

The Effect of Vitex Castus Extract and Exercise Training on Psychological and Physical Symptoms of Premenstrual Syndrome in Young Girls

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ABSTRACT

Introduction: Premenstrual Syndrome (PMS) is a psycho-neuroendocrine disorder in which biological, psychological, and social parameters are involved. Recently, regular and fun sports exercises and the use of some herbal medicines have been considered by researchers as the recommended treatment options for this syndrome. Therefore, this study aimed to investigate the effect of a selected period of exercise training and consumption of Vitex Agnus Castus extract on the psychological and physical symptoms of premenstrual syndrome in young girls.

Method: This research was a quasi-experimental study conducted among female students living in Gachsaran Azad University dormitories. In this study, out of 75 female students with PMS who had the conditions to enter the study, 40 people were randomly selected and divided into 4 groups of 10 people, including: 1) Aerobic Training, 2) Vitex extract consumption, 3) Aerobic Training+ Vitex, and 4) control. The training group performed 3 sessions per week for 8 weeks and 35 to 45 minutes each session at a maximum intensity of 55 to 65% of maximum heart rate. The Vitex group took 40 drops of Vitex Agnus Castus before breakfast with juice and six days before menstruation up to menstruation for two consecutive cycles. At the end of the eighth week, the PMS questionnaire was completed again by the subjects and the data analysis was performed in SPSS using multivariate analysis of variance (MANOVA) at $P \leq 0.05$.

Results: Eight weeks of aerobic training and consumption of Vitex extract had a significant effect on the psychological ($P \leq 0.05$) and physical ($P \leq 0.05$) symptoms of intervention groups compared to the control group ($P \leq 0.05$), but there was no significant difference between some intervention groups in terms of reducing physical symptoms ($P \leq 0.05$). Also, the effects of treatment in the Vitex+ Training group and the Vitex consumption group were higher than the Aerobic Training group ($P \leq 0.05$).

Conclusion: Regarding the fun nature of exercises and low cost and low side effects of Vitex extract, it is recommended that young girls use aerobic training and Vitex extract as an alternative treatment to treat and reduce PMS symptoms.

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Introduction

Premenstrual Syndrome is a psycho-neuroendocrine disorder in which biological, psychological, and social parameters are involved. This complication begins on average 5-7 days before the menstrual cycle and continues 2-4 days after the onset of monthly bleeding. Some researchers estimate that 20 to 95% of women of childbearing age experience some of the symptoms of premenstrual syndrome in a variety of ways. Studies in Iran have reported that the onset of this syndrome is 62.4% and 67.7%, so a large number of women contract this

disorder and suffer from it [1]. Many experts have identified this syndrome as a multifactorial disorder and have suggested many etiologies as to why it has not been conclusively proven. Although the true cause of the syndrome is almost unknown, researchers have cited a variety of causes as predisposing factors, including dietary patterns, taking prenatal pills, exercise habits, pregnancy history, genetics, level of education, and psychological pressures [2]. Many physical and psychological symptoms of this syndrome have been reported, the most common of which include fatigue and lethargy,

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bloating, tenderness and swelling of the breasts, joint and muscle pain, headache and dizziness, anxiety, irritability, anger and aggressive behavior, increased appetite and overeating, sleep disorders and depression, depression, social avoidance, emotional-psychological and behavioral changes as well as lack of energy, pimples, and puffiness of the face, vulnerability to accidents, abdominal pain, feeling of disability and incompetence [3].

Today, medicinal plants are one of the most common treatments for any disease, because, in addition to being cost-effective, they have fewer side effects than chemical drugs. According to the World Health Organization, 80% of the world's population currently uses herbal compounds [4]. The plant *Vitex agnus castus* is a medicinal plant belonging to the *Verbenaceae* family. Medicines derived from the extract of this plant have been used in the treatment of premenstrual syndrome (PMS) and menopausal symptoms [5]. Flavonoids, terpenes, and steroids are the most important medicinal compounds found in this plant. This plant has a direct effect on the hypothalamus-pituitary axis, and the fruit extract of this plant has strong analgesic and anti-inflammatory properties [6]. In traditional medicine of Iran, Greece and Rome, wood, leaves, and fruits of this plant have been used to reduce sexual desire. Therefore, this plant is also known as chaste tree or monk's pepper [6]. Also, compounds have been extracted from the plant's extract that can bind to the μ -opioid receptor, and have attributed the mechanism to reducing premenstrual syndrome pain and improving postmenopausal discomfort.

An active lifestyle promotes health and wellness. According to studies, physical activity is a good way to treat premenstrual syndrome [7], so one of the most effective treatments for premenstrual syndrome is regular exercise training [8]. Exercise program releases beta-endorphins from the brain, Beta- and refine affects a variety of hypothalamic functions, including fertility regulation, temperature, cardiorespiratory function, improved blood circulation and mood [9] in a study, Mosallanejad *et al.* in 2006 studied the effect of aerobic exercise on the premenstrual syndrome, which after 2 months of aerobic exercise showed a significant decrease in physical and psychological symptoms [10]. In another study, Aliabadi *et al.* studied the effect of resistance and endurance exercise on improving premenstrual

syndrome and stated that exercise can reduce the symptoms of premenstrual syndrome and there is no difference between endurance and resistance exercise in this regard [11]. The results of the study by Azhari *et al.* showed that aerobic exercise for 8 weeks reduces the severity of the symptoms of premenstrual syndrome [12]. The study of Fotookian *et al.* (2006) conducted as a clinical trial on 80 university students of nursing showed that performing an aerobic exercise program reduces the severity of premenstrual syndrome symptoms [13]. In the study of Sehati Shafaei *et al.* (2013) conducted on 160 athletic and non-athletic college students, no significant difference was observed in the group of athletes and non-athletes in terms of premenstrual syndrome [14]. Given that conflicting results have been reported on the effects of exercise and the extract of vitex agnus castus on the symptoms of premenstrual syndrome, exercise, and physical activity, along with the use of herbal medicines, may be important factors in improving the symptoms of PMS. On the other hand, no study has examined the simultaneous effect of these two variables on premenstrual syndrome. In this vein, the present study aims to determine the effect of a course of exercise training and consumption of vitex agnus castus extract on physical and psychological factors of premenstrual syndrome in young girls.

Materials and Methods

Subjects

This study was a semi-experimental single-blind trial that was performed in 2019 at the Gachsaran branch, Islamic Azad University. The criteria for inclusion in the study through face-to-face interviews and questionnaires, comprised being 20 to 30 years old, having regular menstrual cycles of 21-35 days with a bleeding period of 3-10 days during the last six months, not being under any treatment to reduce PMS symptoms during the study, not taking birth control pills, and the exclusion criteria consisted of smoking and drug use, failure to participate in the exercise training program for more than 3 sessions or lack of regular use of vitex agnus castus extract, the incidence of some disorders affecting the study results such as muscle and skeletal injury, or drug therapy that could interfere with the researcher's intervention, and following a specific diet. The study population consisted of all female students living in the

dormitories of Gachsaran Branch of Islamic Azad University in the first semester of 2018-19. 130 people voluntarily attended the face-to-face interview along with completing the questionnaire out of whom 75 subjects were finally qualified for participation. From among 75 participants, the researchers selected 40 healthy, inactive, girls with moderate to severe PMS and randomly divided them into four groups of 10 subjects, including 1) aerobic training, 2) Vitex Agnus extract consumption, 3) aerobic training + vitex Agnus, and 4) control. Written consent was obtained from all subjects to participate in the study so that all subjects participated in this study in a completely voluntary manner.

Data collection procedure

Data collection was measured using height measurement and digital scale and premenstrual syndrome diagnosis form (SPAF). The training group performed aerobic exercise for 8 weeks (three sessions per week) at moderate intensity (65-55% of maximum heart rate). The subjects' heart rate was measured by a pulse meter. The training sessions started with 10 minutes of warming up, then 40 minutes of aerobic activity, and finally ended with 5 minutes of cooling down. Subjects in the Vitex Agnus groups drank 40 drops of the drug in a glass of fruit juice before breakfast; it was performed for 2 consecutive

cycles from the sixth day before menstruation up to menstruation [15]. The training and Vitex Agnus group performed a combination of exercise and extract consumption according to the instructions, and the control group did not undergo any intervention. It is noteworthy that all groups completed the questionnaire in two stages before and after the intervention.

Data Analysis procedure

In this study, the Shapiro-Wilk test was used to evaluate the normality of the data. Multivariate analysis of covariance (MANCOVA) was used to investigate the effect of an intervention (exercise training and Vitex Agnus extract) on the physical and psychological symptoms of premenstrual syndrome (regarding all the defaults required for covariance analysis). Data were analyzed using SPSS software version 23. The significance level was considered less than 0.05 for all statistical analyses.

Results

Table (1) shows that after controlling the effect of pretests, the group effect on post-test physical and psychological symptoms is significant. In other words, in post-tests, there is at least one significant difference between the mean scores of groups.

Table 1. Results of multivariate analysis of covariance to examine the study dependent variables

Source	Dependent Variable	Sum of Squares	Df	Mean of Squares	F	P
Group	Physical Symptom	155.85	3	51.95	22.15	.001
	Psychological Symptom	208.87	3	69.62	45.43	.001

The results of the mixed two-way ANOVA showed that there was a significant interaction in the total score of premenstrual syndromes between the intervention and pre-test and post-test groups. The post-test rate of the total score of premenstrual syndromes in the intervention groups (aerobic, Vitex Agnus, and aerobic + Vitex) is significantly lower than the control group.

As shown in Table (2), the physical symptoms of premenstrual syndrome in the intervention

groups are significantly lower than in the control group but there is no significant difference between the intervention groups in the number of physical symptoms. The rate of psychological symptoms of premenstrual syndrome in intervention groups is significantly lower than in the control group. Also, the psychological symptoms of premenstrual syndrome in the Vitex + aerobic and aerobic groups are significantly lower than in the Vitex Agnus group.

Table 2. The results of pairwise comparisons of the mean scores of the dependent variable in

Dependent Variable	Group A	Group B	The difference in mean scores (A and B)	Standard Error	P
Physical Posttest	Control	Aerobic	4.274*	.716	.001
		Vitex	4.062*	.735	.001
		Aerobic+Vitex	5.942*	.752	.001
	Aerobic	Control	-4.274*	.716	.001
		Vitex	-.213	.693	0.99
		Aerobic+Vitex	1.668	.692	.129
Vitex	Aerobic	-4.062*	.735	.001	
	Control				

Dependent Variable	Group A	Group B	The difference in mean scores (A and B)	Standard Error	P
Psychological posttest	Aerobic+Vitex	Aerobic	.213	.693	0.99
		Aerobic+Vitex	1.881	.694	.063
		Control	-5.942*	.752	.001
		Aerobic	-1.668	.692	.129
		Vitex	-1.881	.694	.063
		Aerobic	3.936*	.579	.001
	Control	Vitex	5.507*	.594	.001
		Aerobic+Vitex	6.737*	.608	.001
		Control	-3.936*	.579	.001
	Aerobic	Vitex	1.571*	.560	.049
		Aerobic+Vitex	2.800*	.560	.001
	Vitex	Control	-5.507*	.594	.001
		Aerobic	-1.571*	.560	.049
		Aerobic+Vitagnus	1.229	.561	.212
		Control	-6.737*	.608	.001
	Aerobic+Vitex	Aerobic	-2.800*	.560	.001
Vitagnus		-1.229	.561	.212	

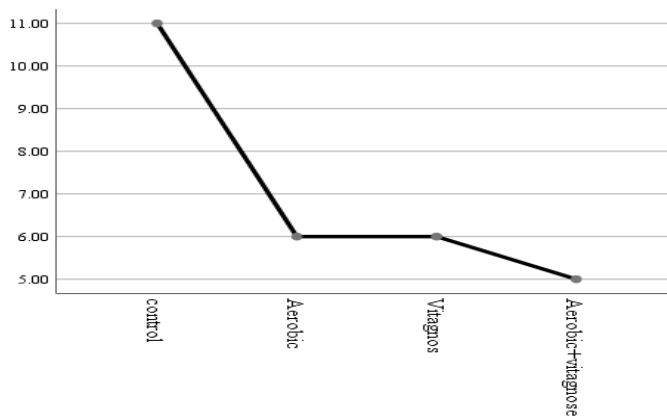


Figure 1. Comparison of the mean scores of individuals in the physical symptoms of menstrual Syndrome in the groups studied.

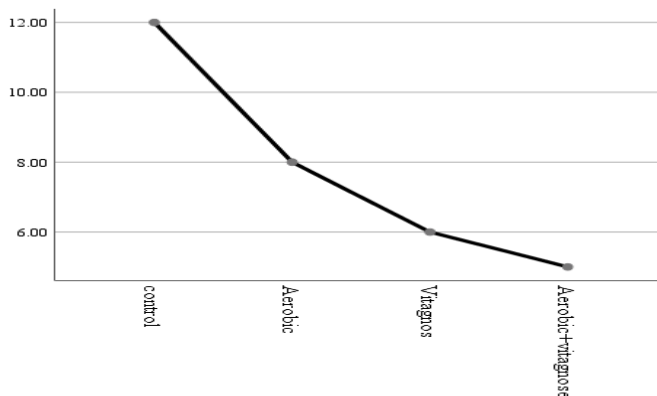


Figure 2. Comparison of the mean scores of individuals in the psychological symptoms of the menstrual syndrome in the groups studied

Discussion

The present study aimed to investigate the effect of eight weeks of selected exercise training and Vitex Agnus extract consumption on the physical and mental symptoms of premenstrual syndrome in female students.

The results of the present study showed a decrease in the physical and psychological symptoms of premenstrual syndrome in the intervening groups. The findings showed that regular exercise and aerobic activity, including moderate-intensity running, reduced the physical symptoms of premenstrual syndrome in girls. Thus, regular aerobic activity leads to reduced swelling of the limbs and reduced pain and tenderness in the breasts, which may be related to serum aldosterone, increased prostaglandin, vitamin B6 deficiency, and magnesium. Also, aerobic training and activity reduce renin levels and increase estrogen and progesterone levels [9], which leads to a decrease in serum aldosterone levels and ultimately improvement in physical symptoms. Because the level of beta-endorphins decreases at the end of the secretory phase due to changes in sex hormones, performing aerobic exercise leads to an increase in the level of beta-endorphins [16]. Also, changes in estrogen and progesterone levels late in the secretory phase can cause physical symptoms, so since exercise is an important factor in increasing estrogen and progesterone levels, it may be effective in reducing the physical symptoms of premenstrual syndrome. According to many researchers, prostaglandin-level disorders at the end of the secretory phase cause physical symptoms, so due to the reduction in physical symptoms in this study, sports activities may have also affected prostaglandin levels. The findings of Karimian *et al.* showed that walking exercise reduces the physical and psychological symptoms of premenstrual syndrome [17]. Also, a study by Samadi *et al.* entitled "Effect of 8 weeks of aerobic exercise on the symptoms of premenstrual syndrome in non-athletic girls" showed that aerobic exercise improves physical and psychological symptoms [18], which is in line with the present study. Thus, considering the side effects of drug therapies, non-pharmacological therapies such as exercise have attracted the attention of experts. Therefore, physical activity can affect the adrenal-pituitary-hypothalamic axis by reducing cortisol levels and improve symptoms of premenstrual syndrome.

On the other hand, based on the findings of this study; it was found that the psychological symptoms of premenstrual syndrome in female students decreased significantly after aerobic exercise and consumption of Vitagnus extract.

In line with the findings of this study, the results of Nikbakht, Samadi, Karimian, Safavi, and many researchers showed that performing aerobic and regular exercise reduces mental symptoms and premenstrual syndrome [9,1,17,19]. However, the findings are inconsistent with the findings of Moghaddasiet *al.* in 2009[20]. The probable explanation for the inconsistency of these results may be related to the combined factors affecting menstrual syndrome, including heredity, age of subjects and their problems, the difference in exercise, environmental conditions, and research conditions. Aerobic activity balances the body and releasing stimulant hormones reduces the severity of the pressures that often cause problems before menstruation and improves mental states [21]. Also, running exercise reduces the psychological symptoms of premenstrual syndrome by increasing the production of relaxation. Late in the secretory phase, the levels of the hormone's estrogen and progesterone decrease. Physical activity can increase progesterone levels and balance estrogen and progesterone levels, so this increase in progesterone reduces psychological symptoms and relieves insomnia. Also, because in group sports, people's social contacts increase, self-esteem and self-confidence increase [9]. On the other hand, in creating a feeling of vitality and freshness during exercise, the secretion of natural drugs such as endorphins, enkephalin, and serotonin in the blood is increased and with their analgesic and happiness effects, they can create vitality and vigor in a person [22].

Therefore, considering the beneficial effects of aerobic exercise on psychological symptoms, it can be said that aerobic exercise can be effective by producing vitality and liveliness to reduce the psychological symptoms of premenstrual syndrome. The mechanism of action of vitex agnus castus in the treatment of physical and psychological symptoms of premenstrual syndrome is unclear; but there are several theories that the plant's extract may play a role in binding to opioid and endorphins receptors and neuronal-activating flavonoids, which could be effective in reducing the mood symptoms of premenstrual syndrome.

Experimental studies have also shown that taking vitex agnus castus extract and a course of exercise training inhibits prolactin release by selective stimulation of the dopamine receptor. In another study, Schellenberg reported a response rate of samples to Vitagnus and selective exercise and placebo after three cycles of premenstrual syndrome treatment, 52%, and 24%, respectively; The difference between the above study and the present study seems to be due to the amount of drug and the form of the drug that was given to the samples in Schellenberg's study as 20 mg tablet of Vitex Agnus extract; However, in the present study, the samples received 40 drops of Vitex extract orally along with one selected exercise [23].

Due to the possible role of prostaglandins in premenstrual syndrome and the fact that studies have shown that vitex agnus castus extract can affect the prostaglandin system, the vitex agnus castus plant may play a role in improving the symptoms of premenstrual syndrome and can be used as a treatment [24]. Therefore, the findings of this study indicate that taking vitex extract and a selected exercise training course can reduce the physical and psychological symptoms of premenstrual syndrome in young girls; thus, the use of vitex agnus castus extract and regular exercise training along with other necessary training can be considered further in women with premenstrual syndrome.

The limitations of this study were the small number of samples and the lack of complete control over the type and amount of nutrition of the subjects and the physical side activities of the subjects outside the training protocol. Since the duration of this study was 8 weeks (two cycles), it is suggested that it be increased to 12 weeks (three cycles) in future research.

Conclusion

Given the importance of women in society, the implementation of funny sports activities, as well as the consumption of vitex agnus castus extract due to low cost and its relationship with hormonal factors, can be effective in the treatment and reduction of PMS, thus in this study, the combination of both variables was used. It appears that changes in the exercise training protocol or dose may show different results, so it is recommended that the affected women should use both methods simultaneously to relieve the physical and psychological symptoms of PMS.

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