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Correlation between Physical Activity and Premenstrual Syndrome in Undergraduate Female Students

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Abstract
Aim: To evaluate the correlation between physical activity and premenstrual syndrome in undergraduate female students.
Relevance of study: The study reflects the need & awareness for importance of physical activity in day to day life of college going age to improve overall wellbeing so that girls can cope up with PMS symptoms.
Methodology: In this correlational study 143 female students were selected according to inclusion & exclusion criteria. Then participant's physical activity were evaluated by IPAQ-SF and premenstrual syndrome by PMS scale.
Result: By using pearson's correlation coefficient test we found that individuals who was more physically active had less PMS symptoms than the individuals who had low physical activity.
Conclusion: The study concluded that the females with high physical activity (PA > 600) had mild PMS symptoms and those with low physical activity (PA <600) had severe PMS symptoms.

Keywords: Physical Activity, Premenstrual Syndrome, IPAQ, Pms Scale

Introduction

Premenstrual syndrome (PMS) is used to describe physical, cognitive, affective, and behavioral symptoms i.e. PMS is characterized by emotional, behavioral, physical symptoms that occur cyclically during the luteal phase of the menstrual cycle and resolve quickly at or within a few days of the onset of menstruation. It has been reported that 5–8% of reproductive-aged women exhibited moderate to severe PMS symptoms that interfered with their daily activities. PMS may be caused by a variety of factors, mainly including sex hormones, autonomic nervous system, psychological factors, and lifestyle (sleep, diet, exercise, stress, and personal preferences) [1, 2] Various biosocial and psychological causes have been proposed as the cause of the syndrome, including abnormal serotonin function, presence of progesterone, altered endorphin modulation of gonadotrophin secretion, exercise habits, smoking, use of alcohol, altered trans-capillary fluid balance and a diet rich in beef or caffeine containing beverages [3]. Menstruation is a physiological phenomenon experienced by women, many of whom report premenstrual symptoms such as breast tenderness, abdominal bloating, nausea, and headache. These symptoms are usually mild and do not require special treatment in most cases; however, 20-40% of women experience severe premenstrual symptoms that cause disability [4]. The etiology of PMS remains unknown and may be complex and multifactorial. The role of ovarian hormones is unclear, but symptoms often improve when ovulation is suppressed [5]. Since most women of reproductive age report at least mild premenstrual symptoms, a certain degree of discomfort during the lutealphase should probably be considered physiological rather than pathological. In evolutionary terms [6]. Many researchers suggest that premenstrual complaints are elicited by the drop in progesterone concentrations in the late luteal phase, and link this to changes in CNS neurotransmitters such as γ-aminobutyric acid (GABA) [7, 8].

The days of the cycle during which symptoms are likely to appear are those in which progesterone dominates over estrogen. On the other hand, estradiol has been reported to be as effective as progestogen in provoking PMS-like complaints. [9] It remains unclear whether premenstrual somatic symptoms—such as breast tenderness, bloating, and joint and muscle pain—result from reduced tolerance to physical discomfort while in a dysphoric mood state, or are caused by changes in hormone-responsive tissues in the periphery. Studies have failed to confirm fluid retention or breast enlargement in women reporting these symptoms [10, 11]. Physical activity may play an important role in the management of mild-to-moderate mental health diseases, especially depression and anxiety [12]. The health benefits of physical activity and exercise are clear; virtually everyone can benefit from becoming more physically active. Most international guidelines recommend a goal of 150 min/week of moderate-to-vigorous intensity physical activity [13]. In the ABC of Physical Activity for Health, A is for All healthy adults, B is for Beginners, and C is for Conditioned individuals. All healthy adults aged 18-25 years should aim to take part in at least 150 min of moderate-intensity aerobic activity each week, or at least 75 min of vigorous intensity aerobic activity per week, or equivalent combinations of moderate- and vigorous intensity activities. College going undergraduates between the age of 18-25 years have a tendency 8 to lead a stationary lifestyle and might be more prone to have problems related to PMS, thus a detailed study is required to evaluate this particular age group. Moderate-intensity activities are those in which heart rate and breathing are raised, but it is possible to speak comfortably. Vigorous-intensity activities are those in which heart rate is higher, breathing is heavier, and conversation is harder [14]. The "behavior" of physical activity (PA) is multifactorial, including social, environmental, psychological, and genetic factors. Abundant scientific evidence has demonstrated that physically active people of all age groups and ethnicities have higher levels of cardiorespiratory fitness, health, and wellness, and a lower risk for developing several chronic medical illnesses, including cardiovascular disease, compared with those who are physically inactive. Although more intense and longer durations of PA correlate directly with improved outcomes, even small amounts of PA provide protective health benefits [15].

Methodology

Study design: - Correlational study

Study population: - Undergraduate female students of 18 to 25 age group

Study duration: - 6 months

Study setting: - Dr. Ulhas Patil college of physiotherapy, Jalgaon

Sample size: - 143

Sampling technique:- Convenient sampling technique.

Maximum sample size (n)

To estimate population mean

$$n = \frac{z_1^2 pq}{d^2}$$

P= 0.61

q=0.39

d= 0.08

Z1 = 1.96 at α = 5% level of significance

$$n = \frac{(1.96)^2\ (0.61^2)\ (0.39)}{0.08^2}$$

n= 143

Subjects: A correlational study was conducted on 143 participants at Dr. Ulhas Patil College Of Physiotherapy, Jalgaon. The criteria for inclusion was: 1. Female students between the age group of 18 to 25 years 2. Undertaking undergraduate degree 3. Who are willing to participate 4. Literate in English, Marathi, Hindi. Exclusion criteria was: 1. Overweight and obese females 2. Not willing to participate 3. Those with current depression, anxiety or any other psychiatric disorder 4. Those who take contraceptive pills, received hormonal therapy 5. Those who experienced traumatic life event before 6. Irregular menstrual cycle.

Procedure: Ethical clearance was obtained from the institutional ethical committee. The purpose & procedure of the study was explained to participants. Subjects were screened according to the inclusion and exclusion criteria. A written consent were obtained. Total 143 subjects were included in the study. Demographic details & baseline measurement were recorded. The selected participants were evaluated for premenstrual symptoms using premenstrual (PMSS) syndrome scale. To determine the weekly Physical Activity (PA) short version of IPAQ was used. The participants were asked about moderate intensity active time, vigorous intensity active time and walking time. Then participants METs will be calculated according to IPAQ guidelines.

Assessment of physical activity using IPAQ- SF

Participants were assessed according to Inclusion & Exclusion criteria IPAQ-SF was administered on all the participants. To determine weekly Physical Activity (PA) of participants Short version of IPAQ was used. The participants were asked about moderate intensity active time, vigorous intensity active time, walking time. The participants METs were calculated according to IPAQ guidelines as follows:

Walking MET – minutes/week = 3.3* walking minutes * walking days

Moderate MET – minutes/week = 4.0* moderate intensity activity minutes* moderate intensity days

Vigorous MET – minutes/week = 8.0* vigorous intensity activity minutes* vigorous intensity days

Total physical activity MET – minutes/week = sum of walking + moderate + vigorous MET – minutes/week score.

The Premenstrual syndrome scale is one of the most extensively studied symptoms assessment instruments in

identifying adolescents at premenstrual syndrome risk. The premenstrual syndrome scale comprised 40 questions with three sub scales,1. Physiological symptoms 2. Psychological symptoms 3. Behavioral symptoms. This scale consists of symptoms that would occur during the premenstrual phase of your cycle. Each of the symptoms below, circle the number that most closely describes the intensity of your premenstrual symptoms during your last cycle.

Rate each item on this list on a scale from, 1 (not present or no change from usual) to 5 (extreme change, perhaps noticeable even to casual acquaintances). The measurements on the scale are set according to the following scoring system:

- Never was scored as "1"
- Rarely as "2"
- Sometimes as "3"
- Very often as "4"
- Always as "5" points.

In addition, the total score obtained from the sub-scales established the "PMSS total score." The scale's lowest score is 40 and highest score is 200. If the scale's total score reached 80 points or above, this indicates the occurrence of PMS. Increases in the scores indicate an increase in PMS severity.

Level of Symptomes		Actual Score	% of score
No		1-40	<20
Mild	Slightly apparent	41-80	21-40
Moderate	Appeare but doesn't affect daily activity at all	81-120	41-60
Severe	Continuously bothered by symptoms	121-160	61-80
Very Severe	Symptom interfere with daily activity	161-200	>80

Statistical Analysis

Statistical methods use

The entire data of the study was entered and cleaned in MS Excel before it was statistically analyzed in "GraphPad Instat version 3.05".

All the results are shown in tabular as well as graphical format to visualize the statistically significant difference more clearly.

The data on quantitative characteristics was presented as Mean +- Standard Deviation (SD) across study group

The Pearson's correlation coefficient test was used between Physical Activity & Premenstrual Syndrome to test the correlation between them.

The entire data was analyzed statistically using "GraphPad Instat version 3.05" for MS Windows.

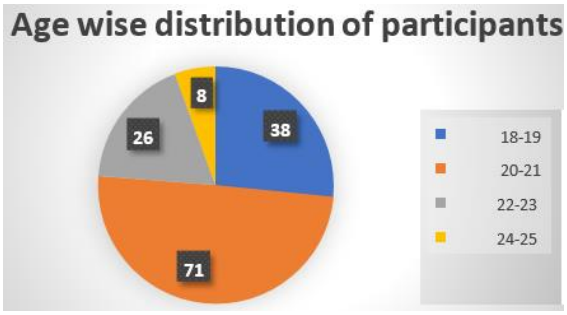
Observation and Tables

Table 1: The age wise distribution of study subjects

Age in years	No. of participants
18-19	38
20-21	71
22-23	26
24-25	8

Interpretation

- In study 38 subjects were between 18-19 years of age, 71 subjects were between 20-21 years of age, 26 subjects were between 22-23 years of age and 8 subjects were between 24-25 years of age



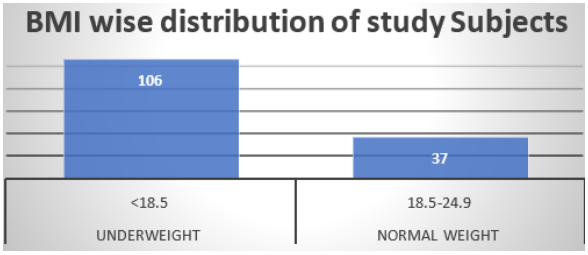
Graph 1: The age wise distribution of study subjects

Comments: The pie chart shows age wise distribution of study subjects.

Table 2: BMI wise distribution of study subjects

BMI		No. of participants
Underweight	<18.5	106
Normal weight	18.5-24.9	37
Overweight	25-29.9	0
Obese	>30	0

Interpretation: In study, 106 participants were underweight and 37 participants were of normal BMI.



Graph 2: The BMI wise distribution of study subjects

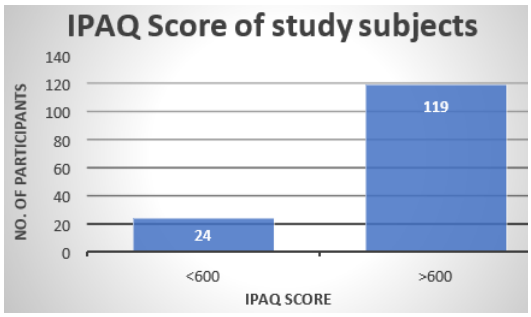
Comments: The graph shows BMI wise distribution of study subjects

Table 3: IPAQ score of the participants

Physical Activity (PA)	No. of participants
<600	24
≥600	119

Interpretation

In study, 24 participants were having IPAQ Score <600 (less physical activity) & 119 participants were having IPAQ Score ≥600 (more physical activity).



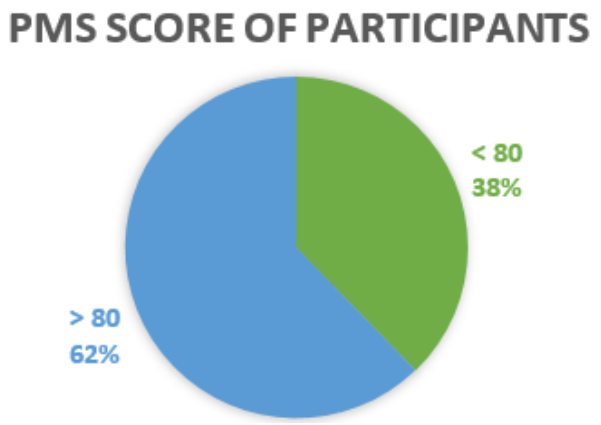
Graph 3: IPAQ Score of the participants

Comments: The graph shows that 24 study subjects had IPAQ Score less then 600 & 119 study subjects had IPAQ Score more than or equal to 600.

Table 4: PMS score of the participants

PMS Score	No. of participants
< 80	54
> 80	89

Interpretation: In study, 54 participants had PMS score <80 & 89 participants had PMS score > 80.



Graph 4: PMS score of the participants

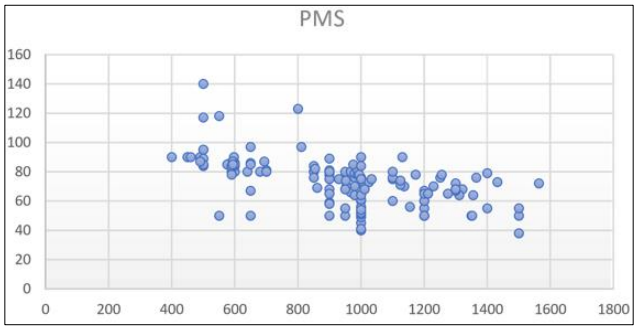
Comments: The graph shows PMS score of the participants.

Table 5: Correlation between IPAQ & PMS

IPAQ	PMS	Pearson's correlation coefficient test
941.67	73.17	-0.5921

Interpretation

The mean value of IPAQ was 941.67 & mean value of PMS was 73.17. On correlation using pearson's correlation coefficient test the 'r' (correlation coefficient) value was -0.5921. There is negative correlation exist between physical activity and PMS.



Graph 5: Correlation between IPAQ & PMS

Comments

The graph shows correlation between IPAQ (PA) & PMS

Results

By using pearson's correlation coefficient test we found that individuals who was more physically active had less PMS symptoms than the individuals who had low physical activity with a 'p' value <0.0001 (considered extremely significant).

Discussion

Today, solving women's problems is one of the most important health and research priorities. PMS is one of the most common problems of women, which can interfere with everyday life in women.

PMS is one of the most common problems among women. Moreover, PMS can interfere with activities of daily living. Thus, finding a way to prevent or treat PMS is an important health and research priority. In our study, we found that over 90% of women reported at least one symptom of PMS. This finding was similar to a study that found that 95% of participating women aged 18–24 years experienced at least one PMS symptom [16].

PMS symptoms are encountered repeatedly during the luteal phase of the menstrual cycle, causing adverse effects on daily life and work productivity. More than 200 PMS symptoms have been reported in the literature, and most women of childbearing age experience at least one PMS symptom, although in the vast majority medical or psychiatric treatment is not required [17].

Traditionally, exercise is considered to be one of the nonpharmacological treatments for PMS. Many researchers have observed that the frequency of PMS is higher among women with a sedentary lifestyle. In this study too, similar findings were obtained, and the physical activity level was inversely associated with the PMS symptom scores. Physical activity may alleviate the PMS symptoms via several biological mechanisms, such as secretion of endorphins and improvement in mental and physiological health. Muscle contractions during exercise reduce back pain and pelvic discomfort and ease PMS symptoms by lowering the local concentrations of prostaglandins and other inflammatory substances [18, 19, 20].

The etiology of PMS includes hormone imbalances, Na+ retention, dietary factors such as vitamin deficiency, estrogen and progesterone imbalances, normal ovarian function, neurotransmitter imbalances, and other biological, psychological, and social psychological theories. This suggests that PMS is a multifactorial neuropsychological endocrine disorder, although a definitive conclusion has not been reached [21, 22]. In this study, we found that highly PA women had lower PMS symptom scores (physical and psychological symptoms). This study clarified that people with a PA of ≥ 600 METminutes/week had lower scores for psychological and physical symptoms.

Abedi and Nikbakht (2007), Moqadasi *et al*. (2009), Dehghan Manshadi *et al*. (2008), Samadi *et al*. (2012) indicate positive effects of exercise on reducing the Physical symptoms of PMS [23, 24, 25].

PA, including resistive exercise, induces neuroimmunomodulation effects, increases neurotrophies [26] and β-endorphins [27], decreases the sympathetic response, affects the hypothalamic–pituitary–adrenal axis reactions, and improves the serotonin system. All of these responses may decrease anxiety and depression [28].

In summary, according to our results, female students with ≥ 600 MET-minutes/week of PA had milder symptoms of PMS.

Conclusion

The study concluded that the females with high physical activity (PA>600) had mild PMS symptoms and those with low physical activity (PA<600) had severe PMS symptoms.

Limitations

In present study, study is limited to a particular age group.

Future Scope of Study

In future, study on specific intervention strategies to improve PMS symptoms in females can be conducted.

In future, we can do research on which type of exercise is most suitable for females to cope with the symptoms of PMS.

Clinical Implication

The study reflects the need and awareness about importance of physical activity in day to day life among the young and adult females.

Also on other hand, infertility is a growing concern among today's generation due to so many reasons but some of them are lack of physical activity, stress, obesity & unhealthy lifestyle which in future leads to medical issues like PCOS, PCOD, hormonal imbalance.

Hence creating awareness of physical activity & it's clinical benefits among females is important.

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