

Original Article

The effect of eight weeks aerobic exercise on psychological symptoms of premenstrual syndrome

Zahra Mohebbi-Dehnavi^{1*}, Farzaneh Jaafarnejad², Zahra Kamali³, Ala-Saber Mohammad³

¹Department of Midwifery, School of Nursing and Midwifery, Isfahan University of Medical Sciences, Isfahan, Iran

²Department of Midwifery, School of Nursing and Midwifery, Mashhad University of Medical Sciences, Mashhad, Iran

³ Student Research Committee, Department of Midwifery, School of Nursing and Midwifery, Mashhad University of Medical Sciences, Mashhad, Iran

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ABSTRACT

Background & Aim: Premenstrual syndrome includes physical and psychological symptoms that occur at the end of menstrual cycle and exercise is one of the ways to reduce symptoms. The aim of this study was to determine the effect of regular 8-week aerobic exercise program on psychological symptoms of premenstrual syndrome.

Methods & Materials: This clinical trial study was carried out on 65 dormitory students of Mashhad University of Medical Sciences. The samples were selected using available sampling method and were included in the study if they had premenstrual syndrome. The intervention group performed aerobic exercise for 8 weeks, three times a week and 20 minutes for each session. The control group completed only the questionnaires. The tool was research recorded daily symptoms of premenstrual syndrome. Data analysis was done using SPSS software.

Results: At the beginning of the study, two groups of control and intervention were homogeneous for demographic variables and psychological symptoms. According to the results of independent t-test, the scores showed after intervention, Among the ten psychological signs of premenstrual syndrome, four signs of anger outbreak ($p = 0/01$), loneliness ($p = 0.04$) and irritability ($p = 0/01$), Mood swings ($p = 0.01$) difference Has a significant relation with the control group, However, the difference in pre and post scores in the two groups was significant only in the symptom of mood fluctuation ($p = 0.02$).

Conclusion: The results of this study showed that eight weeks of aerobic exercise training were effective in reducing the number of psychological symptoms of premenstrual syndrome, Therefore, these exercises may be combined with other therapies for the treatment of psychological symptoms of premenstrual syndrome.

Introduction

Premenstrual syndrome is one of the most common disorders of reproductive age associated with periodic changes in physical, psychological and behavioral conditions. This syndrome starts 6-12 days before the start of monthly bleeding and lasts for 2 days (max. 4 days) after the bleeding (1).

In the current era, with the increasing role of women and the achievement of high-responsibility positions in the labor market

for women, premenstrual problems have deprived them of having the best performance in their work. One of the problems caused by premenstrual syndrome is the educational outcomes and the negative effects on students 'and students' academic performance, family outcomes, and the controversy between women, spouses and children and other members of the family, the economic consequences of absenteeism Working and reducing the efficiency of individuals in daily activities and social outcomes such as increased incidents and committing crimes, which emphasizes the

* Corresponding Author: Zahra Mohebbi-Dehnavi, Postal Address: Faculty of Nursing and Midwifery, Isfahan University of Medical Sciences, Isfahan, Iran. Email: Zahra.midwife@yahoo.com

importance of eliminating premenstrual problems for women (2).

Some researchers estimate that more than 90 percent of women of reproductive age experience some symptoms of premenstrual syndrome. Also, the research conducted in Iran reported the prevalence of this syndrome 62/4% and 67.7%. This suggests that a large number of women suffer from this disorder (3).

Premenstrual syndrome may occur at any time during the years of fertility, but when the symptoms occur, it persists predominantly until the menopause and improves at the time of menopause (4). Premenstrual syndrome symptoms are divided into two categories of psychological and physical groups. Some of the psychological symptoms include anxiety, irritability, depression, loss of control, drowsiness, insomnia or sleepiness, nervousness, aggressiveness, tendency to suicide, jumpiness, restlessness, confusion, social phobia (1, 4, 5).

Numerous factors make women vulnerable to premenstrual syndrome (6). the researchers have mentioned different causes as predisposing factors of this syndrome such as diet, taking oral pills before pregnancy, menstrual and reproductive history, social and cultural factors, pregnancy history. Reductions in endorphins, lack of essential fatty acids, acid disorder, prostaglandin balance and lifestyle are also known as causes of the syndrome (7-10) . Some recommended treatments to reduce premenstrual syndrome symptoms include pharmaceutical treatment such as: analgesics like mefenamic acid, danazole, antidepressant drugs including serotonin reuptake inhibitor, herbal medicine (Saffron, valerian), surgical therapy (removal of ovaries), non-pharmaceutical treatments (yoga, exercise) and lifestyle modification (11-13). With regard to the side effects of surgical and pharmaceutical treatments, they

are used only in severe cases or cases where the patient is not responsive to other treatments. Hence, researchers who investigate the afflicted women have become more interested in non-pharmaceutical treatment and physical exercise (14).

Among the non-pharmacological methods and lifestyle changes affecting the premenstrual syndrome, regular and continuous exercise programs. Exercise has a positive effect on one's abilities and increases his practical capacity. The effect of sports activities on premenstrual syndrome has been studied in various studies. Exercise can release beta-endorphins from the brain. Beta-endorphin affects the various actions of the hypothalamus, including fertility regulation, heat, cardio-respiratory depression, blood circulation improvement, perception of pain and mood. The exercise balances the body's lifestyle and reduces the severity of the pressure that often causes issues before the menstruation (15). Mild exercise balances body activities and reduces the intensity of the pressures which often cause problems before menstruation. Women who have more physical activity often complain less about premenstrual syndrome symptom(1). Exercise can be affected by the reduction of cortisol levels on the suprarenal glands - kidney-pituitary-hypothalamus axis, which can lead to changes in behavioral or psychological responses to stress and improve symptoms of premenstrual syndrome (16). Physical activity has beneficial effects on one's ability and increases his practical capacity. It also increases the efficiency of the mind, the sense of happiness and health, and by providing a good attitude to life, it provides mental health to the person. Women are more likely to be affected by psychological factors than men. And the good feeling in them increases more than men (17).

Aerobic exercise seems to increase the level of circulating endorphins and reduce adrenal cortisol for a short time and act as a non-specific analgesic, and can also reduce the symptoms of depression and psychological problems (18). Aerobic exercise also plays an important role in reducing stress, anger, depression, pain, and overall severity of premenstrual syndrome. Exercise like walking, cycling, swimming and running smoothly is a good way to suppress stress and eliminate premenstrual syndrome (19). In the study of de la Cerda and colleagues 8 weeks of aerobic exercise was performed on 82 women with moderate depression. The results of this study showed that aerobic training as a treatment can be used to reduce symptoms in patients with moderate depression (20).

The Lustic study in 2004 Indicated non-linear relationship between exercise and symptoms of premenstrual syndrome, In that way, stresses in women who exercise were more often than women who often exercise or even exercise. In fact, This study focuses on having regular exercise programs to reduce the symptoms of premenstrual syndrome (21). The study of Yekeh Fahlah (2013) and colleagues (22) , Moghaddisi (2009) and colleague) (2) Emami (2008) and colleagues (23) , Silva and colleagues (24) (2006) , sadler and colleagues (25) (2010), Mousavi (2015) and colleagues (26) Who have been studying the effect of physical activity on symptoms of premenstrual syndrome, reported that aerobic exercise had no significant effect on the psychological symptoms of premenstrual syndrome.

While Samadi and colleagues (2012)(3), Ghanbary and colleagues (2008)(27), Tonekaboni and colleagues (2012) (28), Karimian (2006) and colleagues (14), Vishnupriya (2012) (29) were emphasized The positive and significant effects of aerobic exercise on psychological symptoms of premenstrual syndrome.

Sehati shafaei and colleagues (2013) highlighted this issue that There is no difference between athletes and non-athletes in their psychological symptoms of premenstrual syndrome (30). Regarding the high prevalence of this syndrome among women of reproductive age, and given many studies, there are many contradictory results in this regard. The researcher decided to conduct a study to determine the effect of 8 weeks of regular aerobic exercise on the severity of all psychological symptoms of premenstrual syndrome according to the recorded daily symptoms of premenstrual syndrome questionnaire.

Methods

We conducted this clinical trial study with IRCT 2015021721116N1 code, for 4 months on the dorm students of Mashhad University of Medical Sciences in the academic year 2014-15. A statistics consultant estimated the sample size as 35 individuals in each group according to Azhari et al. study and by taking into account $\alpha = 0.05$ and $\beta = 0.2$ with the inclusion of sample loss.

The requirements to be included in the study were as such: the individual must be a student and a resident of dormitory with 20-40 years of age, 21-35 days regular cycles with a 10-3 days period of bleeding, with premenstrual syndrome according to two standard questionnaires of temporary determination of premenstrual syndrome (had experienced 5 symptoms out of 11 symptoms of temporary determination of premenstrual syndrome questionnaire and one of those symptoms was among the first 4 symptoms of the questionnaire) and recorded daily symptoms of premenstrual syndrome (People with moderate severity and intense: score 30-60%), the individual must not be pregnant, without chronic (renal, respiratory, cardiac, diabetes, hypertension, asthma, headache, migraine, thyroid, anemia, neuro-psychological) disease, without depression(the individuals

who scored below 40% in depression questionnaire), not engaged in physical exercise courses or other sports programs, and no continuous use of medication (antihypertensive, antidepressant, antihistamine, anticholinergic, hormonal drugs), no stressful and unpleasant incident during the past 3 months, and People with mild severity (0-29%) or very intense severity (60% and above) of premenstrual syndrome were excluded from the study. the criteria to exclude from the study included: unwillingness to continue the research, pregnancy during the study, irregular menstrual cycles during two months, failing to fill the questionnaire of recorded daily symptoms of premenstrual syndrome (3 consecutive days and 5 intermittent days), failure to do the exercises for 3 consecutive sessions or 4 intermittent sessions, and occurrence of bad and stressful incident during the study. Written consent was obtained from all the samples for participation in the study, and they were assured that they could leave the research at any stage of the research. It was recommended for samples with severe depression and severe premenstrual syndrome be followed up by their specialists.

The instruments used in this study were two questionnaires. The first questionnaire was related to the overall profile and the personal and midwifery characteristics of the participants. Included 19 questions, 6 questions about personal particulars, 10 questions about midwifery and menstrual particulars, and 3 questions about the daily diet. The second questionnaire was Recorded daily symptoms of premenstrual syndrome, which consists of 22 symptoms (12 signs of the most common physical symptoms and 10 symptoms of psychological symptoms) among the most common symptoms of premenstrual syndrome. In this article, 10 questions about psychological symptoms have been investigated. Psychotic symptoms include

anger, anxiety, confusion, fatigue, poor concentration, crying, depression, irritability, forgetfulness, mood fluctuations, tendency to be alone and overly sensitive. The questionnaire should be completed at least 4 months (2 months before the intervention and 2 months after the intervention) from the first day of menstruation bleeding. The severity of the symptoms was reported with a quaternary Likert scale {(No) the desired mark is missing. 1 (Mild) the sign is noticeable but without causing a problem. 2 (Medium) the mark is interfering with the usual activities of life. 3 (Extreme) an unacceptable sign is incapable of performing routine activities }

The validity of this questionnaire has been confirmed by Shakeri and colleagues In 2013 (31). The reliability of the questionnaire by the researcher in this study was determined by the internal consistency of Cronbach's alpha, so that the questionnaire was completed and collected by 10 units of research. The reliability coefficient was 0.77.

In a face-to-face session, the research units of the intervention group learned the aerobic sport exercises. The research units of the intervention group received educational posters and CD containing all of the learned movements. They were asked to do the aerobic exercises for 8 weeks, 3 times a week and 30 minutes each time. Each exercise session included warming up movements for the first 5 minutes (including head movements, stretching and rotation of the shoulders and maintaining balance), cooling down for the last 5 minutes (movements in sitting and lying-down position to return to the initial state) and in the time between the two, aerobic exercises (kinetic movements including rotating and stretching the arms, rotating the upper body, standing-in-place movements).

In order to do research, the researcher invited all people with premenstrual syndrome in a recall.

Due to the lack of interference in the results, two dormitories were randomly selected from the four student dormitories and among the two dormitories, one was considered as the control group and one as the intervention group. In each dormitory separately, a researcher distributed the Recorded daily symptoms of premenstrual syndrome questionnaire among people with inclusion criteria and they were asked to complete questionnaires for 2 consecutive cycles. After two cycles, the intervention group performed 8 weeks of trained aerobic exercise and completed questionnaires for 2 cycles during aerobic exercise. The control group, like the intervention group,

completed the questionnaires, Except that they did not do any sports activities.

During the four months of the study, twice a week, the researcher made phone calls to the research units and once every two weeks, the researcher visited the volunteers. At the end of the four months of the study, only 65 people (35 in the intervention group and 30 in the control group) of 70 research units submitted the filled questionnaires. Figure 1 shows this study's process.

Data were analyzed by SPSS software. Independent T-test was used for normal distribution of variables. In the tests, the confidence coefficient was 95% and the significance level was $\alpha < 0.05$.

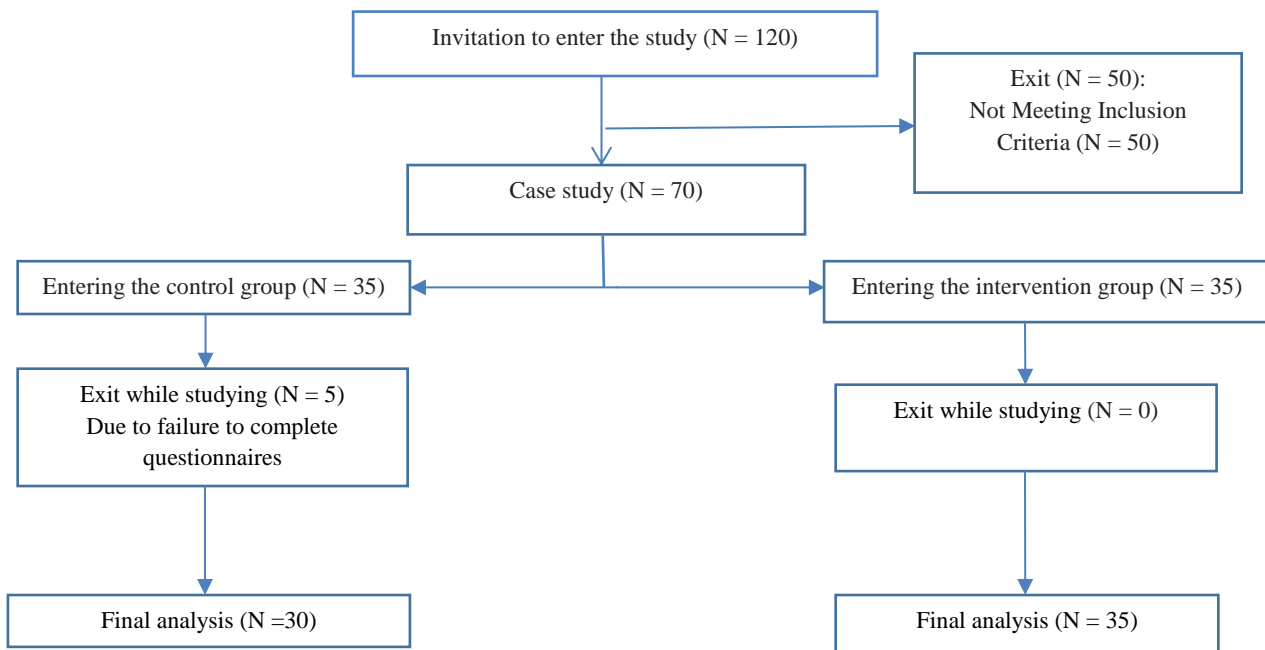


Figure1. Consort flow diagram of the study

Results

Of the 70 volunteers, 65 remained at the end of the study. Five people in the control group were excluded from the study because they did not complete the questionnaires. The mean age of the participants in the intervention group was 25.22 ± 4.41 and in

the control group it was 24.06 ± 4.71 . Most of the participants were single in the intervention group 77.1% (27) and in control group, 60% (18 persons). The two groups were homogeneous for all demographic characteristics (Table 1). The scores of ten psychological symptoms of premenstrual syndrome were similar before the

intervention in the two groups. According to the results of independent t-test, the scores showed after intervention, Among the ten psychological signs of premenstrual syndrome, four signs of anger outbreak ($p = 0/01$), loneliness ($p = 0.04$) and irritability (p

$= 0/01$), Mood swings ($p = 0.01$) difference Has a significant relation with the control group, However, the difference in pre and post scores in the two groups was significant only in the symptom of mood fluctuation ($p = 0.02$) (Table 2).

Table 1. Qualitative variables of participants' demographic indicators

Variable	Intervention N (%)	Control N (%)	P value
History of absenteeism	13(37.1)	9(30)	0.54
History of using pre-study treatment	16(45.7)	10(33.3)	0.31
History of impact on us before the study	11(31.4)	8(26.7)	0.49
Single	27(77.1)	18(60)	0.13
Married	8(22.9)	12(40)	

Table 2. The mean of indicators of psychological symptoms of premenstrual syndrome in the control and intervention groups before and after the intervention

Psychological symptoms		Control group Mean \pm SD	Intervention group Mean \pm SD	P value
The outbreak of anger and violent tendencies	Before	0/83 \pm 1/08	1/14 \pm 1/28	0/30
	After	0/76 \pm 1/13	0/6 \pm 0/8	0/01
	Difference	-0/06 \pm 0/5	-0/5 \pm 0/8	0/08
Concern, tension, nervousness	Before	0/93 \pm 1/14	1/14 \pm 1/19	0/47
	After	0/7 \pm 1/02	0/60 \pm 0/77	0/1
	Difference	-0/2 \pm 0/5	-0/5 \pm 0/8	0/06
Dizziness and poor focus	Before	0/2 \pm 0/61	0/11 \pm 0/47	0/5
	After	0/1 \pm 0/3	0/05 \pm 0/23	0/2
	Difference	-0/1 \pm 0/3	-0/05 \pm 0/3	0/5
Easy to cry	Before	1/33 \pm 1/24	1/05 \pm 1/16	0/3
	After	1/02 \pm 1/32	0/71 \pm 0/89	0/2
	Difference	-0/3 \pm 0/4	0/3 \pm 0/6	0/06
Depression	Before	1/73 \pm 1/44	1/37 \pm 1/13	0/2
	After	1/3 \pm 1/08	1/8 \pm 5/49	0/2
	Difference	0/4 \pm 0/6	0/5 \pm 5/1	0/3
Loneliness	Before	1/06 \pm 1/33	1/05 \pm 1/13	0/9
	After	0/76 \pm 1/13	0/62 \pm 0/77	0/04
	Difference	-0/3 \pm 0/91	-0/4 \pm 0/6	0/5
Forgetfulness	Before	1/26 \pm 1/25	1/32 \pm 1/13	0/8
	After	1/0 \pm 1/16	0/88 \pm 0/93	0/2
	Difference	-0/2 \pm 0/5	-0/3 \pm 0/5	0/5
Irritability	Before	1/2 \pm 1/27	1/11 \pm 1/23	0/7
	After	1/10 \pm 1/17	0/65 \pm 0/83	0/01
	Difference	-0/2 \pm 0/4	-0/4 \pm 0/7	0/08
Mood swings	Before	1/53 \pm 1/10	1/7 \pm 1/10	0/5
	After	1/23 \pm 1/13	1/02 \pm 0/78	0/01
	Difference	-0/3 \pm 0/6	-0/6 \pm 0/7	0/02
Too sensitive	Before	1/33 \pm 1/24	1/0 \pm 1/11	0/2
	After	0/06 \pm 0/25	0/05 \pm 0/23	0/08
	Difference	-0/13 \pm 0/7	-0/3 \pm 0/5	0/2

Discussion

In this study (eight weeks of aerobic exercise), there was a significant decrease in mental symptoms of premenstrual

syndrome. In the study of Azhary and colleagues, 8 weeks aerobic exercise reported a significant reduction in irritability symptoms ($p = 0.001$), depression ($p = 0.001$) and feeling under pressure ($p =$

0.003), and on Anger, anxiety, irritability and a tendency to specific foods did not change significantly ($p < 0 / 005$) (32). Also, Karimian and colleagues reported that exercise caused a significant decrease in irritability ($p = 0.02$), anxiety ($p = 0.008$), boredom ($p = 0.001$), crying ($p = 0.001$) Desire to stay at home ($p = 0.001$), depression ($p = 0.03$) and avoidance of social activity ($p = 0.02$), but no significant effect on anger, forgetfulness, insomnia, and sensory concentration.(33) Also, the results of Vishnupriya study showed that exercise can reduce symptoms of premenstrual syndrome (29) But Aimee and colleagues reported that there is no significant relationship between exercise and premenstrual syndrome (34). In 2004, Lustik and colleagues conducted a research on stress, quality of life, physical activity, and symptoms of premenstrual syndrome. This study was performed on 114 women aged 18-33 years old and divided into 2 severe and weak groups in terms of symptoms of premenstrual syndrome. Studies have shown that people who exercise at times experience more severe symptoms than those who often exercise (21). Yekeh Fallah and colleagues reported that the average of psychological symptoms such as anger, anxiety, irritability and self-esteem were decreased in the walking and aerobic groups one month later and three months after intervention, but it was not statistically significant. Finally, there was no significant difference in the general comparison of psychological symptoms in the three months of the intervention period (22). In the study of Emami, which was done on 91 women living in Tehran, the subjects were divided into 3 experimental and control groups with experience and experience without exercise history. During 3 months, three hours per week and for one session, one hour of exercise was performed. The results showed that there was no significant decrease in

psychological and neurological symptoms in the athlete group (23). Also, in the study of Moghadasi and colleagues on 100 female students of Ilam University of Medical Sciences, the results indicated that exercise was not effective in reducing psychological symptoms (2). The results of Maslanejad's research on 40 students of Jahrom University of Medical Sciences during 8 weeks, three times a week showed that exercise does not affect the improvement of psychological symptoms of premenstrual syndrome (35). Tonekaboni study was performed on 90 women. Individuals were selected from the Tonekabon Azad University and were aerobically trained 3 months and 3 times a week. Tonekaboni confirms the positive effects of exercise on reducing the symptoms of premenstrual syndrome (28). Also, Ganbari's study showed a significant decrease in neurological and emotional symptoms, but there was no significant decrease in skin and behavioral symptoms (27). According to the research, exercise seems to play a role in eliminating the distressing symptoms of premenstrual syndrome. However, the reason for the lack of consistency between the results of this study and existing research and the effect of exercise on the symptoms in different studies can be found in the practice style, intensity of activity, and the multivariable symptoms of premenstrual syndrome, such as the life or lifestyle of people.

Regarding the mechanism of exercise effect on the psychological symptoms of premenstrual syndrome, it can be concluded that the amount of estrogen and progesterone hormone levels decreases at the end of the luteal stage. The rate of reduction of progesterone hormone is higher than that of estrogen. High levels of estrogen and progesterone deficiency and magnesium deficiency cause psychological symptoms. Physical activity can increase the amount of

progesterone and balance estrogen and progesterone levels. This increase in progesterone reduces psychological symptoms and eliminates insomnia (3).

Also, physical activity with the mechanism of action on brain endorphins including endorphins, enkephalin and serotonin improves mood symptoms. Stress and anxiety by reducing the brain endorphins and increasing cortisol and adrenal leads to mood symptoms in people (3). Since this syndrome can have negative effects on the efficiency and presence of women in their employment centers, the existence of this syndrome also has a damaging effect on the economic aspect. With the emphasis on the results of the research, exercise can be combined with other therapies to reduce the symptoms of this syndrome.

The results of this study showed that eight weeks of regular aerobic exercise in people with premenstrual syndrome can reduce the symptoms of mood swings in premenstrual syndrome. Regarding this point, it is recommended that aerobic exercises be performed more on a larger number of specimens and in combination with other therapeutic methods in order to make Body's hand to a more effective treatment.

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Conflict of Interest

The authors of this study declare no conflicts of interest.

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