

# Effectiveness of Pilates Exercises Versus Stretching Exercise in Reducing Premenstrual Syndrome among College Girls

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**How to cite this article:** Harina, Senthil Kumar S, Karthika Ramalingam. Effectiveness of Pilates Exercises Versus Stretching Exercise in Reducing Premenstrual Syndrome among College Girls. Indian Journal of Physiotherapy and Occupational Therapy / Vol 19 No 2 April-June 2025

## Abstract

**Background:** The majority of women who are of reproductive age have premenstrual syndrome, a variety of issues that impact them throughout the luteal phase of their menstrual cycle. The symptoms of premenstrual syndrome affect both physical and emotional states, and the most commonly experienced symptoms are stiffness or cramps, abdominal cramps, breast pain, and moodiness. To determine the effect of Pilates and stretching exercises on premenstrual syndrome using premenstrual syndrome questionnaire and visual analogue scale among young girls.

**Methods:** The study was conducted at Saveetha College of Physiotherapy with 250 female students recruited using convenient sampling. They were recruited and tested using the premenstrual syndrome questionnaire before and after the treatment. Among them, 152 students who had premenstrual symptoms were divided equally into two groups: the Pilates group (n = 76) and the stretching group (n = 76). The Pilates group received Pilates exercises, and the stretching group received stretching exercises for 12 weeks with 3 sessions per week. The visual analogue scale and premenstrual syndrome questionnaire were used as outcome measures for the study.

**Results:** The premenstrual syndrome questionnaire and visual analogue scale pre- and post-test results revealed a significant difference ( $p < 0.0001$ ) between the two groups. where the Pilates group showed better results than the stretching group in reducing premenstrual syndrome.

**Key words:** Premenstrual syndrome, Pilates, Stretching exercise, Visual analogue scale,

## Introduction

Menstrual cycles are the most significant indicators of a healthy reproductive system in females, but they can also be linked to symptoms that lead to mental and physical health issues in females.<sup>1</sup> The average cycle duration for women in their reproductive years who have regular periods is between 24 and 35 days.

There are two primary phases: the luteal phase and the follicular phase. Estrogen drops precipitously during the luteal phase before beginning to climb whereas progesterone increases and peaks on day 21 of a 28-day cycle.<sup>2</sup> Then, just before menstruation, in the late luteal phase both hormone levels steadily decrease. Premenstrual syndrome is diagnosed in the luteal phase.

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**Submission:** Jan 2, 2025

**Accepted:** February 28, 2025

**Published date:** April 11, 2025

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The American College of Obstetricians and Gynaecologists (ACOG) defines premenstrual as a clinical condition characterized by the periodic occurrence of both physical and emotional symptoms and does not relate to any kind of disease.<sup>3</sup> The fluctuation in the level of ovarian hormones in this metabolite in the neurotransmitter system can lead to the pathogenesis of premenstrual symptoms.<sup>4</sup> These signs were present in all three of the preceding menstrual cycles, with the onset occurring before the fifth day of the cycle and disappearing on the fourth day of menstruation lower back discomfort, stiffness, acne, constipation, diarrhoea, desires for food, bloating in the abdomen, headaches, mood swings, anxiety, depression Sleep disturbance and emotional instability are the symptoms of premenstrual syndrome.<sup>5</sup>

In India, Premenstrual syndrome has a significant influence; among adolescents, the prevalence is 49.6%, and that of premenstrual dysphoric disorder is 8%.<sup>6</sup> The World Health Organization (WHO) reports that 97% of women have dysmenorrhea, and 40% of women report having more than one premenstrual symptom. Exercise is essential for managing premenstrual syndrome (PMS) as it helps alleviate physical and emotional symptoms. Regular physical activity releases endorphins, which improve mood and reduce irritability, anxiety, and depression.<sup>7</sup> It also enhances blood circulation, easing bloating and menstrual cramps, while regulating hormonal fluctuations. As an alternative to pharmaceutical treatments for premenstrual syndrome, the American College of Obstetrics and Gynaecology recommends practicing frequent physical activity and regular exercise.<sup>8,9</sup>

Numerous non-pharmacological treatments have been used to treat premenstrual syndrome and have demonstrated efficacy in lowering the intensity of menstrual pain. There are various treatments to treat pre-menstrual syndrome, which include acupuncture, acupressure, massage, heat therapy, and various exercise regimens. Interestingly, manual visceral therapy has recently been proposed as a supplemental treatment option for premenstrual syndrome by increasing the uterus's motility and

movement. Conventional exercises such as aerobic exercise, stretching, strength training, and yoga have been demonstrated in previous systematic reviews and meta-analyses on the effects of exercise on premenstrual syndrome to lessen the intensity of menstrual discomfort.<sup>10</sup> In order to increase joint range of motion, stretching is a crucial therapeutic and exercise training method. Stretching appears to have two major acute effects: a considerable drop in most types of muscle performance and a notable gain in range of motion, mostly because of greater stretch tolerance.<sup>11</sup>

Pilates is a form of low-impact exercise focusing on core strength, flexibility, and overall body awareness through its controlled movements and emphasis on breathing and posture. Regular Pilates practice can significantly reduce both the physical and emotional symptoms of PMS, such as cramping, fatigue, and mood swings. This improvement is attributed to Pilates' role in enhancing blood circulation, reducing stress levels through relaxation, and strengthening the pelvic and abdominal muscles, which are often implicated in menstrual discomfort. Integrating Pilates into a weekly routine may thus serve as a non-pharmacological, cost-effective, and holistic approach to managing PMS symptoms.<sup>8,9</sup> Stretching and increasing one's flexibility has been key objectives in both the leisure and therapeutic sectors, with the understanding that they help promote healthy bodily and mental functioning.<sup>12,13</sup>

Premenstrual syndrome (PMS) is a widespread issue among teenage girls, characterized by physical and emotional symptoms such as fatigue, irritability, headaches, mood swings, bloating and abdominal discomfort. These symptoms can significantly impact their quality of life, disrupting daily routines and activities. Despite its prevalence, effective non-pharmacological treatments for PMS remain underexplored. Exercise, particularly Pilates and stretching, has been proposed as a potential intervention due to its benefits for physical and mental well-being. While Pilates focuses on core strength, body awareness and relaxation, stretching aids in relieving muscle tension and improving flexibility. However, there is limited evidence comparing the

effectiveness of these two approaches in managing PMS symptoms. This study seeks to address this gap by evaluating the impact of Pilates and stretching exercises on alleviating PMS symptoms among college girls. Understanding which method is more beneficial can provide a simple, accessible, and non-pharmacological strategy to improve the quality of life for teenage girls dealing with PMS.

### Methods

In this experimental study, 152 participants were selected based on the inclusion and exclusion criteria. The number of participants (152) was determined based on a power analysis conducted prior to the study. We aimed to detect a statistically significant difference in PMS symptom alleviation between the Pilates and stretching exercise groups with a power of 80% and an alpha level of 0.05. The effect size was estimated from similar studies on exercise interventions for PMS. This calculation indicated that a minimum of 76 participants per group would be required to achieve the desired statistical power, leading to a total of 152 participants. A convenience sampling technique was used to recruit participants, allowing for easy access to the target population. The study was conducted at Saveetha College of Physiotherapy, where participants experiencing premenstrual syndrome (PMS) were recruited through convenience sampling. Access to participants was facilitated with the help of the college's health services and faculty. An invitation to participate in the study was sent via email, and details about the study were posted on the college noticeboard. Students experiencing PMS symptoms were encouraged to reach out through a designated faculty point of contact, who guided them through the inclusion process. Those who met the inclusion criteria were provided with detailed information about the study and informed consent was obtained from each participant before their inclusion in the study. The inclusion criteria included girls aged 18–25 years with regular menstrual cycles, a history of premenstrual symptoms, and willingness to participate in the study. Exclusion criteria included irregular or infrequent menstrual cycles, recent

gynecological surgery, chronic illnesses (such as diabetes, hypertension, heart disease, or infections), inability to withstand physical exertion, a history of polycystic ovarian disease or syndrome, and use of hormonal therapy. The study, approved by the Institutional Scientific Research Board (01/021/2023/ISRB/PGSR/SCPT). Participants were randomly allocated into two groups using a closed-envelope method: the Pilates group (n = 76) and the stretching group (n = 76). Both groups performed their respective interventions Pilates exercises or stretching exercises three times a week for 45 minutes each session over a duration of 12 weeks.

### Intervention

**Group A (Pilates Exercises)** - The Pilates group included exercises such as lunges, spine twists, double-leg and single-leg stretches, pelvic bridging, and single-leg circles to improve core stability and flexibility. Additional exercises like the swan dive, mermaid stretch, breaststroke, and forward spine stretches were performed to enhance spinal mobility and overall muscle strength.

**Group B (Stretching Exercises)** - The stretching group focused on dynamic and static stretches such as shoulder stretches (across chest and doorway), cat and camel stretch, downward dog, child's pose, and cobra pose. Exercises like the butterfly stretch, lower trunk rotation, fish pose, wall chest stretch, and triceps dips were included to improve flexibility, posture, and muscle relaxation.

### Outcome Measures

**Premenstrual Syndrome Questionnaire** - The Premenstrual Syndrome Questionnaire is a comprehensive assessment tool designed to evaluate the frequency and severity of symptoms associated with PMS in young females. In some cases, PMS can become so severe that it disrupts daily activities, academic performance, and overall quality of life. Understanding these symptoms is crucial for implementing effective interventions that can improve the well-being of individuals affected by PMS. The questionnaire includes six domains:

physical, emotional, neurological, musculoskeletal, and behavioral symptoms. It aims to gather detailed information on the different aspects of PMS, with a focus on determining the extent to which these symptoms impact the participant's quality of life.<sup>14</sup>

**Visual Analogue Scale (VAS)** - The Visual Analogue Scale (VAS) is a straightforward tool for measuring subjective feelings such as pain, discomfort, or other symptoms. It is commonly used in both clinical and research settings to assess the intensity of symptoms experienced by patients or participants. Typically, the VAS is a horizontal line, with endpoints labeled to represent the extremes of the symptom being measured. For example, one end may indicate "no pain" or "no symptoms" (0 cm), while the other end may represent the "worst pain imaginable" or "most severe symptoms" (10 cm). Participants mark a point on the line that corresponds to their experience, with the mark placed at any position along the line to indicate the severity of their symptoms.<sup>15</sup>

### Statistical Procedures

The collected data were tabulated and all parameters were analyzed subjected to mean and standard deviation was used. Paired t-test was used to analyze significant changes between the pre and post-test of a single group for each outcome measure and an unpaired t-test was used to analyze significant changes between the two group's post-test data for each outcome measure using the SPSS software version 29.0.2.0. Statistical significance of  $p < 0.001$  was for both paired and unpaired t-tests for all three outcome measures.

### Data Analysis & Results

The comparison of pre-test and post-test values of the Visual analogue scale of the Pilates group, the pre-test mean was 7.1842 was reduced to the post-test mean value of 5.0263 with a statistical significance of  $p$ -value  $< 0.0001$  (Table 1).

**Table 1. Pre-Test and Post-Test Values of Visual Analogue Scale of Pilates Group**

Visual Analogue Scale	Mean	SD	T value	P value
PRE-TEST	7.1842	1.25124	23.016	< 0.001
POST-TEST	5.0263	1.05797		

The pre-test and post-test values of the Visual analogue scale of the stretching group, was 7.4474 and 6.4868 with a statistical significance of  $p$ -value  $< 0.0001$  (Table 2).

**Table 2. Pre -Test and Post-Test Values of VAS Scale of Stretching Group**

Visual Analogue Scale	Mean	SD	T value	P value
PRE-TEST	7.4474	1.18203	12.647	< 0.001
POST-TEST	6.4868	0.97288		

The comparison of pre-test and post-test values of the premenstrual syndrome questionnaire for the Pilates group, the mean value was pre-test 71.3158 and the post-test mean value of 55.0789 with a statistical significance of  $p$ -value  $< 0.0001$  (Table 3).

**Table 3. Pre-Test and Post-Test Values of Premenstrual Syndrome Questionnaire of Pilates Group**

Premenstrual Syndrome Questionnaire	Mean	SD	T value	P value
PRE-TEST	71.3158	4.71653	39.819	< 0.001
POST-TEST	55.0789	4.94978		

The comparison of pre-test and post-test values of the premenstrual syndrome questionnaire for the stretching group, the mean value of pre-test 70.6579 was reduced to the post-test mean value of 60.4079 with a statistical significance of  $p$  value  $< 0.0001$  (Table 4).

**Table 4. Pre - Test and Post-Test Values of Premenstrual Syndrome Questionnaire of Stretching Group**

Premenstrual Syndrome Questionnaire	Mean	SD	T value	P value
PRE-TEST	70.6579	4.89504	26.508	< 0.001
POST-TEST	60.4079	5.03634		

The comparison of post-test values of visual analogue scale of the Pilates group and stretching group the post-test mean value of in 5.0263 the Pilates group and the post-test mean value of in 6.4868 the stretching group is statistically significant with a p-value < 0.0001 (Table 5).

**Table 5. Post-Test and Post-Test Values of Visual Analogue Scale of Pilates Group Stretching Group**

Visual Analogue Scale		Mean	SD	T value	P value
PILATES GROUP	POST TEST	5.0263	1.05797	23.016	< 0.001
STRETCHING GROUP	POST TEST	6.4868	0.97288	12.647	

The comparison of post-test values of the premenstrual syndrome questionnaire of the Pilates group and the stretching group, the post-test mean value of in 55.0789 Pilates group, and the post-test mean value in 60.4079 stretching group is statistically significant with a p-value < 0.0001 (Table 6).

**Table 6. Post- Test and Post-Test Values of Premenstrual Syndrome**

Premenstrual Syndrome Questionnaire		Mean	SD	T value	P value
PILATES GROUP	POST TEST	55.0789	4.94978	39.819	< 0.001
STRETCHING GROUP	POST TEST	60.4079	5.03634	26.508	

## Discussion

In recent times, young girls have been attaining puberty between the ages of 9 and 14. The changes observed in females are considered to be mostly caused by the early beginning of the menstrual cycle.<sup>16,17</sup> Approximately 3000 days are spent with severe symptoms for women during their reproductive years. The premenstrual phase of the menstrual cycle is ascribed to certain symptoms as reported by 80% of women in the reproductive age group, according to epidemiological surveys.<sup>18</sup> During their reproductive years, females experience a variety of psychological and physiological changes, particularly around menstruation. These changes are often referred to as premenstrual symptoms, and the illness that results from them is called premenstrual syndrome. Engaging in physical exercise and activity improves mental clarity, happiness, physical well-being, and brain function. Hormone-dependent emotional, behavioral, and physical symptoms that begin several days before menstruation and terminate after the menstrual cycle are referred to as Premenstrual symptoms.<sup>19,20</sup>

Afaf Hassan Ahmed. et al. (2022) conducted a quasi-experimental study with 90 nursing students with premenstrual syndrome who were given Pilates and Benson relaxation techniques for a period of 8 weeks. The present study was conducted for a period of 12 weeks with 152 physiotherapy students with premenstrual syndrome symptoms; hence, the current study improves the scope of the study with a longer duration and a larger sample size.<sup>21</sup>

Nisha Pathak et al. (2023) conducted a screening of 118 subjects using the WaLIDD score and the premenstrual syndrome scale. 52 people were involved in that study; 26 were in the aerobic exercise group and 26 were in the yoga group. It was shown that while yoga and aerobic exercise may both effectively cure dysmenorrhea and premenstrual syndrome, aerobic exercise is more helpful in addressing symptoms related to premenstrual symptoms.<sup>22</sup>

Hsing Chi Chang. et al. (2023) carried out a cluster randomized research trial in which 128 women in total reported having premenstrual syndrome symptoms on their own. The experimental group consisted of 65 people, whereas the control group consisted of 63 people. A yoga DVD program was given to the experimental group, while the control group went about their daily lives and concluded that yoga helps with premenstrual symptoms.<sup>23</sup>

Nikita Mathus et al. (2020) conducted an experimental study with 40 students in an age group of 17–20 years. Group A, with 20 participants, performed daily exercise for 8 weeks, and group B followed their routine without exercise and concluded that exercise was effective in reducing menstrual symptoms.<sup>24</sup>

Yuni Ron Mah. et al. (2020) conducted a study with 10 cases of premenstrual syndrome, and they focused only on abdominal stretching for 2 menstrual cycles and concluded that abdominal stretching exercise was effective in reducing the symptoms of premenstrual syndrome. In the present study, even though the focus was on abdominal and lower limb stretches, whole body stretches were administered.<sup>25</sup>

E. Mohamed et al. (2015: The research included thirty women with premenstrual syndrome. Two groups were randomly assigned to the participants. the study group had laser acupuncture and Mitchell's basic physiological relaxation technique for 30 minutes per session, while the control group was given vitamin B6 and calcium supplements and conclude that, in terms of premenstrual tension and symptoms, there was positive biological evidence to corroborate the empirical data for laser acupuncture and Mitchell's basic physiological relaxation approach.<sup>26</sup> Pharmacological interventions show similar results like the following studies. Many researchers conducted using pharmacological treatment for reducing premenstrual syndrome and its significant effect in reducing the symptoms of premenstrual syndrome our study aims to focuses on non - pharmacological treatment like Pilates and stretching exercise and this study concludes that the Pilates exercise is more effective for reducing premenstrual syndrome symptoms.

## Conclusion

This study concludes that Pilates exercise and stretching exercise are significantly effective in treating premenstrual syndrome symptoms. When comparing the two groups' Pilates exercise was more effective in relieving the symptoms of premenstrual syndrome by the activation of core and pelvic floor muscles and facilitating blood circulation in the body.

The study highlights the benefits of non-pharmacological interventions, such as Pilates and stretching exercises, as safe and accessible options for managing PMS symptoms. Its strengths include a well-planned experimental design, guided by a power analysis, and a holistic approach that evaluates both physical and mind-body exercises. However, limitations include the use of convenience sampling, which may limit generalizability, reliance on self-reported symptoms, a single-center setting, a short study duration, and the lack of blinding in the design. Future research should address these limitations by employing random sampling, conducting multicenter studies with diverse participants, using objective measures alongside self-reports, and ensuring longer follow-up periods to assess the sustained effects of interventions. Incorporating and exploring the combination of exercise with other lifestyle modifications, such as diet and stress management, could further enhance the understanding and management of PMS symptoms.

**Funding:** None

**Conflict of interest:** The authors of this study declare no conflict of interest

## Reference

1. 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.
2. Le J, Thomas N, Gurvich C. Cognition, the menstrual cycle, and premenstrual disorders: a review. *Brain Sci*. 2020;10(4):198.
3. Mortola JF, Girton L, Yen SS. Depressive episodes in premenstrual syndrome. *Am J Obstet Gynecol*. 1989 Dec 1;161(6):1682-7.

4. Ravichandran H, Janakiraman B. Effect of aerobic exercises in improving premenstrual symptoms among healthy women: a systematic review of randomized controlled trials. *Int J Womens Health*. 2022 Aug 16;14:1105-14.
5. ACOG Committee on Practice Bulletins--Gynecology. ACOG Practice Bulletin: No 15: Premenstrual syndrome. *Obstet Gynecol*. 2000 Apr;95(4):suppl 1-9.
6. Dutta A, Sharma A. Prevalence of premenstrual syndrome and premenstrual dysphoric disorder in India: a systematic review and meta-analysis. *Health Promot Perspect*. 2021 May 19;11(2):161-70.
7. Karimian N, Rezaeian M, Nassaji F, Velaei N, Gachkar L. The effects of physical activity on premenstrual syndrome. *J Zanjan Univ Med Sci*. 2006;13(53):8-15.
8. Çitil ET, Kaya N. Effect of Pilates exercises on premenstrual syndrome symptoms: a quasi-experimental study. *Complement Ther Med*. 2021 Mar;57:102623.
9. Niroomand A, Goodarzi K, Roozbahani M, Tanha Z. The effectiveness of pilates exercises on emotion regulation and distress tolerance in students with premenstrual syndrome. *Health and Development Journal*. 2022 Dec 1;11(4):187-94.
10. Esildere Saglam H, Orsal O. Effect of exercise on premenstrual symptoms: a systematic review. *Complement Ther Med*. 2020 Jan;48:102272.
11. Sureshkumar S. The Effects of stretching exercises and walking in premenstrual syndrome. *Journal of Pharmaceutical Negative Results*. 2022 Oct 12:715-22.
12. Safaian Z, Kohan M, Hoseinifard SM, Forouzi MA, Jahani Y, Ahmadi A. Quality of life and symptom severity in premenstrual syndrome: a quasi-experimental study. *Online Brazilian Journal of Nursing*. 2022 Jul 4;21(e20226559):2.
13. 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.
14. Chojiljav D, Sukhbat T, Ogawa S, Yanjmaa E, Badamdorj O, Saito A, Arai Y, Shinozaki H. Validation of the premenstrual symptoms questionnaire among Mongolian nursing school students. *BMC Women's Health*. 2024 Dec 23;24(1):661
15. Jeong D, Lee H, Kim J. Effects of sleep pattern, duration, and quality on premenstrual syndrome and primary dysmenorrhea in Korean high school girls. *BMC Women's Health*. 2023 Aug 28;23(1):456.
16. Mahdi SM, Khairi SH. Effectiveness of an Educational Program on Female Students' Practices toward Premenstrual Syndrome at Secondary Schools in Third Al-Rusafa Education Directorate. *Iraqi National Journal of Nursing Specialties*. 2021;34(2):39-58.
17. Buddhabunyakan N, Kaewrudee S, Chongsomchai C, Soontrapa S, Somboonporn W, Sothornwit J. Premenstrual syndrome (PMS) among high school students. *Int J Womens Health*. 2017 Jul 21;9:501-5.
18. Dutta A, Sharma A. Prevalence of premenstrual syndrome and premenstrual dysphoric disorder in India: A systematic review and meta-analysis. *Health promotion perspectives*. 2021;11(2):161.
19. Eyigor S, Karapolat H, Yesil H, Uslu R, Durmaz B. Effects of Pilates exercises on functional capacity, flexibility, fatigue, depression and quality of life in female breast cancer patients: a randomized controlled study. *Eur J Phys Rehabil Med*. 2010 Dec;46(4):481-7.
20. Vishnupriya R, Rajarajeswaram P. Effects of aerobic exercise at different intensities in premenstrual syndrome. *J Obstet Gynaecol India*. 2011 Dec;61(6):675-82.
21. Ahmed A, Hassan NM, Shamekh A, Badawy A. Effect of Pilates exercises versus Benson relaxation technique on premenstrual syndrome symptoms. *Egyptian J Health Care*. 2022;13:39-53.
22. Pathak N, Shukla YU. Aerobic exercise versus yoga on pre-menstrual symptoms and primary dysmenorrhea among adult girls: a comparative interventional study. *Int J Sci Healthc Res*. 2023;8:2455-87.
23. Chang HC, Cheng YC, Yang CH, Tzeng YL, Chen CH. Effects of yoga for coping with premenstrual symptoms in Taiwan—a cluster randomized study. *Healthcare*. 2023;11(8):1193.
24. Mathur N. Effectiveness of exercise in menstruation symptoms in late adolescents (17-20 years of age). *Inreincm*. 2020;5(2):5.
25. Rohmah Y, Mukhoirotin M. Abdominal stretching to reduce premenstrual syndrome: a case series. *Medisains*. 2020;18:37.
26. Mohamed E, Ewidea M. Efficacy of laser acupuncture with Mitchell's simple physiological relaxation technique in alleviating premenstrual tension. *Adv Sci J*. 2015;2:65-72.