgia.

The mechanisms underlying the effectiveness of acupressure in relieving pain and lowering stress were previously mentioned. Considering fatigue, acupressure relaxes muscles, improves vital energy flow and increases endorphin and enkephalin, resulting in fatigue reduction [34, 37]. Considering sleep quality, acupressure alters the serum melatonin levels, releases neurotransmitters (such as serotonin), activates opioid systems and thus reduces pain that causes sleep disruption [38]. Considering cognition, the improved sleep quality by acupressure could result in cognition improvement [34].

The current study results present new data about the beneficial effects of acupressure for 6 weeks on reducing pain, enhancing overall improvement and improving health-related quality of life in premenopausal women with fibromyalgia.

The current study limitation is the lack of measuring the blood levels of different pain, stress and sleep quality markers. Thus, future research to measure the blood levels

of different pain, stress and sleep markers (e.g. endorphin, neuropeptide Y, substance P, serotonin, cortisol and melatonin) to explore the mechanisms underlying the pain relieving, stress lowering and sleep quality improvement effects of acupressure in premenopausal women with fibromyalgia.

CONCLUSION

Acupressure for 6 weeks is considered as a safe, non-invasive method for reducing pain, enhancing overall improvement and improving health-related quality of life of fibromyalgia women during their premenopausal period.

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