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

Zahra Shabani 1, Amin Mohammad2,3, Ali Khajehlandi 2, Khadijah Asadi3

1. Master Student, Department of Physical Education and Sport Sciences, Gachsaran Branch, Islamic Azad University, Gachsaran, Iran.
2. Department of Physical Education and Sport Sciences, Gachsaran Branch, Islamic Azad University, Gachsaran, Iran.
3. Department of Midwifery, Gachsaran Branch, Islamic Azad University, Gachsaran, Iran.

Abstract: 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 Agnus Castus extract was taken 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≤0.05.

Results: Eight weeks of aerobic training and consumption of Vitex extract had a significant effect on the psychological (Ps0.05) and physical (Ps0.05) symptoms of intervention groups compared to the control group (Ps0.05), but there was no significant difference between some intervention groups in terms of reducing physical symptoms (Ps0.05). Also, the effects of treatment in the Vitex+ Training group and the Vitex consumption group were higher than the Aerobic Training group (Ps0.05).

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.

Keywords:
- Premenstrual Syndrome (PMS)
- Vitex Castus extract
- Aerobic Training
- Young girls

Introduction

Premenstrual Syndrome (PMS) 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.
Effect of Vitex Castus Extract on Psychological Symptoms

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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>
<thead>
<tr>
<th>Source</th>
<th>Dependent Variable</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean of Squares</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>Physical Symptom</td>
<td>155.85</td>
<td>3</td>
<td>51.95</td>
<td>22.15</td>
<td>.001</td>
</tr>
<tr>
<td>Group</td>
<td>Psychological Symptom</td>
<td>208.87</td>
<td>3</td>
<td>69.62</td>
<td>45.43</td>
<td>.001</td>
</tr>
</tbody>
</table>

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>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Group A</th>
<th>Group B</th>
<th>The difference in mean scores (A and B)</th>
<th>Standard Error</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aerobic</td>
<td>-.213</td>
<td>.693</td>
<td>.099</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aerobic+Vitex</td>
<td>1.881</td>
<td>.694</td>
<td>.063</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>-5.942*</td>
<td>.752</td>
<td>.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitex</td>
<td>-1.668</td>
<td>.692</td>
<td>.129</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aerobic</td>
<td>-1.881</td>
<td>.694</td>
<td>.063</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aerobic+Vitex</td>
<td>3.936*</td>
<td>.579</td>
<td>.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>5.507*</td>
<td>.594</td>
<td>.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitex</td>
<td>6.737*</td>
<td>.608</td>
<td>.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>-3.936*</td>
<td>.579</td>
<td>.001</td>
<td></td>
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</tbody>
</table>

**Psychological posttest**

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Group A</th>
<th>Group B</th>
<th>The difference in mean scores (A and B)</th>
<th>Standard Error</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aerobic</td>
<td>2.800*</td>
<td>.560</td>
<td>.001</td>
<td></td>
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</tr>
<tr>
<td>Aerobic+Vitex</td>
<td>-5.507*</td>
<td>.594</td>
<td>.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>-1.571*</td>
<td>.560</td>
<td>.049</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitex</td>
<td>1.229</td>
<td>.561</td>
<td>.212</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>-6.737*</td>
<td>.608</td>
<td>.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aerobic+Vitex</td>
<td>-2.800*</td>
<td>.560</td>
<td>.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitex</td>
<td>-1.229</td>
<td>.561</td>
<td>.212</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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 improves 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 Moghadasi et 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.

**Acknowledgments**

This article comes from a master’s thesis in Sport Physiology. It has been registered with code IR.IAU.KAU.REC.1399.006 at the ethics committee of the Islamic Azad University. All of the subjects in this study gave voluntary informed consent to participate in this research. We feel obliged to extend our appreciation to all those who participated in this study.

**Reference**

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