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Effectiveness of aerobic exercise and yoga intervention on symptoms of premenstrual syndrome in healthy young females: A comparative study

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Abstract
Objective: Objective of the study was to compare the effectiveness of Aerobic exercise and Yoga intervention on symptoms of premenstrual syndrome in healthy young females over the period of 12 weeks.
Subjects and methods: The study included healthy young females between age 18-25 with premenstrual syndrome. Total 40 females were included. The samples were selected based on ACOG (American college of Gynaecology) criteria for premenstrual syndrome. Two groups of 20 females were formed by convenient sampling method.
Group 1 performed yogic exercises and group 2 performed aerobic exercises for the period of 12 weeks for three days per week, along with mild stretching of extremities as warm-up and cool down exercise. A Menstrual symptom questionnaire was distributed to both the groups prior and post interventions to fill up in order to record the difference in severity of the symptoms before interventions.
Result: The pre and post mean scores of Yoga group were 166.05 and 160.85 and 166.42 and 129 for Aerobic exercise. There was significant difference in pre and post scores on menstrual symptom questionnaire for Aerobic exercise group.
Conclusion: Our study conducted for 12 weeks showed that, on comparing Group 1 (Yoga) and Group 2 (Aerobic exercise) statistically, aerobic exercises were found more effective in reducing the symptoms of premenstrual syndrome than Yoga, assessed by menstrual symptom questionnaire (MSQ)

Keywords: yoga, aerobic exercise, premenstrual syndrome, menstrual symptom questionnaire, menstrual abnormalities, young adult females, Asanas

1. Introduction

Premenstrual syndrome is an array of predictable physical, cognitive, mental and behavioural symptoms associated with female reproductive system, occurring in late luteal phase of the menstrual cycle [1]. On an average it starts 5-7 days before onset of menstruation and ceases 2-4 days after the onset of monthly bleeding. This cycle occurs repeatedly [2]. Up to 80% of women experience at least one premenstrual symptom during their menstrual cycle [3]. Premenstrual symptoms sufficient to affect daily life are estimated to affect 40% of women of reproductive age [4]. Several menstrual symptoms can have an impact on the interpersonal relationships, family and social life, employment and work of affected women in varied degrees; depending on the severity of the symptoms [3]. Clinical and psychological symptoms are diverse and disabling. Frequently reported physical symptoms are abdominal bloating, headaches, abdominal cramping, heart pounding, hot flushes, fatigue, dizziness, nausea. Behavioural symptoms are increased appetite, food craving, avoidance of social and work activities etc. Psychological symptoms include tension, mood swings, irritability, restlessness, crying, loneliness, insomnia, reduced concentration etc [5]. The exact cause of the disorder is unknown. Though, changes in ovarian steroid levels, vitamin and mineral deficiencies, age, genetic factors, disorders in path of rennin angiotensin aldosterone, increased prostaglandins and prolactin have been mentioned as risk factors [2]. Since the cause of PMS in unknown, various treatment methods are used which include medication (ant depressive tablets, vitamin B supplements); surgery (removal of ovaries); non pharmacological treatments (hot packs, massage, rest) As the pharmacological and surgical treatments can have various side effects on a female's body, non-drug treatments especially physical activity has drawn attention of medical professionals [2].

Aerobic exercise or conditioning is augmentation of energy utilization of the muscle by means of an exercise program [6]. The positive effects of physical activities on reproductive system and changes in menstrual periods were observed in some studies [2]. Gannon *et al*. found that the length of time women had been exercising correlated significantly with lower level of premenstrual symptoms by correction of neuroendocrine activity. Schwartz found that the women runners reported a decrease in PMS. Keye reported lower anxiety levels in exercisers than non-exercising women [1].

Yoga has been reported to be beneficial in reducing pre-menstrual tension by relaxation of tense muscles, massage to the internal organs and complete relaxation of mind and body. Pal *et al*. showed increased parasympathetic and decreased sympathetic activity following practice of Pranayama over a period of 3 months. Mehta V. and Chakrabartty showed that there is an effect of Yoga on various autonomic responses in premenstrual sydrome. Anita Chuadhari and Jaya Mishra found positive effects of yoga on reduction of severity of symptoms of PMS [6].

2. Methodology

a. Purpose: The purpose of study was to compare the effectiveness of Yoga and Aerobic exercise on symptoms of premenstrual syndrome over the period of 12 weeks.

b. Selection of subjects: 40 Females of age between 18 to 25 years with regular monthly menstrual cycle, without any menstrual abnormality except PMS were selected. Females qualifying as a patient of premenstrual syndrome by ACOG (American college of obstetrics and gynaecology) criteria were included in the study. Females with history of regular physical activity or fitness regime 3 months prior or during the study, history of diseases such as asthma, obesity, diabetes, renal, cardiac, psychiatric, thyroid, neurological condition were excluded. Females with history of recent back pain, any fractures, trauma to lower limbs and spine, degenerative conditions of spine and joints of lower limb, those on any medications those with cognitive impairments were also excluded.

c. Procedure: The study began after ethical clearance from the committee of modern college of physiotherapy. The study was conducted in Modern college of physiotherapy and jogging tracks in and around Pune. The subjects were selected on the basis of inclusion and exclusion criteria.40 females were selected for the study based on diagnosis of premenstrual syndrome according to the criteria by ACOG(American college of obstetrics and gynaecology)(6) The subjects were explained about the nature and duration of the study. Consent forms were filled by the subjects. Two groups of 20 females were formed by convenient sampling method.

3. Treatment protocol

Group 1 performed yogic exercises and Group 2 performed aerobic exercises for the period of 12 weeks for three days per week. A questionnaire was distributed to both the groups prior and post interventions to fill up in order to record the severity of the symptoms before interventions.

Group 1 was asked to perform specially designed yoga program under supervision for a period of 12 weeks. Specially designed yoga techniques were included in the programme. Asanas with abdominal compression and all backward bending asanas were specially avoided one week before the expected date of menstruation. Initially asanas with simple posture like Tadasana, Vakrasana, Bhadrasana along with proper breathing pattern and duration were performed. The asanas providing stretch to pelvic region such as Matsyasna, Paryankasana, Vakrasana in lying position were performed. Asanas providing massage in pelvic organs like, Shashankasana, Janu-shirshasana, Yogamudra were included in programme after 4 weeks. Anulom-viloma and Kapal Bharti for 80 times in sets of 20 breathes were added in programme. Nishpand bhav and Yoga Nidra were taught and asked to practice at home in evening from 5th week. Hastapadangusthasana, Yasthikasana, Shalabhasna were included after 8 weeks. Anulom-viloma was adviced to perform for 20 times daily from 9th week. The same program was followed for 12 weeks [3, 6].

Aerobic exercises were done by Group 2 over a period of 12 weeks, as 3 sessions in a week with 60 minutes for each session under supervision. In the first place, for about 5 minute warm up and stretch was performed. The warm up included spot marching for 2-3 minutes, trunk rotations, jumping jacks, stretches with 30 second hold and 3 repetitions for major muscles such as biceps, triceps, quadriceps, hamstrings etc. Then moderate intensity exercise that is brisk walking with 60-80% HR max by karovenen formula for healthy adults was performed for 45 minutes and at the final stage. 5 minutes light stretching was done to go back to the original state. These exercises were performed between two menstrual cycles [1, 2, 7].

4. Findings:

Mean values of menstrual symptom questionnaire (MSQ)

Table 1: Domainwise distribution of average pre-post intervention score on menstrual symptom questionnaire: Group 1

Domain	Mean Value		t-value	p-value	Significance
	Pre	Post			
Pain	28.6	19.4	6.78	0.0001	Extremely Significant
Concentration	31.7	25.25	11.433	0.0001	Extremely Significant
Behavioural Change	15.45	11.75	12.711	0.0001	Extremely Significant
Autonomic Reactions	12.35	10.25	10.02	0.0001	Extremely Significant
Water Retention	12	10.05	9.831	0.0001	Extremely Significant
Negative Effect	32.15	29.65	14.694	0.0001	Extremely Significant
Arousal	12.55	10.5	9.706	0.0001	Extremely Significant
Control	21.6	19.25	9.647	0.0001	Extremely Significant

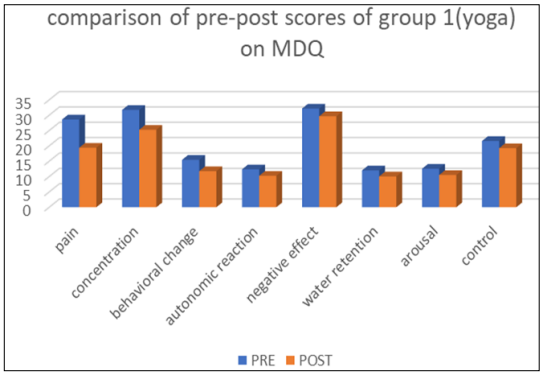

Fig 1: Comparison of Pre-Post scores of Group 1 (Yoga)

Table 2: Domainwise distribution of average pre-post intervention score on menstrual symptom questionnaire: Group 2

Domain	Mean Value		t-value	p-value	Significance
	Pre	Post			
Pain	28.5	17.85	15.714	0.0001	Extremely Significant
Concentration	31.5	23.6	20.616	0.0001	Extremely Significant
Behavioural Change	16.1	10.8	24.218	0.0001	Extremely Significant
Autonomic Reactions	12.25	8.8	16.689	0.0001	Extremely Significant
Water Retention	11.75	10.15	8.718	0.0001	Extremely Significant
Negative Effect	32.2	29.45	14.457	0.0001	Extremely Significant
Arousal	12.7	10.65	9.18	0.0001	Extremely Significant
Control	22	18.1	19.126	0.0001	Extremely Significant

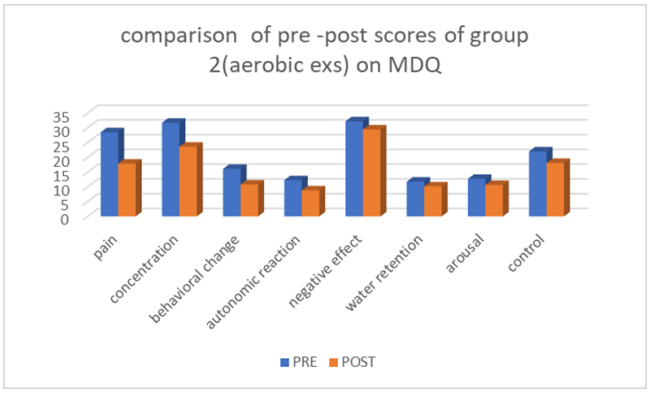

Fig 2: Comparison of Pre-Post scores of Group 2 (Aerobic Exercise)

4.1 Domain wise comparison of average pre-post intervention score on menstrual symptom questionnaire: Group 1 and 2

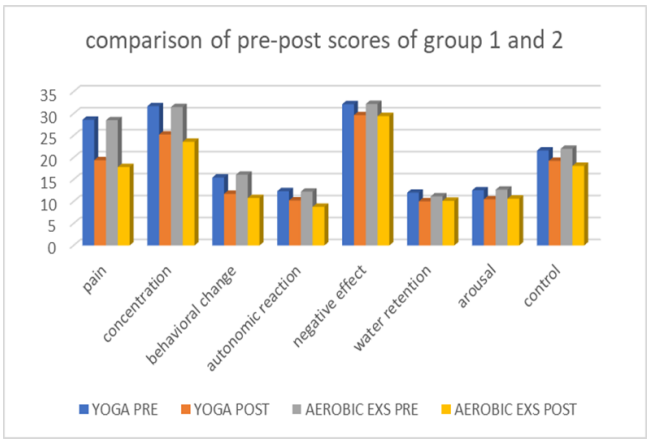

Fig 3: Comparison of Pre-Post scores of Group 1 & Group 2

5. Results

After the analysis of data, we can see that the women who underwent aerobic exercise program showed significant reduction of symptoms of premenstrual syndrome on the menstrual symptom questionnaire as compared to the Group which received yoga intervention, by comparing the pre and post data. Table 1 shows mean pre and post scores of group 1 for 8 domains of MDQ, which were analysed by using paired test and shows extremely significant result with p value of <0.0001. Table 2 shows mean pre and post scores of group 2 for 8 domains of MDQ which were analysed by using paired t test and shows extremely significant result with p value of <0.0001. Table 3 shows domain wise intergroup comparison of MDQ scores pre and post treatment with unpaired test for Groups 1 and 2 which shows that Aerobic exercise had more significant effect than yoga in reducing symptoms of PMS in healthy young females.

5. Discussion

The present study was done in order to check the effectiveness of aerobic exercise and yoga interventions on reduction of symptoms of premenstrual syndrome. In this study, total 40 females between ages 18-25 with premenstrual syndrome as per ACOG criteria were selected. They were divided in two groups. Women with any history of diseases like asthma, diabetes, obesity, renal, cardiac, neurological, hormonal conditions were excluded. Women with history of recent fractures, trauma and degenerative joint conditions were excluded. In this study, we found that moderate intensity aerobic exercise was more effective in reducing the symptoms of premenstrual syndrome than yoga intervention. Zinat Ghanbari, Farideh Manshavi and Mina Jafrabadi in their case study reported that moderate intensity aerobic exercise is found effective in reducing the symptoms of premenstrual syndrome. So our study was in account with that as the value for paired test of pre-post score was <0.0001. Effect of Yoga on premenstrual symptoms among female employees in Taiwan-a research by Tsu Ying tsai reported that Yoga exercises were found to be effective in reducing the symptoms of premenstrual syndrome. So our study results were in account with that that as the p value for paired t test of pre-post score was <0.0001. Menstrual symptom questionnaire (MDQ) was the outcome measure used to assess the affective and somatic symptoms of PMS. The result of our study shows that moderate intensity aerobic exercise is found to be more effective in reducing the symptoms of PMS than yoga intervention. The result of unpaired t test of post intervention mean scores of Group 1 and 2 was P<0.0001. The reason may be that repetitive contraction of large group of muscles during aerobic exercise helps in improving venous return, reducing the levels of prostaglandins thus reducing the level of abdominal and back pain as well as discomfort. Release of endorphins due to aerobic exercise is associated with significant reduction in depression. Improved insulin sensitivity and glycaemic control due to aerobic exercise might be the reason behind reduced premenstrual symptoms. Thus, overall findings suggest that 12 weeks of regular moderate intensity aerobic exercise given in healthy young adult females is more effective in reducing the symptoms of PMS than Yoga intervention.

6. Conclusion

Our study conducted for 12 weeks showed that, on comparing group 1 (Aerobic exercise) and group 2 (yoga) statistically, aerobic exercises were found more effective in reducing the symptoms of premenstrual syndrome than

Yoga, assessed by Menstrual symptom questionnaire (MDQ).

7. References

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