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Original Article

Comparing the effects of reflexology methods and Ibuprofen administration on dysmenorrhea in female students of Isfahan University of Medical Sciences

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Abstract

BACKGROUND: Dysmenorrhea or menstrual pain is one of the most common disorders experienced by 50% of women in their reproductive age. Adverse effects of medical treatments and its failure rate of 20-25% have caused many women to seek other complementary and alternative treatment methods for primary dysmenorrhea. Hence, this study aimed to compare and determine the efficacy of reflexology and Ibuprofen on reduction of pain intensity and duration of menstrual pain.

METHODS: This was a quasi-experimental clinical trial study on 68 students with primary dysmenorrhea living in Isfahan University of Medical Sciences' dormitories. Simple random sampling was done considering the inclusion criteria and then the students were randomly divided into two groups. In the reflexology group, the subjects received 10 reflexology sessions (40 minutes each) in two consecutive mense cycles. The Ibuprofen group received Ibuprofen (400 mg), once every eight hours for 3 days during 3 consecutive mense cycles. To assess the severity of dysmenorrhea, Standard McGill Pain Questionnaire, visual analog scale (VAS) and pain rating index (PRI) were used in this study.

RESULTS: Findings of the study showed that the two groups had no statistically significant difference in terms of demographic characteristics ($p > 0.05$). Reflexology method was associated with more reduction of intensity and duration of menstrual pain in comparison with Ibuprofen therapy. Independent and Paired t-test showed that there was a significant difference in the two groups between intensity and duration of menstrual pain using VAS and PRI in each of the 3 cycles between reflexology and Ibuprofen groups ($p < 0.05$).

CONCLUSIONS: Considering the results of the study, reflexology was superior to Ibuprofen on reducing dysmenorrhea and its treatment effect continued even after discontinuing the intervention in the third cycle. Therefore, considering that reflexology is a non-invasive, easy and cheap technique, it seems that it can replace anti-inflammatory drugs (NSAIDs) to avoid their adverse side effects.

KEY WORDS: Primary dysmenorrhea, reflexology, ibuprofen, McGill pain questionnaire scale.

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Dysmenorrhea is a Greek term to describe painful uterine contractions during menstruation and is one of the most common disorders in women.[1] Dysmenorrhea is the most prevalent problem in women with different intensities which involves 45 to 95% of women.[2] The prevalence of dysmenorrhea in Iran has reported as 74 to 86.1 percent.[3]

Dysmenorrhea influences the mental and physical health of women particularly those who are not seeking healthcare and treatment. It is estimated that annually 140 million work hours and school hours are devastated due to symptoms associated with dysmenorrhea and the financial costs of dysmenorrhea in U.S. is $ 2 billion per year, on the other hand dysmenorrhea causes school absenteeism in 14 to 25 percent of the students.[4] Primary dysmenorrhea is considered as the major cause of women absenteeism from the work which obviously reduces the quality of life, daily activities and economic situation due to decreased working hours, fir-

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ing from work and increase of health care costs.[3,5]

There are there therapeutic approaches for the primary dysmenorrhea as the following:

1. Pharmacological approach 2. Non-pharmacological approach 3. Surgical approach.[6]

The first-line medical treatment for primary dysmenorrhea is administration of inhibitors of prostaglandin sysnthesis.[4] These inhibitors should be taken the day before or at the onset of pain and then every six to eight hours to prevent the formation of prostaglandin byproducts. On the other hand, consumption of non-steroidal anti-inflammatory drugs (NSAIDs) is prohibited in patients with gastrointestinal problems or those with bronchial sensitivity to aspirin. The side effects of these types of drugs are nausea, indigestion, diarrhea, fatigue and etc.[7]

Therefore, it seems necessary to provide a non-pharmacological method for such patients who do not respond to medication or suffer from its side effects and are not willing to consume drugs.[8]

Among these methods, reflexology can be pointed out which is one of the interventions in the manual therapy groups.[9] Reflexology is not a new method and its history goes back to at least 5000 years ago in China, India and Egypt. Nearly 2330 years B.C. the primary scientific images of the reflexotherapy was discovered in Ankhmahor's tomb (an Egyptian physician) in Saqqara, Egypt; an image from two servants who were working on hand and feet of two patients.[10,11] In this technique, the theory of association between the hands and feet and other parts of the body through the energy lines or channels is introduced.[12]

Reflexology is based on the principle that there are reflex areas in the hands and feet which are in association with muscles, nerves, organs, glands and bones. Specific pressure on specific reflex points would activate the healing power and make balance in the body.[13,14] This technique should not be misinterpreted with massage. Reflexology is a form of pressure which is often done on the feet. Because feet are the most sensitive parts of the body and that is why they are considered as the best site for implementing reflexology.[15,16] Regular reflexology on the body can relieve the anxiety, cause relaxation and preserve health.[12]

Kim and Cho, conducted a study to determine the effects of foot reflexology on premenstrual symptoms and dysmenorrhea in 40 female college students. Mean score of premenstrual symptoms and dysmenorrhea pain reduced from 8.35 to 4.16 in the first menstrual cycle and to 3.25 in the second menstrual cycle by foot reflexology. The results indicated that implementing foot reflexology can be effective on reducing premenstrual symptoms and dysmenorrhea in female students.[17] Furthermore, a study by Oleson and Flocco, aimed to determine the effects of ear, hand and foot reflexology on the premenstrual symptom of 35 women. The results indicated that there was a significant and considerable reduction in premenstrual symptoms in those who were in the real reflexology group.[18]

Considering this safe and non-invasive technique (manual therapy) and since reflexology is a non-invasive, cost effective and a technique with application of hand, it can be well implemented by a skilled midwife.[19] Due to high prevalence and high loses resulted from dysmenorrhea among the employees and students and due to reduction of the abilities of women and selecting safer treatment alternatives, the researcher decided to compare the efficacy of this technique with Ibuprofen on reducing the intensity and duration of dysmenorrhea.

Methods

This study was a quasi-experimental clinical trial. The study population included all the single female students living in the dormitories of Isfahan University of Medical Sciences. Eighty people with the primary dysmenorrhea who were diagnosed by accurate description of their backgrounds and their families and also checklist, entered the study and were randomly divided into two groups. Treatment with Ibuprofen was implemented during three consecutive menstrual cycles and the reflexology group dur-

ing two consecutive menstrual cycles. Reflexology was done for 20 daily sessions (40 minutes) on the study subjects and in the third cycle no reflexology was done in order to compare the durability of its effect with Ibuprofen drug.

The inclusion criteria included: being single, age range of 18 to 25 years, living in dormitories of Isfahan University of Medical Sciences, suffering from the primary dysmenorrhea with regular menstrual cycles, the pain should not be associated with non-menstrual pains, lack of endometriosis in one or higher first grade relatives, lack of diagnosed chronic diseases (diabetes, high blood pressure, cardiovascular or pulmonary diseases and etc.) with body mass index (BMI) in the range of 19 to 26, and not employed.

The exclusion criteria included: using pharmacological methods (hormonal and painkiller drugs except Ibuprofen, herbal drugs) and non-pharmacological methods (such as heat therapy, cryotherapy, massage and etc.), not participating the reflexology sessions or lack of appropriate Ibuprofen use.

Sampling was done in simple random sampling method considering the inclusion criteria which they were randomly divided into two groups. Data collection tool was a questionnaire consisted of three parts; demographic characteristics, menstruation characteristics and dysmenorrhea data, visual analog scale (VAS) and Pain Rating Index (PRI) scales extracted from standard McGill pain scale which was completed once before the intervention and three times after that by the study subjects.

In the study subjects of reflexology group, by assigning an appropriate time for implementing the technique ten days before the probable menstruation time, reflexology was done for 20 minutes on each foot (totally 40 minutes) in 15 stages generally during two consecutive days (1. Solar plexus, 2 & 3. Areas related to the digestive viscera, 4. Pelvic area, 5. Pituitary, 5. Sinuses, 7. upper and lower extremities, 8. Spinal cord, 9. Lungs, 10. Shallow chest area [chests], 11 & 12. Back and waist areas, 13. Ovaries, 14. Uterus and 15. Fallopian tubes) and specific reflexology including the areas related to dysmenorrhea including liver, spleen, the kidneys, pituitary, and the solar plexus. In order to investigate and follow-up the durability and lasting effects of reflexology at the third cycle, intervention was not implemented, but the questionnaire was completed again by the study subjects of this group. In the Ibuprofen group, in each cycle, a pack of ibuprofen capsules (10 capsules) with the medication orders (one day before menstruation and the first two days of menstruation, one capsule every 8 hours after the meal) were given to the study subjects during three consecutive cycles. At the end of each cycle, the questionnaires were gathered and then the next questionnaire and capsules for the next cycle were given to them. At the end, the subjects who used drugs irregularly were excluded from the study.

8 subjects from the reflexology group (1 student due to diagnosis of ovarian cysts during the intervention, 4 due to using drugs and 3 due to lack of co-operation) and 4 subjects from the Ibuprofen group (due to inappropriate use of the drug) were excluded from the study. Finally, 68 subjects (32 in the reflexology group and 36 subjects in the Ibuprofen group) were left in the study. The collected data were statistically analyzed using independent and paired t-tests by SPSS software version 16.

Results

The mean age of the participants was 21.6 ± 1.79 years (mean ± SD). All the study samples used to take some techniques to relief their pain and most of them consumed NSAIDs. The BMI of the study subjects was in the normal range (19-26). Frequency distribution of their academic field of study showed that most of the participants were educating in sub branches of paramedical science (56 subjects or 82.4%) and the rest were educating medical courses (17.6%). In terms of educational degree of the study subjects, 48 had BS (70.6%), 5 had MSc (7.4%) and the rest had PhD (22.1%).

Mean and frequency distribution of menarche age of the study subjects were 13.4 and 1.21 years, respectively. Comparing the two groups using independent t-test and chi-square

test before the intervention showed no significant difference between the two groups in terms of demographic characteristics (age, field of study and degree) and menstrual characteristics (duration of bleeding, interval between the menstrual periods, rate and volume of bleeding, pain onset and pain site).

Mean pain intensity are shown based on VAS and PRI in the reflexology and Ibuprofen groups before and after the intervention in each of the three menstrual periods. In a comparison which was done before and after the intervention in both groups, paired t-test showed that mean pain intensity using VAS had a significant difference after the intervention in each reflexology and Ibuprofen groups in all three periods ($p < 0.001$). These results indicated that mean pain intensity based on VAS in each group was reduced in comparison with before the intervention.

Comparing the two groups in terms of mean intensity of pain with VAS in the first (1), second (2) and third (3) menstrual periods using independent t-test indicated a significant statistical difference between the two groups with ($t_1 = 2.983$; $p_1 = 0.004$) , ($t_2 = 5.07$; $p_2 < 0.001$) and ($t_3 = 4.08$; $p_3 < 0.001$), respectively (Table 1).

Furthermore, comparing the two groups in terms of total score of pain rating index (PRI) after the intervention in the first, second and third menstrual periods showed a significant difference with ($t_1 = 2.30$; $p_1 = 0.024$), ($t_2 = 3.58$; $p_2 = 0.001$) and ($t_3 = 3.89$; $p_3 < 0.001$), respectively (Table 2).

Paired t-test showed that total pain index score before and after the intervention in each reflexology and Ibuprofen group in each three periods had a significant difference ($p < 0.001$). These results indicated that total pain index score had reduced in both groups compared to before the intervention.

Moreover, PRI in each of the sensory, emotional, assessment or cognitive and other pains dimensions were assessed separately.

Mean score of sensory pain dimension in McGill questionnaire (with 0 to 42 scores), in the reflexology group reduced from 17.31 before the intervention to 8.46 after the first menstrual cycle, 6.71 after the second cycle and 5.18 after the third cycle. This number also decreased in the Ibuprofen group from 17.38 before the intervention to 12.36, 12.22 and 11.58, respectively. comparing the two groups in terms of sensory pain dimension score through independent t-test before the intervention showed no significant difference between the two groups ($t = 0.04$; $p = 0.968$); however, after the intervention comparing the two groups in each of the first, second and third periods showed a significant difference ($t_1 = 2.02$; $p_1 = 0.047$) ($t_2 = 2.85$; $p_2 = 0.006$) and ($t_3 = 3.78$; $p_3 < 0.001$) respectively.

Furthermore, in a comparison by paired t-test which was carried out before and after the intervention in each group, in terms of sensory pain dimension score in each the first, second and third periods showed that there was a significant difference between pain intensity before and after the intervention in each of reflexology and Ibuprofen groups ($p < 0.05$).

Mean score of emotional pain dimension in McGill questionnaire (score 0 to 140), in the reflexology group reduced from 6.31before the

Table 1. Comparing the mean pain intensity using VAS scale in the study subjects of the both groups before and after the intervention

	Before the intervention		After the intervention					
			1st period		2nd period		3rd period	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Reflexology group	4.24	1.10	1.95	1.24	1.28	0.99	1.34	1.19
Ibuprofen group	4.31	1.22	2.81	1.14	2.74	1.32	2.65	1.42
Independent t-test	p = 0.784 t = 0.276		p = 0.004 t = 2.983		p < 0.001 t = 5.07		p < 0.001 t = 4.08	

Table 2. Comparing the mean PRI score in the study subjects of the both groups before and after the intervention

Pain intensity score	Before the intervention		After the intervention					
			1st period		2nd period		3rd period	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Reflexology group	33.96	12.6	15.25	11.06	11.37	10.91	9.06	8.41
Ibuprofen group	34.19	14.38	22.72	15.03	22.69	14.61	20.30	14.27
Independent t-test	p = 0.945 t = 0.07		p = 0.024 t = 2.30		p = 0.001 t = 3.58		p < 0.001 t = 3.89	

intervention to 2.21 at the first period, 1.59 at the second period and 1.09 at the third period. The scores of this dimension in the Ibuprofen group also decreased from 6.91 to 4.19, 3.80 and 3.13 at the first, second and third periods, respectively. Comparing the two groups by independent t-test before the intervention showed that there was no difference between the two group in terms of emotional pain dimension score ($t = 0.753$; $p = 0.454$), but after the intervention, comparing pain intensity in the emotional dimension showed a significant difference in the two studied groups in each three menstrual cycles ($t_1 = 2.81$, $p_1 = 0.006$) ($t_2 = 3.89$; $p_2 < 0.001$) and ($t_3 = 3.49$; $p_3 = 0.001$), respectively.

Mean score of cognitive pain dimension in McGill questionnaire (scores 0 to 5) in the reflexology group was 3.50 before there intervention and reduced to 1.40 at the first period, 1.21 at the second period and 1.09 at the third period. In the Ibuprofen group also these scores reduced from 3.05 before the intervention to 1.75, 2.0 and 1.52 at the first, second and third periods, respectively.

Comparing the two groups by independent t-test before the intervention showed that there was no difference between the groups in terms of cognitive pain dimension score ($t = 1.232$; $p = 0.220$), but after the intervention, comparing pain intensity in the cognitive dimension showed a significant difference in the two studied groups in each three menstrual cycles as ($t_1 = 2.64$, $p_1 = 0.02$) ($t_2 = 3.01$; $p_2 < 0.01$) and ($t_3 = 3.43$; $p_3 = 0.008$), respectively.

Mean score of other pain dimension in McGill questionnaire (various and different pain dimension, scores 0 to 17) in the reflexology group reduced from 6.84 before the intervention to 3.15 at the first period, 1.84 at the second period and 1.68 at the third period. The scores of this dimension in the Ibuprofen group reduced from 6.83 to 4.41, 4.66 and 4.05 at the first, second and third menstrual periods, respectively. Comparing the groups by independent t-test before the intervention showed that there was no difference between the two groups in terms of other pain dimension score ($t = 0.012$; $p = 0.990$), but after the intervention, comparing pain intensity in the other dimension showed a significant difference in the two studied groups in each three menstrual cycles respectively as ($t_1 = 1.78$, $p_1 = 0.008$) ($t_2 = 3.91$; $p_2 < 0.001$) and ($t_3 = 3.73$; $p_3 < 0.001$).

Moreover, in a comparison which was done separately in each group, a significant difference between the pain intensity in other dimension was indicated at the first, second and third menstrual periods in each of the reflexology and Ibuprofen groups (paired t-test, $p < 0.05$).

Mean duration of menstrual pain in the reflexology group reduced from 32.46 hours before the intervention to 15.90 hours at the first period, 14.86 hours at the second period and 9.78 hours at the third period. In the Ibuprofen group also, mean pain duration reduced from 36.19 hours to 26.19 hours at the first period, 23.91 hours at the second period and 23.41 hours at the third period.

The results of independent t-test indicated

that mean duration of menstrual pain in the two groups had no difference before the intervention ($t = 0.677$; $p = 0.501$). Whereas, after the intervention, both groups had a significant difference in each three periods in terms of mean duration of menstrual pain respectively as ($t_1 = 2.227$; $p_1 = 0.029$) ($t_2 = 2.67$; $p_2 = 0.005$) and ($t_3 = 2.98$; $p_3 = 0.004$). In a comparison that was done before and after the intervention in each group, paired t-test showed that in each first, second and third periods, there was a significant difference between mean duration of menstrual pain before and after the intervention in each of reflexology and Ibuprofen groups ($p < 0.05$).

Discussion

Findings of the present study showed that intensity and duration of menstrual pain using VAS and PRI and separately by sensory, emotional, cognitive and other pain dimensions in each reflexology and Ibuprofen groups had a significant difference before and after the intervention. Comparing the two groups showed that reflexology was more effective than Ibuprofen in reducing pain intensity and duration.

Kim and Cho, confirmed the effect of reflexology in relieving menstrual pain. In this study, implementing reflexology on the feet was done for 6 sessions in each menstrual period for two consecutive cycles. Mean pain score with VAS scale was 8.35 which reduced to 4.16 at the first menstruation and 3.25 at the second menstruation after the foot reflexology.[17]

In addition, in the study of Oleson and Flocco, the effect of reflexology was confirmed. In this study, study subject s randomly were divided into true and false reflexology groups and the results showed a significant reduction in premenstrual symptoms in the true reflexology group that the durability of the treatment also remained up to 8 weeks after the intervention ($p < 0.001$).[18]

In the present study, the effect of reflexology at the second cycle was better than the first cycle; so that there was more reduction in mean pain intensity via VAS and PRI.

Many different studies investigated about different complementary medicine methods. In the study of Wong et al the effect of acupressure on the splenic point VI (SP6) or San Yin Jiao on menstrual distresses was evaluated. The results indicated a significant reduction in pain intensity score by VAS scale ($p = 0.003$) and short form of McGill questionnaire ($p = 0.002$) immediately after acupressure for 20 minutes. The subjects of the acupressure group also statistically showed a significant difference at the third menstrual period with each one of the scales.[20] It seems that these techniques (acupuncture, acupressure, reflexology and etc.) have more durability than non-steroidal anti-inflammatory drugs such as Ibuprofen which needs repetition of the drug dosage in each menstrual period.

In this regard, Iorno et al in a study titled as "Acupuncture treatment of dysmenorrhea resistant to conventional medical treatment" on 15 women with mild to severe dysmenorrhea showed that response to was observed in 13 subjects (87%) and this difference was significant than before the study ($p < 0.001$). The follow-up of the patients showed that the pain of almost 50% of them had been controlled to six months after the treatment.[21]

Furthermore, the study results of Ghasemi, showed that intensity of dysmenorrhea had a significant reduction after massage therapy in comparison with before the intervention ($p < 0.001$). The results indicated that the effect of massage therapy on pain intensity was stable even six weeks after the intervention ($p < 0.001$).[22]

The results of a study by Aghamiri et al in 2005 titled as “study of effect of acupressure methods on pain in primary dysmenorrhea” on 100 students girls with primary dysmenorrhea in the dormitory showed that there was a significant difference between mean pain intensity before and after the intervention in the case group (70% reduction). Moreover, the study results showed that there was a significant difference between mean pain intensity before and after the intervention in the two case and placebo groups ($p < 0.001$).[23]

In the present study, the effect of reflexology on reducing the pain intensity influence at the very first menstrual cycle and Zhixing also in Traditional Chinese Medicine Hospital (Hangzhou) on 10 women with dysmenorrhea conducted the foot reflexology and found the immediate effect of reflexology on pain relief in his study samples. Only, three of them did respond to the treatment and required additional treatment.[24]

Suhrabi et al conducted a study titled as "the effect of acupressure in San Yin Jiao point and Ibuprofen on primary dysmenorrhea" on 80 females college students. Comparing the results showed that pain intensity after the treatment at the first and second treatment in both groups had no significant difference, respectively as ($p = 0.073$ and $p = 0.328$), but comparing pain intensity before and after the treatment in the acupressure group ($p < 0.001$) and Ibuprofen group ($p < 0.001$) illustrated a significant difference. In the present study also, pain duration in each two groups and in each three menstrual cycles showed a significant reduction.[25]

In addition, comparing the two groups in terms of pain intensity score by independent t-test in each one of the pain dimensions (sensory, emotional, cognitive and others) showed that the two groups had no difference in terms of pain intensity score in each sensory, emotional, cognitive and others pain dimensions before the intervention, but after the intervention, comparing the two groups in order to determine the most effective method in each of the first, second and third menstrual cycles, showed that reflexology group had a better performance than Ibuprofen group ($p < 0.05$); in other words, this technique could be more effective in emotional and cognitive dimensions than the pharmacological method and it had more score reduction in other dimensions.

Perhaps, more reduction of emotional dimension score in the reflexology group was due to more presence of the researcher along with study samples; i.e. the subjects of this group during this 10 days of reflexology before incidence of menstruation felt the presence of researcher with themselves and had more solace, and with expressing their feelings and discharge their emotions could adopt themselves more with this physiological phenomenon and maybe due to some reasons such as increase in level of endogenous endorphins, their pain tolerance threshold had increased more and felt less pain. Therefore, they chosen better words to describe their pain or preferred not to choose a word in some of the different pain dimensions subsets.

Although the majority of the study subjects in their menstrual cycles used one or more methods to reduce their menstrual pain, the results indicated that duration and intensity of menstrual pain had reduced in comparison with the time before the intervention. Overall, this study indicates that implementing reflexology for 20 sessions during the two consecutive cycles, 10 days before menstruation onset could reduce mean intensity and duration of menstrual pain.

Therefore, it can be stated that by conducting more studies about the effect of reflexology on other groups with primary dysmenorrhea, this technique (which has been highly ignored) can be applied easily, simple and cost-effectively. Appropriate application of this technique can reduce the menstrual pain in those with primary dysmenorrhea and consequently reduce medical techniques such as different drugs like painkillers which unconsciously impose some side effects to the individual. Application of different complementary medicine methods such as reflexology technique that does not have any side effects similar to chemical drugs and is a simple technique with application of the hands, safer alternatives can be recommended to treat dysmenorrhea to medical practitioners and those with dysmenorrhea.

The authors declare no conflict of interest in this study.

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