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Original Research Article

Relationship between physical activity and premenstrual syndrome among college students: A cross-sectional study

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ABSTRACT

Background: Premenstrual syndrome (PMS) is a prevalent condition among women of reproductive age, characterized by physical, emotional and behavioral symptoms that can significantly impact daily life. Physical activity is known for its health benefits, including fitness, mood enhancement and stress reduction. This study aims to determine the relationship between Physical activity and Premenstrual syndrome among college students.

Materials and Methods: A cross-sectional study was performed on 500 female college students aged between 18-30 years old. A questionnaire was used to collect research data. Demographic characteristics, PMS severity and physical activity levels were measured. Data were analysed using SPSS software (SPSS Inc.; Chicago, IL) version 26.0.

Result: A total of 500 participants with a mean age of 21.3±1.8 years. Among total participants, 59.6% of students had normal BMI. Regarding physical activity, 58.6% of students had low physical activity and 41% were experiencing moderate levels of PMS severity. Spearman's ratio was used to determine the relationship between PMS and PA. The study reported a significant correlation ($p < 0.05$) between behavioural symptoms and physical activity level.

Conclusion: There is no significant correlation between overall premenstrual symptoms and physical activity however behavioural symptoms of PMS and PA levels are correlated.

1. Introduction

Premenstrual syndrome (PMS) is a disorder characterized by emotional, physical and behavioural symptoms in women of reproductive age that increase the severity of the menstrual cycle during the luteal phase and subsides within a few days after the onset of menstruation.[1,2] The global prevalence of women of reproductive age who experience PMS is 47.8%. About 20% of these women suffer symptoms that are severe enough to interfere with their everyday activities, while the rest of the women suffer mild to moderate symptoms.[3] According to recent Indian studies, 14.3%–74.4% of the general population reported having PMS.[4] Symptoms of PMS can be categorized as mild, moderate and severe which can range from emotional and behavioural issues like depression, irritability, anger, crying spells, anxiety, confusion, social withdrawal, poor concentration, sleep disturbance, changes in thirst and appetite to physical issues like breast tenderness, abdominal bloating, weight gain, headache, swelling of the extremities and aches or pains.[4–6] These symptoms peak one week before the menstruation and then subside once the onset of menstruation.[7] Severe PMS affects women, making it difficult for them to engage indaily activities at school and in their social and familial lives.[5] The pathophysiology of premenstrual syndrome is complex and remains unclear.

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PMS is likely to be influenced by the action of progesterone on neurotransmitters. A variety of factors may cause PMS, including genetics, abnormal hypothalamic-pituitary-adrenal (HPA) axis function, changes in glucose metabolism, insulin resistance, elevated prolactin levels or sensitivity to the effect of prolactin, psychological variables and lifestyle changes like sleep, nutrition, exercise, stress and personal preferences.[3,4] PMS may have an impact on everyday activities, interpersonal connections, productivity at work and quality of life in terms of one's health. Additionally, it can lead to a greater need for specialized medical treatment.[8] Many women prefer non-medical approaches for treating PMS, primarily due to their desire to avoid the adverse effects of the medications.[9] Exercise, dietary changes, stress reduction, cognitive behavioral therapy and medications are all part of managing PMS.[5] The American College of Obstetricians and Gynaecologists (ACOG) guidelines recommend non-pharmacologic therapy as the first line of treatment for all women experiencing PMS.[3] Physical activity is seen as a useful alternative to medication in the management of premenstrual symptoms and has been linked to enhancing well-being throughout PMS episodes.[10]Exercise and nutrition management are currently advised methods of coping with PMS. These are key non-pharmacological treatments that can be modified and are frequently mentioned as a means of controlling PMS.[9] Other advantages of exercise include increased general health, socialization chances and a potential reduction in depressive symptoms. These advantages may all work to lessen the severity of PMS symptoms.[10] Even though women suffer from PMS, some coping strategies help in reducing symptoms. This includes exercise, rest, sleeping, body massages, listening to music, drinking hot beverages & herbal tea, taking a hot shower, applying hot packs, using analgesics, caffeine intake, diet alteration, taking herbal medicines, drinking alcohol, smoking cigarettes and make one self-busy on other activities.[11]

There are several studies done in other countries but there is a lack of literature in the Indian population. Therefore, this study aims to determine the relationship between PA and PMS among college students.

2. Materials and Methods

We conducted a cross-sectional study to determine the relationship between premenstrual syndrome (PMS) and physical activity (PA) among female college students in India. The study was conducted between May and July 2023. In this study, 500 female college students consented to participate. The participants received information regarding our research and those who agreed to participate were included in the sample. Responses from participants were anonymous and kept confidential.

2.1. Inclusion criteria

In this study, female college students aged between 18 to 30 years old, who consented to participate and students with regular menstrual cycles were included.

2.2. Exclusion criteria

In this study, students with incomplete data, psychiatric disorders, and current pregnancy or childbirth were excluded.

The questionnaire comprised three parts. Part one was used to collect demographic characteristics which include age, education, address, height, weight and BMI. Part two was used to collect data on PMS. Premenstrual Syndrome Scale (PMSS) a 40-item Likert scale with three subscales (physiological, psychological and behavioural) was used to assess the severity of premenstrual syndrome among the participants. The minimum and maximum score is 1 -5 for each symptom. The PMS Score was generated using the combined score from three subscales. The lowest score is 40 and the highest score is 200. If the score is 1 - 40 it is considered as 'No symptoms', a score from 41 - 80 is considered as 'Mild symptoms', a score from 81 - 120 is 'Moderate symptoms' and 121 – 160 is 'Severe' and score from161 - 200 is considered as ' Very Severe'. Additionally, the participants were also questioned about their coping mechanisms related to PMS.[11,12] Part three was used to collect data on PA. Global Physical Activity Questionnaire (GPAQ) developed by WHO was used to assess the PA level among participants. The questionnaire consists of 16 questions (P1 to P16) which gather data on physical activity participation in three domains as well as sedentary behavior. The domains are (a) Activity at work (b) Travel to and from places (c) Recreational activities. According to the GPAQ cut-off values the participants were categorized into a high, moderate and low level of PA.[13,14] Participants were contacted through a proper channel and the Google form link was circulated through WhatsApp

All the study materials have been reviewed and approved by the Srinivas Institute of Physiotherapy research ethical committee.

2.3. Statistical analysis

Descriptive statistical analysis was carried out for demographic characteristics and individual parameters. The study presented the prevalence and categorical variables in terms of frequency and percentages, while the continuous variables were described using the mean ± standard deviation. The Spearman's ratio was used to find the relation between PMS and PA. The p-value < 0.05 was considered significant. Data were analyzed by using the SPSS software (SPSS Inc.; Chicago, IL) version 26.0.

3. Results

A total of 500 female college students were recruited. Table **??** shows the Socio-demographic characteristics of the subjects. The mean age of participants was 21.3±1.8 years. Among the total participants, more than half of the individuals had a normal BMI (59.6%). Regarding the level of PA, 58.6% comes under low followed by 23% moderate and 16.8% high.

Concerning PMS severity, 41% of students experienced moderate PMS severity, 28.8 % had mild severity, 24.4% had severe PMS and few participants (4.4%) reported a very severe level of PMS.

Table 1: Socio-demographic characteristics

Variable	Number (n)	Percentage (%)
Age (Mean ± SD)	21.3 ± 1.8	
BMI		
Underweight	121	24.2
Normal	298	59.6
Overweight	62	12.4
Obesity	19	3.8
Physical activity level		
Low	293	58.6
Moderate	115	23
High	84	16.8
PMS severity		
Mild	144	28.8
Moderate	205	41
Severe	129	25.8
Very Severe	22	4.4

In our study, the PMS scale was used to score using three subscales: physiological, psychological, and behavioral. Table 2 shows that, among the physiological symptoms, 90.8% of participants reported experiencing severe abdominal cramps, followed by skin color changes, rashes, and pimples (84.8%). Table 3 presents the psychological symptoms, with 93.6% of students severely affected by mood swings. Table 4 highlights the behavioral symptoms, where 82% of participants lack interest in their usual activities.

Various coping strategies were followed by the participants, as shown in Table 5 , with relaxation and meditation being the most common (41.6%), followed by listening to music (33.6%), applying hot packs (29.6%), and sleeping (16%).

The Pearson correlation coefficient was used to find the relation between the various domains of PMS. There was a positive correlation ($p < 0.05$) between physiological and psychological symptoms, physiological and behavioral symptoms, as well as psychological and behavioral symptoms. (Table 6)

Table 7 shows the relation between PA level and individual score of three subscales of PMSS. The Spearman's ratio was used to find out the relation. The study reported a significant correlation ($p < 0.05$) between behavioral symptoms and PA level. However, there is no statistically significant correlation between PA and overall components of PMS.

Table 2: Frequency of premenstrual physiological symptoms of the study participants**.**

Variables	Frequency(n)	Percentage (%)
Physiological symptoms		
Abdominal cramps	454	90.8
Skin color changes, rashes, pimples	424	84.8
Generalized aches and pains	415	83
Muscle and Joint pain	408	81.6
Food cravings (Sugar/ Salt)	407	81.4
Pelvic discomfort and pain	390	78
Fatigue	389	77.8
Abdominal bloating	372	74.4
Headache	372	74.4
Increased appetite	364	72.8
Change in bowel habits	324	64.8
Dizziness/fainting	288	57.6
Nausea/vomiting	260	52
Weight gain	235	47
Breast tenderness and swelling	232	46.4
Palpitations	186	37.2

Table 3: Frequency of premenstrual psychological symptoms of the study participants.

Variables	Frequency (n)	Percentage (%)
Psychological symptoms		
Mood swings	468	93.6
Irritability	425	85
Loss of concentration	421	84.2
Tension	392	78.4
Easy crying/ Crying spells	391	78.2
Aggression	384	76.8
Anxiety	371	74.2
Sleep changes (Insomnia/ hypersomnia)	368	73.6
Depression	325	65
Confusion	323	64.6
Hopelessness	314	62.8
Forgetfulness	310	62

4. Discussion

A cross-sectional study was conducted to determine the relationship between the PA and PMS among college students which included 500 participants with a mean age

Table 4: Frequency of premenstrual behavioural symptoms of the study participants.

Variables	Frequency (n)	Percentage(%)
Behavioural symptoms		
Lack of interest in usual activities	414	82.8
Being over-sensitive	402	80.4
Restlessness	362	72.4
Impaired work performance	354	70.8
Lack of self-control	336	67.2
Irrational thoughts	329	65.8
Social withdrawal	324	64.8
Obsessional thoughts	320	64
Feeling guilty	320	64
Clumsiness	317	63.4
Compulsive behavior	301	60.2

Table 5: Coping strategies of participants for premenstrual syndrome.

Variable	n (%)
Relaxing, meditation	208 (41.6%)
Listening music	168 (33.6%)
Applying hot packs	148 (29.6%)
Sleeping	82 (16%)
Eating	39 (7.8%)
Watching movies	28 (5.6%)
Painkillers	17 (3.4%)
Exercise, yoga	15 (3%)
Herbal drinks	8 (1.6%)
Others (Keeping oneself busy, going out with friends, reading books)	13 (2.6%)

Table 6: Relation between the various domains of PMS

Correlations	Pearson correlation coefficient ("r")	p-value
Physiological and psychological symptoms	0.713	< 0.001*
Physiological and behavioral symptoms	0.689	< 0.001*
Psychological and behavioral symptoms	0.875	< 0.001*

(* Statistically significant)

Table 7: Relationship between PMS and PA.

PMSS	Spearman's ratio	p-value
Physiological symptoms	0.077	0.087
Psychological symptoms	0.058	0.198
Behavioral symptoms	0.096	0.032*
PMS Scoring (Overall)	0.074	0.096

(* Statistically significant)

of 21.3±1.8 years. The participants selected were college students in which 59.6 % of participants had normal BMI.

In our study, the PMS scale was scored based on three subscales (physiological, psychological and behavioral). Among these, all participants had at least one PMS symptom. In physiological symptoms, 90.8% of participants reported experiencing severe abdominal cramps followed by skin color changes, rashes and pimples (84.8%), generalized aches and pains (83%), muscle and joint pain (81.6%) and food cravings (81.4%). Regarding psychological symptoms, a majority of students, 93.6% were severely affected by mood swings. In behavioral symptoms, 82% of participants show a lack of interest in usual activities.

A study done by Chen Z et.al. showed that the most common symptom was fatigue, 46.8%, followed by headache (26.4%), gastrointestinal symptoms (15.1%), breast tenderness (7.0%) and bloating (4.6%). As for the psychological symptoms, the most common symptom was cannot concentrate (22.8%), followed by depression (19.5%/), feeling out of control (20.0%), anxiety (20.0%) and irritability (17.7%).[15]

There are various coping strategies followed by the participants (Table 3) in which relaxation and meditation account for 41.6% followed by listening to music (33.6%), applying hot packs (29.6%) and sleeping (16%). A study by Eshetu et.al., reported various coping mechanisms like taking rest (67.6%) and sleeping 335 (60.7%) were most common followed by applying hot packs (29.5%) and taking anti-pain drugs (28.1%).[11]

Our study showed the relation between the various domains of PMS. There was a positive correlation ($p < 0.05$) between physiological and psychological symptoms, physiological and behavioral symptoms, as well as psychological and behavioral symptoms. A similar study by Erbil et.al. showed that sleep quality was positively correlated with PMS and its subscales scores. Sleep changes were the strong predictor, followed by depressive thoughts and mood and abdominal bloating for PMS.[16] Also, a study by Abu Alwafa et.al. revealed a significant relationship between physical and behavioral symptoms ($p = 0.001$).[17]

Our study reported a significant correlation ($p < 0.05$) between behavioral symptoms and PA level. However, there is no statistically significant correlation between PA and overall components of PMS. A similar study by Kroll-Desrosiers et al. also found no association between PA and total PMS score.[18] In contradictory, a study by Kawabe et.al. reported that young women with high PA have milder symptoms of PMS.[9]

There are certain limitations to this study where the study relied on self-reported data for both PMS symptoms and physical activity levels, which can introduce subjectivity and recall bias. Also, no information is provided on other factors that may influence PMS symptoms such as diet, medication use and menstrual history. According to the

questionnaire we used GPAQ only measures recent physical activity and may not reflect long-term activity levels. Self-reported PMS symptoms can vary monthly, so a prospective study tracking symptoms over several months may be better.

5. Conclusion

There is no significant correlation between overall premenstrual symptoms and physical activity however behavioral symptoms of PMS and PA levels are significantly correlated.

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7. Ethical Approval

This study was conducted after taking approval from Institution Ethical Committee with Ref. No.SCPT/P/3/100664/18/2023

8. Source of Funding

None.

9. Conflict of Interest

None.

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