CHAPTER III
SUBJECTS, MATERIALS AND METHODS

I-Subjects

This study was carried out on a random sample of fourty normal females diagnosed as premenstrual syndrome. They were selected from El Gezira Youth Center and clubs related to Ministry of Sports after full examination at Specialized Sports Medicine Center in Nasr City.

Inclusion criteria:

All females had premenstrual syndrome. They were virgins. Their age ranged from 18 to 25 years old and their body mass index (BMI) $\geq 18 \leq 25$ kg/m^2. They were clinically and medically stable during the study, they had regular menstrual cycle of 23 to 35 days interval.

Exclusion criteria:

They were free from: cardiopulmonary or orthopaedic problems, taking any hormonal drugs for three months at least before participation in the study, any abnormality in ovulation or pelvic inflammatory diseases (PID).

They were divided randomly into two equal groups in number;

Group (A) (Study group): which consisted of 20 females engaged into swimming exercise.

Group (B) (Control group): which consisted of 20 females who didn't engage into swimming exercise.

The symptoms must occur during most menstrual cycles and must interfere significantly with work, social activities or relationship.

Initial assessment of premenstrual syndrome symptoms was performed in 3 consecutive months, and then the subjects were referred to the gynecologist to confirm the diagnosis.

A full explanation of the treatment protocol were given for all participants. An informed consent form had been signed by each female in both groups (A&B) before participation in the study **(Appendix I**). Duration of this study was three months (from June 2014 to September 2014).

II – Instrumentations

A- Evaluative instruments:

a) ***History taking*****:** Asking about age, time of menarche, marital status, cycle length, duration of bleeding in menstrual cycle **(Appendix II).**

b) ***Weight and height scale:*** to measure weight and height of each female then BMI was estimated, **(fig.1).**

Fig.(1): Weight and height scale

c) ***Ultrasonography machine***: which was used to exclude any uterine or ovarian abnormalities, **(fig. 2).**

Fig.(2): Ultrasonography machine

d) ***Laboratory investigatioms***: which included complete blood count (CBC), serum prolactin, thyroid stimulating hormone (TSH) to exclude any other possible causes of PMS symptoms and ensured the medical stability of the females during the study **(Kathleen et al., 2010), (fig.3).**

Fig.(3): Blood sampling for laboratory investigations.

e) ***Premenstrual distress questionnaire*:** Re-test reliability of the whole test as well as its whole components have been reported.

These values ranged from 0.993 to 0.998. Validity for the test was claimed on the basis of the fact that it is an adaptation of an existing popular tool with established validity **(Thomas & Narayanan, 2006).**

Each female rated her experience of 47 symptoms on a six-point scale separately for the menstrual, premenstrual, and intermenstrual phases of her most recent menstrual cycle and for her worst menstrual cycle. She filled the questionnaire in the form of "Daily Symptoms Report" at the start of the study and another time after finishing the study (before and after performing swimming exercise) **(Appendix III)**.

The 47 symptoms were intercorrelated and factor analyzed separately for each phase, and eight basically replicated factors were extracted from each of these analyses. These factors which represent separate but empirically intercorrelated clusters of symptoms were labeled (pain, concentration, behavioral change autonomic reactions, water retention, negative affect, arousal, and control). Scores on these eight clusters of symptoms were slightly correlated with age and parity. The scores were not affected by the specific menstrual cycle phase a female was in when filling out the questionnaire or by the length of time since the female had experienced the symptoms **(Johnson et al., 2007).**

B) Treatment instrument

- A swimming pool for performing the swimming exercise, **(fig. 4)**.

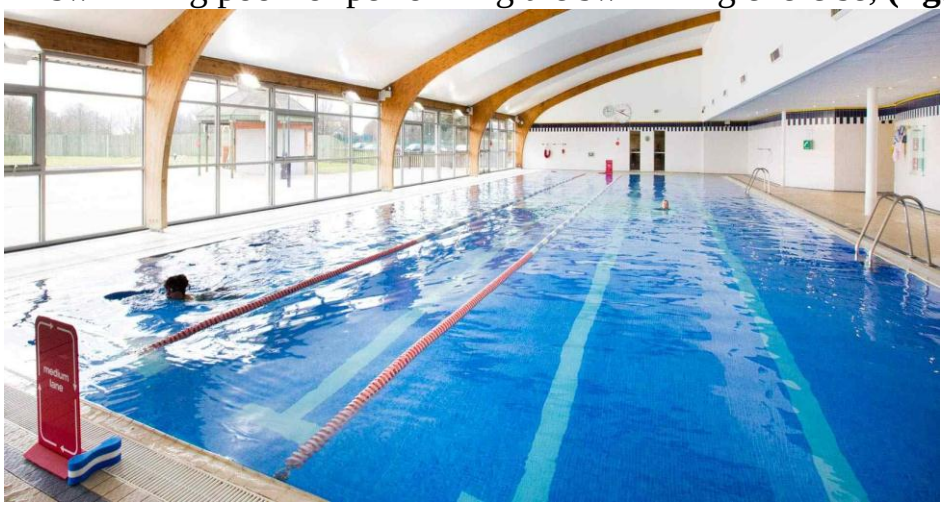

Fig.(4): A swimming pool for exercise performance.

III- Treatment procedures

Fourty females were divided randomly into two equal groups, history was taken, the examination includes pelvic examination using the ultrasonography machine that excluded any other causes of the symptoms, laboratory investigations were taken includes complete blood count (CBC), thyroid stimulating hormone (TSH) and serum prolactin level and the results were normal, the weight and height of each female were taken and the body mass index (BMI) was calculated, **(fig.5).**

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Fig.(5): Estimating the weight and height of female to calculate BMI.

Females in group (A) were instructed to engage into swimming exercise as following:

The female was asked to perform swimming exercise for 3 months ,3 times per week for 30 minutes per day. She stopped exercise on the first three days of menstrual cycle and after that she returned back to exercise again.

The exercise was divided into three stages:

-Warming up phase: it included 5 minutes of exercise at low intensity in the form of breathing exercise, circulatory exercise and stretching exercise.

1- Breathing exercise includes:

a) ***Diaphragmatic breathing exercise:***

The female was asked to choose the preferred position and relaxed completely, then was asked to take deep inspiration from her nose, make

her abdomen like a balloon by pushing her hands which placed on it then expired the air from her mouth with a sigh and slowly, repeated the previous breathing exercise 3-5 times and relax, **(fig.6).**

Fig.(6): Diaphragmatic breathing exercise in the warming up phase before swimming exercise.

b) Costal breathing exercise:

From any comfortable position, the therapist asked the female to take deep breath from her nose, open out her ribs and expired the air from her mouth with a sigh slowly, repeated the previous breathing exercise 3-5 times and relax.

2- Circulatory exercises:

Circulatory exercises included foot and ankle exercises by instructing the female to point her toes up and down (ankle pumps), doing isometric contractions of calf muscle and general mobilizing exercise (flexion and extension of the knee joint), **(fig.7)**.

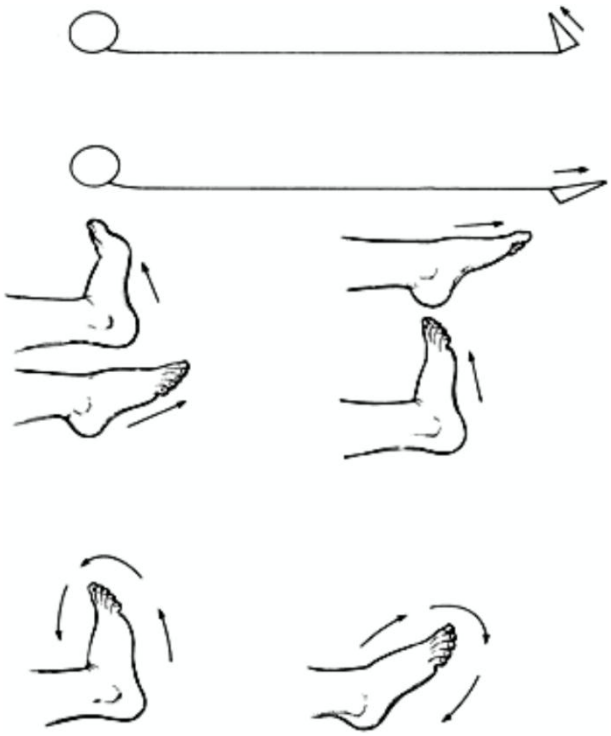


Fig.(7): Circulatory exercise through ankle pump.

3- Stretching exercise:

Stretching exercise of neck flexors, neck extensors, latissimus dorsi, posterior fibers of deltoid, triceps, pectoralis major, supraspinatus, wrist extensors, lumbar extensors, abdominal, lumbar flexors, lumbar rotators, hamstrings, adductor, gluteal, gastrocnemius, hip flexors, tensor fascia latae and quadriceps muscles were performed during warming up phase, **(fig.8).**

Fig.(8): Stretching exercise of various muscle groups in warming up and cooling down phases of swimming exercise.

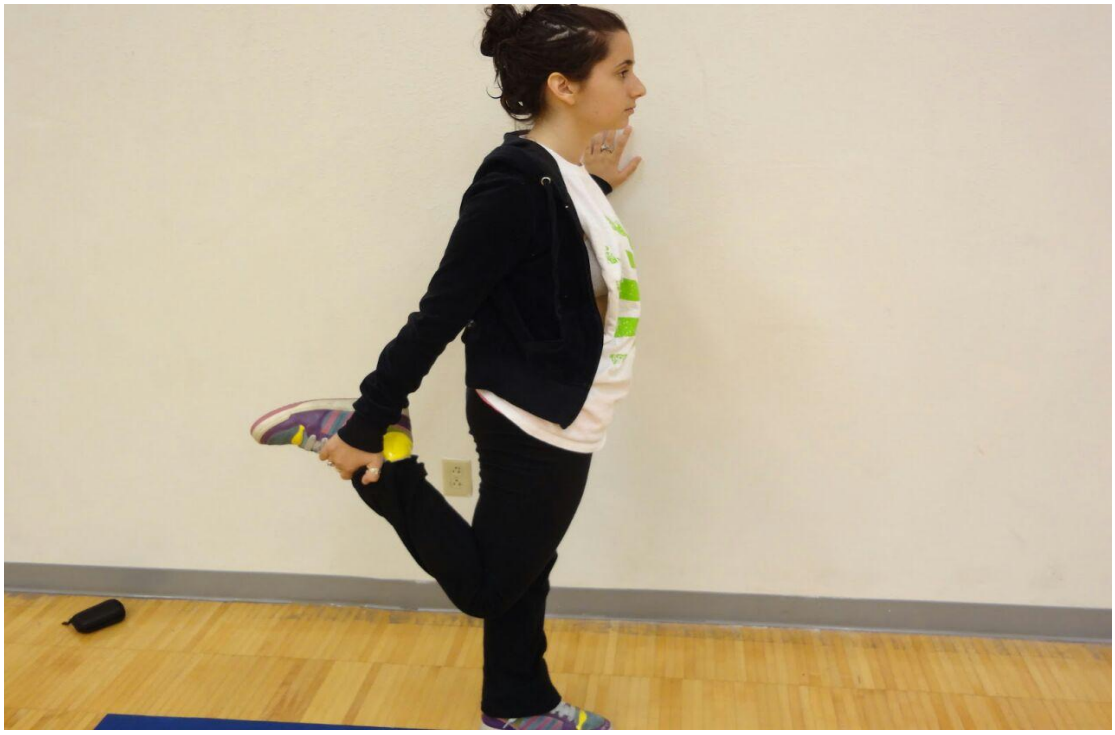


Fig.(9): A female doing quadriceps femoris stretch in warming up phase of exercise.

Fig. (10): Hip flexors muscles stretch

Fig.(11): Supraspinatus muscle stretch.

The second phase of treatment was swimming exercise as the female was instructed to perform swimming exercise for 20 minutes.

The exercise began by walking inside the pool around its edges for 5 minutes, then the female began to perform swimming exercise level forth and back without reaching fatigue level for 15 minutes.

The last phase was cooling down phase which was the same exercises of the warming up phase for 5 minutes, **(fig.8&9).**

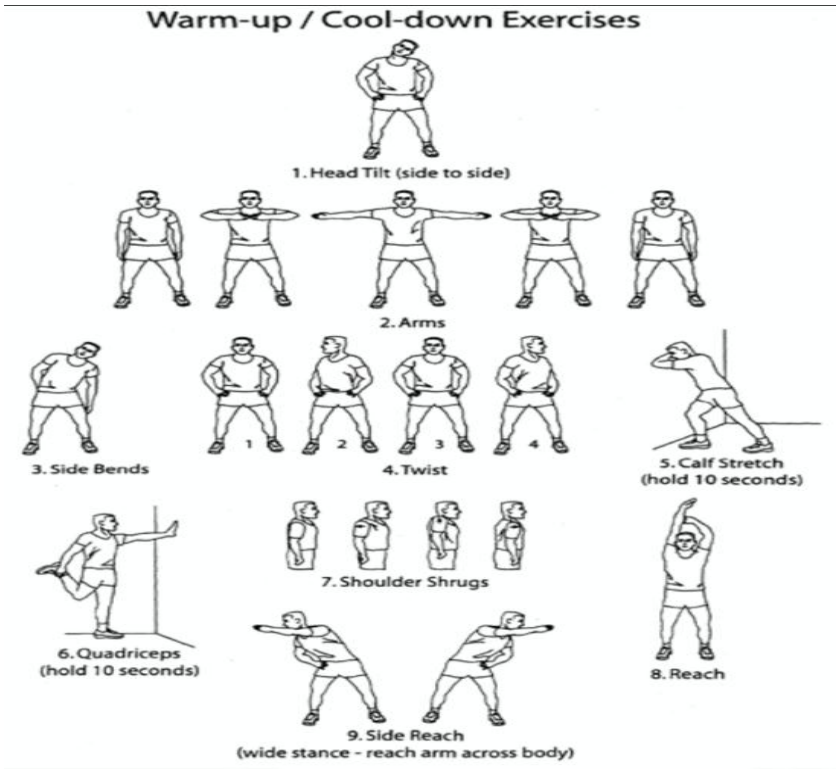


Fig.(12): Warming up and cooling down phases of exercise.

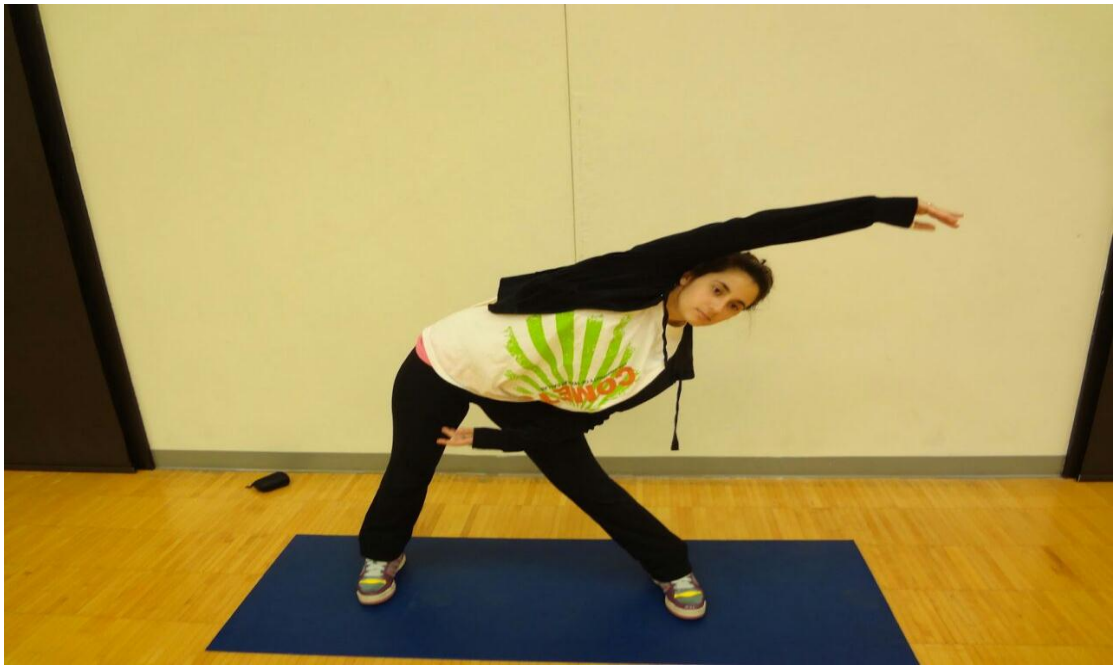


Fig.(13): A female doing side bends during warming up and cooling down phases of exercise.

(C) Statistical analysis:

SPSS version 20.0 was used for data management and data analysis. Median and range described quantitative data. Non-parametric t-test (Mann Whitney test) compared medians of the 2 study groups. Percent change in different score is the difference between the initial score and score after swimming exercise in experimental group and after the same period in control group calculated as a percent from the initial score. For scores that decreased on the average the signs of change will be negative. P value is always 2 tailed and considered significant at 0.05 level .

CHAPTER IV

RESULTS

The purpose of this study was to investigate the effect of swimming exercises on premenstrual signs and symptoms. Forty female participated in this study. They were divided randomly into two matched groups, each group consisted of 20 subjects, the first group was the study group who performed swimming exercises, and the second group was the control group who didn't perform any exercise.

Data obtained from groups prior and following the exercise program regarding premenstrual signs and symptoms were statistically analyzed and compared. The design of this study was clinical controlled trial.

General characteristics of the subjects:

Study group:

Twenty female with premenstrual syndrome were included in this group that performed swimming exercise. Their mean values of age and BMI were 21.1 ± 2.33 years and 21.11 ± 1.21 kg/m² respectively**. (Table 1 & figure 14-15).**

Control group:

Twenty female with premenstrual syndrome were included in this group. Their mean values of age and BMI were 21.15 ± 1.66 years and 20.84 ± 1.41 kg/m² respectively. **(Table 1 and figure 14-15).**

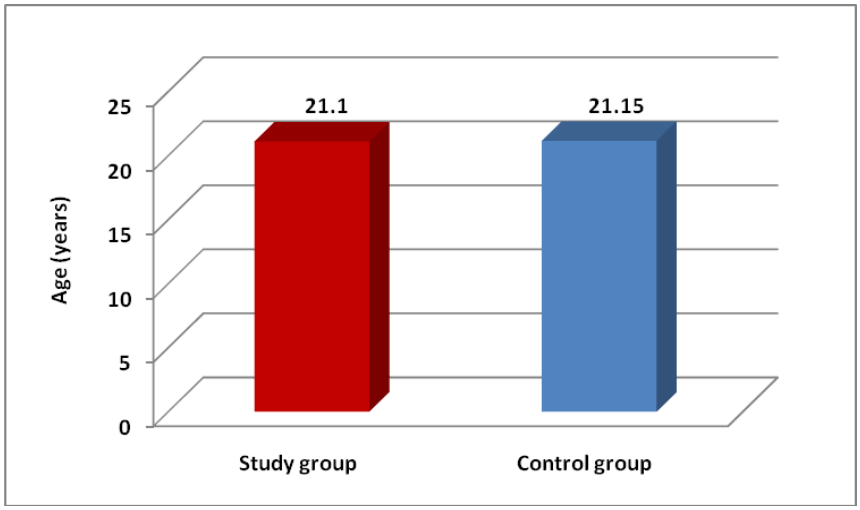
Comparing the general characteristics of the subjects of both groups revealed that there was non significance difference ($p > 0.05$) between both groups (A&B).

Table (1): Mean values of age and BMI of both groups (A&B).

	Study group	Control group	p-value	Significance
	$\bar{X}$± SD	$\bar{X}$± SD		
Age (years)	21.1 ± 2.33	21.15 ± 1.66	0.94	**NS**
BMI (kg/m²)	21.11 ± 1.21	20.84 ± 1.41	0.53	**NS**

$\bar{X}$: Mean **p value: Probability value**

SD: Standard Deviation **NS: Non significant**



Fig(14): Mean values of age in both groups (A&B).

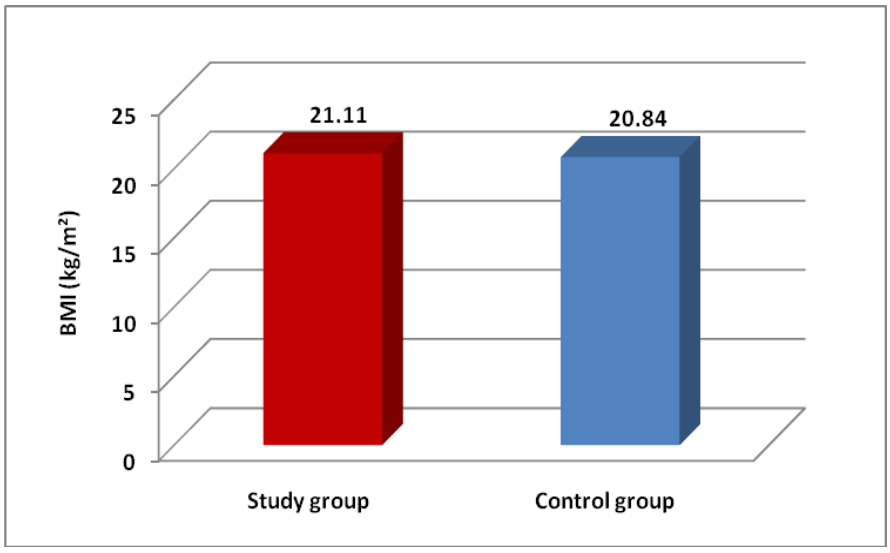


Fig (15): Mean values of BMI in both groups (A&B).

I- Comparison of premenstrual signs and symptoms between groups pre treatment

Anxiety

The median value of anxiety pre treatment of study group was 1 and that of control group was 5. There was non significant difference ($p > 0.06$) in the median values of anxiety pre treatment between study and control groups, **(Table 2&figure 16).**

Irritability

The median value of irritability pre treatment of study group was 0 and that of control group was 0. There was non significant difference ($p > 0.69$) in the median values of irritability pre treatment between study and control groups, **(Table 2&figure 16).**

Depression

The median value of depression pre treatment of study group was 14 and that of control group was 10. There was a highly significant difference ($p >0.001$) in the median values of depression pre treatment between study and control groups, **(Table 2&figure 16).**

Tension

The median value of tension pre treatment of study group was 15 and that of control group was 12. There was non significant difference ($p > 0.07$) in the median values of tension pre treatment between study and control groups, **(Table 2&figure 16).**

Mood

The median value of mood pre treatment of study group was 1 and that of control group was 6. There was non significant difference ($p > 0.84$) in the median values of mood pre treatment between study and control groups, **(Table 2&figure 16).**

Feeling out of control

The median value of feeling out of control pre treatment of study group was 5 and that of control group was 7. There was non significant difference ($p > 0.88$) in the median values of feeling out of control pre treatment between study and control groups, **(Table 2&figure 16).**

Poor coordination

The median value of coordination pre treatment of study group was 11 and that of control group was 12. There was non significant difference ($p > 0.46$) in the median values of cordination pre treatment between study and control groups, **(Table 2&figure 16).**

Insomnia

The median value of insomnia pre treatment of study group was 2 and that of control group was 0. There was a highly significant difference ($p > 0.003$) in the median values of insomnia pre treatment between study and control groups, **(Table 2&figure 16).**

Confusion

The median value of confusion pre treatment of study group was 10 and that of control group was 11. There was non significant difference ($p > 0.55$) in the median values of confusion pre treatment between study and control groups, **(Table 2&figure 16).**

Headache

The median value of headache pre treatment of study group was 14 and that of control group was 17. There was non significant difference ($p > 0.12$) in the median values of headache pre treatment between study and control groups, **(Table 2&figure 16).**

Crying

The median value of crying pre treatment of study group was 0 and that of control group was 0. There was non significant difference ($p >$