

Effects of Barre Exercise Versus Pilates Versus Aerobic Exercise on Pre-Menstrual Syndrome Among College Going Coastal Students

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Hemalatha.R^{1*}, Shanmugananth.E², Murugaraj.T³, Velkumar.V⁴

¹*Research Scholar, Academic Department of Physiotherapy, Mahatma Gandhi Medical College and Research Institute, Sri Balaji Vidyapeeth, (deemed to be university) Pondicherry, India.

²Professor And Head, Academic Department of Physiotherapy, Mahatma Gandhi Medical College and Research Institute, Sri Balaji Vidyapeeth, (deemed to be university) Pondicherry, India.

³Assistant Professor, Academic Department of Physiotherapy, Mahatma Gandhi Medical College and Research Institute, Sri Balaji Vidyapeeth, (deemed to be university) Pondicherry, India.

⁴Assistant Professor, Academic Department of Physiotherapy, Mahatma Gandhi Medical College and Research Institute, Sri Balaji Vidyapeeth, (deemed to be university) Pondicherry, India.

Corresponding Author: Shanmugananth.E,

Professor and Head, Academic Department of Physiotherapy, Mahatma Gandhi Medical College and Research Institute, Sri Balaji Vidyapeeth, Puducherry, INDIA.

Email- shankutty1981@gmail.com Ph. No: +919328456980

Keyword:

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Abstract:

BACKGROUND: Coastal living, due to increased exposure to natural light and outdoor activity, may alleviate some symptoms of premenstrual syndrome (PMS) in females. The fact that millions of women experience PMS, or premenstrual syndrome, is still recognised as a significant disruption. This is because 40 million women globally suffer from this condition's symptoms, and more than 5 million of them seek medical attention for the mental and behavioural disorders it causes. A group of symptoms known as PMS start near the end of the menstrual cycle's secretory phase (five to seven days before menstruation) and stop during the follicular phase. (2–4 days following menstruation). Special tailored educational needs arise.

OBJECTIVE: The purpose of the study is to compare the benefits of Barre, Pilates, and aerobic exercise on PMS symptoms in college-bound students.

METHODOLOGY: This study consists of 45 female participants with premenstrual syndrome age between 18 to 25 years. They were screened and diagnosed primarily by the Department of gynecology to rule out any abnormality or any other defects with minimal investigations. The 45 participants with premenstrual syndrome were selected based on the Premenstrual syndrome scale. In this study the participants were divided into three groups, group A, group B and group C, The group A received barre exercise, group B received Pilates and group C received aerobic exercise. The participants received intervention at the duration of 8 weeks and the total research duration was 10 weeks. The data were analyzed and interpreted by using SPSS version 26

RESULT: Analysis of premenstrual syndrome scale (<0.05) showed statistically significant differences in the effectiveness of the three exercise programs in reducing PMS symptoms. The participants in barre exercise group exhibited greater improvement.

CONCLUSION: This study showed that all three groups experienced significant reductions in PMS symptom severity after the 8-week exercise program. However, the results showed that tailored education techniques like barre exercise and Pilates are equally effective in reducing Premenstrual syndrome symptoms and associated disabilities compared to Aerobic exercise.

1. Introduction

Millions of women have premenstrual syndrome, which is regarded to be a significant impairment. This

is due to the fact that 40 million women worldwide experience symptoms and signs of this sickness, and over 5 million of them seek medical attention for the

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mental and behavioural abnormalities brought on by this illness. Premenstrual syndrome is a group of recurring symptoms that start at the end of the menstrual cycle's secretory phase (5-7 days before menstruation) and stop during the follicular phase. (2-4 days following menstruation)⁽¹⁾.

Coastal living may lessen some premenstrual syndrome (PMS) symptoms in females due to greater exposure to natural light and outdoor activities, which may enhance mood and lower stress levels. To properly manage PMS symptoms, a healthy lifestyle is still necessary. This includes eating right, staying hydrated, and exercising. 20% of women experience symptoms that are severe enough to limit their ability to go about their daily lives, while the other 80% experience mild to moderate symptoms. The biggest barrier to treating premenstrual syndrome is a lack of knowledge about its origins. A woman's bodily tissues grow more sensitive to changing hormone levels throughout the menstrual cycle. Serotonin, a brain chemical that regulates mood, in particular, may vary as a result of changes in hormone levels (oestrogen and progesterone). ⁽²⁾. According to studies, these symptoms are triggered by fluctuating oestrogen and progesterone levels⁽³⁾⁽⁴⁾.

This could be because progesterone treatment causes symptoms to resurface in postmenopausal women who had previously been diagnosed with PMS⁴. Furthermore, gonadotropin-releasing hormone analogues that lower oestrogen significantly reduce PMS symptoms⁽⁵⁾⁽⁶⁾. Changes in mood may be caused by the cyclic influence of oestrogen and progesterone on serotonin, -aminobutyric acid, and dopamine systems. ⁽³⁾⁽⁵⁾.

The renin-angiotensin-aldosterone (RAS) pathway can be altered by these mechanisms, which may explain PMS symptoms as bloating, cramps, swelling, and weight gain³. Women's levels of oestrogen and progesterone are the same whether or not they have PMS⁷. However, studies have shown that people with PMS do not have a higher amount of oestrogen and progesterone than other women, leaving it unclear why some women get PMS and others do not. The most logical explanation for this, according to numerous studies, is that women with PMS are more sensitive to typical changes in hormone levels during the menstrual cycle. ⁽²⁾⁽⁴⁾. Although no genes have been identified that indicate the hereditary character of PMS, several

research imply that premenstrual illnesses may have a genetic component⁽⁸⁾.

The symptoms of PMS include lethargy, bloating, irritability, depression, and anxiety⁹. Other signs and symptoms include anxiety, tenseness, mood swings, difficulty concentrating, changes in appetite, insomnia, swelling, fatigue, and vertigo. They also include changes in sexual interest and food cravings. Physical signs include nausea, muscle and joint discomfort, weight gain, swelling of the limbs, back pain, abdominal pain, and tenderness and swelling of the breasts. Premenstrual syndrome may cause capacity loss in females, resulting in psychological symptoms like irritability, anger, sadness, crying and tearfulness, anxiety, tension, mood swings, lack of concentration, confusion, forgetfulness, restlessness, decreased self-esteem, and suicidal thoughts, which lowers the quality of life in terms of health ⁽¹⁰⁾⁽¹¹⁾⁽¹²⁾⁽¹³⁾.

Along with medications including oral contraceptives and selective serotonin reuptake inhibitors, the National Institute for Health and Care Excellence (NICE) and the Royal College of Obstetricians and Gynaecologists (RCOG) both recommend exercise as a first-line treatment. Although there are risks associated with the latter two treatments, including exhaustion, nausea, and pregnancy exclusion or complications, they are typically useful. Women may also actively choose alternative remedies. However, it is well known that exercise boosts endorphin levels, controls the synthesis of progesterone and oestrogen, and promotes the production of naturally occurring anti-inflammatory compounds. Other advantages of exercise include improved general health, socialisation chances, and a potential decrease in depressive symptoms, all of which may help to control the PMS symptom profile..

The best technique for all women to relieve stress and reestablish chemical equilibrium in the brain is through physical activity, which also serves as an excellent PMS treatment. Physical activity appears to relieve PMS symptoms, increase pain tolerance, and reduce anxiety, depression, and other issues by increasing endorphins and lowering adrenal cortisol. ¹⁴⁾.

According to a previous study⁽¹⁵⁾, aerobic exercise has the ability to reduce the physical signs and symptoms of premenstrual syndrome. According to a different

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study, Pilates exercises greatly lessened PMS symptoms. In this situation, pilates workouts are essential for treating PMS symptoms⁽¹⁶⁾.

The barre method is a famous exercise regimen that is fast gaining popularity and followers. This programme consists primarily of ballet-inspired, yoga, and Pilates movements. Barre is derived from the Lotte Berk Method, which was created in London in 1959. Aerobic exercise is also incorporated into this strategy, as the goal is to improve cardiovascular endurance while boosting the body's fat-burning metabolism. Barre Exercise help you build and strengthen your muscles, as well as enhance your posture and core strength. In contrast to yoga and Pilates, where obvious improvements can take weeks or even months to appear, barre participants begin to see results after as little as eight exercises. A further advantage of the barre approach is the joyful tone and sense of community and camaraderie that are inherent to the barre environment. In contrast to yoga and Pilates sessions, which frequently involve silent self-reflection, having fun during barre classes is permissible and encouraged⁽¹⁷⁾.

2. Materials And Methodology:

This study consist of 45 female participants with premenstrual syndrome age between 18 to 25 years, were taken on the basis of Inclusion and exclusion criteria. The participants that included are Age between 18 and 25 years, Having regular menstrual cycles – 24–35 days and Participant reaches 80 points or above in PMS scale. The participants excluded are history of any mental and physical diseases, history of joint, motion, muscle, and bone diseases that reduce their abilities of exercise, taken any medication and mineral supplements during three menstrual cycles, incidents such as relatives' death, marriage, or any medical emergency in the last 3 months, Not able to tolerate physical exercise, Gynecological surgery, Professional athletes, Chronic disease such as diabetes, hypertension, cardiac disease, infectious disease, Irregular and infrequent menstrual cycle, Using intrauterine devices and hormonal therapy, Pregnancy. They were recruited from Sri Balaji Vidyapeeth university. They were screened and diagnosed primarily by the Department of gynecology to rule out any abnormality or any other defects with minimal Investigations. Participants are then referred to physiotherapy department for the interventions. The 45

participants with premenstrual syndrome were selected based on the Premenstrual syndrome scale. In this study the participants were divided into three Group, group A, group B and group C, The group A received barre exercise, group B received Pilates and group C received aerobic exercise. The participants received intervention at the duration of 8weeks and the total research duration was 10 weeks. The participants Were made aware about the study and the proper consent form from the participants was taken then the participants were asked to follow the instructions.

OUTCOME MEASURE:

PREMENSTRUAL SYNDROME SCALE:

The premenstrual syndrome scale has three subscales (Physiological, Psychological, and Behavioural symptoms), totaling 40 questions. 40 items make up this 5-point Likert-type scale. The following scoring system is used to determine the measurements on the scale: the answer Never received a score of "1", never received a score of "2", occasionally received a score of "3", frequently received a score of "4", and always received a score of "5". Additionally, the "PMSS total score" was generated using the combined score from the sub-scales. The lowest score on the scale is 40, and the highest is 200. This indicates the presence of PMS if the scale's overall score was 80 or higher. As the scores rise, the severity of PMS also rises.⁽¹⁸⁾

TREATMENT PROCEDURE:

In this study, the treatment procedure involved three different exercise interventions: Barre, Pilates, and Aerobic exercise.

BARRE EXERCISE	PILATES	AEROBIC
1. Allongee Propellers	9. Spine Stretch	17. Jumping jacks
2. Arabesque lunges	10. Double kick	18. Jump squats
3. Allongee swiveling	11. Boomerang	19. Jump rope
4. Ballerina Squats	12. Shoulder bridge	20. High knees
5. Barre Assembles	13. Crab leg	21. Butt kicks
	14. One circle	22. Skaters
	15. Neck Pull	23. Bear crawls
	16. Saw	24. Lateral plank walk

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<p>6. Pilates curtesy 7. Side led lift 8. Balance into led extend</p>			<p>Throughout the 8-week intervention period, the participants were asked to maintain their normal daily routines and physical activity levels outside the exercise sessions. Additionally, they were asked to refrain from participating in other structured exercise programs during the study period.</p> <p>After 8 weeks of exercise intervention, each participant's PMS symptoms were assessed using the PMS symptom scale to determine the effectiveness of each exercise intervention in reducing PMS symptoms.</p>
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Participants in each group received their respective exercise interventions for 8 weeks, with 3 sessions per week, and each session lasting for 30 minutes. Before the actual exercise intervention, a 5-minute warm-up exercise was conducted to prepare the participants' muscles for the upcoming workout, followed by the 30-minute exercise session, and finally, a 5-minute cool-down exercise was done to bring the participants' heart rate and breathing back to their normal levels.

During the exercise sessions, participants were instructed and monitored by qualified fitness trainers. The trainers ensured that the participants followed the correct form and technique while performing the exercises to prevent injury and maximize the effectiveness of the exercises.

First, the demographic data for the participants were analysed using descriptive statistics, including mean and standard deviation, to describe the characteristics of the sample. Second, to assess the differences between the three groups, a one-way analysis of variance (ANOVA) was conducted. If the ANOVA indicated a significant difference, a post-hoc analysis was performed using the Tukey Kramer multiple comparisons test to determine which groups differed significantly from each other. Third, to evaluate the within-group changes from pre- to post-intervention, paired t-tests were conducted. The statistical significance level was set at $p < 0.05$ for all analyses. All statistical analyses were performed using SPSS (Statistical Package for the Social Sciences) software 26.

3. Result Analysis:

TABLE 1: ANALYSIS OF AGE DISTRIBUTION

Table 1: Analysis of Age Distribution		
Age	Frequency	Percentage
18	11	24.4
19	11	24.4
20	11	24.4
21	7	15.6
22	4	8.9
23	1	2.2

Table shows the distribution of age between 18 and 23 whereas the percentage of 18, 19 and 20 was 24.4%, 21 was 15.6%, 22 was 8.9%, 23 was 2.2%.

TABLE 2: DURATION MENSTRUAL BLEEDING

Table 2: Duration of Menstrual Bleeding		
Days	Frequency	Percentage
3	1	2.2
4	7	15.6
5	24	53.3
6	7	15.6
7	6	13.3

Table shows the duration of menstrual bleeding, whereas the percentage of 3 days was 2.2%, 4 and 6 was 15.6%, 5 was 53.3% and 7 was 13.3%.

TABLE 3: MONTHLY BLEEDING INTERVAL

Table 3: Monthly Interval Bleeding		
Days	Frequency	Percentage
25	1	2.2
27	1	2.2
28	16	35.6
29	1	2.2
30	14	31.1
31	2	4.4
32	4	8.9
35	6	13.3

Table shows the monthly interval bleeding, whereas the percentage of 25,27 and 29 was 2.2%, 28 was 35.6%, 30 was 31.1%, 31 was 4.4%, 32 was 8.9%, 35 was 13.3%

TABLE 4: ANALYSIS OF PRE AND POST COMPARISON OF PREMENSTRUAL SYNDROME SCALE AMONG GROUP A

Table 4: Analysis of Pre and Post Comparison of Group A					
	Frequency (n)	Mean	SD	T Value	P Value
Pre -Test	15	124.73	18.94	10.143	0.0001
Post -Test	15	99.13	21.7		

Table Describes the analysis of pre and post comparison of premenstrual symptoms among Group A with barre exercise program. The obtained pre-test value of mean and standard deviation using premenstrual syndrome scale was

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124.73±99.13 whereas post-test value is 99.13±21.70. the t-value notes as 10.143 and the significant value is 0.0001 which proves the significant effect on Premenstrual symptoms after barre exercise program.

TABLE 5: ANALYSIS OF PRE AND POST COMPARISON OF PREMENSTRUAL SYNDROME SCALE AMONG GROUP B

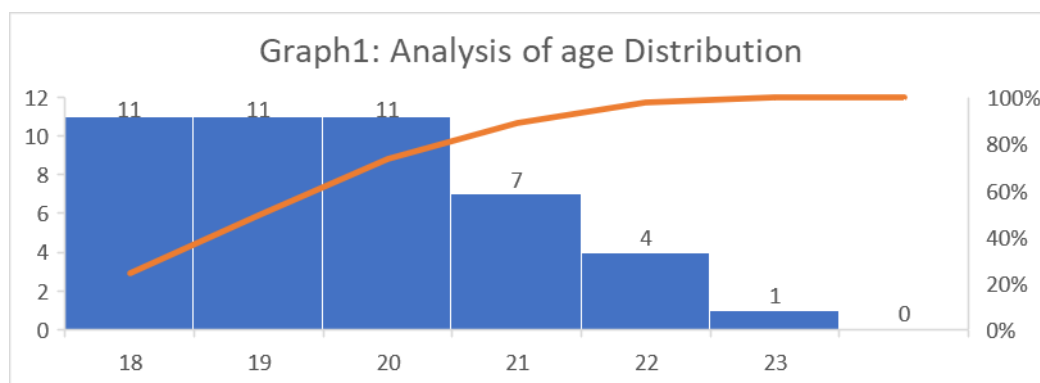
Table 5: Analysis of Pre and Post Comparison of Group C					
	Frequency (n)	Mean	SD	T Value	P Value
Pre-Test	15	115.8	16.31	9.904	0.0001
Post-Test	15	93.2	8.58		

Table Describes the analysis of pre and post comparison of premenstrual symptoms among Group B with Pilates exercise program. The obtained pre-test value of mean and standard deviation using premenstrual syndrome scale was 115.80±16.31 whereas post-test value is 93.20±8.58. the t-value notes as 9.904 and the significant value is 0.0001 which proves the significant effect on Premenstrual symptoms after Pilates exercise program

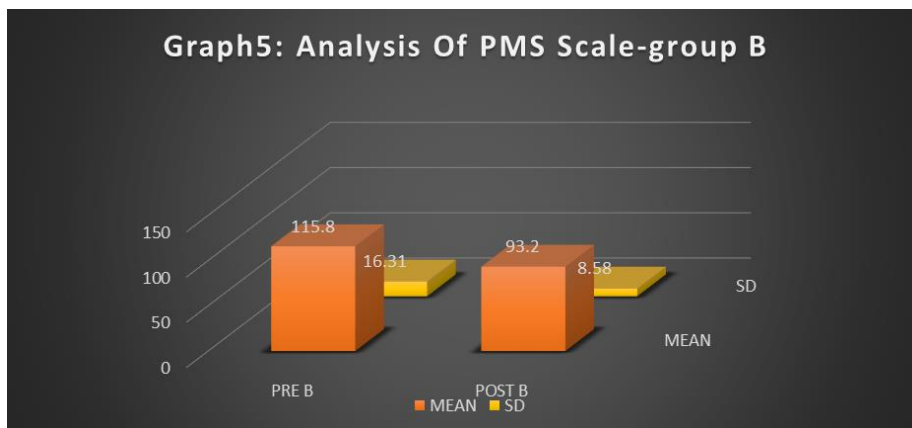
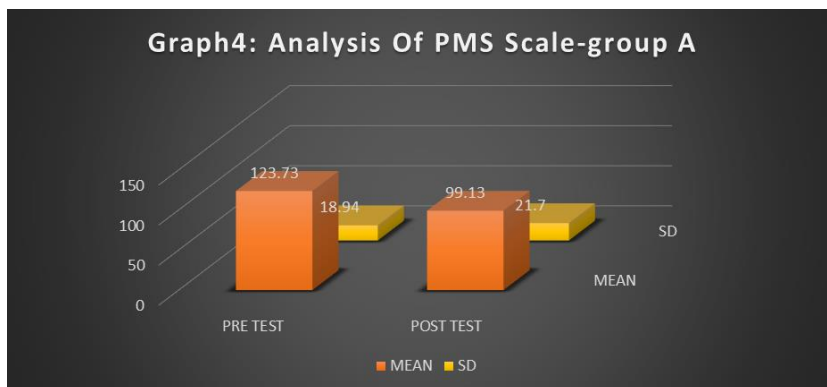
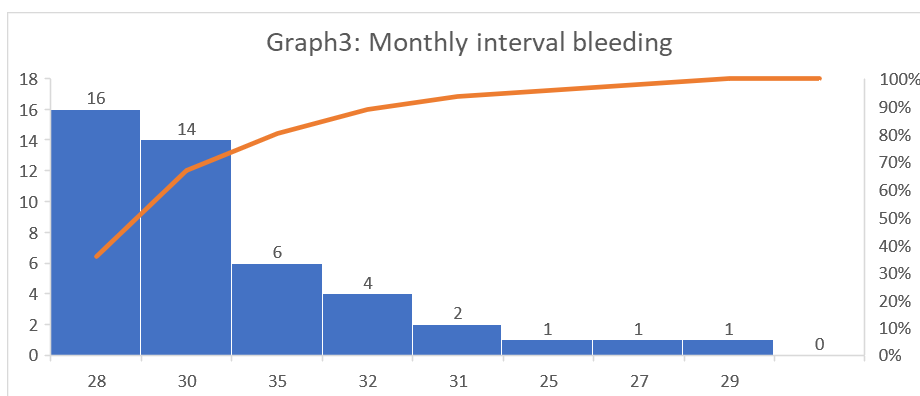
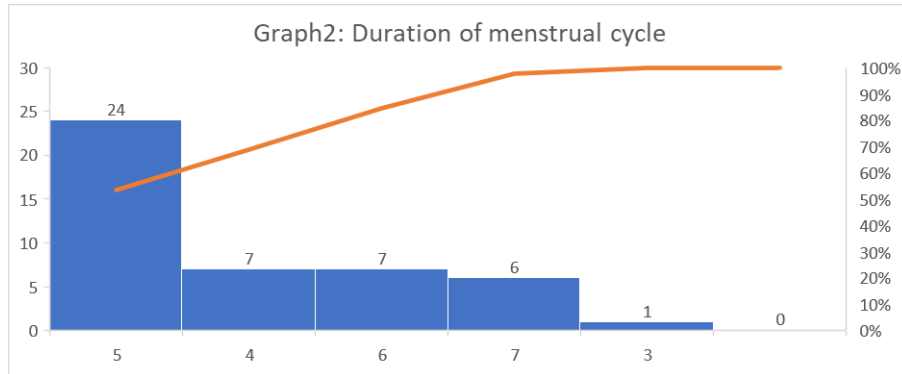
TABLE 6: ANALYSIS OF PRE AND POST COMPARISON OF PREMENSTRUAL SYNDROME SCALE AMONG GROUP C

Table 6: Analysis of Pre and Post Comparison of Group C					
	Frequency (n)	Mean	SD	T Value	P Value
Pre-Test	15	128.53	19.52	14.428	0.0001
Post-Test	15	119.47	20.23		

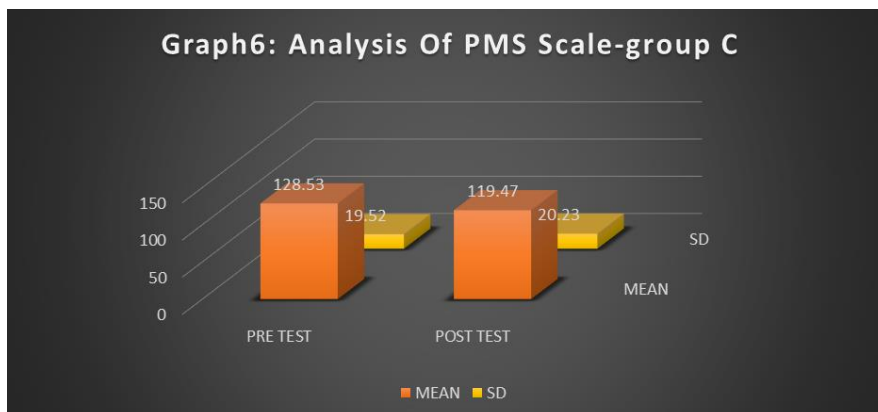
Table Describes the analysis of pre and post comparison of premenstrual symptoms among Group C with Aerobic exercise program. The obtained pre-test value of mean and standard deviation using premenstrual syndrome scale was 128.53±19.52 whereas post-test value is 119.47±20.23. the t-value notes as 14.428 and the significant value is 0.0001 which proves the significant effect on Premenstrual symptoms after Aerobic exercise program.



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Graph6: Analysis Of PMS Scale-group C



4. Discussion:

Coastal living, due to increased exposure to natural light and outdoor activity, may alleviate some symptoms of premenstrual syndrome (PMS) in females, which may improve mood and reduce stress levels. A healthy lifestyle, including proper nutrition, hydration, and exercise, is still required to effectively manage PMS symptoms. Nowadays, tackling women's concerns is one of the most significant health and research goals. PMS is one of the most prevalent disorders of women, which can interfere with regular life in women. Effectiveness of barre exercise, Pilates and aerobic exercise has been proven in the literature among the female students with menstruation problems; however, no study has examined the efficiency of these three therapy modalities.

The present study aimed to investigate the effects of barre exercise, Pilates exercise, and aerobic exercise on premenstrual syndrome (PMS) symptoms among college-going students. The study was based on the biopsychosocial model and aimed to provide evidence-based recommendations for the use of exercise as a non-pharmacological intervention for managing PMS symptoms. The results of the study showed that all three types of exercise were effective in reducing PMS symptoms. In particular, when compared to the aerobic exercise group, the barre exercise and Pilates group demonstrated significantly greater improvements in both their physical and emotional symptoms.

This study's findings suggest that exercise has a beneficial impact on PMS symptoms, which is consistent with previous research indicating that aerobic activity is beneficial. According to the findings

of a study conducted by Zeinab Samadi and her colleagues, eight weeks of aerobic exercise is an effective treatment for reducing the symptoms of premenstrual syndrome (PMS)⁽¹⁹⁾. In the study of Mohamed Maged et al. (2018) showed that Swimming has a beneficial effect on the majority of the physical and psychological symptoms that are associated with premenstrual syndrome (PMS)⁽²⁰⁾.

According to a study conducted by Mohebbi Dehnavi et al., participants with PMS who underwent regular aerobic exercise for a period of eight weeks experienced a significant reduction in the severity of some of the syndrome's physical symptoms⁽¹⁵⁾. Additionally, Dehghan et al. (2008) found that engaging in aerobic activity for a period of three months effectively reduced both the physical and psychological symptoms⁽²¹⁾.

Additionally, studies have indicated that regular exercise has a host of advantages. All post-treatment subscale symptoms, scores, and total score decreased significantly in the study group according to El-Lithy et al. In contrast to mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH), mean corpuscular haemoglobin concentration (MCHC), and white blood cell count, significant increases in haemoglobin, haematocrit, red cell count, and platelet count were not seen. Prolactin, oestradiol, and progesterone concentrations also markedly declined. In conclusion, aerobic exercise reduces prolactin, oestradiol, and progesterone levels while increasing haemoglobin, haematocrit, red cell count, and platelet count. This reduces fatigue, disorientation, and the majority of premenstrual symptoms⁽²²⁾.

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In this study, it was also shown that Pilates exercises are a form of exercise that can help with PMS. The result this study shows that Pilates exercise reduce the physiological and psychological symptoms effectively. The study by Elif Tugce et al. shows that the total score and sub-dimension scores for depressive affect, anxiety, irritability, depressive thoughts, pain, changes in appetite, changes in sleep, and swelling decreased and that there was a significant difference between the mean scores; however, there was no significant difference in the sub-dimension mean score for fatigue. The experimental group's data were collected concurrently with the control group's data at the start and third month of the exercise Program. When the total score and sub-dimension mean scores were examined, a significant increase was found in the mean score of the irritability sub-dimension of the scale, but no significant differences were found in the sub-dimensions of depressive affect, anxiety, depressive thoughts, pain, and changes in appetitive behaviour⁽¹⁶⁾. Curi et al. (2018) conducted a randomised controlled trial to investigate the effect of Pilates exercises on women's sleep quality. At the conclusion of the exercise programme, the quality of sleep for the women in the experimental group was found to have improved, whereas the quality of sleep for the women in the control group did not change at all. The researchers concluded that the effect of Pilates exercises on the quality of Sleep in women was positive⁽²³⁾.

In this present study shows that the psychological symptoms also reduced after the end of intervention program. In a recent meta-analysis by Fleming and Hering (2018), which looked at the effects of pilates on mental health and included 8 controlled studies, the researchers found that Pilates exercises significantly reduced depressive symptoms and anxiety levels⁽²⁴⁾. Eyigor et al. (2010) conducted a randomised controlled trial to determine the effect of Pilates exercises with multiple variables on depression. At the conclusion of the exercise programme, the experimental group showed improvement, whereas the control group showed no change⁽²⁵⁾.

It is well known that exercise can alleviate PMS symptoms⁽²⁶⁾⁽²⁷⁾⁽²⁸⁾. Although no studies on the effect of barre exercises on PMS were found in the literature, it was determined in this study that barre exercises are a type of exercise that heals PMS. In the study of Chae, jiwoo et al (2020) shows that Women in their middle

years showed improvements in their body composition, physical fitness, and postural alignment after participating in an exercise programme that incorporated both ballet barres and elastic bands⁽¹⁷⁾.

Additionally, Onwaree Ingkatecha et al (2017) study shows that findings suggest that participation in a ballet programme is beneficial for elderly people and helps improve balance as well as the muscle strength of the lower extremities⁽²⁹⁾. A study by da Silva CC et al. found that teenage dancers' body composition and cardiac autonomic modulation were improved after seventeen weeks of ballet training, which included ballet courses and rehearsals. Blood measurements helped to explain why a training programme before a ballet competition had positive impacts on adolescent girls. Additionally, the young ballerinas showed significant anabolic indications and typical physical growth during the observation period.⁽³⁰⁾

In this study, there was a statistically significant difference between the mean score of physical and psychological symptoms before and after the intervention. Taken together, these studies support the findings of the present study that exercise can be an effective non-pharmacological intervention for managing PMS symptoms. Healthcare providers and policymakers should consider exercise as a viable option for PMS management, and future research should continue to investigate the effectiveness of different types of exercise and exercise programs for PMS management.

Limitation:

The study's relatively modest sample size could be a drawback. It could be challenging to extrapolate the results to a larger population with a small sample size. Additionally, the study only focused on college-going students, which may not accurately represent other demographic groups. The study also did not assess the long-term effects of the exercise interventions on PMS symptoms beyond the 8-week intervention period. Therefore, it is unclear whether the effects of the interventions are sustainable in the long term. The absence of a control group in the study is another possible weakness. It is challenging to say whether any observed reductions in PMS symptoms were purely attributable to the exercise interventions or if other

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factors may have played a role in the outcomes in the absence of a control group.

FUTURE RECOMMENDATION:

The future studies could explore the long-term effects of different types of exercise on PMS, as this study only looked at the effects over an 8-week period. The future studies could consider using a larger sample size to increase the generalizability of the findings.

Finally, future research could explore the potential benefits of combining different types of exercise or incorporating other interventions, such as dietary changes or stress management techniques, for managing PMS. Such studies could provide a more comprehensive understanding of the potential benefits of a multi-faceted approach to managing PMS. The study can be extended to women living in non-coastal areas.

5. Conclusion:

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After analysing the data from this study, we concluded that all three exercise interventions of barre, Pilates and aerobic were effective in reducing PMS symptoms among college-going students. However, the results showed that barre exercise and Pilates are equally effective in reducing Premenstrual syndrome symptoms compared to Aerobic exercise. Such tailored learning improved disabilities in coastal patients with PMS.

CONFLICT OF INTEREST: NIL

FINANCIAL SUPPORT : Nil

IHEC approval – Yes

AUTHORS CONTRIBUTION:

HR: Primary Author, study design,. SE: Corresponding Author, finalized the manuscript. MT: participated in the study design, revised the manuscript critically. VV: revised the manuscript critically. All authors read and approved the final manuscript.

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