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Comparison of Effect of Pilates Exercise and Vitex Agnus Intake on Premenstrual Syndrome in Sedentary Girls

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A B S T R A C T

Premenstrual-syndrome (PMS) is one of the most common problems in women during their childbearing age. It has negative effects on their work performance and the quality of their lives. This study aimed to study Comparison of Effect of Pilates exercise and Vitex agnus intake on Premenstrual Syndrome in sedentary girls. This quasi-experimental study was conducted on 60 sedentary adult girl students aged 18-25 at Isfahan University, with a diagnosis of PMS. The instruments included personal information and a medical questionnaire, a form of premenstrual symptoms DSM-IV, the GHQ 28 questionnaire, and the Beck Depression and Anxiety questionnaire, and also, daily symptoms were recorded for 4 months. After collecting personal and medical information, the participants were allocated to two experimental groups (Pilates exercise and Vitex agnus) and a control group. Assessments were performed during the first-third menstrual periods (pre-test, mid-test, and post-test, respectively). One way and repeated measures analysis of variance (ANOVA) were used to analyze the data. Results showed that the mean scores of PMS and symptoms declined after 2 months of training in the experimental group. In both experimental groups, the mean scores of PMS and physical and psychological symptoms decreased after one and two months ($P<0.001$). Also, the results indicate that the mean score in decreasing physical, psychological symptoms and total score in Pilates was more than Vitex agnus and control group ($P<0.001$). Overall, the findings showed that 2 months of Pilates exercise is effective in preventing the symptoms of PMS and can be used as a treatment.

Keywords: *Pilates exercise, Vitex agnus, Premenstrual-syndrome*

1. Introduction

Today, women's health is a main goal for the social and economic development of the society. One of the psychosomatic problems associated with the female reproductive system is premenstrual-syndrome (1).

In other words, premenstrual-syndrome is a combination of physical, psychological or behavioral changes in the late secretory phase of menstrual cycle and interferes with interpersonal relationships or disrupts the normal activities (2). PMS average starts 5 to 7 days before menstruation begins and 2 to 4 days after the onset of monthly bleeding and the cycle continues repeatedly (3, 4). The exact prevalence rate of premenstrual-syndrome is unknown; however, it is estimated that over 90 percent of women in their fertility age experience some premenstrual symptoms among which 3-8 percent have severe symptoms (5).

Studies in Iran indicate the high prevalence of this syndrome. The results of a study in the city of Mashhad has shown that in 210 students in Mashhad University of Medical Sciences with a mean age of 22.45 years, 48 percent were diagnosed with premenstrual-syndrome and this would suggest that a lot of girls in adolescence suffer from this disorder (6).

Although the exact cause of this syndrome is almost unknown, the changes of ovarian steroids' levels, vitamin and mineral deficiencies, disorders in the path of renin - angiotensin - aldosterone, increased prostaglandins and prolactin age and genetics have been mentioned as risk factors (7, 8).

Clinical and psychological symptoms of this common syndrome include depression, irritability, abdominal cramps, breast tenderness, headaches, isolation, and performance reduction (7-9).

Treating this complication as a periodic, predictable and debilitating discomfort that has a large proportion in women's low performance seems to be necessary, especially, due to the fact that this problem is relevant to a wide stratum of the society, namely women (10, 11).

In this way, treatment includes medication (Anti Depression tablets, vitamins B Etc.), surgery (removal of ovaries) and alternative non-pharmacological treatments (exercise, massage, therapy, etc.) have been proposed (12). Considering the side effects of drug treatments and surgery, non-drug treatments, particularly physical activity, has attracted the attention of professionals and women (10).

It seems that physical activity affects the mechanisms of brain endorphins and improves mood symptoms. By increasing endorphins and reducing the symptoms of adrenal cortisol, physical activity leads to the improvement of PMS (increased pain tolerance, anxiety, depression, etc.) (12, 13).

Physical activities have beneficial effects on individuals' ability and increase their practical capacity. They also increase the efficiency of mind and feeling refreshed with a good attitude to life and health to provide mental health (14-18).

One of the movement treatments which experts have considered pervasive is Pilates exercise (19).

This exercise is a collection of specialized training with a combination of both body and mind. This training focuses on the body center, including the abdomen, pelvis and spine. The main purpose of these exercises is to increase strength, flexibility, endurance, balance and posture. Pilates exercise is actually a good way to practice mind-body awareness and postural movement control (20). Those researches done to prove the effect of this method show positive results (21-23).

Another positive effect of this type of training has been shown in research on factors related to physical fitness and female students health to increase immune globulins and sex hormones (23) also in Eyigor's study, during a period of rehabilitation, the positive effects of Pilates training on flexibility, fatigue, depression and quality of life in women with breast cancer was observed (22).

Also, Vitex agnus is required for generating the neurotransmitters potentially involved in the pathophysiology of PMS. Vitex agnus has been shown to reduce psychological symptoms in PMDD, and a systematic review of nine studies containing 490 patients demonstrated that Vitex agnus is effective in relieving overall symptoms of PMS. The results of Sharma researches showed that, after 2 months of taking Vitex agnus, Vitex agnus group mean score decreased from 30 to 14 (24)

Considering the high prevalence of PMS among women and girls, and the known complications of this syndrome on job performance, social and interpersonal relationships and family and its role in limiting the phenomenon of educational, social and economic progress in the community, This is the first study that aimed to compare the effects of 2 months of Pilates training and Vitex agnus intake on the symptoms severity of premenstrual-syndrome in non-athletes girls in order to improve the health and capabilities.

2. Methods and Materials

The present research is an applied review with a quasi-experimental design, with pre-test, mid-test, post-test and control groups. The population for this study consisted of all girl students of 18-25 years of age studying at the Isfahan University. Individuals entering the selection criteria were aged between 18-25 years old, single, with regular menstrual periods, bleeding between menstrual cycle length of 22-35 days, for 3-8 days), exclusion criteria were :history of regular physical activity for 3 months before starting the study and during the study, history of diseases such as

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asthma, diabetes, renal, cardiac, psychiatric, thyroid, epilepsy, medication or being on a special diet and syndrome identification based on PMS standard option complaint check list (or the check list of 30 standard cases) (25) Those with less than 30 points from the list are considered as a mild PMS and those with more than 30 are considered as moderate to severe PMS. In this study, people who scored 30 and had moderate to severe PMS and had the symptoms 7 days before menstruation and the first 4 days of the menstrual cycles in the recorded daily and were asymptomatic for the rest and scored below 21 in the General Health Questionnaire GHQ28 (26), and in the Beck Depression Inventory had one score below 4 and in Beck Anxiety Inventory obtained one score below 7 were selected as research subjects in this study. The researcher, then, attempted to obtain written consent from them, and used a calendar to record daily symptoms for 4 cycles (2 pretraining courses and 2 during the training) and asked them to complete it from the first day of the cycle in the manner that the researcher explained. At the end of the second cycle the researcher collected the data which was completed by the subjects and after confirming, 60 cases were simple randomly divided in tree groups (Pilates exercise 20 N, Vitex agnus 20N and control 20 N). In the next stage of research, the nutritional guidelines were provided to the subjects in a form.

Exercises took place over a period of 8 weeks, 3 sessions in a week and 60 minutes for each session in the evening. Arrangements were provided at the beginning of each session, including: checking the physical condition (including the pelvis and spine), controlled breathing and standing right in Pilates classes, then stretching movement sets were started along with the trainer explanations (about 5 minutes). The sessions were followed by Pilates exercise (about 50 minutes); at the end of the class cool down and going back to the initial state was carried out (about 5 minutes). Number of sets started from 10 and reached to 90-80 in the final sessions. This exercise was performed between the two menstrual cycles. And Vitex agnus group were used a pill after food for 2 months. The control group did not do any exercise training in this period. After a month of training, the questionnaire was distributed between three groups of subjects and they completed it according to their characteristics and situations (the mid-test) and the practice continued in the second month. At the end of the second month the questionnaire was distributed among the subjects and the post-test was performed.

The data analysis was done by $SPSS_{26}$ software and then analysed using descriptive and inferential statistics. Descriptive statistics indicators such as mean and standard deviation and inferential statistics indicators like the Independent one way (ANOVA) were used in order to compare variables in three independent groups, and to compare each group before, during and after the test has been used with repeated measurement analysis of variance (ANOVA). Level $P<0.05$ was considered as the significance level.

3. Findings and Results

The mean age of subjects in both Pilates ,Vitex agnus and control groups were 20.60 ± 1.95 , 20.73 ± 2.02 and 20.85 ± 2.08 respectively, the average age at menarche was 13.10 ± 1.20 , 13.08 ± 1.47 and 13.05 ± 1.73 respectively, and the mean BMI of the subjects were 22.18 ± 3.45 , 21.84 ± 2.98 and 21.50 ± 2.50. One way ANOVA showed that the average age at menarche and BMI in the three groups before the intervention had no significant difference.

Table 1

The mean scores of PMS, physical, and psychological symptoms of groups before, during, and after intervention

Mean Score	Group	Pre-test Mean	Pre-test Standard deviation	Mid-test Mean	Mid-test Standard deviation	Post-test Mean	Post-test Standard deviation	F	P-value*
PMS	Pilates	46.5	11.70	28.10	9.65	15.20	6.41	62.45	<0.001
	Vitex agnus	46.20	11.80	32	8.10	21.90	9.50	137.55	<0.001
	Control	46	12.30	47.10	9.55	47.95	9.02	0.61	0.55
P-value			0.82	< 0.001		< 0.001			
Physical symptoms	Pilates	21.60	6.60	14.10	4.16	6.55	2.41	52.32	<0.001

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	Vitex agnus	20.45	7.04	13.95	4.86	8.20	3.10	46.75	<0.001
	Control	21.50	7	21.70	5.62	21.60	5.61	0.97	0.39
P-value			0.76	< 0.001		< 0/001			
Psychological symptoms	Pilates	24.45	7	14	6.40	8.65	4.45	56.30	<0.001
	Vitex agnus	23	6.20	18.45	5.60	13.65	6.74	19.93	<0.001
	Control	24.45	7.90	25.40	7.60	25.35	7	0.86	0.43
P-value			0.94	< 0.001		< 0.001			

Table 1 shows the effects of Pilates exercise program and Vitex agnus intake on reducing physical and psychological symptoms of Premenstrual-syndrome in the experimental group. As it can be seen, in this group, mean PMS, physical and psychological symptoms before, during and after the intervention have a significant difference (P<0.001).

Also, paired repeated measurement showed that the mean PMS, physical, and psychological symptoms in Pilates and Vitex agnus groups during intervention were less than that before intervention and after intervention was also lower than that during intervention (P <0.001).

This study also showed that the mean percentage score changes of PMS, physical, and psychological symptoms during intervention were not similar before and after intervention in three groups (P<0.001).

Table 2

Percentages of scores in PMS, physical, and psychological symptoms of groups before, during, and after intervention

Mean of change in percentages	Group	Change in percentages before and during intervention		Change in percentages before and after intervention	
		Mean (%)	Standard deviation (%)	Mean (%)	Standard deviation (%)
PMS	Pilates	-38	17	-66	12
	Vitex agnus	-24	9	-50	12
	Control	04	13	07	18
P-value		<0.001		<0.001	
Physical symptoms	Pilates	-29	31	-66	15
	Vitex agnus	-27	20	-57	17
	Control	04	18	10	23
P-value		<0.001		<0.001	
Psychological symptoms	Pilates	-42	19	-63	15
	Vitex agnus	-17	19	-38	30
	Control	05	12	07	22
P-value		<0.001		<0.001	

The results of this survey showed that the physical and psychological symptoms of experimental and control groups after 2 months of training had a significant difference (P<0.001). As it is shown in Table 3, after 4 weeks of Pilates and Vitex agnus groups the overall 38% ,24% percent of PMS, 29%,26% physical symptoms, and 42%,17% psychological symptoms have reduced and after 2 months this reduction rate became 66%-50%, 66%-57% and 63%-38%. Also, the results indicate that the mean score in decreasing physical, psychological symptoms and total score in Pilates was more than Vitex agnus and control group (P<0.001).These findings indicate the impact of Pilates exercise in the first 1 months on the reduction of PMS symptoms, i.e., with the 1 months Pilates exercise and Vitex agnus intake, it can be expected that PMS symptoms be reduced. But reduction of PMS symptoms after 2 months was significant and better than that observed after 1 month. However, the persistence of this demands further investigation.

4. Discussion

In this study, the positive impact of 2 months of Pilates exercise and Vitex agnus intake on physical and psychological symptoms of Premenstrual-syndrome was observed in sedentary adult girls.

This result is consistent with a lot of studies done on positive effects of Pilates exercises.

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Rashidi study (2013) showed that 8weeks of Pilates exercises decreased the depression rate significantly in women's postmenopausal depressive symptoms (26). Also, Eyigor (2010) in his study reported that 8-weeks of Pilates exercise could improve fatigue, depression and quality of life in 52 women with breast cancer (22). Deep and diaphragmatic breathing in Pilates exercises can control tension and as the result arousal of the sympathetic nerves decreases which is effective in improving many health-related symptoms (27).

Also, Loch et al (2000) studied the effects of Vitex agnus on four symptoms of PMS including depression, anxiety, desire for sweets and water blockage. They reported 85% decrease of signs in patients (28). Schellenberg (2001) studied Vitex agnus effects on 6 symptoms (headache, nervousness, mood change, restlessness, breast pain and tympani) in women with PMS in comparison with placebo with successful effects on reducing symptoms (29). Physical symptoms such as swelling, weight gain, headache, breast pain are possibly related to increased activity in Aldosterone System - renin - angiotensin, prolactin, prostaglandin E2, vitamin B6 and magnesium deficiency (7, 8).

The increase in prostaglandin E2 is one of the factors of physical symptoms (17). Due to repeated muscle contractions in physical activities, these contractions help venous blood return and as a result increases Prostaglandins and other substances and prevents their accumulation in the pelvis and reduces backache and abdominal discomfort (29). It can be said that Pilates exercises which are a series of muscle contractions lead to the lateral abdominal muscle endurance and help prostaglandin movement and reduce the upper body muscle pains, especially the abdomen, waist and hips. On the other hand, due to deep diaphragmatic Pilates breathing, the levels of the norepinephrine hormone decreases in asleep and in turn can cause a decrease in heartbeat and blood pressure while taking a rest (27).

Also the mechanism of action of Vitexagnus may also be related to modulation of stress induced prolactin secretion via dopamine, without directly affecting LH and FSH. Binding to opioid receptors, endorphins, and neuroactive flavonoids may also have a role (30). Some side effects of Vitex agnus are minor dermal problems and some intestinal problems such as diarrhea, headache, vertigo and palpitation, which disappear after stopping its use. Some herbalists believe that Vitexagnus could interfere with birth control pills, hormone replacement therapy, and other hormone replacement medication (28). Additionally, it has been hypothesized that individuals taking drugs classified as dopamine-receptor antagonists should use caution when taking Vitex agnus because animal studies indicate that Vitex agnus may interfere with the dopamine receptors (31).

The Pilates exercises and Vitex agnus intake can be helpful to reduce the heartbeat in patients with PMS. In this study Pilates exercises and Vitex agnus intake also reduced physical symptoms.

Increased renin-angiotensin activity and reduced levels of estrogen and progesterone are mentioned as the factors which increase serum levels of Aldosterone in the late luteal phase (30) and increased Aldosterone serum levels will increase sodium and water absorption, resulting in edema and symptoms (16). Studies have shown that body activities decrease levels of renin and elevate estrogen and progesterone levels (31) and in this way Aldosterone serum levels, the absorption of sodium and water absorption decrease, thereby edema reduces and physical symptoms improve. According to Na (2010) 10-weeks of Pilates exercise with 61-70% maximum heartbeat increases immune globin and progesterone (23). Accordingly, this type of training probably reduces renin and increase levels of estrogen and progesterone, thereby reduces levels of physical symptoms including Aldosterone and the edema.

In the present study the positive effect of Pilates exercises on reducing psychological symptoms was also observed. Eyigor (2010) in his study reported that 8-week of Pilates exercise could improve fatigue, depression and quality of life in 52 women with breast cancer (22). Deep and diaphragmatic breathing improves oxygen transfer and makes muscles more active; this increases the insulin sensitivity in individuals and there is no need for more insulin secretion (32). With this method, fat oxidation increases, [31] which is followed by a decrease in estrogen and an increase in progesterone and this can lead to an improvement in psychological symptoms (16).

Thus, progesterone may increase with a decrease in psychological symptoms. Furthermore, Betaandorphine decreases in late luteal phase, due to changes in sex hormones (30, 33). Physical activity and Vitex agnus leads to the balance of sex hormones and thereby serotonin and

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Betaandorphine level increases (8, 15, 34, 35). so it can be said that as the result of Betaandorphine increase due to the Pilates exercises and Vitex agnus, psychological symptoms improve. Studies showed that sleep quality in people improved due to the balance of estrogen and progesterone levels as the result of the Pilates exercises and Vitex agnus therefore it can be expected that these exercises and Vitex agnus improve sleep quality and reduce the psychological symptoms of premenstrual-syndrome in the sufferers. The positive effects of physical activity on psychological symptoms can be justified with factors such as negative thoughts reduction, creating positive thoughts and positive effects on strengthening the social contact, self-confidence and self-imag (36). In this study the mean score of psychological symptoms before, during and after the intervention had a significant difference.

5. Conclusion

Premenstrual Syndrome is a non-organic disorder including a set of physical and psychological symptoms. Because of the lack of knowing exactly the pathological mechanism of this syndrome, several therapeutic procedures have been proposed to control it, among which doing exercises and galenical are of a particular importance. In the present study, it has been attempted to assess the effect of Pilates exercises and Vitex agnus intake on the symptoms of premenstrual syndrome among non-athlete girls. In general, the results obtained from this study indicates that Pilates exercises and Vitex agnus intake have a significant effect on the decrease in the physical and psychological symptoms of premenstrual syndrome in 2 months, which cause individuals' higher job and social efficiency and can be recommended as an effective therapeutic procedure Since this syndrome can have a negative impact on the employment and the performance of women and can cause economic damage, those method are recommended to improve other aspects of women's health as well.

Authors' Contributions

All authors equally contributed to this study.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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Declaration of Interest

The authors report no conflict of interest.

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Ethics Considerations

The study placed a high emphasis on ethical considerations. Informed consent obtained from all participants, ensuring they are fully aware of the nature of the study and their role in it. Confidentiality strictly maintained, with data anonymized to protect individual privacy. The study adhered to the ethical guidelines for research with human subjects as outlined in the Declaration of Helsinki.

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