

Correlation of physical fitness with fatigue in females with Premenstrual Syndrome

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ABSTRACT

Background: Premenstrual syndrome is a common clinical condition that happens 5-7 days before the onset of menstruation. It causes a set of psychophysiological symptoms among which fatigue is a common complaint.

Objective: To determine the correlation of physical fitness with fatigue in females with Pre-menstrual syndrome.

Methods: This analytical cross-sectional survey (Ethical and IRB review number: IRB # 066-24) was conducted in Shifa Tameer-e-Millat University Islamabad, Pakistan from May 2024 to August 2024. A total of 377 female students (18-28 years) were selected through non-probability convenient sampling technique. University students who were married, or using any other medications and those who do not fall under the criteria of Premenstrual Syndrome were excluded. Self-structured demographics questionnaire, Premenstrual Syndrome diagnostic questionnaire based on American College of Obstetrics and Gynecology (ACOG) criteria and Fatigue severity scale were used in this study. For the assessment of cardiorespiratory fitness, 20 m shuttle run test was performed, while muscle strength was assessed through Manual Muscle Testing. Speed and flexibility were determined by 4×10 m running test and sit and reach test respectively. Data analysis was done by using SPSS software version 23.

Results: The study found weak, non-significant correlations between VO₂max and fatigue ($r=0.055$, $p=.289$). Upper limb strength showed weak, non-significant correlations with fatigue ($r=-0.018$, $p=.727$). Lower limb strength had very weak, non-significant correlations with fatigue ($r=0.035$, $p=.500$). Agility had weak, non-significant correlation with fatigue ($r=-0.005$, $p=.923$). Flexibility showed weak, non-significant correlations with fatigue ($r=0.078$, $p=.131$).

Conclusion: The study concludes that physical fitness levels may not play a substantial role in alleviating fatigue symptoms in premenstrual syndrome.

Keywords: Fatigue, physical fitness, premenstrual syndrome, VO₂max

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Introduction:

Premenstrual syndrome is a relatively common clinical condition in which many females experience physical, emotional and psychological symptoms.(1) Common symptoms include anger, agitation, fatigue, nervousness, headache, insomnia and many other.(2) This syndrome begins with the luteal phase of menstruation and terminates at the end of menstrual flow.(1)

Premenstrual syndrome (PMS) is reported in 75%-80% of the females worldwide.(3) The exact cause of PMS is not known but changes in hormones which take place during the menstrual cycle are thought to play an integral part.(4)

Fatigue is a common complaint, deeply interfering with normal daily activities in females with menstrual disorders.(5) Studies indicate a frequently high percentage of fatigue symptoms among females with premenstrual syndrome.(6) A study conducted by Pai-Cheng et al concluded that females with PMS experienced severe fatigue, sleep disturbances, and these symptoms exacerbated during premenstrual phase.(5) However, fatigue in premenstrual syndrome has not been adequately evaluated.

Physical fitness is a multidimensional term and it is defined as the person's ability to perform daily activities. (7) It consists of different measurable components

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including cardiorespiratory fitness, muscular strength, flexibility, agility and walking speed.(7)

Evidence suggests an indirect relationship between fatigue and aerobic fitness.(8) It is reported that there is a significant physical deconditioning, reduced flexibility, back strength and functional capacity in women with menstrual problems. Additionally, these women also perceived lower physical fitness, and health related quality of life. However, higher levels of fatigue are significantly observed in these females.(9) Furthermore, muscle strength was found significantly lower in females with menstrual problems.(10)

Premenstrual syndrome is a common condition among females during their reproductive age, yet many women remain unaware of the possible adverse effects PMS can have on their overall well-being. It's worth noting that fatigue in premenstrual syndrome have not been studied, there's a significance gap in understanding its relationship with physical fitness. Therefore, the objective of current study was to determine the correlation of physical fitness with fatigue in females with premenstrual Syndrome.

Methods:

An analytical cross-sectional survey was conducted from May to August 2024. Ethical approval was obtained from Institutional Review Board and Ethics Committee of Shifa International Hospital (IRB # 066-24).

A total of 377 females were selected using convenient sampling technique from different departments of Shifa Tameer-e-Millat University, Islamabad, Pakistan. Calculation of sample size was done through Rao software with estimated population of 20,000, confidence interval of 95 % and 5% margin of error.

Unmarried females with age range (18-28 years) having pre-menstrual syndrome and females with regular menstrual cycle were included in the study. Exclusion criteria was females using medications affecting their sleep, stress and fatigue, with any other menstrual problem and females with history of psychiatric or sleep problems other than pre-menstrual syndrome.

ACOG diagnostic criteria for premenstrual syndrome was used to include females, which identifies the condition when physical and emotional premenstrual symptoms occurs on one or more of the 5 days before menstruation in previous 3 cycles and disappears in 4 days after the start of menstruation.(11) For this purpose the participants were asked to track their menstrual cycles for at least three months prior to inclusion to accurately determine the luteal phase (the premenstrual phase).

The Fatigue Severity Scale is an accurate and

common tool used to quantify fatigue. It has an excellent internal consistency ($\alpha=0.93$). The "Fatigue Severity Scale" questionnaire has 9 responses that illustrate that how severe the symptoms of fatigue are, a low number "1" denotes severe opposition with the statement, while a high value "7" denote strong agreement. A score less than 36 indicates that you are not suffering from fatigue. A total score of 36 or more indicates that you are fatigued.(12)

VO2 max was calculated using 20 Meter Shuttle Run test. The individuals were instructed to run in between two lines 20 meter distant while following audio signals. The test was terminated when individual failed to reach the end lines simultaneously with the audio signals. Score was measured based on number of shuttles reached.(13) For sit and reach test participants were instructed to sit without shoes, with knees fully bent, arms properly stretched, and palms down. Feet were flat against the horizontal transverse bar of the tool and the inside edges of the soles were placed 2 cm from the scale. Next, participants were instructed to bend and stretch forward without shaking while using their fingertips to push the slide marker as far as they could along the scale. The test was recorded thrice for the average.(14)

Manual Muscle Testing was used to assess the muscle strength. Flexors, extensors, supinator, pronators, adductors and abductors of upper limb and lower limb were tested in grade 4 and grade 5 of manual muscle testing.(15) Agility was assessed through 4*10 m running test. This procedure consist of four sets that involves running both ways between points A and B, which are 10 meters (33 feet) apart for an overall distance of 40 meters (4*10m) while measured. We used a stop watch to check how long the individual requires to finish both the initial and second sets of runs in seconds rounded to the closest one.(16)

After the subjective and objective assessment of the participants, data analysis was done by using IBM SPSS 23. To assess the degree of correlation between variables, Pearson correlation test was applied. Qualitative data was expressed as frequencies (percentages) whereas, quantitative data was expressed as means and standard deviation.

Results:

The mean age and BMI of the participants were 21.05 ± 1.5 (years) and 21.13 ± 3.6 kg/m² respectively. While the mean age of menarche of the participants was 13.1 ± 1.3 years.

The results of Fatigue severity scale (FSS) are shown in figure 1.

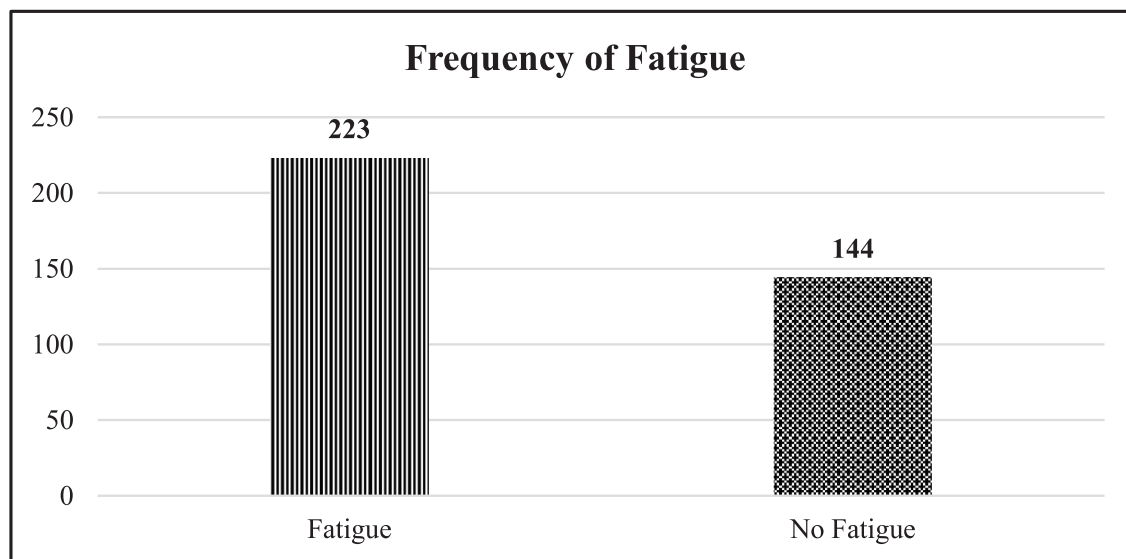


Figure 1: Fatigue of the Participants

On the assessment of VO₂max by 20-meter shuttle run test, majority 376 (99.7%) of the participants reported to have very poor VO₂ max whereas only 1 (0.30%) participant reported poor VO₂ max. The mean VO₂max of the participants was 20.3±2.2 (ml/kg/min). Manual muscle testing (MMT) revealed that the mean strength of upper limb and lower limb was 4.6±0.48 and 4.60±0.5 respectively.

The 4×10 meter run test reported that majority of females 162 (43%) have good agility followed by 94 (24.9%) participants with average agility. While 72 (19.1%) participants reported excellent agility. The poor and fair agility was reported by 11 (2.9%) and 38 (10.1%) of the participants respectively. The mean agility of the participants was 1.7±0.3 (m/sec).

The assessment of flexibility by sit and reach test reported that 310 (82.20%) participants out of 377 have super flexibility while 59 (15.60%) respondents reported excellent flexibility. On the other hand, very poor and good flexibility was equally reported by,

4 (1.10%) participants. The mean flexibility of the respondents was 13.5±2.8 (inches).

To determine the correlation of physical fitness with fatigue” Pearson correlation test” was applied. The relationship between VO₂max and fatigue was weak and statistically non-significant (r=.055, p=.289). The relationship of upper limb muscle strength with fatigue showed weak negative and statistically non-significant correlation (r=-0.018, p=.727).

Furthermore, the correlation of Lower limb muscle strength with fatigue was weak and statistically non-significant (r=.035, p=.500). Agility of participants showed very weak and statistically non-significant correlation (r = -.005, p = .923), indicating that speed does not impact fatigue levels.

Flexibility of participants showed weak and non-significant (r = .078, p = .131) correlation with fatigue, indicating flexibility does not significantly impact fatigue levels.

Table 1: Correlation of physical fitness with fatigue in females with Premenstrual syndrome

Physical fitness components	Correlation Variable	r-value	P- value
VO ₂ max	Fatigue Severity Scale (FSS)	0.055	0.289
Upper limb muscle strength		-0.018	0.727
Lower limb muscle strength		0.035	0.500
Agility		-0.005	0.923
Flexibility		0.078	0.131

Discussion:

Premenstrual syndrome is a common problem among females during their reproductive years. The primary objective of present study was to determine the correlation of physical fitness with fatigue in females with premenstrual syndrome

Fatigue was a common complaint in females with premenstrual syndrome in the current study. These findings are supported by study conducted by Pai-cheng Lin in 2021 which suggested that ovarian hormone fluctuations contribute to PMS related fatigue in majority of the females.(17)

In the present study, physical fitness had a non-significant relationship with fatigue level in females with Premenstrual syndrome. Haghighi et al. in the year 2015 conducted a study to find the correlation between cardiorespiratory fitness and premenstrual symptoms. A total of 86 participants were included. The study reported statistically significant correlation between cardiorespiratory fitness and PMS Symptoms. These results are incoherent with the results of the present study. The difference in the study results might be due to different outcome measures used and multiple symptoms of PMS were assessed in the previous study. (18)

Furthermore, Francisco Álvarez-Salvago et. al. in 2020 conducted a study to determine the correlation of health related physical fitness with fatigue. Statistically significant correlation between physical fitness and fatigue was reported by this study. These findings are inconsistent with the results of current study. The discrepancy in results with current study might be due to variation in sample size, population characteristics, inconsistent measurement tools and differences in the parameters of physical fitness. Poor fitness leads to physical deconditioning that increases the level of fatigue.(19) Multiple other studies have highlighted the significant correlation of physical fitness with fatigue in multiple conditions yet limited literature is available on this correlation in premenstrual syndrome.

This study had few limitations that should be considered when interpreting the results. First, demographic variables such as participant's age may have influenced participants' fatigue levels, as it can affect energy. Additionally, lifestyle factors, such as physical activity, sleep quality, and dietary habits, were also not comprehensively controlled, potentially confounding the relationship. Psychological factors, including stress and anxiety, might have also played a role in fatigue perceptions, yet these were not adequately measured.

Future research should consider these confounding factors to enhance the understanding of fatigue and improve the rigor of findings in this area. It is also recommended for future studies to measure VO2 max on a treadmill or cycle ergometer to quantify cardiorespiratory fitness. They can include control group of females without PMS to establish a baseline and compare the findings.

Conclusion:

The study concluded that VO2 max had weak, non-significant correlations with fatigue. Upper limb muscle strength also showed weak, non-significant correlations with fatigue. Lower limb muscle strength had a weak, non-significant correlation with fatigue. Speed and flexibility had a weak correlation with fatigue.

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