

Comparison of the effects of acupressure and self-care behaviors training on the intensity of primary dysmenorrhea based on McGill pain questionnaire among Shiraz University students

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Background: Dysmenorrhea is one of the common problems during reproductive ages, with prevalence rate of 60–90%. This study aimed to compare the effects of acupressure at Guan yuan (RN-4) and Qu gu (RN-2) acupoints, self-care behaviors training, and ibuprofen on the intensity of primary dysmenorrhea based on McGill pain questionnaire. **Materials and Methods:** In the randomized clinical trial, 120 females, aged between 18 and 25 years, with primary dysmenorrhea, randomly selected from five dormitories of Shiraz University, Shiraz, Iran were screened and randomized into acupressure group, in that pressure was applied for 20 min over the 1st 2 days of menstruation for two cycles. In the second group, the training group took part in four educational sessions each lasting for 60–90 min and control group received ibuprofen 400 mg. The intensity of pain before and after the intervention was measured using short-form McGill pain questionnaire. The data were entered into the SPSS statistical software (version 16) and analyzed using Kruskal–Wallis test, paired *t*-test, and Chi-square test. **Results:** A significant difference was found in the mean intensity of pain before and after the intervention in all the three study groups. The mean score of pain intensity was 10.65 ± 5.71 in the training group, 19 ± 5.41 in the control group, and 14.40 ± 6.87 in the acupressure group after the intervention. The results of Kruskal–Wallis test revealed that both interventions were more effective compared to consumption of ibuprofen. **Conclusion:** Training and acupressure were more effective than ibuprofen in the reduction of dysmenorrhea. Thus, they can be considered as trainable methods without side effects in adolescent girls.

Key words: Acupressure, dysmenorrhea, training

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INTRODUCTION

Among menstrual disorders, menorrhagia, dysmenorrhea, and abnormal cycles are highly prevalent and are considered as disabling conditions among women at reproductive ages.^[1,2] Dysmenorrhea is defined as painful cramps in lower abdomen during menstruation without any evidence of pelvic pathologic lesions. This condition occurs right before or during menstruation without any describable macroscopic

pelvic pathology.^[3] In general, 50% of women suffer from dysmenorrhea and 10% experience this condition for 1–3 days a month.^[4] One study reported the prevalence of dysmenorrhea to be over 75%.^[5] In another study in Sweden, more than 72% of 19-year-old women suffered from this condition (34%, 23%, and 15% of the participants had mild, moderate, and severe symptoms, respectively).^[6] This rate was reported as 71% in Iran.^[7]

Dysmenorrhea can reduce efficiency and production due to daily stresses and socioeconomic losses.^[3] In the US, at least 600 million hours and 2 billion dollars are lost

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due to dysmenorrhea every year. In addition, dysmenorrhea affects young girls' opinion about femininity and method of childbirth.^[7] For the treatment and control of dysmenorrhea, there are many ways:^[8] common drug interventions for reduction of pain include nonsteroidal anti-inflammatory drugs (NSAIDs) and oral contraceptive pills. Despite their usefulness, these medications are accompanied by side effects, drug dependency, and unnecessary costs.^[7,9,10] Their side effects include diarrhea, stomachache, nausea,^[4] renal complications, hepatic complications, blood problems, edema, sleepiness,^[11] indigestion, and fatigue.^[6] Other treatment methods also include supplementary vegetarian diet, vitamins, minerals, nerve block, spinal manipulation, magneto-inertial fusion,^[12] percutaneous electrical nerve stimulation, acupressure, acupuncture, rest, muscle relaxation, reflexology, hand pressure, heat, aromatherapy, and physical therapy.^[4,13]

Since the acupressure is a new therapy, the side effects of drug therapies are not readily acceptable.^[14-17] Hence, but the rationales for using complementary and alternative medicine have been widely used for many years, and they are accepted by many people and doctors.^[18] Approximately 38.2 million adult people in America have used complementary medicine (herbs and supplements) in 2002. Moreover, more than half of them said that complementary medicine was important to their health and well-being,^[19] besides the points examined in this study. In reviewing the past 30 years, no article has been found. Hence, the acupressure points in this research are entirely new.

According to the gate control theory of pain, cutaneous stimulation through massaging, needling, and scratching can stimulate large fiber nerves that transfer nervous impulses to the spinal cord. In case this stimulation is continued, it can close pain gates, eventually reducing the feeling of pain. Evidence has shown acupressure as a noninvasive, inexpensive, safe, and simple method for reduction of labor pain.^[20] In the study by Wang *et al.*, (2010) acupressure was applied at Sanyinjiao (SP-6) acupoint for 20 min to assess its effect on menstrual pain and distress in young women suffering from dysmenorrhea. The results revealed a significant decrease in pain in acupressure and self-care training groups based on short-form McGill pain questionnaire.^[21] In another study in Iran, acupressure at SP-6 acupoint significantly reduced the intensity of dysmenorrhea in the intervention group compared to the control group 30 min and 1, 2, and 3 h after the intervention ($P < 0.05$).^[4]

In the present study, our aim is to perform acupressure at Guan yuan (RN-4) and Qu gu (RN-2) acupoints located on the abdominal meridian between the navel and the

symphysis pubis and compare its effect to that of using ibuprofen (control group). RN-4 acupoint is located on the midline, 3 cuns below the navel. Pressure is applied on this point in dysmenorrhea and irregular menstrual cycles. RN-2 acupoint is also located on the midline, 5 cuns below the navel, 1 cun between the two grooves of the interphalangeal joints of the massager's middle finger.^[22]

The rationale for using self-care education to increase awareness of one's own body and the adoption of appropriate health behavior and lifestyle modification such as diet and exercise will lead to the improvement of dysmenorrheal.

Considering the limited interventions in this regard and importance of complementary medicine, the present study aims to compare self-care behaviors training, acupressure at RN-4 and RN-2 acupoints, and ibuprofen consumption.

MATERIALS AND METHODS

Subject/participants

The present randomized clinical trial was conducted on 120 nonmedical students (three groups of 40) living in dormitories of Shiraz University Shiraz, Iran. The sample size was determined based on the study by Kashefi *et al.*^[4] and considering the loss rate of 10%. Of course, the initial sample comprised 157 patients with primary dysmenorrhea, of which 37 patients were excluded from the trial due to lack of inclusion criteria [Figure 1].

At first, five dormitories of Shiraz University were selected randomly. Then, one, two, and two dormitories were randomly considered as control, self-care behaviors training, and acupressure groups, respectively. After that, simple random sampling was performed in each dormitory.

The inclusion criteria of the study were being single, being below 25 years old, having primary dysmenorrhea with pain intensity of four and above based on visual analog scale (VAS), having regular menstrual cycles (21–35 days), having experienced dysmenorrhea in the recent six menstrual cycles (self-report), not having used oral contraceptive pills, and treatment interventions (NSAIDs, antiprogestins, and supplements) since 2 months before the study, not suffering from physical (vertebral fracture, herniated disk, acute inflammation, deep vein thrombosis, and gynecological diseases) and mental disorders, not consuming special medications such as benzodiazepines and antidepressants, and not having experienced stress due to parents' divorce or loss of first-degree relatives during the recent 6 months. On the other hand, the exclusion criteria of the study were having symptoms such as burn, itch, and abnormal vaginal discharges, experiencing stressors (parents' divorce, loss of

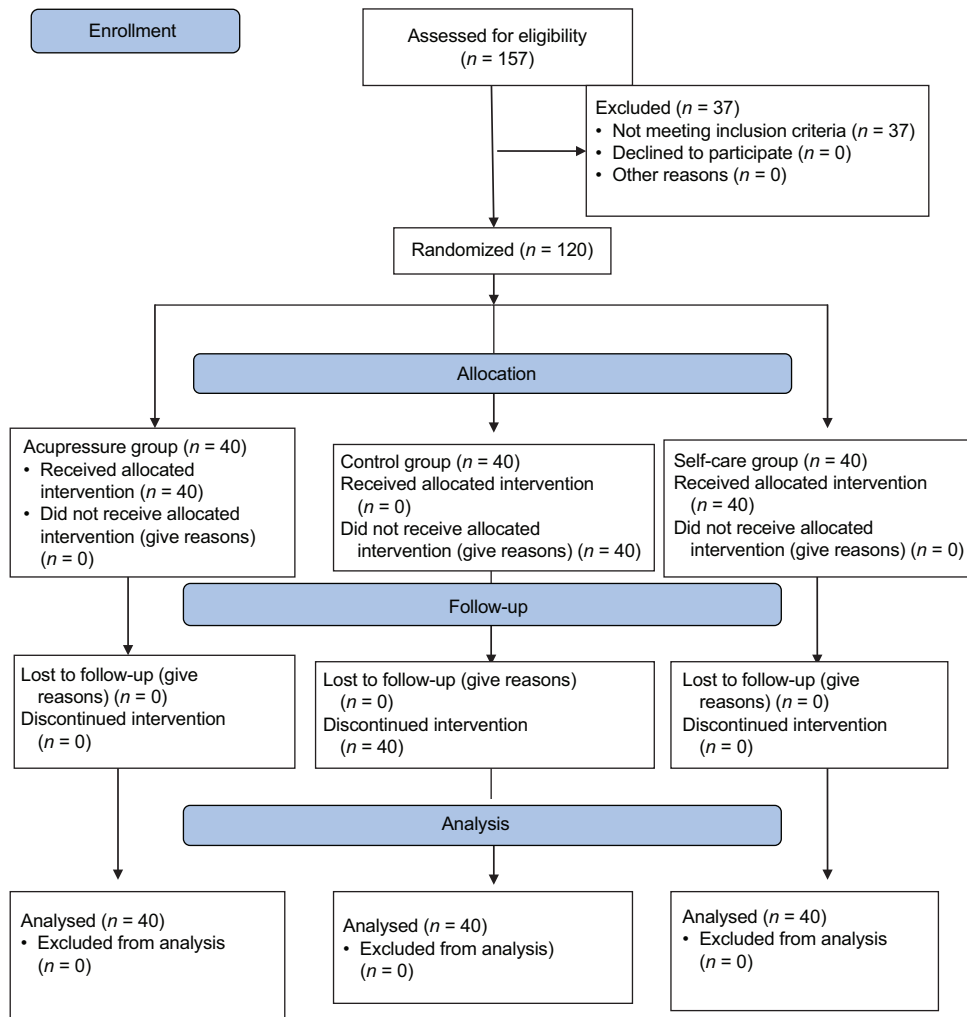


Figure 1: CONSORT diagram of sampling

first-degree relatives, etc.) during the study, and not being willing to participate in the study. All interventions and inclusion criteria carried out by the researcher, and research was done in student dormitories.

Intervention

Before the intervention, intensity of pain was determined in all the three groups. It should also be noted that researcher's performance of acupressure was confirmed by a specialist. In doing so, pressure was repeatedly applied with the thumb and was controlled by a scale to equalize its amount in each application.

First group, in the acupressure group, pressure was applied on the abdominal meridian using the thumb for 20 min (15 s pressure, 15 s rest) over the 1st 2 days of menstruation for two cycles. Pain intensity was assessed ½ h, 1 h, and 2 h after application of pressure. It should be mentioned that pain intensity was assessed by the researcher's assistant to avoid bias.

The method of compression in acupressure groups was done after obtaining confirmation from a trained researcher (i.e., from a specialist in physical medicine and rehabilitation). After confirmation from the researcher, the intervention was conducted.

In the second group, self-care behaviors were conducted in two parts: Teaching theoretical base of using lecture, discussion, and experience sharing was performed through four sessions (one - 60–90 min session a week). The educational content included anatomy and physiology of the genital system, nutrition during the menstrual cycle (based on books, articles, and a nutritionist's advice, emphasis was put on the resources that were effective in dysmenorrhea), the second part was practical training and includes isometric exercises during the menstrual cycle. It should be noted that isometric exercises were educated to Researcher by a master of physical education, and researcher was trained to girls in the gymnasium dormitory. Isometric exercise duration was 8 weeks, In the first 4 weeks was conducted by the researcher.

In the second 4 weeks with an appropriate images of playing sports the girls were given regarding how exercise. and the girls without Researcher continued (a total of 8 weeks). To ensure the exercise was done in the dormitory to follow up ,as well as phone calls,for continued exercise classes were encouraged after the 1st 4 weeks. Food recommendations and other educational content have been on the books and articles.

In Group three, the control group received the routine treatment for dysmenorrhea, i.e., taking ibuprofen 400 mg three times a day for three cycles. Of course, they were provided with the educational pamphlet at the end of the study.

Instrumentation

Questionnaires were completed in the student dormitories and after the intervention; to avoid sampling bias in research, pain assessment was conducted by a research assistant. In this study, intensity of pain was assessed using McGill pain questionnaire developed by Melzack,^[23] which has been introduced as a reliable instrument for the assessment of pain intensity.^[24] However, since this questionnaire takes a long time to be completed, its short form was designed^[25] and has been frequently used in Persian studies.^[26] The short form of McGill pain questionnaire consists of 15 sensory (11 questions) and emotional (4 questions) items, and the patients determine the quality of their pain by selecting one of the options of none, mild, average, and severe.^[26] The validity and reliability of this scale in the current research were based on the study performed by Adelmanesh *et al.* that reported Cronbach's alpha coefficients of 0.951, 0.832, and 0.840 for sensory, emotional, and total scores, respectively.^[27]

Data analysis

Data analysis was performed using the SPSS for Windows, Version 16.0. Chicago, SPSS Inc. Descriptive statistics, Kruskal–Wallis test was used to compare the three study groups. Besides, paired *t*-test was employed to compare the means before and after the intervention. Finally, qualitative variables were compared using Chi-square test. $P < 0.05$ was considered statistically significant.

Ethical considerations

This study was approved by the Ethics Committee of Shiraz University of Medical Sciences. Besides, written informed

consents for taking part in the study were obtained from all the participants. Hence, thesis number: 92-6900, IRCT: 2013071013940N1 and ethic number: 1392-12-11-6900.

RESULTS

The mean age of the participants was 20.02 ± 1.44 , 20.12 ± 1.50 , and 20.37 ± 1.54 years in the acupressure, training, and control groups, respectively ($P = 0.569$). Besides, the mean time of beginning of pain after menarche was 1.80 ± 0.82 years in the acupressure group, 1.90 ± 0.77 years in the training group, and 1.87 ± 0.79 years in the control group ($P = 0.844$). According to the results of Kruskal–Wallis test, the three groups were homogeneous regarding these two variables [Table 1].

In the training group, the mean intensity of pain was 16.90 ± 7.43 before the intervention and 10.56 ± 5.71 after the intervention, and the results of paired *t*-test showed that the difference was statistically significant ($P < 0.001$).

In the acupressure group also, the mean intensity of pain was 20.25 ± 6.93 before the intervention, and the results showed a significant difference in this regard before and 1 and 2 months after the intervention ($P < 0.001$) [Table 2].

In the control group, the mean intensity of pain was 31.77 ± 6.36 before the intervention, 23.52 ± 5.55 1 month after the intervention ($P < 0.001$), 9 ± 5.99 2 months after the intervention ($P < 0.001$), and 14.57 ± 6.40 3 months after that ($P < 0.001$) [Table 3].

Based on McGill pain questionnaire, the mean intensity of pain was 10.65 ± 5.71 in the training group, 19 ± 5.41 in the control group, and 14.40 ± 6.87 in the acupressure group after the intervention. The results of Kruskal–Wallis test, which is the nonparametric equivalent for Kruskal–Wallis test, showed that these differences were statistically significant, and both interventions were more effective compared to the control group [Table 4].

DISCUSSION

According to the present study results, discussion is on three main axes: In our study, the mean intensity of pain

Table 1: Comparison of the age of in three groups (acupressure - education of self-care behaviors and control)

Group	n	Mean±SD	SE	95% CI for mean		Minimum	Maximum	Significant
				Lower bound	Upper bound			
Age								
Acupressure	40	20.02±1.44	0.22	19.56	20.48	18	23	0.569
Education	40	20.12±1.50	0.23	19.64	20.60	18	25	
Control	40	20.37±1.54	0.23	19.88	20.86	18	23	
Total		20.25±1.69	0.15	19.95	20.56	18	25	

SD = Standard deviation; SE = Standard error; CI = Confidence interval

significantly decreased in the self-care training group. Chang and Chuang conducted a study to introduce the effective factors in dysmenorrhea. In that study, the participants with moderate dysmenorrhea received self-care behaviors training, and the results showed that training self-care behaviors at schools were one of the effective methods in reduction of dysmenorrhea.^[28] Chen *et al.* also carried out a research on self-care behaviors using herbal medicines and complementary medicine in primary dysmenorrhea among Taiwanese adolescents. The results of the study by Chen *et al.* revealed the necessity to educate individuals regarding the effect of food diet and effective herbal medications on the treatment of dysmenorrhea.^[29] In that study, the participants mentioned the reduction of physical activities as a self-care behavior, but the researchers modified this opinion and trained individuals regarding aerobic exercises as a self-care behavior to decrease their pain. The findings of our study were similar to those obtained by Kannan *et al.*, who investigated the effect of heavy exercises on the treatment of dysmenorrhea using McGill

pain questionnaire. The results of that study demonstrated that exercising was effective in reduction of pain without any side effects.^[30] In contrast, Shafaie-Sehati *et al.* found no significant difference between athletic and nonathletic groups with respect to the frequency of dysmenorrhea.^[31] In the present study, self-care behaviors training resulted in a reduction of pain and exercising was among the bases of this training. Exercising enters the body in the state of hypoxia where beta-endorphin levels increase. For instance, higher beta-endorphin levels were reported in newborns with hypoxia. Therefore, hypoxia and acidosis stimulate production of beta-endorphins, and the relationship between breathing and beta-endorphin production can be associated with the effect of acidosis on the two through different mechanisms.^[32] Reduction of pain after self-care training can also be attributed to the control of prostaglandins. In fact, aerobic exercises empty the uterus from waste materials and prostaglandins, which are the main cause of pain, eventually reducing the duration of pain through the menstrual cycle.^[33] In another survey exercise after 6 weeks is created flexibility in the hamstring, back and hip muscles, and reduces pain.^[34] Yoga has also been effective in reducing the severity and duration of pain.^[35]

Table 2: Comparison of the intensity of pain after and before the acupressure and educational groups based on the McGill questionnaire

Stage of intervention	Mean±SD	P ^a
Acupressure group		
Before the intervention	20.25±6.93	<0.001
After 1 st month, 1 st day	17.55±7.44	
After 1 st month, 2 nd day	7.80±13.50	
After 2 nd month, 1 st day	7.08±15.47	
After 2 nd month, 2 nd day	6.94±11.10	
Education group		
Before the intervention	16.90±7.43	<0.001
After the intervention	10.56±5.71	

^aP value of the paired t-test; SD = Standard deviation

Table 3: Comparison of the intensity of pain after and before the acupressure and educational and control groups based on the McGill questionnaire

Group	Before intervention	After intervention	P*
Training	16.90±7.43	10.65±5.71	<0.001
Acupressure	20.25±6.93	14.40±6.87	<0.001
Control (ibuprofen)	31.77±6.36	19±5.41	<0.001

^aP value of the Kruskal-Wallis test

The current study at the second part findings showed a significant difference in the acupressure group's pain intensity before and after the intervention. Considering the limited number of studies conducted on RN-4 and RN-2 acupoints, the results of performance of acupressure at other points have been discussed in this section.

In the study by Yeh *et al.*, pressure was applied for 1 min four times a day for 2 days, which is different from our study. Pain intensity was evaluated using VAS and McGill pain questionnaire. The results showed a significant difference in each group's pain intensity before and after the intervention.^[36] In the present study, however, the study groups' pain intensity was significantly different only based on McGill pain questionnaire. Other researches have also revealed the effectiveness of acupressure in treatment of dysmenorrhea and relaxation.^[4,7,21,37]

In a review study about efficacy of self-acupressure showed several studies (eight RCTs and two quasi-RCTs) have a

Table 4: Comparison of the difference mean scores severity of pain of in three groups (acupressure - education of self-care behaviors and control of the McGill questionnaire

Group	n	Mean±SD	SE	95% CI for mean		Minimum	Maximum	F	Significant	df
				Lower bound	Upper bound					
Difference mean										
Education	40	6.25±4.34	0.68	4.85	7.64	-9	14	18.09	0.000	2
Control	40	8.25±4.64	0.73	6.76	9.73	0	19			
Acupressure	40	2.70±3.45	0.54	1.59	3.80	-1	13			
Total	120	5.73±4.74	0/43	4.87	6.59	-9	19			

SD = Standard deviation; SE = Standard error; CI = Confidence interval

positive effect and effective on primary dysmenorrhea.^[38] In another study concluded that enough evidence not exists for the effectiveness of acupressure or acupuncture and RCT larger studies are needed.^[39] The analgesic effect of acupressure can be due to release of endorphins and glucocorticoids that block pain gates.^[4] Acupressure, in fact, refers to the touch technique for balancing human body's energy flow or QI.^[7] This method leads to the release of various neurotransmitters, which cut the nervous signals transferred by the nervous system. It also inhibits secretion of prostaglandins, reduces stimulation of cerebral cortex, and regulates secretion of endocrine hormones.^[3]

Based on McGill pain questionnaire scores, the control group's pain intensity scores were significantly different before and after the intervention. Similarly, the results of the studies by Zafari^[40] and Witt *et al.*^[41] indicated the effectiveness of ibuprofen. However, the results obtained by Salmalian were on the contrary to those of the present study.^[42] In general, NSAIDs are the first-line treatment, but their side effects, including gastrointestinal problems, make patients choose alternative therapies.

Overall, the results of the current study showed a significant difference among the three groups regarding the intensity of pain, and that training and acupressure were more effective compared to consumption of ibuprofen.

In this study, new and effective acupoints were employed, whereas the previous studies had not used such a combination of effective points. Furthermore, no similar studies were found on performing acupressure at these acupoints.

One of the limitations of our study was the difficulty in obtaining the required permissions from dormitories and performing the procedures privately. Hence, probable physiological tolerance of pain in each people is different, so feel pain is different, as well as contrast to the reactions and feelings of loss pain after pain relief methods will be different, which is beyond the control of the researcher. Another limitation was to assess the severity of pain after intervention. In order to solve the problem and avoid bias in sampling, research assistant assessed pain intensity after intervention. Finally, due to the different time periods, research conducted at the same time for all units is not possible.

Future studies are recommended to compare the effects of acupressure at other acupoints and common chemical and herbal drugs on primary dysmenorrhea in larger populations.

Suggestions for future research: (1) comparison the effect of other point of acupressure on severity of primary dysmenorrhea with the RN-2, RN-4 points. (2) The application of educational models such as BASNEF models on knowledge and attitudes of people with primary dysmenorrhea.

CONCLUSION

According to the current study results, the most effective method in reduction of dysmenorrhea was self-care behaviors training followed by acupressure at RN-4 and RN-2 acupoints and consumption of ibuprofen. Considering the side effects of consuming ibuprofen drug, training and acupressure as nonpharmacological, easy, safe, and inexpensive methods can be incorporated into the curricula of girls' high schools. Considering the effectiveness of acupressure in reducing dysmenorrheal, obstetricians, gynecologists, and midwives have recommended acupressure not only in the treatment of dysmenorrhea but also in reducing labor pain and pain control. The effective nondrug method that is the responsibility of the midwifery, and in clinics and delivery room applications and even self-education is also applicable.

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Conflicts of interest

The authors have no conflicts of interest.

AUTHORS' CONTRIBUTIONS

All authors contributed to the conception of the work, conducting the study, revising the draft, approval of the final version of the manuscript, and agreed for all aspects of the work.

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