Clinical Cancer Investigation Journal-ISSN: 2278-0513

The Effect of Aerobic Exercise on Premenstrual Syndrome in Girls

Abstract

This study aimed to investigate the effect of aerobic exercise on premenstrual syndrome in girls. The method of the present study was quasi-experimental and was performed on 60 female high school students in District 2 of Tehran. The results showed that between the pre-and post-test of the overweight group in cases of physical and psychological symptoms (PMS), BMI There was a statistically significant difference between body fat percentage and lean body mass(table3-12 figure1-5), while between pre-and post-test of the underweight group, only significant differences were observed in physical and psychological symptoms (PMS) and BMI(table3-4-5-6-11-12 figure1-2-5), as well as when information related to PMS) (in both The overweight and underweight groups were compared and no significant difference was observed, but the results related to body fat percentage and lean body mass and BMI showed a significant difference between the overweight and underweight groups(table7-12 figur3-5) (P <0,05). Based on this, it can be said that aerobic walking exercise (PMS) and the body composition of female students overweight and underweight have been effective.

Keywords: *Aerobic exercise, Menstrual syndrome, PMS*

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1. Introduction

A large part of women's emotional life is made up of their biological rhythms, women have their emotional characteristics. Some of these traits are caused by regular biological changes, the external manifestations of which may be mood swings. The periodic mood of women during 28 days of menstruation can directly affect the way they work and socialize, and postmenstrual symptoms sometimes prevent women from gaining the most efficiency. Most women experience physical, mood, and behavioral changes before menstrual bleeding begin, sometimes with such severe changes and symptoms that it is considered a disease. Premenstrual Syndrome (PMS) is a combination of periods. Physical, psychological, and behavioral changes of sufficient intensity in the luteal phase of the menstrual cycle lead to disruption of interpersonal communication or disruption of normal activities. Symptoms of PMS usually begin between 7 and 14 days before menstruation and last until Symptoms appear to intensify and subside after a few days. These symptoms include mood swings, anxiety, irritability, depression, breast tenderness, tenderness, headaches, water retention, and bloating, bloating Lichten Edward, 1995)

40 to 60 percent of American women between the ages of 12 and 50 have the syndrome. According to the latest statistics, 85 percent of women have one of the recurrent symptoms of PMS, but only 40 percent of them have these symptoms. In 2 to 10 percent of people, these symptoms are so severe that they can affect their family or work life (Lusty, 2004).

Symptoms are divided into three categories: physical, mood, and behavioral, the most common of which include: pain, limb edema, bloating, depression, nervousness, crying, and fatigue. Estrogen and progesterone imbalances, increased prostaglandins, increased prolactin, and decreased serotonin and psychological factors are some of the causes of this syndrome. Depending on the severity of the symptoms of a wide range of diseases from mild to severe (Rajaian, 2011) .

Dysmenorrhea is associated with pain caused by muscle spasms in the lower abdomen that may spread to the lower back and along the thighs. This pain can be accompanied by symptoms such as nausea, vomiting, diarrhea, headache, dizziness, tiredness, weakness, and chest pain. And is associated with severe cases of syncope. Dysmenorrhea can be primary or secondary. Primary dysmenorrhea occurs in women who are physically elderly and its onset is not dependent on any organic cause. Secondary dysmenorrhea is pain caused by organic pelvic and non-pelvic causes, pelvic inflammatory disease, endometriosis (noncancerous growth) of muscle and fibrous tissues in the uterus, pelvic congestion syndrome, uterine enlargement, etc. are among the reasons. ،2013)

About 10% of women with normal ovulation experience some degree of premenstrual physical and psychological signs and symptoms. The group with mild to moderate symptoms is believed to have premenstrual syndrome. In 5 percent of women or less than 5 percent, these symptoms are so severe that they are serious and dangerous with daily activities or relationships. Personal interference of the individual (Murge, 2005)

One of the possible factors in the prevalence of this syndrome is having a high body mass index, which has been studied in a few studies and is directly or indirectly related to the body's hormonal balance mechanism. Acceptable methods in determining the indicators of Body composition in children

and adults are body mass index (BMI) and fat percentage (BF%) (Tawfiqi, 2012)

Roberta foster et al in thire study, Premenstrual Syndrome, Inflammatory Status, and Mood States in Soccer Players showed that, The PMS group showed higher concentrations of interleukin (IL)-1β, IL-6, and IL-8 than the athletes without PMS. After the game, IL-6 decreased in the follicular phase and the luteal phase. The tumor necrosis factor-α levels were higher in the group without PMS during the post-game follicular phase than before the game. In the PMS group, tension was higher in the follicular phase before the game and depression was higher in the pre-game luteal phase than in the group without PMS. The PMS group also presented a negative correlation between depression and IL-10 levels in the pre-game follicular phase. Finally, in the pre-game luteal phase were found positive correlations between growth hormone and IL-10. PMS influences the inflammatory condition related to mood states and stress hormones in female soccer players (Roberta foster 2019). of the study of Shirdel, R et al (2021), The Effect of Aerobic Exercise Combined with Salvia Officinalis Extract on The Changes of Premenstrual Syndrome Symptoms in Inactive Women, showed that Premenstrual syndrome is one of the most common problems in women of childbearing age that affects one's functioning in the family and society. The purpose of this study was to investigate the effect of 8 weeks of aerobic exercise with salvia officinalis extract on the changes of premenstrual syndrome symptoms in inactive women.that the results showed a significant decrease in mood symptoms in the three groups of exercise, Exercise + salvia and salvia compared to the placebo group, but no significant difference was observed between them Exercise and saliva + exercise significantly decreased the physical symptoms of PMS Also, improvement of behavioral symptoms of PMS was observed only in the Exercise and Exercise +salvia group ($p < 0.05$).Aerobic exercise combined with salvia officinalis extract reduces symptoms of premenstrual syndrome, but salvia officinalis extract alone resulted in significant improvement in mood(shirdel 2021).

Theoretical Foundations

Today, ensuring women's health is a major goal for the social and economic development of society. PMS is a common disorder among women of childbearing age. Premenstrual Syndrome (PMS) is a set of disturbing physical, psychological, and behavioral changes that recur during the luteal phase of each menstrual period. Various causes are effective in the prevalence of premenstrual syndrome. One of these factors is the body mass index. Nowadays, being overweight and obese is one of the most serious health problems prevalent in today's societies. Not only does it hurt different people; Rather, it imposes an economic burden on the country's economy and accounts for a percentage of annual mortality. People whose BMI is higher than 30% are considered obese and people whose BMI is 18,5. are considered as low weight people and people who are 29,9 > BMI ≥25 are overweight (Amiri Farahani, 2011).

According to Spirov (2005), the task of promoting menstrual education is the responsibility of healthcare professionals. This training must begin with ourselves. We need to know the physiology of reproduction and reproduction so that we can pass it on to our patients; We also need to have a positive attitude about sexual function and reproduction. Understanding these natural events along with learning about them is a powerful mechanism for dealing with menstrual problems and disorders. Also, according to many sports scientists, aerobic exercise; Proper physical activity is important in maintaining and improving the physical and mental health of members of the community, as well as in maintaining weight and losing weight. Therefore, considering the prevalence of this syndrome and body composition in different societies of women, it is necessary to have a brief overview of the physiology of the menstrual cycle and the causes of PMS and to evaluate body composition (Spirov, 2005).

Menstrual cycle

Menstrual cycle from a clinical point of view

Menstruation is the periodic uterine bleeding that most women experience at reproductive age. Normal menstruation indicates the periodic shedding of the uterine endometrium due to decreased production of estradiol and progesterone due to the corpus luteum. The duration of the menstrual cycle usually varies from one to two days per month and only 50% of women in the cycle are in the range of 26 They have 30 days, which in the definition is typically 28 days.

One of the characteristic features of adult women is periodic changes in the reproductive system, which is called the menstrual cycle or menstruation. The menstrual cycle depends on the coordination between the hypothalamus, pituitary gland, ovarian follicles, and endometrium.

An adult woman's body undergoes a complete and regular cycle for 28 days, which is accompanied by physical changes in the structure of the uterine wall and ovarian follicles, as well as related hormones. If we take the middle of the cycle to be zero, then the cycle can be divided into three main stages: the follicle for 12 to 13 days, during which the ovarian follicles grow, the ovulation stage which is right in the middle of the cycle, and one to two days. It lasts and finally the luteal phase during which the corpus luteum is produced and lasts for 15 days (Rajaian, 2011)

The main axes involved in the menstrual cycle are neural, hypothalamic, pituitary, and ovarian. There are complex hormonal connections between the ovaries and the pituitary gland and the hypothalamus. As for the normal fertility cycle, the five hormones of LH, FSH, GNRH, Estrogen, and Progesterone are involved. During menstruation, follicles begin to grow, which only one of them reaches the ovulation stage. This stage of fertility cycle is called follicular phase in terms of the ovarian function, and proliferative phase in terms of uterine endometrial layer changes. The duration of this step is about 14 days, but this time can be very variable. From the end of menstrual blood to ovulation, the endometrial layer grows and the number and size of its cells increase. The second half of the menstrual cycle, which lasts from the onset of ovulation to the onset of bleeding in the next stage, is called the Gn-RH in the luteal (ovarian) stage in relation to the ovaries and relation to the ovulation of the secretory stage and is produced in the hypothalamus. It is essential for the production and secretion of FSH and LH from the pituitary gland. FSH and LH act on the ovaries, are responsible for the production of estrogen and progesterone, and contribute to the survival of the cycle and thus ovulation by applying a positive and negative feedback mechanism to the pituitary gland. Interruption of any point in this sequence leads to menstrual disorders (Sadr Sadeghinejad, 2017).

Cause of blood on menstruation

If fertilization does not occur, the secretion of progesterone and estrogen from the corpus luteum stops, and, therefore, the uterine wall is destroyed and bleeding begins. Of course, the main mechanism of bleeding every month is not clear. One theory is that as the weight of the uterine wall decreases in response to a decrease in the plasma concentrations of corpus luteum steroids, the spring or spiral arteries become more twisted and compressed. This phenomenon reduces the amount of blood flow to the endometrium layer and blood during the menstrual cycle. According to this information, menstruation may be the result of the release of lysosomal enzymes from cells with anemia in the endometrial layer (Sandgol, 1993).

Menstrual disorders

Primary and secondary amenorrhea

Amenorrhea means no menstrual bleeding. If the first menstrual period did not occur before the age of 16, it is called primary amenorrhea, which is caused by genetic or congenital developmental defects and is associated with developmental disorders. Secondary amenorrhea A woman with regular menstruation has had amenorrhea for three months or more, which is caused by environmental effects, stress, activity, or acquired (not congenital) diseases.

Oligomenorrhea

Oligomenorrhea is the prolongation of cycles to more than 35 days. Nazarpur, S. (2007). Painful menstruation is one of the most common gynecological disorders, affecting more than 50% of women with regular periods. Dysmenorrhea is divided into two categories: Primary dysmenorrhea occurs without any organic cause during menstruation in women and is more common in young girls. Primary dysmenorrhea is without the presence of pelvic pathology (trauma). Primary dysmenorrhea occurs in ovulatory menstrual cycles, so it usually occurs in the first menstrual cycle due to the development of the pituitary, hypothalamic, and ovarian dysmenorrhea. Secondary dysmenorrhea occurs in association with pathological conditions. Primary dysmenorrhea is caused by an increase in prostaglandins, vasopressin, and chemicals synthesized from phospholipids (such as thromboxane 2A, and prostacyclin). The difference between dysmenorrhea and premenstrual syndrome is twofold: It is both physical and mental. B) Premenstrual syndrome begins about a week before menstruation.

Premenstrual Syndrome

Premenstrual Syndrome (PMS) is the occurrence of a combination of periods of physical, psychological, and behavioral changes of sufficient intensity in the luteal phase of the menstrual cycle that leads to disruption of interpersonal communication or disruption of normal activities. Symptoms of the syndrome usually begin between 7 and 14 days before menstruation and appear to intensify near the time of menstruation and subside after a few days. These symptoms include mood swings, anxiety, anger, depression, breast tenderness and tenderness, special dietary cravings, headache, water retention and swelling, enlargement, and bloating (Lichten Edward, M. (1995).

Definition and prevalence of PMS

One of the most common problems during fertility is premenstrual syndrome. This syndrome is a set of physical, psychological, and behavioral symptoms that begin at the end of the secretory phase of the menstrual cycle, on average 5-7 days before menstruation, and continue for 4-2 days after the onset of menstrual bleeding. Recurrence of symptoms in at least two consecutive cycles is one of the diagnostic criteria for the syndrome. 90% -70% of women of childbearing age experience at least some unpleasant symptoms during this period, but about 40% -20% in the age range of 25-25 years are specifically affected by this syndrome (Rapckin, A, 2013)

There is a link between PMS and cyclic ovarian activity; Because the symptoms occur only between puberty and menopause and disappear in the cycles without ovulation and pregnancy. Even if the uterus was removed in the presence of

the ovaries, the symptoms of this complication were first discovered in 1931 by Frank. But the results of his research were forgotten. It does not seem to matter to anyone that women have this syndrome, whether it has minor symptoms such as fatigue and lack of concentration or more important complications such as epileptic seizures, asthma, and nervous seizures that were sometimes so severe that they forced them to commit suicide. Suffering has been reported in various sources for almost the same premenstrual syndrome. In general, more than 75% of women of childbearing age report some of the symptoms and periodic changes caused by this syndrome. The prevalence of severe PMDD is 10-3%. Premenstrual syndrome increases the incidence of crime, imprisonment for alcoholism, abuse at school, illness in industrial centers, hospitalization in public hospitals, increased suicide attempts, psychiatric admissions, poor workmanship and homework According to the latest statistical research, 85% of women have one of the recurrent symptoms of PMS, but only 40% of them report these symptoms. In 2 to 10 percent, these symptoms are so severe that they can affect their family or work life. The most common symptoms in this percentage of women are estimated to be inefficiency and incapacity for work. According to Johnson (2007), nearly 50% of women experience symptoms for only a few short days in the luteal phase, which may lead to a diagnosis of PMS. They are not laid (Paulak, M. ()2007

Premenstrual syndrome can be physical, mental, behavioral, or a combination of all three. Women with PMS experience a wide range of symptoms with varying degrees of severity. More than 150 symptoms are known for this syndrome; But irritability, tension, and restlessness are the most common symptoms among people. Significant physical symptoms include weight gain, headache, bloating, water retention, swelling of the limbs, swelling and tenderness of the breasts, muscle pain, and nausea Significant psychological symptoms include depression, anxiety, irritability, restlessness, anger, confusion, social isolation, crying, and forgetfulness. Significant behavioral symptoms include fatigue, insomnia, dizziness, changes in sexual orientation, increased appetite, and Overeating (Dickerson LM, 2003). Scott et al. (2004) increasing evidence suggests that neuroendocrine mechanisms are important in the pathophysiology of PMS. Serotonin is a neurotransmitter in the central nervous system that affects mood. Peripheral markers of serotonin production are altered in mood disorders and indicate a decrease in its synthesis within the CNS. Similar changes in serotonin synthesis have been observed during the luteal phase in women suffering from PMS. The association between this neurotransmitter and PMS is strengthened by the observation that selective serotonin reuptake inhibitors, which increase CNS serotonin, are useful in relieving symptoms. Scott,(2013)

Research method

This research is descriptive and is done by correlation method; This quasi-experimental study was performed on 60 female high school students in Tehran's second district. Subjects were selected based on purpose and availability and were divided into overweight and underweight groups. In two experimental groups, 5 weeks of aerobic exercise were performed. Data collection tools were temporary PMS diagnosis forms, as well as demographic characteristics of individuals including age, history of the specific disease, age of onset, duration of PMS symptoms, daily status record form, height, and weight were measured with a standard tape measure and standard scale. The body BMI of the subjects was calculated. Subcutaneous fat was measured with a caliper. The step test was taken before the start of the training protocol and after the training protocol steps. In this study, descriptive and inferential statistics were used and in the descriptive statistics section, graphs, frequency distribution, mean and standard deviation were used and inferential statistics were compared in two groups of dependent and independent t-tests. Inferential analysis of statistical data using SPSS software.

Data analysis

Descriptive findings

The statistical sample of the present article was 60 high school students in Tehran's second district who were studied in two groups overweight (30 people) and low weight (30 people). Information about the characteristics of the subjects including age, height, and BMI is presented in the table below.

Table 1- Characteristics of the subjects by group

BMI) m^2 kg/ (	Next weight (kg)	Weight (kg)befor	Height (cm)	Age (years)	Number	group	row
34/55±3/67	87/05±11/53	89/23±10/97	154±0/11	13/78±0/58	30	Fat	1
16/78±1/20	32/19±3/85	28/41±3/78	157±0/06	13/74±0/72	30	thin	2

As can be seen in the table above, the mean age of the subjects in the obese group (was 13,78) years with an average height of (1,54) cm and BMI (of 34,55) kg / m2, and the mean age of the subjects in the underweight group (13,74) years with an average height of (1,57) cm and BMI (16,78) kg / m2.

Investigate the normality of data distribution

Table 2 - Results of the Kolmogorov-Smirnov test to investigate the natural distribution of variables

thin		Fat		group
sig	z	sig	Z	
0/21	1/02	0/19	1/09	Physical symptoms
0/20	1/05	0/28	0/82	Psychological symptoms
0/32	0/74	0/17	1/12	fat percentage
0/29	0/91	0/21	1/04	Lean percentage
0/12	1/23	0/30	0/89	BMI

Kalmogorov-Smironov test was used to check the normal distribution of data. Table 2-4 shows that according to the obtained statistical level ($P \leq 0.,05$), the hypothesis of normal data distribution is confirmed, and therefore the data distribution is normal and it is possible to use parametric tests.

Hypothesis test

The effect of a period of aerobic exercise on walking on the physical symptoms of the premenstrual syndrome varies in obese and underweight female students.

Table 3: Results of correlated t-test to compare physical symptoms of premenstrual syndrome in pre- and post-test stages

P	d.f	t	Post-test	pre-exam	group	Variable
0/001	19	4/02	39/19±41/82	51/17±71/41	Fat	Physical symptoms
0/001	19	4/57	28/17±67/65	41/20±79/55	thin	

As shown in Table 3, the mean of physical symptoms in the obese group (51,71) in the pre-test and the post-test (39,41) decreased, and this decrease was statistically reduced by t = 4,02. It has been meaningful. Also, the mean of physical symptoms in the low-weight group (41,79) in the pre-test and the post-test (28,67) decreased, and this decrease was statistically significant with t = 4,57; Therefore, it can be concluded that a period of aerobic exercise and walking has been effective on the physical symptoms of premenstrual syndrome in obese and underweight female students.

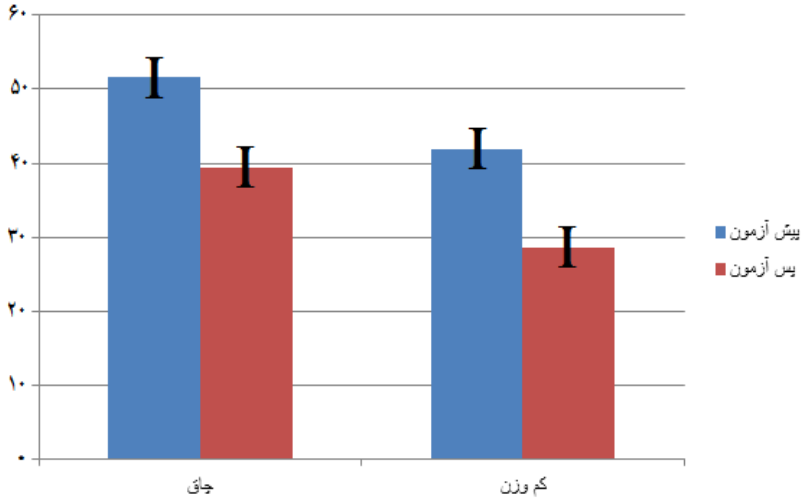

Figure 1- Comparison of physical symptoms of premenstrual syndrome in pre- and post-test stages

Due to the changes in both obese and underweight groups, using the independent t-test of the differences between the two groups to examine the difference in the effect of a course of aerobic exercise on walking physical symptoms caused by premenstrual syndrome in obese female students And lightweight were compared.

Table 4 - Results of independent t-test to compare physical symptoms of premenstrual syndrome in obese and underweight female students

P meaningful level	t	average difference	standard average	deviation±	group	Variable
0/85	0/20	0/82	12/13±30/67		Fat	Physical symptoms
			13/12±12/85		Thin	

The results of comparing the means of the two groups through a t-test for two independent groups are presented in the table above. The observed t value of the difference between pre-test and post-test measurements, assuming equality of variances, is not statistically significant (t = 0,20) for comparing the physical symptoms of premenstrual syndrome in obese and underweight female students. (85 / 0 ≤ P); Hence, the hypothesis of zero is not rejected and the research hypothesis that a course of aerobic exercise walking on the physical symptoms of premenstrual syndrome is different in obese and underweight female students; Not approved; In other words, a period of aerobic exercise and walking had the same effect on the physical symptoms of premenstrual syndrome in obese and underweight female students.

The effect of a period of aerobic exercise on walking on the psychological symptoms of the premenstrual syndrome varies in obese and underweight female students.

Table 5 - Results of paired t-test to compare psychological symptoms of premenstrual syndrome in pre- and post-test stages

P Significance level	d.f	T	Post-test	pre-exam	group	Variable
0/001	19	4/34	46/18±75/95	61/19±62/75	Fat	Psychological symptoms
0/001	19	5/49	34/17±35/73	48/18±51/99	thin	

As shown in the table, the mean of psychological symptoms in the obese group (62,62) in the pre-test and the post-test (46,75) decreased, and this decrease was statistically significant with t = 4,34. Have been. Also, the mean of psychological symptoms in the low-weight group (48,51) in the pre-test and the post-test (34,35) decreased, and this decrease was statistically significant with t = 5,49; Therefore, it can be concluded that a course of aerobic walking exercise has been effective on psychological symptoms caused by premenstrual syndrome in obese and underweight female students.

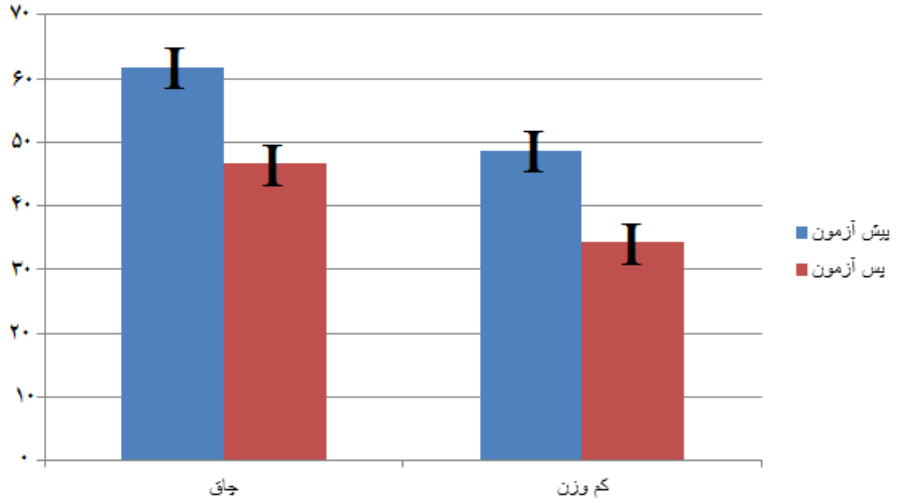

Figure 2 - Comparison of psychological symptoms of premenstrual syndrome in the pre-and post-test stages

Due to the changes in both obese and underweight groups, using the independent t-test of the differences between the two groups to investigate the difference in the effect of a course of aerobic exercise on walking psychological symptoms of premenstrual syndrome in obese female students And lightweight were compared

Table 6 - Results of independent t-test to compare psychological symptoms of premenstrual syndrome in obese and underweight female students

P Significance level	t	Mean difference	standard deviation± average	group	Variable
0/87	0/17	0/72	14/15±88/34	Fat	Psychological
			14/11±16/52	thin	

The results of comparing the means of the two groups through a t-test for two independent groups are presented in the table above. The observed t value of the difference between pre-test and post-test measurements, assuming equality of variances, to compare the psychological symptoms of premenstrual syndrome in obese and underweight female students (t = 0,17) is not statistically significant. (87 / 0≤P); Therefore, the null hypothesis is not rejected and the research hypothesis that a course of aerobic exercise walking on the psychological symptoms of PMS is different in obese and underweight female students; Not approved; In other words, a period of aerobic exercise and walking had the same effect on the psychological symptoms of premenstrual syndrome in obese and underweight female students.

The effect of a course of aerobic exercise on walking on body fat percentage is different in obese and underweight female students

Table 7- Correlated t-test results to compare body fat percentage in pre- and post-test stages

P Significance level	d.f	T	Post-test	Pre-test	group	variable
0/001	19	2/98	39/2±17/95	41/3±21/15	fat	Body fat percentage
0/07	19	2/03	19/1±97/13	19/1±52/23	thin	

As shown in the table, the average percentage of body fat in the obese group (41,21) in the pre-test and the post-test (39,17), has decreased, and this decrease with t = 98,2 statistically has been meaningful. Also, the average percentage of body fat in the low-weight group (19,52) in the pre-test and the post-test was 97,19) which decreased and this decrease was not statistically significant with t = 2,03; Therefore, it can be concluded that a period of aerobic exercise and walking has been effective on the percentage of body fat in obese female students. Due to the changes in both obese and underweight groups, using an independent t-test, the differences between the two groups to compare the effect of a course of aerobic exercise on body fat percentage in obese and underweight female students compared (Table3-4).

Figure 3- Comparison of body fat percentage in pre- and post-test stages

Table 8- Results of independent t-test to compare body fat percentage in fat and thin female students

P Significance level	t	Mean difference	standard deviation± average	group	Variable
0/001	3/96	2/49	2/2±03/63	fat	Percentage of body fat
			0/1±45/01	thin	

The results of comparing the means of the two groups through a t-test for two independent groups are presented in the table above. The observed t value of the difference between pre-test and post-test measurements, assuming equality of variances, to compare the percentage of body fat due to the premenstrual syndrome in obese and underweight female students (t = 3,96) is statistically significant. Be (00P 0,001.); Hence, the null hypothesis is rejected and the research hypothesis that a course of aerobic exercise is different in the percentage of body fat in obese and underweight female students; Is approved; In other words, a period of aerobic exercise walking has a greater effect on body fat percentage in obese female students than underweight female students.

The effect of a period of aerobic exercise on lean body mass in obese and underweight female students is different.

Table 9 - Results of correlated t-test for comparison on lean body mass in pre- and post-test stages

P Significance level	d.f	T	Post-test	Pre-test	group	variable
					Fat	BMI
0/001	19	2/98	52/5±75/80	51/5±59/82		
0/74	19	0/33	33/2±88/96	33/3±85/04	thin	

The average lean body mass in the obese group (51,59) in the pre-test and the post-test (52,75) increased, and this increase was statistically significant with t = 2,98. Also, the mean lean body mass in the low-weight group (33,85) in the pre-test and the post-test (33,88) increased, and this increase was not statistically significant with t = 0,33; Therefore, it can be concluded that a course of aerobic exercise walking has been effective on lean body mass in obese female students. Due to the changes in both obese and underweight groups, using the independent t-test, the differences between the two groups to investigate the differences in the effect of a period of aerobic exercise on lean body mass in obese and underweight female students. Compared

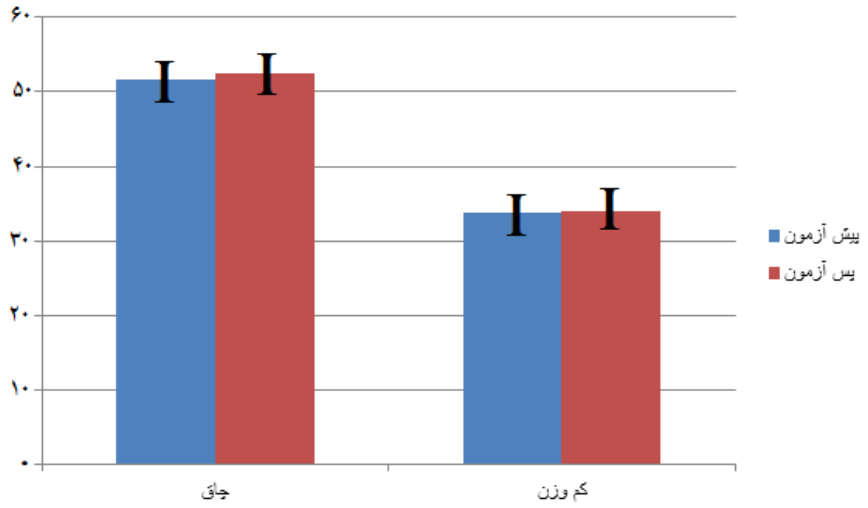

Figure 4-4. Comparison of lean body mass in pre- and post-test stages

Table 10 - Independent t-test results for comparison of lean body mass in obese and underweight female students

P Significance level	t	Mean difference	standard deviation± average	group	variable
0/001	2/81	1/13	1/1±16/75	Fat	BMI
			0/0±03/43	thin	

The results of comparing the means of the two groups through a t-test for two independent groups are presented in the table above. The observed t value of the difference between pre-test and post-test measurements, assuming equality of variances, to compare lean body mass due to the premenstrual syndrome in obese and underweight female students (t = 2,81) was statistically significant Is (00P 00 0,001); Hence, the null hypothesis is rejected and the research hypothesis that a course of aerobic exercise walking on lean body mass is different in obese and underweight female students; Is approved; In other words, a period of aerobic exercise walking has had a greater effect on lean body mass in obese female students than underweight female students. The effect of a period of aerobic exercise on walking on body mass index is different in obese and underweight female students.

Table 11- Correlated t-test results for comparison of lean body mass in pre- and post-test stages

P Significance level	d.f	T	Post-test	Pre-test	group	variable
0/001	19	3/14	34/3±14/68	34/3±55/67	Fat	BMI
0/04	19	2/22	17/1±02/13	16/1±78/20	thin	

The mean body mass index in the obese group (34,55) in the pre-test and the post-test (34,14) decreased, and this decrease was statistically significant with t = 3,14. Also, the mean body mass index in the low weight group (16,78) in the pre-test and the post-test (17,2) has increased and this increase was statistically significant with t = 2,22; Therefore, it can be concluded that a period of aerobic exercise and walking has been effective on body mass index in obese and underweight female students. Due to the changes in both obese and underweight groups, using the independent t-test, the differences between the two groups to compare the effect of a course of aerobic exercise on body mass index in obese and underweight female students compared (Table 3-4).

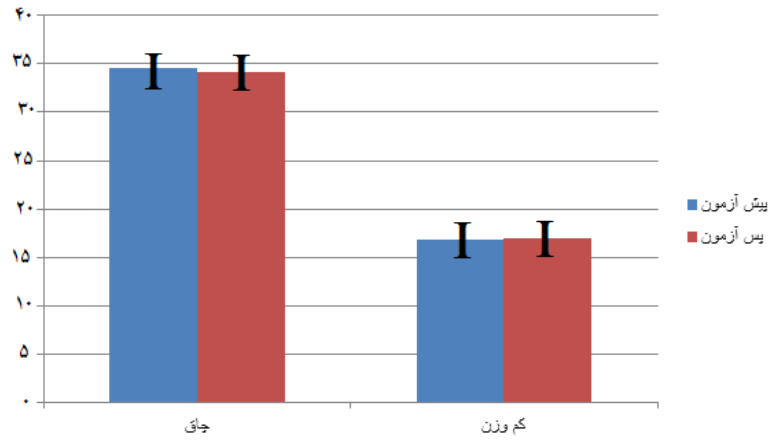

Figure 5 - Comparison of body mass index in pre- and post-test stages

Table 12 - Independent t-test results for comparison of body mass index in obese and underweight female students

P Significance level	t	Mean difference	standard deviation± average	group	variable
0/04	2/23	0/25	16/1±78/20	Fat	BMI
			17/1±02/13	thin	

The results of comparing the means of the two groups through a t-test for two independent groups are presented in the table above. The observed t value of the difference between pre-test and post-test measurements, assuming equality of variances, to compare the body mass index due to the premenstrual syndrome in obese and underweight girls (t = 2.23) is statistically significant. Be (00P 0.001); Hence, the null hypothesis is rejected and the research hypothesis that a course of aerobic exercise walking on body mass index is different in obese and underweight female students; Is approved; In other words, a course of aerobic exercise has a greater effect on body mass index in obese female students than underweight female students.

Conclusion

The results showed that walking exercise was effective in reducing physical symptoms caused by premenstrual syndrome in comparison between before and after in both obese and underweight groups(table3-4-figure1). Possible causes in reducing physical symptoms in both groups of walking exercise can be He noted the increase in exercise-induced self-confidence, biological changes, or a combination of both. In addition, exercise leads to dehydration, which improves physical symptoms such as inflammation. Studies show that when they engage in moderate-intensity exercise for at least 3 days a week, the symptoms of pre-existing syndrome They experience less menstruation. Therefore, this decrease in physical symptoms of the subjects in the present study may have been due to their regular physical activity for 5 weeks and five days a week with mild to moderate intensity. On the other hand, it is said that women with the premenstrual syndrome do a variety of aerobic exercises that increase the heart rate to 120 beats per minute and do it for 20 to 30 minutes a day and three to four times a week. It can also be effective in weight loss because being overweight exacerbates the symptoms of PMS. Electrolyte symptoms may be related to elevated serum aldosterone, elevated prostaglandins, and E, vitamin B6 and magnesium deficiency. Aldosterone levels naturally increase during ovulation and remain high during the luteal phase. This increase in serum aldosterone and the secretion of prostaglandin E2 from the endometrium during menstruation can be responsible for physical symptoms such as swelling, weight gain, headache, and allergies. One of the symptoms in women with PMS is excessive cravings for sweets, which is also mentioned as one of the symptoms in the daily status record form used in the present study. This study aimed to reduce this symptom through exercise in addition to other symptoms of PMS. Therefore, the secretion of endorphins in the blood stabilizes blood sugar and prevents excessive desire for sweets in the premenstrual period. Accordingly, the improvement in the symptom of excessive desire for sweets in the subjects in this study may have been due to the above-mentioned reason. During physical activity, the transfer of oxygen and nutrients to the body's cells is accelerated and reduces the feeling of lethargy and lethargy. For this reason, it may be possible to attribute the reduction of physical symptoms such as fatigue to this study. Consistent with the results of the present study, Farideh Dehghan et al. (2008)

investigated the effects of regular aerobic exercise on the severity of PMS symptoms. This quasi-experimental study was performed on 91 women living in Tehran with an age range of 48-16 years. All of these individuals had symptoms of PMS with varying severity based on daily records. After recording the individual characteristics, presence, and severity of symptoms of PMS, using the modified form of the questionnaire to assess the symptoms of menstrual disorders, once before and once after the three-month training period was completed. Overall, the study showed that 3 months of regular aerobic exercise is effective in reducing the severity of PMS symptoms. Consistency of the results in the present study was recorded once a day before and once after the walking exercise. In both studies, regular aerobic exercise was effective in reducing the symptoms of PMS. Consistency of the results with the research of Asal Rajaian et al. (2011) in the study entitled The study of the relationship between aerobic capacity with premenstrual syndrome in female athletes and non-athletes. The subjects of this study were 40 female students (20 athletes and 20 non-athletes) who were selected by a questionnaire and referred to the laboratory during the days 18-26 days after bleeding (luteal phase) to perform the maximum Bruce test and complete the premenstrual questionnaire. The results of this study showed that the symptoms of premenstrual syndrome are less common in the athlete group than in the non-athlete group. The number of samples in this study was the same as the present study and was divided into two groups. In the study of Mohebbi Dehnavi Z(2018), The effect of 8 weeks aerobic exercise on severity of physical symptoms of premenstrual syndrome, This study was a randomized clinical trial (IRCT2015021721116N1) that was performed on 65 students living in student dormitories of Mashhad University of Medical Sciences in 2016, Iran. Samples were randomly assigned to control and intervention groups. The intervention group engaged in 8 weeks of aerobic exercises, three times a week, and 20 min for each session. The tools were research unit selection questionnaire, midwifery and personal particulars, temporary determination of premenstrual syndrome, Beck Depression, recorded daily symptoms of premenstrual syndrome and Borg scale. We analyzed the data using SPSS software and Mann-Whitney U test and Friedman test. At the beginning of the study, both control and intervention groups were homogeneous. The results of independent t-test showed that among the physical symptoms of the premenstrual syndrome in the intervention group compared to the control group, at the end of the study, headache ($p = 0.001$), nausea, constipation diarrhea ($p = 0.01$), swollen ($p = 0/001$) had a significant reduction. Also, the comparison of the difference between the mean of the signs at the beginning and the end of the study, bloating ($p = 0.01$), Vomiting ($p = 0.002$), hot flashes ($p = 0.04$), increase in appetite ($p = 0.008$) were significantly decreased. Aerobic exercise as one of the ways to treat premenstrual syndrome can reduce the physical symptoms of the syndrome. This study was conducted by Fahimeh Sehati et al. (2013) with the aim of comparing the frequency of menstrual disorders (amenorrhea, oligomenorrhea, dysmenorrhea and premenstrual syndrome) among female athletes and non-athletes. This study was performed on 360 female students aged 28-18 in medical and non-medical fields of Tabriz universities. There was no significant difference between athletes and non-athletes ($P = 0,15$). Therefore, exercise can improve dysmenorrhea and premenstrual syndrome, which is consistent with the present study. Both obese and underweight groups were equally different. And the reduction of the syndrome in both groups was effective due to regular aerobic walking exercise. The findings of the present study show that aerobic exercise was more effective on the body fat percentage of obese female studentsthanunderweight(table7-8-figure3). Body composition has a significant effect on physiological responses to exercise. Muscle tissue, fat, bone, etc .... are the constituent parts of the body In the methods of assessing the composition of the body, in this method the constituents of the body are divided into two parts. Fat mass and lean mass are present in adipose tissue where internal organs and under the skin are located. Almost all available sources and books have somehow mentioned the need to determine the percentage of body fat to diagnose obesity and overweight. The present study was conducted by Ode JJ (2007), Body mass index as a predictor of percent fat in college athletes and nonathletes. A total of 226 college-aged athletes and 213 college-aged nonathletes participated. Three male groups (athletes, football linemen, and nonathletes) and two female groups (athletes and nonathletes) were created. BMI was calculated. Percent fat was determined via BOD POD. BMI >or= 25 kg.m(-2) was used to define overweight. Twenty percent fat for males and 33% fat for females were used to define overfatness. Using % fat as the criterion, sensitivity and specificity of BMI were calculated. Receiver operator characteristic curves determined optimal BMI cut points for % fat. Sensitivity was high (0.83-1.0) and specificity was low (0.27-0.66) in male athletes, male nonathletes, and female athletes. Sensitivity was high in linemen (1.0). Sensitivity was low (0.56) and specificity was high (0.90) in female nonathletes. Optimal BMI cut points for male athletes, linemen, male nonathletes, female athletes, and female nonathletes were 27.9, 34.1, 26.5, 27.7, and 24.0 kg.m(-2), respectively. BMI should be used cautiously when classifying fatness in college athletes and nonathletes The present study with Westerterp KR (2018),conducted a study Exercise, energy balance and body composition, Activity-induced energy expenditure, as determined by the activity pattern including exercise, is the most variable component of daily

energy expenditure. Here, the focus is on effects of exercise training on energy balance and body composition in subjects with a sedentary or light-active lifestyle. Then, exercise training induces an energy imbalance consistently lower than prescribed energy expenditure from exercise. Additionally, individual responses are highly variable and decrease in time. Combining the results from 23 exercise training studies in normal-weight, overweight, and obese subjects, varying in duration from 2 to 64 weeks, showed an average initial energy imbalance of about 2 MJ/day with an exponential decline to nearly zero after about 1 year. A compensatory increase in energy intake is the most likely explanation for the lower than expected effect of exercise on energy balance. Overall, exercise training results in a healthier body composition as reflected by a reduction of body fat, especially in overweight and obese subjects, with little or no long-term effect on body weight.

Findings show that walking aerobic exercise has been more effective on lean mass in obese girls than underweight(table9-10-figure4). Lean mass refers to all body tissues except adipose tissue. Lean mass can be reduced by losing weight. Total body fat was calculated from total body weight. Body composition assessment is performed to determine the percentage of fat, lean mass and to determine the optimal weight and minimum weight. The present study conducted a study with otarsky CJ(2021), Time-restricted eating and concurrent exercise training reduces fat mass and increases lean mass in overweight and obese adults, This study was a randomized, controlled trial. Overweight and obese adults (mean ± SD; age: 44 ± 7 years; body mass index [BMI]: 29.6 ± 2.6 kg/m2 ; female: 85.7%) were randomly assigned to a TRE or normal eating (NE) dietary strategy group. The TRE participants consumed all calories between 12:00 p.m. and 8:00 p.m., whereas NE participants maintained their dietary habits. Both groups completed 8 weeks of aerobic exercise and supervised resistance training. Body composition, muscle performance, energy intake, macronutrient intake, physical activity, and physiological variables were assessed. A total of 21 participants completed the study (NE: n = 10; TRE: n = 11). A mild energy restriction was observed for TRE (~300 kcal/day, 14.5%) and NE (~250 kcal/day, 11.4%). Losses of total body mass were significantly greater for TRE (3.3%) relative to NE (0.2%) pre- to post-intervention, of which TRE had significantly greater losses of fat mass (9.0%) compared to NE (3.3%). Lean mass increased during the intervention for both TRE (0.6%) and NE (1.9%), with no group differences. These data support the use of TRE and concurrent exercise training as a short-term dietary strategy for reducing fat mass and increasing lean mass in overweight and obese adults.

The results show that walking aerobic exercise has been effective on the body mass index of obese and underweight girls(table11-12-figure5). Many diseases that cause organ failure, heart disease, diabetes, and osteoarthritis are due to obesity. In this regard, some tables help the person to find their desired weight and height. Regular exercise generally leads to a reduction in fat and an increase in lean body mass (FFM). Perhaps one of the reasons for the higher body mass index in people with PMS is that people with PMS often have more symptoms of stress, anxiety, depression, and impatience and are less active, which leads to inactivity. They become obese as a result. As mentioned, body mass index is obtained by dividing body weight (kg) by height squared (meters). The present study was designed and conducted by Leila Amiri et al. (2012) to determine the relationship between premenstrual syndrome and body mass index. It was performed on 500 students living in the dormitory of Arak University of Medical Sciences who did not suffer from stress, anxiety, and severe depression. In this study, based on normal body mass index (less than 25), normal upper body (25 and more than 25) were 90,8% and 9,2%, respectively, which showed that the normal body mass index compared to body mass index Natural highs relative to body mass index increase the risk of PMS by 2,43.times, which results in overweight and obesity increase the risk of PMS. In the present study, walking on PMS The bodies of the two groups of obese and low-weight female students were effective and consistent. Because after exercising, walking affects body mass index and the physical and psychological symptoms of PMS have decreased. The research of Habibzadeh and Rahmaninia (2010) on the effect of two months of walking exercise on serum lipids and body mass index, showed that in the experimental group body mass index (P = 0.001) after walking exercise Regular physical activity walking can alter lipoprotein metabolism and reduce cardiovascular risk factors in obese girls. However, the present study was performed on two groups, which shows a better comparison of BMI results. The results of statistical analysis of the findings of this study show that a period of aerobic exercise has been effective on walking body mass index in obese and underweight female students and obese statistical samples more than low-weight statistical samples. The present study is consistent with the research of Leila Amiri et al. (2011) and Habibzadeh and Rahmaninia (2010).

Since most studies have reported that regular exercise is effective in improving health and reducing the symptoms of PMS. Given that, the results of the present article suggest that girls should pay more attention to their physical activity and weight. On the other hand, increasing the level of body activity includes reducing the body mass index, which can be effective in increasing health. Due to the significant reduction in girls' daily activities, it is recommended to offer various solutions such as holding lecture sessions, and workshops, about the benefits of regular exercise for the ideal weight, as well as

reducing the symptoms of PMS and allocating places. More than the city level for girls to exercise can help improve their health and reduce their disease, especially reducing the psychological and physical symptoms of the syndrome and cardiovascular disease and reducing their overweight

ethical statements: None
financial support : None
ethical statements: None

References

Spirov, L., Fritz, M. (2005). Clinical endocrinology of women and infertility Spirov, translated by Bahram Ghazi Jahani, Samira Mohajerani, Akbarfadaei, Golban Publishing in collaboration with Arian Teb and Ghazi Jahani, pp. 470-426, 469-436

Amiri Farahani, Leila Heydari, Touba. Orange, Fereshteh. Jafarabadi, Mohammad Asghar. Shirazi, Wahida. (2011). The relationship between premenstrual syndrome and body mass index in female students. Journal of the School of Nursing, Midwifery, Tehran School of Medical Sciences. Volume 17, Number 4.

Tawfiqi, Asghar Tartibian, Bakhtiar. Tolouei Azar, Javad (2012). The effect of body composition and gender on physical fitness factors of 17-19-year-old students using FMI- FMI regression model. Urmia Medical Journal.4,23.

Rajaeyan, A.S.A.L., Nourshahi, M.A.R.Y.A.M. and Zahedi, H.A.D.I., 2011. The relationship of prevalence of premenstrual syndrome prevalence with aerobic power of female athletes and non athletes. Iranian Journal of Obstetrics, Gynecology and Infertility, 14(5), pp.16-22.

Sandgol, Hussein (1993). Exercise physiology. Publications of the National Olympic Committee of the Islamic Republic of Iran

Sadr Sadeghi Nejad, Nooshin. (2017). Factors associated with menstrual disorders and decreased bone density in women athletes5,13-15.

Gaini, Abbas Ali Kifrashi, Zahra. Nazari Katoli, Farideh. Kazemi, Fahima. Shafi'i Nik, Leila. (2010). The effect of different stature statuses on WHR, BMI,% BF, and non-athlete adolescent girls in cold and tropical regions. Journal of Sports Science. The sixth year. Issue 11.

Murge, J., Hacker, N. (2005). Necessities of gynecological and obstetric diseases, translated by Malek Mohammadi and Sara Arian Mehr, Teymourzadeh Publishing Cultural Institute, Tabib Publishing, p.440.

Dickerson LM, Mazyck PJ, Hunter MH. (2003). Premenstrual syndrome AM Fam physician; 67 (8): -52-1743

Lichten Edward, M. (1995) .medical treatment of PMS

Lusty, K. Widman, L. Paschane, A. Ecker, E. (2004). stress, Quality of life, and physical activity in women with varing degrees of premenstrual (symptomatogy. 393). Pp44-35

Nazarpur, S. (2007). Textbook of gynecological and infertility. First edi- published by boshra with Johfe publication. 235-224 (Persian).

Paulak, M. (2007). Premenstrual syndrome and premenstrual dysphoric disorder Journal of pediatric and Adolescent Gynecology, 20 (3).

.Rapckin, A. (2013) .Areview of treatment of premenstrual syndrome and premenstrual dysphoric. psychoneuro endocrinology; 28 supp13:53-39

Scott, J. Gibbs, R. Karlan, B. Heney, A. (2013). Danforth, s ob & gy. (9th ed). Lippincott Williams & Wilkins., Pp: 658-655

Leila Amiri, F., Tooba, H., Fereshteh, N., Mohammad Asghari, J. and Vahideh, S., 2012. Relationship between pre menstrual syndrome with body mass index among university students.

Dehghan Manshadi, F., Emami, M., Ghamkhar, L., Shahrokhi, B. and Ghanbari, Z., 2008. The effect of a three–month regular aerobic exercise on premenstrual syndrome. Journal of Rafsanjan University of Medical Sciences, 7(2), pp.89-98.

Ode JJ, Pivarnik JM, Reeves MJ, Knous JL. Body mass index as a predictor of percent fat in college athletes and nonathletes. Med Sci Sports Exerc. 2007 Mar;39(3):403-9. doi: 10.1249/01.mss.0000247008.19127.3e. PMID: 17473765.

Westerterp KR. Exercise, energy balance and body composition. Eur J Clin Nutr. 2018 Sep;72(9):1246-1250. doi: 10.1038/s41430-018-0180-4. Epub 2018 Sep 5. PMID: 30185845; PMCID: PMC6125254.

otarsky CJ, Johnson NR, Mahoney SJ, Mitchell SL, Schimek RL, Stastny SN, Hackney KJ. Time-restricted eating and concurrent exercise training reduces fat mass and increases lean mass in overweight and obese adults. Physiol Rep. 2021 May;9(10):e14868. doi: 10.14814/phy2.14868. PMID: 34042299; PMCID: PMC8157764.

Sehati Shafaie F, Matin Homaei H, Zoodfekr L. Comparison the frequency of menstrual disorders (amenorrhea, oligomenorrhea, dysmenorrhea and premenstrual syndrome) between athletes and non-athletes female students of Tabriz universities, Tabriz, Iran. The Iranian Journal of Obstetrics, Gynecology and Infertility. 2013 May 22;16(51):14-21.

Mohebbi Dehnavi Z, Jafarnejad F, Sadeghi Goghary S. The effect of 8 weeks aerobic exercise on severity of physical symptoms of premenstrual syndrome: a clinical trial study. BMC Womens Health. 2018 May 31;18(1):80. doi: 10.1186/s12905-018-0565-5. PMID: 29855308; PMCID: PMC5984430.

Shirdel, R., Soheili, S. and Parsian, H., 2021. The Effect of Aerobic Exercise Combined with Salvia Officinalis Extract on The Changes of Premenstrual Syndrome Symptoms in Inactive

Women. Sport Physiology & Management Investigations, 13(2), pp.177-185.
Leila Amiri, F., Tooba, H., Fereshteh, N., Mohammad Asghari, J. and Vahideh, S., 2012. Relationship between pre menstrual syndrome with body mass index among university students
Habibzadeh, S., Rahmaninia, F.A.R.H.A.D. and Daneshmandi, H.A.S.A.N., 2010. Effect of walking program on bone mass density, body composition and some of blood factors in obese and thin girls. Kowsar Med J, 15(1), pp.55-9