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"TO FIND OUT THE EFFECT OF AEROBIC EXERCISE ON THE SYMPTOMS OF PREMENSTRUAL SYNDROME IN ADOLESCENT GIRLS-QUASI - EXPERIMENTAL STUDY"

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Abstract: Menstrual cycle is one of the most important signs of reproductive system functioning in females associated with signs and symptoms that causes physical and psychological problems which is termed as Pre-Menstrual Syndrome. Aerobic exercise is the suitable and best method for the treatment of PMS. Methods: This study is a quasi – experimental study performed on 30 female students of B N Patel College of Physiotherapy. Sampling was done using convenient sampling method. The assessment tool used to record PMS symptoms was Premenstrual syndrome scale (PMSS). Experimental group were given 8 week of aerobic exercise; 45 minutes per session for 5 days in a week. Results analysed using SPSS software and paired t test was used. Results: The results of paired t test showed that there was significant reduction in total score of PMS; pre score was 131.23±24.72 and post score was 87.6±16.85.Physical symptoms showed significant reduction; pre score was 54±8.25 and post score was 36.86±6.55. There was moderate amount of reduction in psychological symptoms; pre score was 39.43±9.69 and behavioural symptoms also showed that moderate amount of reduction; pre score was 37.8±10.69.Conclusion: Aerobic Exercise is effective in reducing the physical, psychological and behavioural symptoms of Premenstrual Syndrome.

Keywords: Premenstrual Syndrome (PMS), Adolescents girls, Premenstrual Syndrome Scale (PMSS), Aerobic Exercise.

I. INTRODUCTION:

Menstrual cycle is one of the most important signs of reproductive system functioning in females, but sometimes this phenomenon is associated with signs and symptoms that causes physical and psychological problems for women. Pre-Menstrual Syndrome (PMS) is a set of repetitive symptoms that begins at the late secretory phase of the menstrual cycle (5–7 days before menstruation) and ends in the follicular phase (2–4 days after menstruation).[1] In this syndrome, more than 160 signs have been associated with the premenstrual phase of ovarian cycle that includes the physical, emotional and behavior symptoms. Some of the symptoms includes: abdominal cramps, boredom, abdominal bloating, pain and tenderness of the breasts, acne, back pain and headache, joint pain and muscle pain,weight gain, fatigue, changes in appetite and thirst, constipation, heart rate elevation.[2]The duration of affective symptoms can vary from a few days to 2 weeks. Symptoms often worsen a week before and spike two days before menstruation begins.[3] Since most women of reproductive age report at least mild premenstrual symptoms, a certain degree of discomfort during the luteal phase should probably be considered physiological rather than pathological.[4] Several possible causes have been reported for this syndrome: estrogen, progesterone,fluid retention, hyperprolactinemia, vitamin B6 deficiency, hypoglycemia, prostaglandin deficiency, androgen hormones allergy, psychosomatic problems, increased activity of aldosterone and rennin plasma, thyroid disorders and lack of serotonin.[5] It may include the effect of progesterone on neurotransmitters such as serotonin, opioids, catecholamine, and GABA, increased prolactin level or increased sensitivity to the effect of

prolactin, insulin resistance, sensitivity to endogenous hormones, abnormal hypothalamic-pituitary-adrenal axis(HPA) function, nutritional deficiencies,alteration of glucose metabolism, and fluid and electrolyte imbalance.[6]Since PMS symptoms occur simultaneously with the hormonal fluctuations of the menstrual cycle, hormonal disproportion like estrogen surplus and progesterone deficiency have been proposed. Symptoms are also associated with serotonin to link as a key etiological factor.[7] Estrogen comprises of three major hormones: Estrone, Estradiol, Estriol, and Estradiol being the most important. The decreased estrogen causes the hypothalamus to release norepinephrine, which triggers a decline in acetylcholine, dopamine, and serotonin thatleads to insomnia, fatigue, depression, which are common symptoms of PMS.[7] Estrogen levels that fluctuate during the luteal phase are what is responsible for women's mood changes. Clinical trials have shown that serotonin precursors significantly increases between days 7 to 11 and 17 to 19 of the menstrual cycle. This indicates that PMS is closely associated with mood disorders through estrogenserotonin regulation. The brain neurotransmitters serotonin is implicated in the regulation of mood and behavior.[8] It remains unclear whether premenstrual somatic symptoms- such as breast tenderness,bloating, joint and muscle pain – results from reduced tolerance to physical discomfort while in a dysphoric mood state, or are caused by changes in hormone- responsive tissues in the periphery.[9]

40 million women in the world suffer from the symptoms of this syndrome and more than 5 million of them are going on to medical treatment for mental and behavioural changes that occurs due to PMS.[10] Epidemiologic surveys have estimated that as many as 80% women of reproductive age experience some symptoms attributed to the premenstrual phase of the menstrual cycle.[11]A large number of women are involved in the fields of occupation, education, family, and other responsibilities. And the stress associated with these responsibilities is related to health issues, such as PMS.[12]

More than 300 different treatments for PMS symptoms have been suggested. Different therapeutic interventions, such as lifestyle changes, stress management training (massage and reflexology therapy), yoga, exercise, vitamins, herbal remedies, selective serotonin reuptake inhibitors and antidepressants exist.[13] Considering the side effects of drugs and surgical treatments, non-drug treatments; physical activity have attracted the attention of specialists and women with the disease.

Aerobic Exercise program has three components: warm up period, aerobic exercise program and cool down period. The warm up should be gradual and sufficient to increase muscle and core temperature without causing it to fatigue. It includes 10 minutes of total body movement exercises.[14] Aerobic exercise period is an exercise which involves or improves oxygen consumption by large muscles of group. Aerobic means "With Oxygen" and refers to the use of oxygen in body's metabolic or energy generating process. Cool-down period is necessary following the exercise period. It should last for 5 to
10 minutes including stretching and relaxation. [14]

NEED FOR THE STUDY

Considering the high prevalence of this syndrome among girls, and the consequences of this syndrome on job performance, social and interpersonal relationships and family, and the role in limiting the phenomenon of educational, social and economic progress in the community and lack of physical activity, the role of aerobic exercises in improving overall health during PMS serves to be important.

So, need of the study was to examine the effect of aerobic exercise on physical and psychological symptoms and simultaneously to see the improvement in behavioural symptoms of PMS in adolescent girls.

Aim of the study was to determine the effect of aerobic exercise on reducing the symptoms of PMS in Adolescent girls. The study objectives were to assess the effect of aerobic exercise on reducing physical symptoms, psychological symptoms, behavioural symptoms and overall symptoms of PMS in adolescents girls.

MATERIAL AND METHODS

- Study Setting: B.N. Patel College of physiotherapy, Anand.
- Study design: A Quasi- experimental study.
- Study population: 18 to 25 years girls.
- Sampling method: Convenient sampling method.
- Sample size: Total 30 girls were examined.
- Study duration: 8 weeks.
- Treatment duration: 5 sessions per week for 45 minutes.

The participants were selected on the basis of inclusion and exclusion criteria which were: regular menstrual cycle with 28-35 days with the age range of 18 to 25 years having moderate to sever symptoms in unmarried girls and those willing to participate. Participants with the history of Cardio-respiratory, Musculo-skeletal, Metabolic, Endocrinal, neurological disorders, on any sort of medications like analgesics and the ones taking oral contraceptive pills were excluded from the study.

In this study, the instrument scale used to assess the premenstrual syndrome score was PMSS (Premenstrual Syndrome Scale). The premenstrual syndrome scale is one of the most extensively studied symptoms assessment instruments) It measures the inter-rater reliability of the premenstrual syndrome and its individual items. It comprises of 40 questions with three sub-scales: Physiological, psychological and behavioural symptoms. The measurement on the scale are set according to the following scoring system: the response Never was scored as "1 ", rarely as "2", sometimes as "3", very often as "4" and always "5"The scale's lowest score is 40 and highest score is 200. If the scale's total score reaches 80 points or above, this indicates the occurrence of PMS.[15]

The procedure of self – reported PMS symptoms were recorded before 2 to 3 days of Menstrual cycle using Premenstrual Syndrome Scale (PMSS).In this study, people with moderate to severe PMS symptoms and who were fulfilling the inclusion criteria were selected as research subjects. Before starting the study, written consent form were taken from the subjects. Exercises were done over a period of 8 weeks, as 5 sessions in a week for 45 minutes. Pulse rate were checked using pulse ox meter, before starting the session and at the end of session. Exercise protocol of 45 minutes including warm up period for 10 minutes, floor aerobics for 30 minutes and cool down for 5 minutes, as mentioned in table was done. Exercises were performed between three menstrual cycles. Exercise protocol : The warm up session was for 10 minutes including: Neck tilts, Side arm raises and toe touch, Marching in one place, Butterfly stretch and Forward bend stretch. Followed by the floor aerobics which lasted for 30 minutes of 10 repetitions and 2 sets which consisted of Basic steps, V- step, L- step, Side to side moves, over the top, Lunges and side lunges, Squats and sump squats, Boxer squat punch. Ending with cool down which consisted of 5 minutes stretching with 10 seconds hold and 3 repetitions.

III RESULT: The data was analyzed by using SPSS VERSION 22 And were represented as mean and standard deviation PMS score was analyzed using paired t test of various symptoms after menstrual period .The mean age of subjects in experimental group was 21.6 and the mean body mass index (BMI) was 20.4 table [1]

Table [1] :Demographic characteristics of the study participants

Age	21.6±0.93
Height	159.25±5.84
Weight	50.73±9.58
BMI	20.04±4.14

Mean PMS, physical, psychological and behavioral symptoms before and after the intervention showed a significant difference ($p<0.05$). Paired *t*- test showed that the mean PMS, physical, psychological and behavioral symptoms in aerobic exercise after exercise was lower than before exercise ($p<0.05$). The results of this study showed that the physical, psychological and behavioral symptoms of experimental groups after 8 weeks of aerobic exercise had a significant difference ($p<0.05$)

Table [2] Mean scores of PMS, physical, psychological and behavioural symptoms before and after intervention

Mean	Pre- test		Post test		t value	p value
	Mean	Standard Deviation	Mean	Standard deviation		
PMSS	131.23	24.72	87.6	16.85	15.627	<0.05
Physical Symptoms	54	8.25	36.86	6.55	21.678	<0.05
Psychological Symptoms	39.43	9.69	24.56	6.08	11.574	<0.05
Behavioral Symptoms	37.8	10.69	26.16	7.31	10.697	<0.05

IV DISCUSSION

This study, after 8 weeks of aerobic exercise intervention, there was significant reduction in total PMS score; pre mean score was 131.23 with SD 24.72 and post mean score was 87.6 with SD 16.85. The physical symptoms shows significant reduction after intervention; pre mean score was 54 with SD 8.25 and post mean score was 36.86 with SD 6.55. Psychological symptoms shows moderate degree of reduction after intervention; pre mean score was 39.43 with S.D. 24.56. and post mean score was 24.56 with SD 6.08 Behavioral symptoms shows moderate degree of reduction after intervention; pre mean score was 37.8 with S.D. 10.69 and post mean score was 26.16 with S.D. 7.31.Overall findings suggest that, the positive impact of 8 weeks of aerobic exercise on physical, psychological and behavioral symptoms of PMS was observed in adolescent's girls, which is consistent with the studies showing that aerobic exercise is effective. Samadi et al. showed that 8 weeks of aerobic exercise is effective in reducing the symptoms of PMS and can be used as treatment.[10] Similarly, Khademi *et al*.study(2008) showed that 8 weeks of swimming as an aerobic exercise can reduce the physicaland psychological PMS.[16]

In this study, exercises were performed with moderate intensity (60-80 % MHR),which is effective in treating PMS. Pearlstein T., et al (2012) has found that moderate intensity (60% to 80% MHR) and severe intensity (80% to 100% MHR) aerobic activity could significantly reduce the symptoms of PMS symptoms as compared to mild intensity (30% to 40% MHR).[17] Prolactin increases in the luteal phase is one of the cause of pain and swelling in the breast. Physical symptoms like swelling, weight gain, headache and breast pain are related to increase aldosterone in serum, prostaglandin E2, and deficiency of vitamin B and Mg.[18] Prostaglandin E2 is one of the risk factors for developing physical symptoms. The repeated muscle contraction in the aerobic exercise helps venous return and increases the movement of prostaglandin and other substances and prevents their accumulation in the pelvis and which in turn reduces the back pain and abdominal discomfort[19]

The performance of aerobic exercise reduces the levels of estrogen and progesterone,and in this way, it decreases the serum levels of aldosterone and water and sodium resorption, thereby it reduces edema and improves the physical symptoms.[20] A survey conducted by Joyner and Charkoudian (2004) on 20 women showed that the 12 week aerobic exercise created the balance of estrogen and progesterone levels in women, reducing the symptoms.[21] Maximum fluctuation in hormones occurs during the premenstrual/menstrual phases. Israel found a raised threshold for estrogens in patients with PMS and suggests that the cause was not high level of estradiol in the blood but due to lack of progesterone to act as an antagonist.[22]Beta endorphins level are decreased during luteal phase due to changes in ovarian steroids, psycho- emotional symptoms relief could be explained as the effect of increased endorphin levels and related central neurotransmitters. Decreased levels of adipose tissue leading to decreased oestrogen and increased progesterone levels affected by regular exercise are also known as effective factors in improvement of emotional symptoms.[23]

According to cognitive- behavioural theory, disturbing thoughts and cognitive disorders cause depression and exercise declines negative feelings and induce positive thoughts and reduce depression in short time.[24] Scully D, *et al*. (1998) showed that the positive effect of exercise on emotional and psychological symptoms of syndrome, such as depression and anxiety.[25] Stress is stored in the form of muscle tension which is the result of sympathetic abnormal activity. Cramp is caused by sympathetic nervous system which affects on uterine smooth muscles. Vascular contraction, results from stress, leads to hypoxia of uterine muscles. All

of this issues bring about from increase in sympathetic activity resulted from environmental stress. Physical activities are able to improve these problems.[26] Axis of the hypothalamus – pituitary – adrenal (HPA) is part of neuro-endocrine system and regulate many body functions such as appetite, immune system, mood, emotion, sexuality and save energy and reduce stress.[27] Roca CA, *et al.*(2003) showed in their study that patients with PMS, respond of HPA axis during the luteal phase reduced and caused emotional and physical symptoms.[28]

Another mechanism is the effect of exercise on blood leptin levels in women with PMS.Leptin is a hormone secreted from fat cells and regulates the metabolism of the hypothalamus- pituitary- gonad and has an important role in human reproduction.[29]This hormone exerts its metabolic and neuro-endocrinology effects through its receptors in the hypothalamus area of emotional control. A study has shown that circulating leptin concentration in women with PMS is significantly higher than in women without PMS.[29] Some researchers showed that physical activity reduces the amount of leptin in blood to 30- 34%.[30] Thus, aerobic exercise decreases the blood leptin levels in women thereby reduces the psychological symptoms of PMS. Aerobic exercises increases hemoglobin, haemocrit, red blood cell count and platelet count and decreases levels of prolactin, estradiol and progesterone, resulting in improvement of fatigue, impaired concentration, confusion and most premenstrual symptoms, thus it improves behavioral symptoms.[31]

V LIMITATION OF STUDY:

- This study is performed in small sample.
- This study is conducted only to limited age group.
- This study is conducted only for short duration (8 weeks.

VI CONCLUSION: In conclusion, we have found that there is significant improvement in after 8 weeks of aerobic exercise training. There was more improvement in physical symptoms and moderate improvement in psychological and behavioural symptoms.

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