EFFECT OF FOOT REFLEXOLOGY VERSUS AEROBIC EXERCISES ON PRIMARY DYSMENORRHEA

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Abstract

Background: Dysmenorrhea is chronic, cyclical pelvic pain associated with menstruation. Typically, it is characterized by cramping lower abdominal pain occurring just before and/or during menstruation, usually starting soon after menarche once regular ovulation is established**. Aim:** To determine the effect of foot reflexology versus aerobic exercises on female with primary dysmenorrhea. **Subjects**: A sample of 40 females diagnosed with primary dysmenorrhea was selected from Gynecology department at Om El-Masryeen General Hospital. Their ages ranged between 16-23 years and body mass index (BMI) 20-25 kg/m^2. They were randomly assigned into 2 groups equal in number (A&B).Group (A) performed aerobic exercises for 30 min on treadmill and group (B) recieved foot reflexology sessions for 40 min. The treatment program was performed 3 times\week for 8 weeks for both groups. Assessment of all subjects in both groups was carried out before and after 8 weeks of the treatment program throughout visual analogue scale (VAS) to measure pain intensity , analysis of blood cortisol level and Spielberger State –Trait Anxiety Inventory scale (STAI). **Results**: showed that post-treatment a statistical significant decrease in the median value of pain on VAS ($p<0.033$) STAI ($p<0.0430$) and serum cortisol level($p<.0038$) with more decrease in group (B)thangroup(A)**. Conclusion**: Both aerobic exercises and foot reflexology could decrease dysmenorrhea pain but foot reflexology is more recommended.

Keywords: Primary dysmenorrhea, Foot reflexology, Aerobic exercises.

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Introduction

The period of adolescence is transition from child hood to adult life along with pubertal development and sexual maturation. Hormonal, psychological, cognitive and physical changes occur during puberty simultaneously. One of the major physiological changes that take place in adolescent girls is the onset of menarche. **(Suresh and Mrudula , 2011).**

In primary dysmenorrhea, pain is spasmodic in character and felt mainly in the lower abdomen, but it may radiate to the back and along the thighs. pain may be associated with systemic symptoms like nausea, vomiting, diarrhoea, headache, fatigue, and dizziness.**(Gumannga and Kwame, 2012&Sureshandmrudula , 2011).**

The onset of primary dysmenorrhea is usually 6 to 12 months after menarche, which coincides with the occurrence of regular ovulatory cycles. Symptoms are frequently associated with absenteeism from school, work, or other activities (Gumanga and Kwame, 2012).

One of the causes of PD is excessive level of prostaglandins hormones. Prostaglandins released during menstruation and childbirth makes uterus to contract which cause pain during menstrual cycle and also affects those with heavy irregular menstrual cycle, those who attain menarche before 12 years of age, or one with less body weight **(Veena et al., 2018) .**

Exercise may act as a distraction from intrusive thoughts and promote positive thoughts, decreasing short-term depression. Exercise may increase concentration and improve mood and behavior**(Aditi, 2013).**

Regular reflexology on the body can relieve the anxiety, causing relaxation and preserve health. Foot reflexology can be effective on reducing premenstrual symptoms and dysmenorrhea **(Kim and Cho, 2002).**

Subject, materials and methods

This study was carried out upon forty girls diagnosed with primary dysmenorrhea. They were selected from Om El-Masryeen Hospital in Giza, on the following criteria:

Inclusion criteria:

1. Their age was ranged from 16-23years.
2. Their body mass index ranged from 20-25 kg /m^2.

Exclusion criteria:

Any participant was excluded if she meets one of the following criteria:

1- Irregulars or infrequent menstrual cycles.
2- Patients with pacemaker
3- Hyperthyroidism
4- Pelvic pathology.
5- BMI > 25 kg/ m^2
6- Foot ulcers

Design of study:

1- Two group pre-test and post-test design. Participants were assigned randomly into two groups equal in number:

Group (A): consisted of twenty girls who participated in aerobic exercises

Group (B): consisted of twenty girls who received foot reflexology.

The treatment program was applied 3 times per week for eight weeks for all patients in both groups A&B.

All participants were given full explanation of the assessment and treatment procedures and informed consent form was signed from each girl before participating in the study.

Materials:

1-Weight -height scale:

2-ElectronicTreadmill (for group A) :

Exercise treadmills typically have an endless running surface which is extended between and movable around two substantially parallel pulleys at each end of the treadmill. The running surface may be comprised of a belt of a rubber-like material, or alternatively, the running surface may be comprised of a number of slats positioned substantially parallel to one another attached to one or more bands which are extended around the pulleys. In either case, the belt or band is relatively thin. The belt is normally driven by a motor rotating the front pulley. The speed of the motor is adjustable by the user so that the level of exercise can be adjusted to simulate running or walking as desired **(Kodesh et al., 2012).**

3- Syringes, alcohol and cotton

They used to collect blood samples from each participants of both groups (A&B) female before starting and after treatment to measure blood cortisol level.

Methods:

A) For evaluation:

1- History taking:

Detailed medical, obstetric and menstrual history were taken from

each patient before starting the study to confirm there are no any contraindications that interfere with the study.

All data and information of each female was recorded in a recording sheet.

2- Weight and height measurement:

The weight and height of each participant was measured while the girls was wearing light clothes and bare feet, to calculate the body mass index before and after the end of the study according to the following equation:

$$BMI = \frac{Weight}{Height} (\text{kg}/m^2)$$ **(Richard, 2010).**

3- Visual analogue scale:

A graphic rating scale with numerical values placed equidistantly along the line. The descriptors and numbers helped the subject to place her estimate on line in which 0 means no pain, l equals mild pain, 2equals moderate pain, 3 means sever pain, 4 means very severe pain and 5 means unbearable pain. Each patient was asked to read over the list of adjectives and select the word that best describes her pain on the scale **(Hatrick et al., 2003).**

Visual analogue scale was used, to assess pain of each patient in both groups (A&B) before and after the end of the study.

4- The Spielberger State-Trait Anxiety Inventory (STAI : Y Form 6-item):

The Spielberger State-Trait Inventory (STAI) has been widely used to measure patient anxiety in primary health care . The original scale incorporates 20 items that measure "state" anxiety and 20 items that measure "trait" anxiety. Trait anxiety is a stable personality trait that influences a person's "anxiety proneness"; whereas, state anxiety is a transient experience caused by a person's cognitive appraisal of a potential threat or danger. In other words, state anxiety is that dimension of anxiety which may be reactive to the health-care experience. A shortened 6-item version of the state scale has been developed to help reduce the associated respondent burden of the full-length version. The 6-item state anxiety scale has good internal reliability (Cronbach alpha 0.82) and correlation with the full STAI is high (r = 0.95). The shortened scale has been used in many health-care settings, including dental, medical, and general medical practice. The original and

shortened versions of the Spielberger state anxiety scale utilizes a Likert scale. Each item has four response categories ("not at all," "somewhat," "moderately," and "very much") which are assigned numerical values (1–4). These values are added together to produce an anxiety score (Likert scoring) **(Helen et al., 2010)**

To calculate the total STAI score (range 20 - 80):

- Reverse scoring of the positive items (calm, relaxed, content) so 1=4, 2=3, 3=2 and 4=1;
- Sum all six scores.
- Multiply total score by 20/6; The highest the score the highest the anxiety level **(Theresa and Hilary,1992).**

5- Blood Cortisol level:

A blood sample was taken from each patient in both groups (A and B) before and after the treatment to estimate the plasma cortisol .

Samples from all participants were run in the same assay to reduce any variance from interassay variability. These samples were drawn in the luteal phase of the menstrual cycle at the day 20 for each participant before and after the treatment course.

B) For Treatment:

1-Aerobic exercises for group (A):

Before starting the treatment program, each patient in the study group (A) was informed about the benefits of aerobic exercise to gain her motivation and cooperation during the treatment course. She was advised to drink plenty of fluids before and after the exercise session and wore supportive, well-fitting running or walking shoes. The treadmill exercise program started with warm up period in which each participant will walked at 80 m/min at 0.0% grade for 5 min. After that, treadmill speed increased to 147 m/min and its grade increased gradually until reached 25% grade for 20 min. This was followed by cool down period in which the treadmill speed and grade was decreased to 2.0 miles/h and 0.0% grade during a cool down period. Each participant was performed these exercises three times a week for 8 weeks.

2- Foot Reflexology for group (B):

10 days prior to the due time, massage was done on each foot for 20 min per day (totally 40 min for both feet) on special areas in both feet, including liver, spleen, kidneys,

pituitary, ovaries, uterus ,diaphragm and solar plexus points.

This intervention was performed for 2 consecutive menstrual cycles. In this group, pain intensity was measured using VAS before starting reflexology (first month) and on the first day of the second and third menstrual cycles **(El-gilany et al.,2005) .**

Statistical analysis

- Results are expressed as mean ± standard deviation or median, minimum and maximum. 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 WilcoxonSign Ranks test.
- Statistical Package for Social Sciences (SPSS) computer program (version 19 windows) was used for data analysis. P value $\leq$ 0.05 was considered significant.

Results

1. Demographic data

Table (1) represent the comparative of general demographic data values between groups A and B. Mean age values were 20.30 ±1.83 and 18.80 ±2.84 year in group A and B, respectively. Mean weight values were 44.50 ±3.36 and 43.78 ±4.25 kg in group A and B, respectively. Mean height values were 142.75 ±5.20 and 140.10 ±6.06 cm in group A and B, respectively. Mean BMI values were 21.76 ±1.05 and 22.34 ±1.34 kg/m^2 in group A and B, respectively. The statistical analysis by independent t-test revealed that no significant differences (P > 0.05) in values of general demographic data (age, weight, height, and BMI) between groups A and B.

Table(1): Comparison of demographic data mean values between groups A and B.

Items	Age (year)	Weight (kg)	Height (cm)	BMI (kg/m^2)
Group A	20.30 ±1.83	44.50 ±3.36	142.75 ±5.20	21.76 ±1.05
Group B	18.80 ±2.84	43.78 ±4.25	140.10 ±6.06	22.34 ±1.34
t-value	1.983	0.598	1.483	1.185
P-value	0.149	0.554	0.146	0.243
Significance	NS	NS	NS	NS

SD: standard deviation P-value: probability value NS: non-significant.

2. Pain

Within group comparison (intra group comparison)

In group A, there was a statistical significant decrease in the median value of pain measured at post-treatment [2.5 (1.0-4.0)] when compared with its corresponding value measured at pre-treatment [5.0 (3.0-5.0)] with Z value = -4.005 and p value = 0.001 (Table 2).

Also in group B, there was a statistical significant decrease in the median value of pain measured at post-treatment [2.0 (1.0-4.0)] when compared with its corresponding value measured at pre-treatment [4.0 (3.0-5.0)] with Z value = -3.963 and p value = 0.001 (Table 2).

Between groups comparison (inter group comparison)

At pre-treatment, there was no statistical significant difference between the median value of pain in group A [5.0 (3.0-5.0)] and its corresponding value in group B [4.0 (3.0-5.0)] with Z value = -1.555 and p value = 0.120 (Table 2).

On the other hand at post-treatment, there was a statistical significant decrease in the median value of pain in group B [2.0 (1.0-4.0)] when compared with its corresponding value in group A [2.5 (1.0-4.0)] with Z value = -2.132 and p value = 0.033 (Table 2).

Table(2): Intra and inter-group comparison between median values of pain in the two studied groups measured pre- and post-treatment.

	Group A (n= 20)	**Group B (n= 20)**	**$Z^{\#}$ value**	**P value**
Pre-treatment	5.0 (3.0-5.0)	4.0 (3.0-5.0)	-1.555	0.120 (NS)
Post-treatment	2.5 (1.0-4.0)	2.0 (1.0-4.0)	-2.132	0.033 (S)
$Z^{\#\#}$ value	-4.005	-3.963		
p value	0.001 (S)	0.001 (S)		

Data are expressed as median (minimum-maximum). NS= p> 0.05= not significant.

S= p< 0.05= significant $Z^{\#}$= Mann Whitney test. $Z^{\#\#}$= WilcoxonSign Ranks test.

3. STAI: Y-6 questionnaire

Within group comparison (intra group comparison)

In group A, there was a statistical significant decrease in the median value of STAI: Y-6 questionnaire measured at post-treatment [46.7 (23.3-73.3)] when compared with its corresponding value measured at pre-treatment [66.7 (26.7-80.0)] with Z value = -3.826 and p value = 0.001 (Table3).

Also in group B, there was a statistical significant decrease in the median value of STAI: Y-6 questionnaire measured at post-treatment [34.8 (10.0-66.7)] when compared with its corresponding value measured at pre-treatment [34.8 (10.0-66.7)] with Z value = -3.725 and p value = 0.001 (Table 3).

Between groups comparison (inter group comparison)

At pre-treatment, there was no statistical significant difference between the median value of STAI: Y-6 questionnaire in group A [66.7 (26.7-80.0)] and its corresponding value in group B [60.0 (23.3-80.0)] with Z value = -1.099 and p value = 0.272 (Table 3).

On the other hand at post-treatment, there was a statistical significant decrease in the median value of STAI: Y-6 questionnaire in group B [34.8 (20.0-66.7)] when compared with its corresponding value in group A [46.7 (23.3-73.3)] with Z value = -2.022 and p value = 0.043 (Table 3).

Table(3): Intra and inter-group comparison between median values of STAI: Y-6 questionnaire in the two studied groups measured pre- and post-treatment.

	Group A (n= 20)	Group B (n= 20)	$Z^{\#}$ value	P value
Pre-treatment	66.7 (26.7-80.0)	60.0 (23.3-80.0)	-1.099	0.272 (NS)
Post-treatment	46.7 (23.3-73.3)	34.8 (20.0-66.7)	-2.022	0.043 (S)
$Z^{\#\#}$ value	-3.826	-3.725		
p value	0.001 (S)	0.001 (S)		

Data are expressed as median (minimum-maximum). NS= p> 0.05= not significant.

S= p< 0.05= significant. $Z^{\#}$= Mann Whitney test. $Z^{\#\#}$= WilcoxonSign Ranks test.

4. Serum cortisol

Within group comparison (intra group comparison)

In group A, there was a statistical significant decrease in the mean value of serum cortisol measured at post-treatment (10.09 ± 2.85) when compared with its corresponding value measured at pre-treatment (19.01 ± 2.39) and with p value = 0.001 (Table 4).

Also in group B, there was a statistical significant decrease in the mean value of serum cortisol measured at post-treatment (8.22 ± 2.40) when compared with its corresponding value measured at pre-treatment (18.50 ± 4.31) with p value = 0.001 (Table 4).

The percent decrease in cortisol in group A was 0.23% while the percent decrease in group B was 12.83% (Table 4).

Between groups comparison

At pre-treatment, in groups A and B, the mean values (± SD) of serum cortisol were 19.01 ± 2.39 and 18.50 ± 4.31, respectively. There was no statistical significant difference between the two groups (F= 0.214 & p= 0.646) (Table4).

ANCOVA test was used to compare the post-treatment values of the two groups on controlling the effect of pre-treatment value. The results of serum cortisol revealed that there was a statistical significant decrease in its value in group B (8.22 ± 2.40) when compared with its corresponding value in group A (10.09 ± 2.85) (F= 4.652 & p= 0.038) (Table 4).

Table(4): Intra and inter-group comparison between mean values of serum cortisol in the two studied groups measured at pre- and post-treatment.

	Group A (n= 20)	**Group B (n= 20)**	**F value**	**P value**
Pre-treatment	19.01 ± 2.39	18.50 ± 4.31	0.214	0.646 (NS)
Post-treatment	10.09 ± 2.85	8.22 ± 2.40	4.652	0.038 (S)
Mean difference	8.92	10.28		
% change	46.92 ↓↓	55.57 ↓↓		
p value	0.001 (S)	0.001 (S)		

Data are expressed as mean ± SD. F value= ANCOVA test. NS= p> 0.05= not significant. S= p< 0.05= significant.

Discussion

Dysmenorrhea is pain during menstruation. It is estimated that 16%–93% of women suffer from dysmenorrhea in reproductive age , It is a most common menstrual disorder and is classified into primary and secondary based on the absence or presence of an underlying cause. Usually, secondary dysmenorrhea is associated with an existing underlying pelvic pathology. Primary dysmenorrhea (PD) is also known as painful period or menstrual cramps, which causes pain during menstrual cycle **(Veena et al., 2018).**

It usually begins around the time when menstruation begins. The pain is usually in the pelvis or lower abdomen, which may radiate into low back and upper thigh, Other symptoms include diarrhea, headache, stress, and nausea. Absenteeism is a result of dysmenorrhea in college-going and working young females **(Omidvar et al., 2016).**

This study in was conducted to compare between the effect of foot reflexology versus aerobic exercise .Forty female participated in this study .They were selected randomly from Om El Masryreen Hospital. Their ages were ranged from 16 to 23 years. Their body mass index (BMI) was ranged from 20 to 25 kg/m^2. Cortisol level and visual analogue scale were used to estimate level of pain. The obtained results showed that there was a statistical significant decrease in the median values of post- pain, STAI and serum cortisol level in both groups with p value 0.033 ,0.043 and 0.038 respectively with the more decrease in group B.

The present study focused on the problem of pain during

menstruation in girls in the age group of 16-23 years. In this study the effects of exercise protocol is proved to be significantly improving in participants suffering from primary dysmenorrhea, results have shown that exercises reduced pain and discomfort in subjects suffering from primary dysmenorrhea.

There are scientific findings proving that an increase of prostaglandins released from endometrium occurs in menstrual phase which is responsible for the dysmenorrhea. A number of hypotheses emphasize the effect of exercise on decreasing dysmenorrhea or relieving menstrual pain. For the first time, Mosler in 1914 explained that exercise can relieve pelvic contraction by shunting uterine blood flow **(Fatemeh and Mani, 2018).**

Other mechanisms for explaining exercise effect on dysmenorrhea are the release of endogenous opiates, the use of vasodilators, suppressing prostaglandins, decreasing stress and increasing mood, it is acknowledged that stress affects the immune system. However, by exercising, individuals can alleviate stress- related dysmenorrhea **(Fatemeh and Mani , 2018).**

Research show that other techniques such as taping and aerobics are also used for the participants with PD which effectively could reduce pain and discomfort **(Proctor and Farquhar, 2006).**

Also, **Chantler et al.,(2009)** showed that exercising due to the release of endorphins, relaxation, stress relief and improved blood flow can reduce the severity and duration of dysmenorrhea **.**

Mohammadi et al.,(2012) also examined the effect of aerobic exercise on some menstrual symptoms of nonathletic students, and concluded that regular and continuous aerobic exercises can control initial dysmenorrhea and severe menstrual bleeding**.**

Rima et al.,(2013) stated that non pharmacological intervention like dry ginger powder and active exercises were effective as a treatment for dysmenorrheal. These methods were preferred instead of counter medications.

The idea that exercise might help relieve menstrual pain is not new; in 1943 Billig ,proposed that women

with dysmenorrhea had contracted ligamentous bands in the abdomen and subsequently developed a series of stretching exercises for which he claimed a high rate of symptom relief. The belief that exercise was effective seems to have prevailed and led to anecdotal beliefs among health agencies, clinicians, and women that exercise is beneficial **(Ananda et al., 2016).**

Menstrual pain may be resulted from increased contraction of uterine muscle which is innervated by the sympathetic nervous system. Stress is supposed to increase the sympathetic activity which may lead to the increase of menstrual pain by enhancing the intensity of uterine contraction. So, due to the fact that exercise could reduce and moderate stress, the sympathetic activity may be decreased. Thereby, intensity of menstrual pain and other related symptoms may be reduced as well. Another possible dilemma in this respect is that, since performing physical activity leads to the release of endorphins which are produced by brain, the pain threshold could be enhanced **(Shahr et al .,2012 &Dawood ,2006).**

Mahvash et al.,(2012) reported that doing 8 weeks of physical activity significantly decreased drug consumed, amount and duration of bleeding and intensity of pain in students with primary dysmenorrhea**.**

Also, the results of this study agreed with **Broman-Fulks et al.,(2004)** showed that both high intensity and low intensity aerobic exercises reduced anxiety with high intensity exercises being more effective **.**

Studies have demonstrated that stress would lead to increased dysmenorrhea by increasing the stimulation of sympathetic system. Thus, reduction of stress can be effective in improving symptoms of dysmenorrhea **(Sara et al., 2015)**.

Divya and Pooja , (2016) performed a study on 67 athletic women and 96 nonathletic high school girls and found that the intensity of dysmenorrhoea was significantly lower in the athletic group **.**

Additionally, **Onur et al.,(2012)** examined the effect of simple exercises that can be done at home, on dysmenorrhea and life quality of 40 women. The intervention consisted of 10 min stretching exercises, 20 min aerobic exercises such as walking and cycling, and 10

min relaxation every day, which was continued for three months. The participants' intensity of pain was measured using Visual Analogue Scale (VAS). The results demonstrated that, the intensity of dysmenorrhea decreased, which continued in the following two months, as well **.**

Contrary to the above results, **Blakey et al.,(2010)** studied the effects of different exercises on dysmenorrhea of students and did not observe any association between exercise and primary dysmenorrhea **.**

Also according to **Sehati et al.**,**(2014)** study, there was no significant relationship between the distribution of dysmenorrhea between athletic and non-athlete groups **.**

Blakey et al., (2010) & Harlow and Park, (1996),also concluded that there was no relationship between the level of physical activity and the severity of dysmenorrhea **.**There was no relationship between exercise and primary dysmenorrhea

Meta-analysis of observational studies conducted by **Latthe et al.,(2006)** also showed that exercises could slightly reduce the risk of dysmenorrhea **.**

The exercise analgesic effect is thought to be applied through nonspecific mechanisms. Dysmenorrhea has a dose-response association with stress ,stress accelerate uterine contractions and menstrual pain as a result, by decreasing stress and psychological pressures, and enhancing mood, exercise may decrease pain, Moreover, exercise can cause the release of endorphins, which are pain-relieving factors, another potential mechanism is the improvement of pelvic blood circulation and local metabolism during exercise Consequently, exercise may prevent prostaglandin accumulation,which results in uterine contraction, ischemia, and pain, Some believe that stretching exercises can be effective in removing abdominal spasms that stimulate nerve routes **(Narges et al., 2017).**

Exercise could result in reduced stress, fatigue and depressed mood; it therefore has the potential to relieve some of the secondary symptoms that can occur with primary dysmenorrhea. It is therefore possible that the relationship between exercise and primary dysmenorrhea is mediated by stress reduction rather than via

direct biological pathways **(Daley , 2008).**

Also, **Daley,(2008)** reported that in studies with sample size of more than 500 people, reduction of dysmenorrhea has not been observed **.**

Samadi et al.,(2013) examined the effects of 8 weeks of regular, moderate aerobic exercise on physical, and psychological menstrual cycle symptoms. They revealed significant effects for exercise on negative mood states and physical symptoms. In addition, they revealed that women who frequently exercise might be some extent protected from deterioration of mood before and during menstruation **.**

That the increase in the blood flow and metabolism of the uterus during exercise may be effective in the reduction of dysmenorrhea symptoms. In another words, improved metabolism is a factor in the reduction of symptoms **(Mahvash et al., 2012).**

Kim and Cho,(2002) 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 **.**

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 ($p < 0.001$) **(Mahboubeh et al., 2010).**

In the study of **Wong et al.,(2010)** 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 **.**

In this regard**, Iorno et al.,(2008**) 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 **.**

Furthermore, the study results of **Ghasemi,(2008)** 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 ($p < 0.001$) **.**

The results of a study 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 ($p < 0.001$) **(Aghamiri et al., 2005).**

Suhrabi et al.,(2006) 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 **.**

Hur et al., (2012) also reported a reduction in premenstrual syndrome and dysmenorrhea and improvement in the temperature of lower abdomen with reflexology **.**

Similarly**, Sara et al., (2015)** assessed the effect of reflexology on reduction of premenstrual syndrome and dysmenorrhea in students and reported that foot reflexology was effective in recovery of this syndrome and dysmenorrhea these results were consistent with those of the present work**.**

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 **(Bennett, 2011).**

The decrease in the plasma cortisol level revealed by the current study as a respond to the use of reflexology is supported by **TiranandMackereth,(2010)** who stated that Swedish massage to the feet has been shown to reduce stress by activation of the subgenual anterior cingulate cortex region of the brain and this may go some way to explain how reflexology assist in reducing stress levels. Also they stated that reflexology may work by stimulating the release of endorphins and in turn suppresses cortisol levels in normal human subjects, in this way may help to reduce pain and stresses as well as increase feelings of wellbeing and relaxation.

Conclusion

Both foot reflexology and aerobic exercises are useful for primary dysmenorrhea with preference to foot reflexology

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