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Effect of Relaxation Training Augmented with Foot Reflexology on symptoms of Premenstrual Syndrome among nursing female students

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Abstract: **Premenstrual syndrome is a relatively common disorder that affects approximately 90 % of women during the reproductive period at various degrees and characterized by troublesome symptoms as tension, irritability, depression, headache, anxiety and loss of self-control that develop during the luteal menstrual phase and disappear within a few days of menstruation. Aim: To investigate effect of relaxation training augmented with foot reflexology on symptoms of premenstrual syndrome among nursing female students. Method: A quasi-experimental research design (pre and post-intervention). Sample: A purposive sample of 200 female students who have premenstrual syndrome and fulfilled the inclusion criteria were recruited. They were randomly assigned into four equal groups. Setting: The study was conducted at Faculty of Nursing at Menoufia University on nursing female's students. Instruments: A self-administrated questionnaire, Knowledge assessment questionnaire of premenstrual tension symptoms and the numeric pain rating scale (NRS). Results: There were no statistical significance differences among the four study groups regarding physical, psychological, and emotional symptoms before the intervention but there were highly statistical significance differences among them at different phases of intervention (after use in the same menstrual cycle, second cycle and after third cycle (p=<0.001**, <0.001** and<0.001**) respectively.. Increasingly, there was more decrease in mean score regarding pain related symptoms at follow up phase than post-test phase. Conclusion: It seems that relaxation training and self-foot reflexology can be significantly effective in reducing premenstrual syndrome. Furthermore adding self-foot reflexology to relaxation training had a great positive effect on relieving premenstrual syndrome related symptoms among the study nursing female students at different phases of intervention (pre-test, immediately post-test and follow up) than relaxation training only in terms of reducing physical, psychological, and emotional symptoms. Recommendations: Relaxation training and self-foot reflexology should be a clinical practice as an effective nursing interventions to reduce premenstrual syndrome.**

Keywords: **Self-foot reflexology, relaxation training, premenstrual syndrome.**

1. INTRODUCTION

Premenstrual syndrome (PMS) is classified by the World Health Organization (WHO) in the International Classification of Disease (ICD) as gynecological disorder rather than mental disorder which usually start in the late teens or early twenties with gradually worsening manifestations (1).The disease is diagnosed via the presence of physical, behavioral, and mood symptoms that arise in the luteal phase of the menstrual cycle and disappear after menstruation (2). This syndrome is characterized by somatic symptoms, such as fatigue, appetite-changes, low energy, and psychological

symptoms, such as irritability, depressed mood, anxiety, and impulsive behavior. Several other physical symptoms associated with the menstrual cycle, such as bloating, abdominal cramps, constipation, swelling or tenderness of the breasts, cyclic acne and joint or muscle pain were recorded, but the most irritable prominent symptoms are irritability, tension, dysphoria and distress (3). These symptoms may negatively affect the woman's life due to causing distress and disturbing everyday functions and interpersonal relationships and are associated with significant social and professional impairment (5). In young adolescents the symptoms might particularly affect the school functions, and social interactions in a negative way. Previous studies have also shown that women with premenstrual disorder have a poor health-related quality of life (6)

The exact cause of PMS is still unknown. Many theories have been suggested, including increased aldosterone activity, elevated adrenal function, hyperprolactinemia, hypoglycemia, decreased levels of central dopamine and serotonin, and decreased vitamin B6 and essential fatty acids. Decreased central dopamine and serotonin have been the most accepted causes (4).

Today, alternative medicine is one of the most common methods of treating any kind of disease because, in addition to cost-effectiveness, it leaves fewer side effects than chemical drugs. Stress management methods such as relaxation are among non-pharmacological preventions for PMS treatment. Relaxation therapy is an effective intervention for enhancing the immune function, alleviating depression, and improving quality of life. Maintenance and continued improvement of immune function and psychosocial variables at 2 months follow-up indicate that relaxation therapy may have long-term effects (7). Relaxation is thought to exert a direct influence on the autonomic nervous system, reducing levels of physiological arousal through re-establishing a balance between the sympathetic and parasympathetic nervous system (8).

Self-foot reflexology is a non-pharmacological method for treatment of different health problems as PMS. Moreover, it is a form of massage that is associated with applying pressure on reflexive points of the feet. It is believed that these points are connected with all parts of the body. The pressure on reflexive points can affect the body's physiological responses (9). Increasingly, reflexology is a cheap, reliable, noninvasive treatment method that is performed by triggering the natural healing and energy points of the body (10). In other words, reflexology is a special type of foot and hand massage. It is believed that there are some areas in the hands and the feet which are related to glands, organs, and other body parts. The most important theory about the effect of this method is connection between hands and feet, and other body parts through energy lines or channels. Some studies have shown that regular reflexology could reduce anxiety, increase relaxation, and improve the health (11).

The nurse is an important health care personnel who can help the woman and girls in management of PMS. The nurse plays a pivotal role in providing the most effective current management of PMS which is a conservative one including accurate diagnosis, stress control, sensible levels of diet and exercise, but severe cases should be managed by a multidisciplinary team including a gynecologist, psychiatrist or psychologist, dietitian and counselor (12). Relaxation training and self-foot reflexology may be a clinical practice as an effective nursing intervention to reduce premenstrual syndrome of nursing students..

Significant of the Study:

Premenstrual syndrome is a relatively common disorder that affects approximately 90 % of women during the reproductive period at various degrees and characterized by troublesome symptoms as tension, irritability, depression, headache, anxiety and loss of self-control that develop during the luteal menstrual cycle and disappear within a few days of menstruation (13). In the Middle East, it is believed that there is limited research on the consequences of premenstrual syndrome associated symptoms. Therefore, the purpose of this study is to examine the effect of foot reflexology augmented with relaxation training on relieving premenstrual syndrome associated symptoms, to examine the effect of foot reflexology on relieving premenstrual syndrome associated symptoms; compare between foot reflexology and relaxation training on relieving premenstrual syndrome associated symptoms among nursing female' students.

Aim of the Study:

Aim of the study was to investigate effect of relaxation training augmented with foot reflexology on symptoms of premenstrual syndrome among nursing female students.

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Research Hypotheses:

1- Students who apply relaxation training will have less premenstrual symptoms severity than before the intervention.

2- Students who apply self-foot reflexology will have less premenstrual symptoms severity than before the intervention.

3- Students who apply a combination of relaxation training and self-foot reflexology will have less premenstrual symptoms severity than before the intervention.

2. METHOD

Research design: A quasi-experiment research design (pre and post-intervention) was utilized to fulfill the aim of this study.

Research setting: The study was carried out at Faculty of Nursing in Menoufia University.

Sampling:

Sample type: A purposive sample.

Sample size and technique:

Students who had premenstrual syndrome and fulfilled the inclusion criteria included in the study. The total number of study subjects was 200 students.

Inclusion criteria: The students were selected according to the following criteria:

- Regular menstruation.

- Not married.

- No history of mental and physical illnesses.

- Not using sedatives or herbal drugs.

Exclusion criteria:

- Gynecological disorders as polycystic ovarian syndrome and submucous fibroid.

The study participants were 200 female students divided into four groups (each group about 50 students). Group (A) consisted of 50 adolescent female students who received relaxation training techniques twice a week for 8 weeks. Group (B) consisted of 50 adolescent female students who received self-foot reflexology twice daily for 8 to 10 minutes for 8 weeks, Group (C) consisted of 50 adolescent female students who received relaxation training augmented with self-foot reflexology techniques at the same time and Group (D) consisted of 50 adolescent female students (control group) who did not receive relaxation training or foot reflexology. Assessment of all adolescent female students in the four groups was carried out before and after the intervention in two cycles: pre – intervention cycle and intervention cycle through intensity of premenstrual syndrome.

Instruments: Three instruments were utilized for collecting the data:

Instrument (I): A Self-administered questionnaire: it was constructed by the researchers after reviewing the related literature. It included the following parts:

Part I: **Personal characteristics:** It included age, level of mother education, income, weight, height and body mass index …etc.

BMI = weight (kg)/height (m)

BMI Categories:

Underweight	= < 18.5
Normal weight	= 18.**5** – 24.**9**
Overweight	= 25– 29.**9**
Obesity	= BMI of 30 or greater

Part II: **Menstrual history:** It included age of menarche, duration, amount of blood loss, rhythm, cycle frequency, liquidity of blood…etc.

Instruments (II): Knowledge assessment questionnaire: it was developed by the researchers and included questions related to premenstrual syndrome relaxation training and reflexology. It consisted of two parts:

Part one: It consisted of (6) questions and concerned with knowledge related to premenstrual syndrome. This part included: definition, symptoms of PMS, duration of symptoms, causes, how to diagnose PMS, alternative methods to relieve symptoms and the effect of PMS on daily activity, academic achievement and the presence to the faculty.

Part two: It consisted of (5) questions and concerned with knowledge related to relaxation training and self-foot reflexology. This part included: definition, effect of relaxation training and self-foot reflexology on PMS, preparation before application of relaxation training and self-foot reflexology, side effects of relaxation training and self-foot reflexology and points of reflexology on the foot related to PMS.

Instrument (III): The numeric pain rating scale (NRS): it was adopted from Moos (2010) to assess intensity of physical, psychological and behavioral symptoms of premenstrual syndrome before and after the intervention. Which is valid, reliable and proven in different studies as a measure of pain intensity. The numeric pain rating scale (NRS) is a 10 points scale on which, zero represent no pain, 1 to 3 represent mild pain, 4 to 7 represent moderate and pain score between 7 and 10 was considered to be a severe form of pain.

Validity and reliability

Instrument 1 & instrument II was designed by the researchers and validated by five experts (two pazzrofessors of obstetrics and gynecology, two professors of maternal and newborn health nursing, one professor of physiotherapy) (for content validity), while instruments III was adopted from the previous studies. The interviewing questionnaire underwent some modifications according to the panel of judgment regarding the clarity of sentences and appropriateness of content. Test-retest reliability was used to estimate reliability.

Ethical Considerations:

An official permission from the selected study setting was obtained for fulfillment of the study. The aim of the study was explained to each student before giving the instruments to gain their confidence and trust. Approaches to ensuring ethics were considered in the study regarding confidentiality and informed consent. Confidentiality was achieved by the use of closed sheets with the names of the participants replaced by numbers. All students were informed that the information they provided during the study would be kept confidential and used only for statistical purpose and after finishing the study, the findings would be presented as a group data with no personal participant's information remained.

Pilot study

A pilot study was conducted to test the feasibility, applicability and understandability of the instruments. It was conducted on 10% of the total sample (20) students were chosen. Accordingly, the necessary modifications were done in the form of reformulation of some questions and omitting of others due to unavailability to be answered accurately by the students. The sample of the pilot study was excluded from the study.

Procedure:

- An official agreement signed from the Dean Faculty of Nursing, Menoufia University, contains the title and aim of the study.

- The instruments of data collection were developed after reviewing of the current and past national and international relevant literature related to PMS, relaxation training and reflexology and its effect on PMS, by using local and international books, journals, periodicals and computer search.

- The study was implemented for 3 months, from the beginning of February 2019 to the end of April 2019. Implementation of the study was conducted at faculty of nursing at Menoufia University, after the students had been fully informed and consented for participation in the study.

- All students were given instrument (I) to fill it, which included (name, premenstrual syndrome and inclusion criteria).

- The selected students who had premenstrual syndrome and fulfilled the inclusion criteria were included in the study.

- The students were divided into four groups (each group about 50 students) to receive the session of training. The aim of this division is to provide the appropriate time for each group to conduct the training in accordance with the schedule of their both theoretical and practical lectures. Each session took about 35 minutes to be completed.

- The students who were included in the study followed the following steps:

First session:

- The students were given instrument (I) which included socio-demographic data, menstrual history and instrument (II) which included knowledge assessment to be completed by them.

- Instrument (II) took about 20 – 25 minutes to be filled.

- The previously mentioned instruments were gathered by the researchers in the same day.

- The students were given instrument (III) which was (numeric pain rating scale) to assess the severity of premenstrual syndrome before the next menstruation and before application of relaxation training and reflexology (pre-intervention).

Reflexology group

Reflexology can be defined as a science of stimulating points (usually on the soles or the palms) which have a correspondence or a link with internal organs of the body. Reflexology technique is based on the principle that there is a link between various points on the feet and hands with other parts of the body. Therefore, reflexology therapists will put pressure on certain areas that aim to stimulate the parasympathetic nerves so the body heal itself. For example, giving pressure to the area around the foot and the heel is believed to affect the endocrine and reproductive systems so that the symptom of premenstrual syndrome is reduced. Reflexology is given to the reflex points of the genital organs of the woman that is the foot in the form of band around the front aspects of the ankle for 5 minutes in each foot.

Preparation before procedure

• Explain the procedure to the client.

• Procedure should be conducted two hours after meal.

• Client should take 5 to 10 minutes rest before the procedure.

• Ask the client to do deep breathing exercises for three minutes.

• Remove all the jewelries.

• Ask the client to wash the hands and foot.

• Make the person to lie in supine position.

Preparations for the reflexology therapist

• Cut short the nails.

• Hand washing should be done.

• Remove the jewelries.

Duration of treatment session: 20 MINUTES

Frequency of treatment: TWO TIMES A DAY

Steps of foot reflexology

FIRST STEP: The thumb is used to give pressure on all the reflex points of the foot for 5minutes in each foot. (General reflexology).

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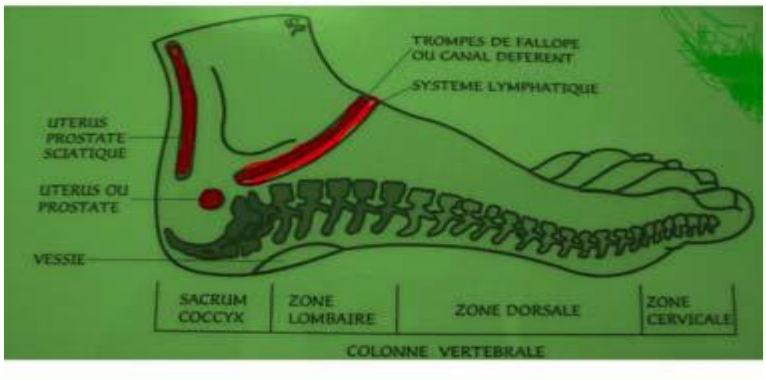
General reflexology

SECOND STEP: Reflexology is given to the reflex points of the genital organs of the woman that is the foot in the form of band around the front aspects of the ankle for 5 minutes in each foot. (Specific reflexology).



Reflex point of the uterus

Reflex point of the ovary

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POST PROCEDURE ADVICE

• Advice the client to take rest for 5 to 10 minutes after the procedure.

• Advice the client to take more natural diet.

Relaxation group

Relaxation training involves several methods and techniques to reduce tension and anxiety through voluntarily control of the muscles. In the relaxation method, patients are taught to completely relax their muscles. Generally, in the relaxation method, therapists direct their patients to contract a set of muscles and then relax them in order to feel the relaxation in these muscles. Then, they are asked to perform the contraction-relaxation exercise in the muscles of different body parts, such as arms,

neck, face, shoulders, feet, etc. Although these exercises might last for several sessions, patients are finally able to relax completely within one or two minutes (28). Relaxation therapy is an effective intervention for enhancing immune function, alleviating depression, and improving quality of life. Maintenance and continued improvement of immune function and psychosocial variables at 2 months follow-up indicate that relaxation therapy may have long-term effects. Relaxation is thought to exert a direct influence on autonomic nervous system, reducing levels of physiological arousal through re-establishing a balance between the sympathetic and parasympathetic nervous system (29).

Second session:

- At the beginning of this session, instrument (III) was gathered by the researchers before application of relaxation training and reflexology (pre- intervention).

- Then, the researchers provided the knowledge to the students regarding reflexology, relaxation training and premenstrual syndrome through demonstration, and session of discussion and brochure.

- After that, the study participants were trained by the researchers how to prepare themselves by massage of the whole leg from knee to ankle using both hands and mildly massage whole of the sole before starting the reflexology massage for about 5 minutes.

- Then, the students were trained to exert pressure on the related and specified zones with special concentration for about 20 seconds for each. These areas consists of: pituitary gland, kidney and adrenal glands, spleen, liver, genital zone (uterus and ovary) and breasts (Fard et al., 2012).

- The duration of massage was once a day for about 15 minutes totally and from the onset of symptoms of the premenstrual syndrome and continued until period time (totally 5–7 days).

- At the end of the second session, re-demonstration was done to confirm the students' knowledge and training session.

- Then, the students were given the same daily record form of premenstrual syndrome (instrument III) to be completed again by the study participants to determine the severity of premenstrual syndrome for two successive cycles after implementation of relaxation training and self-foot reflexology (post- intervention).

- The post- intervention assessment sheet gathered by the researchers. The students were followed-up by the researchers through telephone or other means of social media.

- Instrument (II) and (III) were gathered by the researchers after application of relaxation training and self-foot reflexology (post-intervention). The knowledge assessment sheet regarding relaxation training and self-foot reflexology & premenstrual syndrome (instrument II) was given to the students to be completed in this session. Then knowledge assessment sheet was gathered by the researchers at the same time.

- Finally, the same daily record form of premenstrual syndrome (instrument III) was completed again by the sample to determine the post- intervention severity of premenstrual syndrome after implementation of relaxation training and self-foot reflexology (follow up).

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Statistical Analysis:

The collected data were scored, tabulated and analyzed using (SPSS) version 22. Descriptive as well as nonparametric statistics were utilized to analyze the data pertinent to the study. The level of significance was set at $p < 0.05$. Chi square test, Independent sample t-test, Fischer exact test (FE), Mean and repeated measure ANOVA test were used to analyze the data.

3. RESULTS

Table (1): Distribution of the Study Participants according to their Socio-Demographic Characteristics

I Variables	Relaxation group (n=50)		Reflexology group (n=50)		Combined group (n=50)		Control group (n=50)		X^2	P -value
	No	%	No	%	No	%	No	%		
Age										
18-20 year	40	80.0%	45	90.0%	46	92.0%	40	80.0%	4.96	.175
>20 year	10	20.0%	5	10.0%	4	8.0%	10	20.0%		
Residence									1.94	.584
Urban	5	10.0%	3	6.0%	2	4.0%	5	10.0%		
Rural	45	90.0%	47	94.0%	48	96.0%	45	90.0%		
BMI										
Normal	44	88.0%	45	90.0%	46	92.0%	44	88.0%	2.16	.904
Overweight	5	10.0%	4	8.0%	2	4.0%	5	10.0%		
Obesity	1	2.0%	1	2.0%	2	4.0%	1	2.0%		

Table 1 shows distribution of the study participants according to their socio-demographic characteristics. It reveals that most of the study students their age ranged between 18- 20 years of age. The majority of them were from the rural areas and also, that most of the study students had normal BMI.

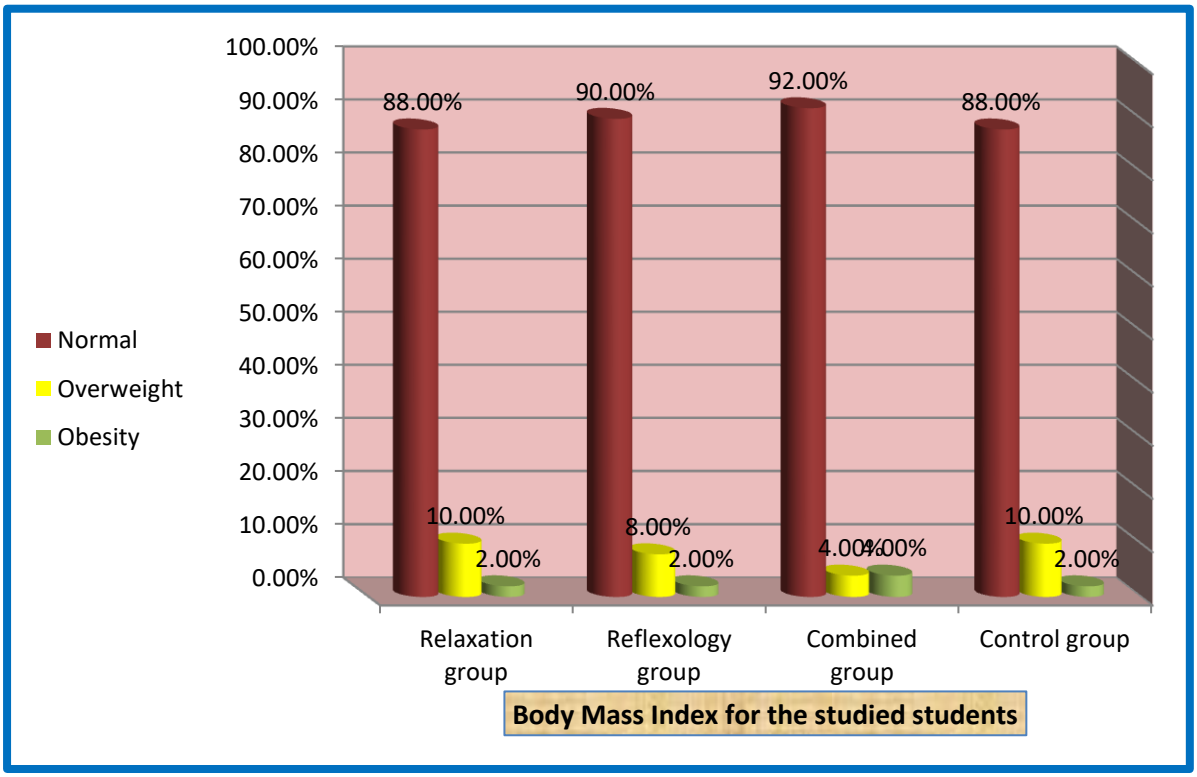

Figure (1): Body Mass Index of the Study participants

Figure 1 illustrates body mass index of the study participants. It shows that most of the study participants had normal BMI.

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Table (2): Distribution of Menstrual History for the Students in the Study Groups

Variables	Relaxation group (n=50)		Reflexology group (n=50)		Combined group (n=50)		Control group (n=50)		X^2	P - value
	No	%	No	%	No	%	No	%		
Age of menarche										
10-15	49	98.0%	48	96.0%	50	100.0%	49	98.0%	2.041	.564
> 15	1	2.0%	2	4.0%	0	.0%	1	2.0%		
Menstrual interval										
< 28 day	8	16.0%	6	12.0%	6	12.0%	8	16.0%	1.38	.967
28 day	39	78.0%	40	80.0%	42	84.0%	39	78.0%		
> 28 day	3	6.0%	4	8.0%	2	4.0%	3	6.0%		
Duration of menstruation										
2-3 days	2	4.0%	1	2.0%	1	2.0%	2	4.0%	1.15	.979
4-6 days	46	92.0%	48	96.0%	47	94.0%	46	92.0%		
7-8 days	2	4.0%	1	2.0%	2	4.0%	2	4.0%		
Menstrual flow										
mild	1	2.0%	2	4.0%	2	4.0%	1	2.0%	3.94	.684
moderate	48	96.0%	45	90.0%	44	88.0%	48	96.0%		
severe	1	2.0%	3	6.0%	4	8.0%	1	2.0%		
Consistency										
With clots	5	10.0%	6	12.0%	4	8.0%	5	10.0%	0.444	.931
Without clots	45	90.0%	44	88.0%	46	92.0%	45	90.0%		

Table 2 shows menstrual history of the study participants. It clarified that regarding to age of menarche; most of the study participants (98.0%, 96.0%& 98.0%) in the relaxation, reflexology and control groups in the combined group were in between 10- 15 years of age. Regarding to menstrual interval**,** more than three quarters of the study participants in the relaxation and control groups and the majority of them in the reflexology and combined groups had menstrual interval every 28 days. Also, most of the study participants had 4-6 days regarding duration of menstruation and moderate menstrual flow without clots.

Table (3): Distribution of Physical Symptoms of the Study participants (Pre and Post Intervention)

Variables	Relaxation group (n=50)				FXT	Reflexology group (n=50)				FXT	Combined group (n=50)				FXT	Control group (n=50)				FXT
	Pre		*Post*			*Pre*		*Post*			*Pre*		*Post*			*Pre*		*Post*		
	No	%	No	%		No	%	No	%		No	%	No	%		No	%	No	%	
Headache																				
Yes	5	10.0%	3	6.0%	.715	4	8.0%	2	4.0%	.678	6	12.0%	1	2.0%	.112	4	8.0%	4	8.0%	1.000
No	45	90.0%	47	94.0%		46	92.0%	48	96.0%		44	88.0%	49	98.0%		46	92.0%	46	92.0%	
Cramps																				
Yes	38	76.0%	19	38.0%	.000	40	80.0%	15	30.0%	.000	39	78.0%	6	12.0%	.000	40	80.0%	37	74.0%	.635
No	12	24.0%	31	62.0%		10	20.0%	35	70.0%		11	22.0%	44	88.0%		10	20.0%	13	26.0%	
Backache					.487					.436					.008					.727
Yes	6	12.0%	3	6.0%		5	10.0%	2	4.0%		10	20.0%	1	2.0%		5	10.0%	4	8.0%	
No	44	88.0%	47	94.0%		45	90.0%	48	96.0%		40	80.0%	49	98.0%		45	90.0%	46	92.0%	
Muscle stiffness					.000					.000					.000					.635
Yes	33	66.0%	10	20.0%		40	80.0%	6	12.0%		39	78.0%	3	6.0%		40	80.0%	37	74.0%	
No	17	34.0%	40	80.0%		10	20.0%	44	88.0%		11	22.0%	47	94.0%		10	20.0%	13	26.0%	
Breast tenderness					.000					.000					.000					.611
Yes	40	80.0%	13	26.0%		42	84.0%	16	32.0%		44	88.0%	10	20.0%		42	84.0%	39	78.0%	
No	10	20.0%	37	74.0%		8	16.0%	34	68.0%		6	12.0%	40	80.0%		8	16.0%	11	22.0%	
Fatigue					.000					.000					.000					.635
Yes	39	78.0%	13	26.0%		40	80.0%	11	22.0%		38	76.0%	16	32.0%		40	80.0%	37	74.0%	
No	11	22.0%	37	74.0%		10	20.0%	39	78.0%		12	24.0%	34	68.0%		10	20.0%	13	26.0%	
Pain					.000					.000					.000					.242
Yes	50	100.0%	10	20.0%		50	100.0%	13	26.0%		50	100.0%	2	4.0%		50	100.0%	47	94.0%	
No	0	.0%	40	80.0%		0	.0%	37	74.0%		0	.0%	48	96.0%		0	.0%	3	6.0%	

Table 3 clarifies physical symptoms of the study participants (pre and post intervention). It shows that there are an improvements in all physical symptoms except headache in the three study groups (relaxation, reflexology and combined groups) on post intervention than pre intervention. So, there are highly statistical significant differences between pre and posttest. Meanwhile, there is no improvement in physical symptoms of control group. So, there are no statistical significance differences between pre and posttest in the control group.

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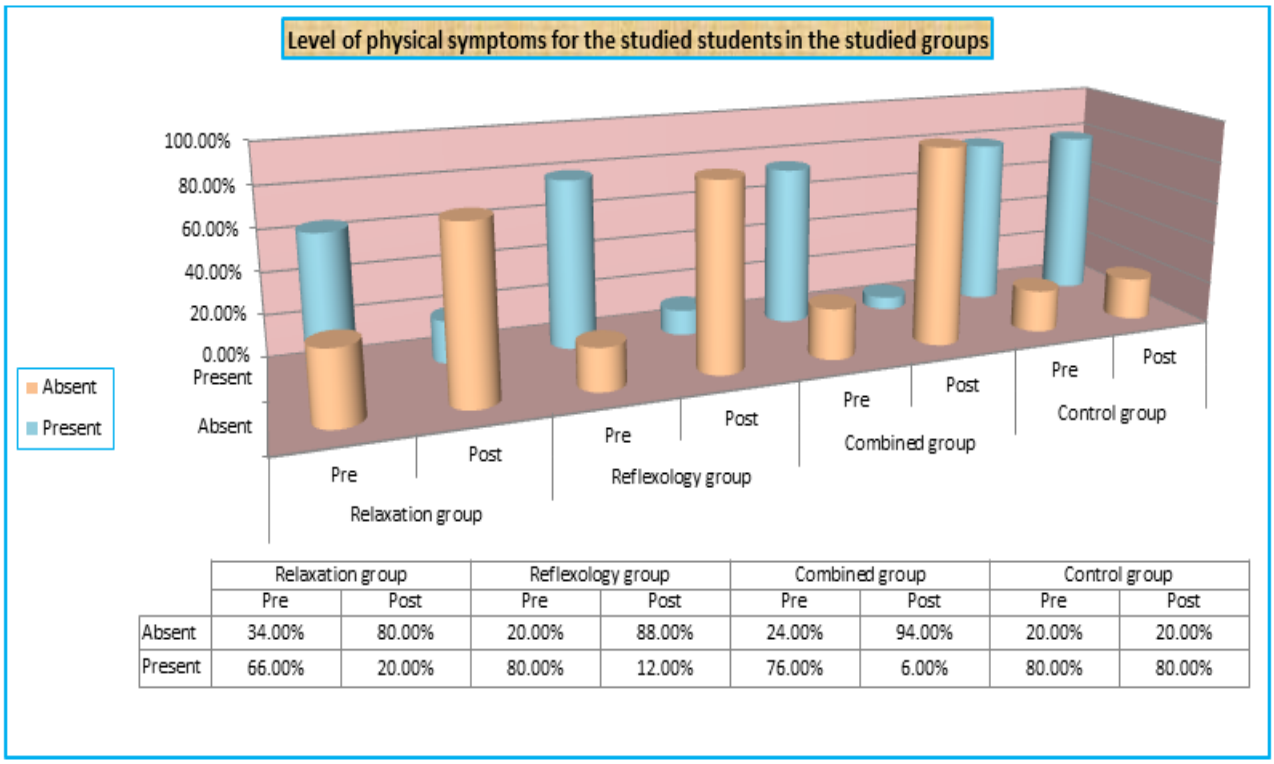
Figure (2): Level of Physical Symptoms of the Study participants (Pre and Post Intervention)



	Relaxation group		Reflexology group		Combined group		Control group	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Absent	34.00%	80.00%	20.00%	88.00%	24.00%	94.00%	20.00%	20.00%
Present	66.00%	20.00%	80.00%	12.00%	76.00%	6.00%	80.00%	80.00%

Figure 2 illustrates level of physical symptoms for the students in the study participants (pre and post intervention). It shows that two thirds (66.0%) in the relaxation group, three quarter (76.0%) in the combined group and the majority of them (80.0%) in the reflexology and control groups had physical symptoms on pre intervention. Meanwhile, the majority and most of the study students (80.0%, 88.0%) in the relaxation and reflexology groups respectively and most of combined group had absent physical symptoms on post intervention.

Table (4): Mean of Total score of Physical Symptoms for the students in the study groups on pre and post intervention.

Variables	***Relaxation group***	***Reflexology group***	***Combined group***	***Control group***	**Anova test**	**p-value**
	Mean ± SD	*Mean ± SD*	*Mean ± SD*	*Mean ± SD*		
Total score of physical symptoms						
Pre	4.22 ±1.8	4.42 ±1.7	4.52 ±1.7	4.42 ±*1.7*	.251	.861
Post	1.42 ±2.3	1.30 ±2.1	0.78 ±1.5	4.42 ±1.7	36.586	.000
Wilcoxon test	-5.760	-6.088	-6.181	-.687		
p-value	.000	.000	.000	.492		

Table 4 shows Mean of total score of physical symptoms for the students in the study groups on pre and post intervention. It reveals that, means of total physical symptoms have been decreased on posttest than on pretest in the relaxation and reflexology groups. As well as, the mean of total physical symptoms have been more apparently improved in the combined group. So, there are highly statistical significance differences between pre and posttest. Meanwhile in the control group, there is no change in mean total physical symptoms. So there is no statistical significance difference between pre and posttest.

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Table (5): Distribution of Psychological Symptoms for the Students in the Study Groups on Pre and Post intervention.

Variables	Relaxation group (n=50)				FXT	Reflexology group (n=50)				FXT	Combined group (n=50)				FXT	Control group (n=50)				FXT
	Pre		*Post*			*Pre*		*Post*			*Pre*		*Post*			*Pre*		*Post*		
	No	%	No	%		No	%	No	%		No	%	No	%		No	%	No	%	
Anxiety																				
Yes	44	88.0%	13	26.0%	.000	45	90.0%	11	22.0%	.000	46	92.0%	6	12.0%	.000	46	92.0%	43	87.8%	.525
No	6	12.0%	37	74.0%		5	10.0%	39	78.0%		4	8.0%	44	88.0%		4	8.0%	6	12.2%	
Irritability					.000					.000					.000					.774
Yes	40	80.0%	20	40.0%		44	88.0%	20	40.0%		44	88.0%	10	20.0%		44	88.0%	42	84.0%	
No	10	20.0%	30	60.0%		6	12.0%	30	60.0%		6	12.0%	40	80.0%		6	12.0%	8	16.0%	
Mood changes					.000					.000					.000					1.000
Yes	42	84.0%	15	30.0%		44	88.0%	20	40.0%		42	84.0%	6	12.0%		42	84.0%	42	84.0%	
No	8	16.0%	35	70.0%		6	12.0%	30	60.0%		8	16.0%	44	88.0%		8	16.0%	8	16.0%	
Depression					.000					.000					.000					1.000
Yes	30	60.0%	10	20.0%		32	64.0%	8	16.0%		38	76.0%	10	20.0%		38	76.0%	38	76.0%	
No	20	40.0%	40	80.0%		18	36.0%	42	82.0%		12	24.0%	40	80.0%		12	24.0%	12	24.0%	
Tension					.001					.001					.000					1.000
Yes	32	64.0%	15	30.0%		30	60.0%	13	26.0%		32	64.0%	6	12.0%		32	64.0%	32	64.0%	
No	18	36.0%	35	70.0%		20	40.0%	37	74.0%		18	36.0%	44	88.0%		18	36.0%	18	36.0%	
Loneliness					.000					.000					.000					1.000
Yes	30	60.0%	16	32.0%		35	70.0%	15	30.0%		39	78.0%	7	14.0%		39	78.0%	39	78.0%	
No	20	40.0%	34	68.0%		15	30.0%	35	70.0%		11	22.0%	43	86.0%		11	22.0%	11	22.0%	
Restlessness					.000					.000					.000					1.000
Yes	32	64.0%	8	16.0%		35	70.0%	16	32.0%		35	70.0%	7	14.0%		35	70.0%	35	70.0%	
No	18	36.0%	42	84.0%		15	30.0%	34	68.0%		15	30.0%	43	86.0%		15	30.0%	15	30.0%	
Confusion					.000					.000					.000					1.000
Yes	35	70.0%	15	30.0%		40	80.0%	10	20.0%		35	70.0%	5	10.0%		35	70.0%	35	70.0%	
No	15	30.0%	35	70.0%		10	20.0%	40	80.0%		15	30.0%	45	90.0%		15	30.0%	15	30.0%	
Insomnia					.727					.487					.269					1.000
Yes	5	10.0%	4	8.0%		6	12.0%	3	6.0%		6	12.0%	2	4.0%		6	12.0%	6	12.0%	
No	45	90.0%	46	92.0%		44	88.0%	47	94.0%		44	88.0%	48	96.0%		44	88.0%	44	88.0%	

Table 5 shows psychological symptoms for the students in the study groups on pre and post intervention. It shows that there is an improvement in all psychological symptoms except insomnia in the three studied groups (relaxation, reflexology and combined groups) on the post intervention than on pre intervention. And, what is worth to mention is that this improvement was More obvious in the combined group . So there are highly statistical significance differences between pre and posttest. Meanwhile there is no improvement in psychological symptoms. So there are no statistical significance differences between pre and posttest in the control group.

Table (6): Mean of Total score of Psychological Symptoms for the Students in the Study Groups on Pre and Post Intervention.

Variables	***Relaxation group***	***Reflexology group***	***Combined group***	***Control group***	**Anova test**	**p-value**
	Mean ± SD	*Mean ± SD*	*Mean ± SD*	*Mean ± SD*		
Total score of psychological symptoms						
Pre	5.80 ±3.2	6.38 ±2.6	6.34 ±2.9	6.34 ±2.9	.456	.714
Post	2.32 ±3.4	2.32 ±3.3	1.18 ±2.7	6.26 ±3.1	25.147	.000
Wilcoxon test	-5.324	-5.795	-5.868	-1.633		
p-value	.000	.000	.000	.102		

Table 6 shows mean of total score of psychological symptoms for the students in the study groups on pre and post intervention. It reveals that, means of total psychological symptoms have been decreased on posttest than on pretest in the study groups. So, there are highly statistical significance differences between pre and posttest. Meanwhile in the control group, there is no change in mean total psychological symptoms. So there is no statistical significance difference between pre and posttest.

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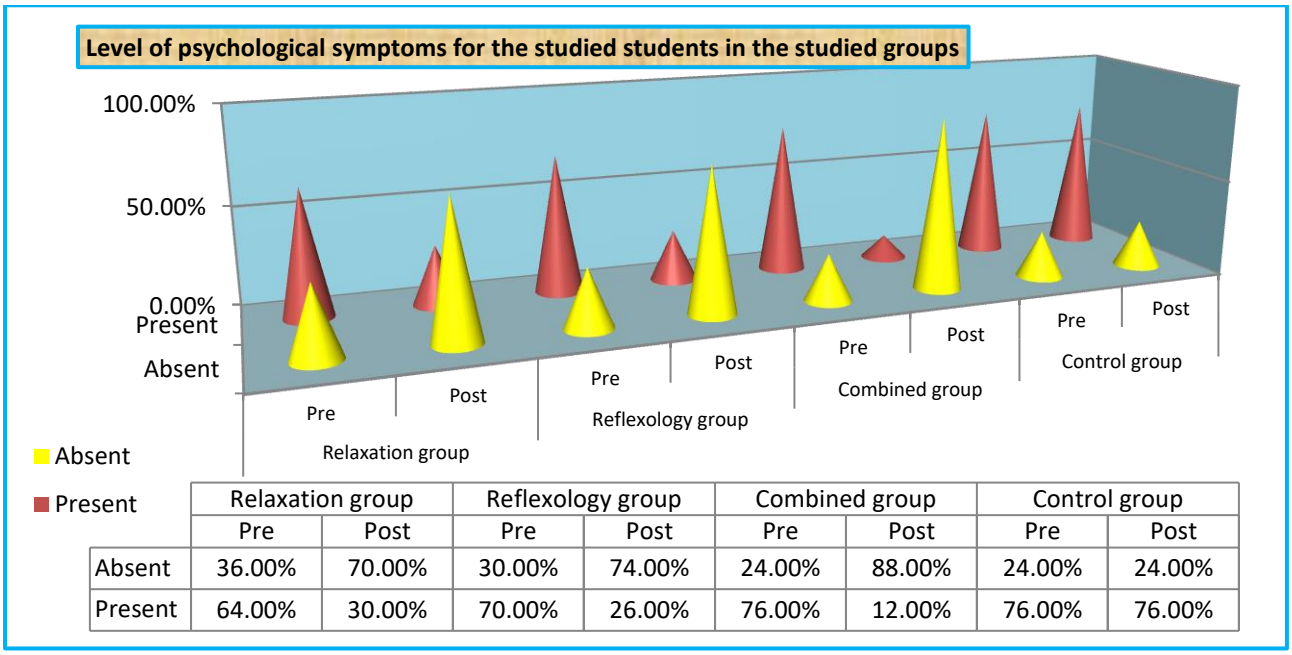
Figure (3): Level of Psychological Symptoms for the Students in the Study Groups on Pre and Post Intervention.



	Relaxation group		Reflexology group		Combined group		Control group	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Absent	36.00%	70.00%	30.00%	74.00%	24.00%	88.00%	24.00%	24.00%
Present	64.00%	30.00%	70.00%	26.00%	76.00%	12.00%	76.00%	76.00%

Figure 3 illustrates level of psychological symptoms for the students in the study groups on pre and post intervention. It shows that on pre intervention, about near two third (64.0%) in the relaxation group, more than two third (70.0%) in the reflexology group and about three quarter (76.0%) in the combined and control groups have psychological symptoms. Meanwhile, the majority of the studied students (88.0%) in the combined group and about three quarters (70.0% &74.0%) in the relaxation and reflexology groups have absent psychological Symptoms on post intervention.

Table (7): Distribution of Behavioral Symptoms for the Students in the Study Groups on Pre and Post Intervention.

Variables	Relaxation group (n=50)				FXT	Reflexology group (n=50)				FXT	Combined group (n=50)				FXT	Control group (n=50)				FXT
	Pre		Post			Pre		Post			Pre		Post			Pre		Post		
	No	%	No	%		No	%	No	%		No	%	No	%		No	%	No	%	
Lowered school or work					.715					269					1.000					1.000
Yes	5	10.0%	3	6.0%		6	12.0%	2	4.0%		2	4.0%	1	2.0%		5	10.0%	5	10.0%	
No	45	90.0%	47	94.0%		44	88.0%	48	96.0%		48	96.0%	49	98.0%		45	90.0%	45	90.0%	
Stay in bed					1.000					.617					.617					1.000
Yes	2	4.0%	1	2.0%		3	6.0%	1	2.0%		3	6.0%	1	2.0%		2	4.0%	2	4.0%	
No	48	96.0%	49	98.0%		47	94.0%	49	98.0%		47	94.0%	49	98.0%		48	96.0%	48	96.0%	
Stay at home					.715					.362					.617					1.000
Yes	5	10.0%	3	6.0%		4	8.0%	1	2.0%		3	6.0%	1	2.0%		5	10.0%	5	10.0%	
No	45	90.0%	47	94.0%		46	92.0%	49	98.0%		47	94.0%	49	98.0%		45	90.0%	45	90.0%	
Avoid social activity																				.422
Yes	30	60.0%	18	36.0%	.027	35	70.0%	15	30.0%	.000	40	80.0%	7	14.0%	.000	30	60.0%	25	50.0%	
No	20	40.0%	32	64.0%		15	30.0%	35	70.0%		10	20.0%	43	86.0%		20	40.0%	25	50.0%	
Decrease efficiency					.001					.000					.000					.402
Yes	35	70.0%	18	36.0%		40	80.0%	20	40.0%		42	84.0%	15	30.0%		35	70.0%	30	60.0%	
No	15	30.0%	32	64.0%		10	20.0%	30	60.0%		8	16.0%	35	70.0%		15	30.0%	20	40.0%	

Table 7 clarifies behavioral symptoms for the students in the study groups on pre and post intervention. It shows that there are improvements in the behavioral symptoms in the study groups (relaxation, reflexology and combined groups) regarding (Avoid social activity & Decrease efficiency). So, there are statistical significance differences between pre and posttest. Meanwhile there are no statistical significance differences between pre and posttest in the control group.

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Table (8): Mean of Total Score of Behavioral Symptoms for the Students in the Study Groups on Pre and Post Intervention.

Variables	*Relaxation group*	*Reflexology group*	*Combined group*	*Control group*	Anova test	p-value
	Mean ± SD	*Mean ± SD*	*Mean ± SD*	*Mean ± SD*		
Total score of behavioral symptoms						
Pre	1.54 ±*1.3*	1.76 ±1.2	1.80 ±1.04	1.54 ±1.3	.640	.590
Post	0.86 ±*1.3*	0.78 ±*1.1*	0.500 ±*0.9*	1.30 ±1.2	4.212	.006
Wilcoxon test	-4.099	-4.928	-5.552	-1.732		
p-value	.000	.000	.000	.083		

Table 8 shows mean of total score of behavioral symptoms for the students in the study groups on pre and post intervention. It reveals that, means of total behavioral symptoms have been decreased on posttest than on pretest in the study groups which also more obvious in the combined group. So, there are highly statistical significance differences between pre and posttest. Meanwhile, there is no change in mean total behavioral symptoms in the control group. So, there is no statistical significance difference between pre and posttest in the control group.

Figure (4): Level of Behavioral Symptoms for the Students in the Studied Groups on Pre and Post Intervention.

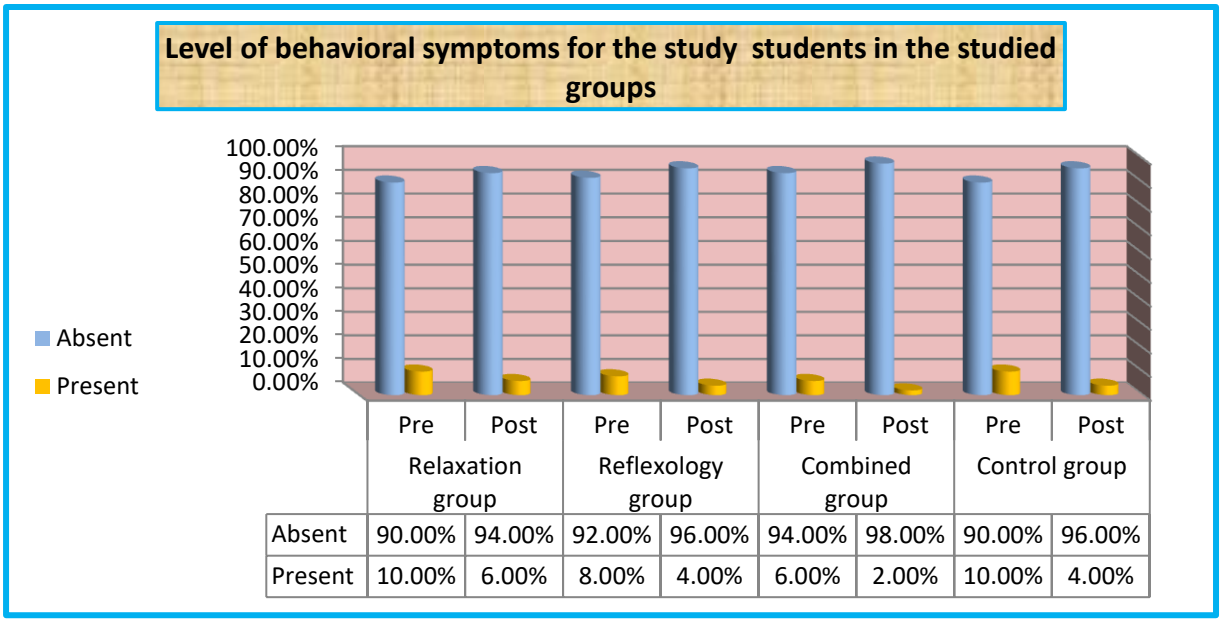

Figure 4 illustrates level of behavioral symptoms for the students in the studied groups on pre and post intervention. It shows that the majority of the studied students (94.0%, 96, 0% 98.0% & 96.0%) in the relaxation, reflexology, combined and control groups respectively have absent behavioral symptoms on post intervention.

4. DISCUSSION

Premenstrual syndrome (PMS) can be referred to as a set of somatic and psychological symptoms that occur periodically in the luteal phase of a menstrual cycle (14). PMS can affect the quality of life of women, so that most of these women have physical problems like dizziness, sweating, weakness, headache, nausea, palpitation, pain and lethargy. As well as, psychological problems like anxiety, irritability, anger, stress, impatience, depression and isolation (15). PMS can be treated by pharmacological and non-pharmacological measures. Non-pharmacological methods, which are called complementary therapies, which include several methods as reflexology and relaxation training are more safe and have less complications than pharmaceutical ones (16). Therefore, the study was carried out to investigate the effect of relaxation training augmented with foot reflexology on symptoms of premenstrual syndrome among nursing female students.

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Regarding socio-demographic characteristics, the findings of the present study revealed that more than three fourth of the study students their age ranged between 18- 20 years old and that the majority of them were from the rural areas. This comes in agreement with (17) who found that most the study sample their age ranged between 18-20 years old and about two thirds of them live in rural regions. But, this study not agree with the present study findings regarding BMI of the study students as they reported that less than half of the study sample had normal BMI. While, the results of the current study showed that more than three fourth of the study students had normal BMI. These results also agree with (18) who found that the mean age of the study students was 21.53 and that the mean BMI for them was 24.04. These similarities shows that the researchers of the current study were successful in selecting the target age group.

Regarding the menstrual history of the stud participants, the current study findings clarifies that more than three fourth of the study students of all groups had age of menarche ranged between 10- 15 years of age, menstrual interval every 28 days, the duration of menstruation ranged between 4-6 days and moderate menstrual flow without clots. This comes near to (17) who reported that the mean age of menarche was 13.28 years, the mean menstrual cycle of subjects was 28.32 days, over half of them had moderate amount of menstrual flow and that most of them without clots. These all also agree with (19) who found that the average age of the students was 19.36±1.61 year, the first menarche age was 13.17±1.32 years and the mean BMI was 21.26±2.77kg/m2. These similarities might be due to similarity in the study age group as they all are students.

Concerning distribution of physical symptoms of the study participants on pre and post intervention, the results of the present study revealed that about two thirds of them in the relaxation group, three quarters in the combined group and more than three fourth of the reflexology group and control groups had physical symptoms on pre intervention. Meanwhile, more than three fourth of the study students in the relaxation, reflexology and the majority of combined group had absent physical symptoms on post intervention. While, there was no improvement in the control group. That shows the extent to which the intervention was an effective in improving the premenstrual symptoms and that the combination between reflexology and relaxation was more efficient in relieving premenstrual symptoms than both of them alone. Reflexology gives an effect as it gives a sense of meditative relaxation which stimulates the parasympathetic system; therefore, its impact on physical symptoms of PMS caused by the improved parasympathetic functions of a number of body systems. These results were supported by (20) who reported that foot reflexology is an effective in improvement of physical and metal symptoms of PMS. Also, these results were confirmed by (21) who reported that the control and progressive muscle relaxation promoted a significant decrease in anxiety and improvement in quality of life scores. As well as, (18) who found an improvement of premenstrual symptoms in the group who received relaxation training techniques only was 9.1% in post intervention than pre intervention and that improvement of premenstrual symptoms in the group who received foot reflexology in addition to relaxation training techniques was 29% in post intervention than in pre intervention. Also, (17) who found that there were highly statistical significant differences regarding pain related symptoms at all stages of intervention. These similarities imply that the combination of both reflexology and relaxation training was efficient in improving the premenstrual symptoms. While this was not supported by (16) who did not report any significant results. This difference may be due to the method used in data collection in which the researchers of that study used Dickerson questionnaire which was completed in two menstruation cycles before the treatment and two cycles during the treatment.

Concerning distribution of psychological symptoms of the study participants on pre and post intervention. The results of the current study showed that there were improvements in all psychological symptoms in the three study groups (relaxation group, reflexology group and more apparent in combined group) on the post intervention than on pre intervention. Meanwhile, there is no improvement in psychological symptoms in the control group. This could be supported by (20) who found that foot reflexology was an effective in mental symptoms of PMS. Also, (22) who concluded that relaxation techniques can be effective for reducing anxiety that in turn will improve quality of life. These results also confirmed by (21) who reported that control and progressive muscle relaxation resulted in a significant decrease in anxiety. As well as, (23) in their study of "Effect of foot reflexology on physical and psychological symptoms of premenstrual syndrome ", and mentioned that the average reduction of PMS symptoms severity was 23.39% among foot reflexology group while it was -9.68% in the control group ($p< p<0.0001$). Also, there were significant differences between the average of physical and mental symptoms in reflexology group compared to the control group. Furthermore (17) illustrated that there was a highly statistical significant difference among negative affect symptoms as anxiety,

irritability, mood swings, depression and crying at different phases of the intervention. Also, the findings of the present study agreed with (24) who found that reflexology might significantly diminish the psychological symptoms of PMS among the intervention group compared to the control group. These all similarities show the degree to which the results of the current study were true and objective. In the other hand, the results of the current study didn't agree with (25) who did not report any significant results. This difference might be due to the different age groups selected in that study which was secondary school students while in the current study they were university students.

As regards with the mean of total scores of behavioral symptoms of the study participants on pre and post intervention. The results of the current study reveals that, the mean of total behavioral symptoms had been decreased on post intervention than on pre intervention in the reflexology group almost equal to the relaxation group. While, the behavioral symptoms were more significantly improved in post intervention than in pre intervention among the combined group. So there were highly statistical significance differences between pre and post intervention. Meanwhile, there was no change in the total mean behavioral symptoms in the control group. This improvement might be caused by stimulation of the reflex points that resulted in general relaxation occurred in the body. This came in accordance with (17) who clarified that there were highly statistical significant differences in behavioral change related symptoms at all phases of the intervention. Also, (26) who suggested that specific relaxation techniques could be to some extent responsible for management of cognitive-behavioral stress. These similarities in results showed the degree to which the intervention was purposive and effective.

The foregoing findings are in contrast with the findings of the study conducted in Iran by Ansari et al., (27) who study "The effect of sole reflexology on the intensity of premenstrual syndrome**",** they confirmed that the therapy can reduce the behavioral symptoms only by 20% which does not show a statistically significant difference that the mean intensity of symptoms before the intervention in both groups showed no statistically significant difference between the two groups. Studying the statistical test results showed that there were not statistically significant differences between the mean differences of the strength of behavioral symptoms of real and unreal reflex zone therapy. That means that the real reflex zone therapy was not successful in lessening the strength of PMS behavioral symptoms. This difference may be due to the difference in cultural values that affects the subjects' methods of applying the intervention on themselves. All the study results highlighting the importance of using the relaxation training augmented with foot reflexology as an effective and less-complicated treatment for symptoms of premenstrual syndrome.

5. CONCLUSIONS

According to the results of the present study that investigate effect of relaxation training augmented with foot reflexology on symptoms of premenstrual syndrome among nursing female students. It could be concluded that: there were less premenstrual symptoms among the female students who applied the relaxation training. This proved the first research hypothesis that students who have premenstrual syndrome and apply relaxation training experience less premenstrual symptoms than before the intervention. There was less premenstrual symptoms among the study participants who applied self-foot reflexology. This proved the second research hypothesis that students who have premenstrual syndrome and apply self-foot reflexology experience less premenstrual symptoms than before the intervention. Also, the current study findings showed that relaxation training and self-foot reflexology can be significantly effective in reducing premenstrual syndrome, while a combination of relaxation training and self-foot reflexology were more effective in reducing premenstrual syndrome in nursing females than relaxation training alone or self-foot reflexology alone in terms of improvement of physical, psychological and behavioral symptoms of PMS. This proved the third research hypothesis that students who have premenstrual syndrome and apply a combination of relaxation training and self-foot reflexology experience less premenstrual symptoms than before the intervention.

6. RECOMMENDATIONS

According to the study findings, the following recommendations are proposed:

- Encourage the female students to practice relaxation training and self-foot reflexology to reduce the premenstrual symptoms.

- Relaxation training and self-foot reflexology should be a clinical practice as an effective nursing interventions to reduce premenstrual syndrome of nursing female students..

Suggestions for future studies:-

•Replication of the same study on large samples may help to draw conclusions that are more definite and generalize to a larger population.

•A comparative study could be conducted to evaluate the effectiveness of reflexology with other non- pharmacological measures for premenstrual syndrome.

•A study could be conducted to evaluate the effectiveness of reflexology for premenstrual syndrome among women.

•A descriptive study could be conducted to assess the knowledge and attitude of nurses towards complementary therapies for premenstrual syndrome.

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