

# Association of Premenstrual Syndrome with Body Mass Index and its Effect on Quality of Life: A Cross-sectional Study

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## ABSTRACT

**Background:** It has been estimated from retrospective community surveys that nearly 90% of women have experienced at least one premenstrual syndrome (PMS). Premenstrual syndrome is more prevalent among younger women. It also has a negative impact on the quality of life (QoL) to such a degree that work and lifestyle may get affected.

**Objective:** To find the association between PMS and the body mass index (BMI) and its effect on the QoL.

**Materials and methods:** A total of 207 females in the age group of 18–25 years were screened using the Moos menstrual distress questionnaire for PMS, of which 57 volunteers were diagnosed with PMS. Baseline characteristics were recorded, BMI was calculated, and QoL of all subjects was measured using the SF-36 questionnaire.

**Outcome measures:** Body mass index, Moos menstrual distress questionnaire, SF-36 questionnaire.

**Results:** The results showed a significant correlation between PMS and the physical component summary ( $r$  value =  $-0.4228$ ,  $p$  value =  $0.0011$ ) and also between PMS and the mental component summary ( $r$  value =  $-0.4326$ ,  $p$  value =  $0.0008$ ). However, there was no significant correlation between PMS and BMI.

**Conclusion:** Premenstrual syndrome has a negative impact on QoL; however, no association with BMI was observed.

**Keywords:** Body mass index, Moos menstrual distress questionnaire, Premenstrual syndrome, Quality of life, SF-36 questionnaire.

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## INTRODUCTION

Premenstrual syndrome begins usually 10–14 days prior to the onset of the menstrual period and becomes progressively worse until the onset of menstruation or several days after the onset. Premenstrual syndrome is defined as the cyclical occurrence of various signs and symptoms beginning near or after ovulation and resolving soon after the commencement of menses. It is the appearance of a large collection of symptoms, occurring to such a degree that it affects lifestyle and work quality, and menstruation is followed by a period entirely free of symptoms.<sup>1</sup>

The most common symptoms include abdominal bloating, breast tenderness and swelling, weight gain, fatigue, depression, and irritability. Headache, constipation, acne, rhinitis, and edema may also occur as well as more uncommon symptoms like paresthesia, sleep disorders, and wide mood swings. Other related symptoms may include poor concentration, sensitivity to noise, and decreased motor skills.<sup>1</sup>

It has been estimated from retrospective community surveys that nearly 90% of women have experienced at least one PMS as defined by the International Classification of Diseases-10 criteria. Epidemiological surveys have estimated that as many as 75% of reproductive-age women experience some symptoms attributed to the premenstrual phase of the menstrual cycle. More than 160 symptoms have been associated with the menstrual cycle, ranging from body aches and fluid retention to migraine, headaches, and fatigue and from instability to mood swings. A small group of reproductive-age women (3–8%) reported much more severe premenstrual symptoms of irritability, tension, dysphoria, and lability of mood, which seriously interfere with their lifestyle and relationships. Without relief from these symptoms, a women's functioning at home, social situations, and at work can be

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substantially impaired every month often over a span of many years. This was further named as premenstrual dysphoric disorder (PMDD).<sup>2</sup>

Studies have suggested that data exist providing evidence that obesity is strongly associated with PMS. Since obesity is a modifiable risk factor, PMS management strategies should not only consider factors such as high stress and smoking but also obesity.<sup>3</sup> Being overweight (15% above standard weight for height) is independently associated with the probability of long cycles. Moderate exercise minimally increases the probability of a long cycle while dieting tends to shorten the expected length.<sup>4</sup>

As per studies, PMS rate is high in college students and this adversely affects the life quality.<sup>5</sup> Moderate-to-severe PMS has negative impact on the health-related quality of life (QoL),<sup>6</sup> hobbies, social activities, and relationships with others.<sup>7</sup> However, PMDD is associated with substantial burden on both physical and mental aspects of health-related QoL.<sup>8</sup> Adolescents with premenstrual disorders suffer from poor health-related QoL and in order to improve QoL in female adolescents appropriate support should be

provided for this population especially for those who suffer from more severe premenstrual disorders.<sup>9</sup> Women do not identify the severity of their PMS difficulties despite the reported difficulties associated with consistent social and occupational interference. They are also reluctant to seek help for treatable PMS symptoms because of attitudinal barriers regardless of the severity of their PMS symptoms.<sup>10</sup>

A study conducted to assess changes in nutrient intake during the menstrual cycle of overweight women with PMS concluded that women with PMS had significantly greater number of “episodes of eating” premenstrually.<sup>11</sup> To the best of our knowledge and literature search, association of the body mass index (BMI) as well as QoL with PMS has not been studied and hence the present study aimed to find the association of PMS with BMI and its effect on the QoL.

## MATERIALS AND METHODS

### Source of Data

Primary data were collected from females with complaint of PMS from various educational institutes of Belagavi district, Karnataka.

### Study Design

The present study was designed as a cross-sectional study to find the association between PMS and BMI and its effect on QoL.

### Sampling Design and Sampling Allocation

Sample of convenience (institutes and students were informed 3 days prior to screening).

### Procedure

- The study was endorsed by the Institutional Ethical Committee. Two hundred and seven females in the age group of 18–25 years were screened using the Moos menstrual distress questionnaire (MMDQ) for PMS.
- Subjects were included based on the fulfillment of the inclusion and exclusion criteria. The inclusion criteria were (1) age group between 18 years and 25 years, (2) females with regular menses in last 6 months, (3) unmarried females, (4) subjects with or without medication for PMS, and (5) willingness to participate in the study.
- The exclusion criteria included (1) girls with irregular menstrual cycle in last 6 months, (2) secondary dysmenorrhea, (3) back pain of neurological origin, and (4) diagnosed with polycystic ovarian disease and known case of other medical disorder.
- All participants signed an informed consent form that declared their voluntary agreement to participate in the study. Out of them, 57 returned the questionnaires who were diagnosed with PMS.
- Demographic details were taken, and baseline data were recorded. Then the subjects were assessed for their BMI using the measures of height in meters and weight in kilograms. The subjects were then examined for the effect of PMS on the QoL using the SF-36 questionnaire.

### Outcome Measures

- The BMI—for obesity—a formula was used to evaluate obesity, which is given by weight in kilograms divided by the square of height in meters ( $BMI \geq 30$ ).

- Moos menstrual distress questionnaire—the questionnaire consists of 47 items, each describing a “symptom that women sometimes experience”; the subjects are asked to rate (their memory of) their experience of the symptom on a six-point scale, ranging from “no experience of the symptom” to “acute or partially disabling.”
- SF-36 questionnaire—the questionnaire consists of eight scaled scores that are weighted sums of the questions in their section. Each scale is directly transformed into a 0–100 scale on the assumption that each question carries equal weight. The eight sections are vitality, physical functioning, bodily pain, general health perceptions, physical role functioning, emotional role functioning, social role functioning, and mental health. It evaluates individual patient’s health status, monitoring, and comparing disease burden.

## RESULTS

An independent *t* test was used to estimate the difference between the groups for each outcome. The Karl Pearson’s correlation test and the regression analysis were done to find the correlation between the given outcomes. The significance level was set at  $p < 0.05$ . Mean values of baseline characteristics and outcome measures are given in Table 1. The mean age was  $20.3 \pm 2.4$  years, and the mean value of BMI measured was  $21.6 \pm 3.3$  kg/m<sup>2</sup>. The mean value of MMDQ was  $37.88 \pm 12.8$ . The mean physical component summary (PCS) was  $43.4 \pm 7.4$ , and the mean mental component summary was  $44 \pm 8.8$ .

The correlation analysis was done using the Karl Pearson’s correlation method. There was a positive correlation between PMS and BMI (*r* value = 0.1215, *p* value = 0.3679); however, the correlation was not statistically significant. The results showed a significant correlation between PMS and PCS (*r* value = -0.4228, *p* value = 0.0011) and MCS (*r* value = -0.4326, *p* value = 0.0008).

The regression analysis was done to assess the relationship among variables where PMS was the independent variable and BMI and QoL were dependent variables. Regression of BMI and PMS scores by MMDQ displayed a linear regression wherein with an increase in BMI, MMDQ scores also increased (Fig. 1).

The regression analysis of SF-36 questionnaire-PCS (%) scores and MCS (%) with MMDQ (%) scores was done. The results displayed a linear regression statistically significant, which stated that with an increase in MMDQ scores there was a decrease in the PCS (%) scores and MCS scores (Figs 2 and 3, Table 2).

The results of the study showed that there existed a negative impact of PMS and QoL; however, no association was found between PMS and BMI. The prevalence is estimated to be 59%.

## DISCUSSION

A cross-sectional study was conducted to determine the association between obesity and PMS by Saba Woldemichael Masho in Virginia.

**Table 1:** Mean values of baseline characteristics and outcome measures

Variables	
Mean age	20.38596 ± 2.469
Mean BMI	21.6254386 ± 3.375
Mean MMDQ	37.8807018 ± 12.838
Mean PCS	43.4070175 ± 7.476
Mean MCS	44.0192982 ± 8.834

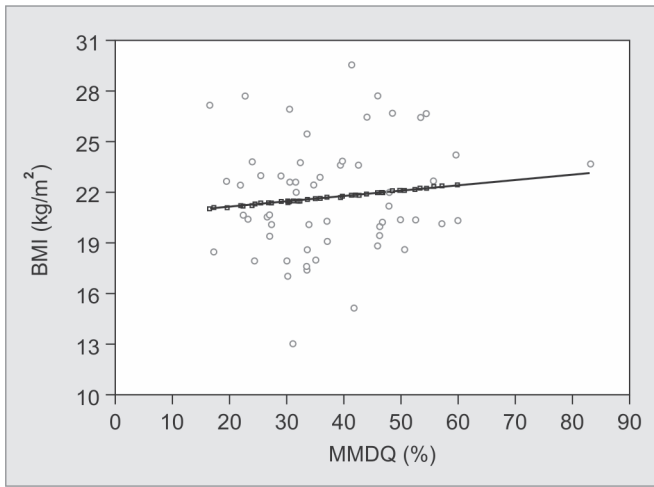


Fig. 1: Regression of BMI (kg/m<sup>2</sup>) scores by MMDQ (%)

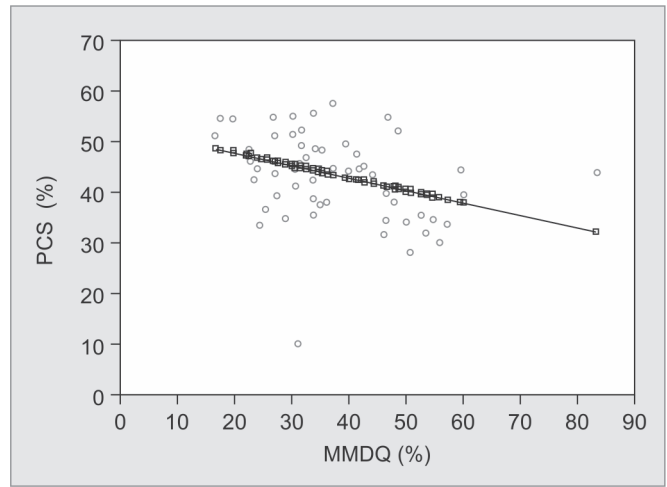


Fig. 2: Regression of PCS (%) scores by MMDQ (%)

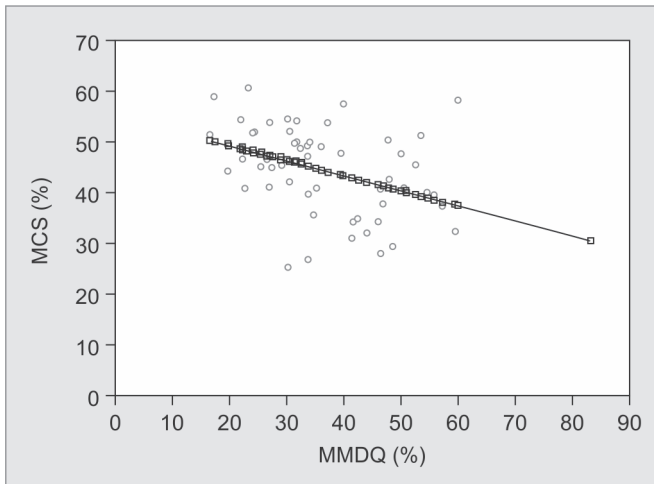


Fig. 3: Regression of MCS (%) scores by MMDQ (%)

The prevalence of PMS in Virginia was 10.3%. Obese women (BMI ≥ 30) had nearly a threefold increased risk for PMS than nonobese women. Premenstrual syndrome was more prevalent among younger women.<sup>3</sup> In the present study, mean BMI of subjects was ≤25 kg/m<sup>2</sup>, which refers to optimal weight and hence no correlation was found between PMS and BMI. However, one inference can be made that PMS exists irrespective of high BMI.

A study was done to investigate the influence of stress, QoL, and physical activity in women with varying degrees of premenstrual symptomatology by Lustyk et al., which concluded that the PMS rate is high in college students and this adversely affects the QoL.<sup>12</sup> The present study also found a positive association between PMS and QoL. Students had a decreased QoL due to PMS, although they were screened at a time when exams were not approaching which

**Table 2:** Correlation between MMDQ (%) and BMI (kg/m<sup>2</sup>) scores, PCS, and MCS by the Karl Pearson's correlation method

Variables	r value	t value	p value
MMDQ (%) with BMI (kg/m <sup>2</sup> )	0.1215	0.9080	0.3679
MMDQ (%) with PCS (%)	-0.4228	-3.4601	0.0011*
MMDQ (%) with MCS (%)	-0.4326	-3.5589	0.0008*

\*p < 0.05

could add on to the stress of PMS and could account for a negative impact on health-related QoL.

A study was conducted to assess the relationship of the menstrual cycle pattern in 14–17-year-old adolescents with gynecological age, BMI, and historical parameters. The associations between weight loss, low body weight, stress, physical exercise or signs of hyperandrogenism, and menstrual cycle patterns in adolescents are weak when studied on a population basis. The value of these parameters to explain abnormal menstrual cycle patterns is limited.<sup>13</sup> The age of the subjects in the present study ranged between 18 years and 22 years. However, other comparisons were not done in the present study.

A study was conducted on explorative evaluation of the impact of severe premenstrual disorders on work absenteeism and productivity by Heinemann et al. The study concluded that moderate-to-severe PMS/PMDD seems to be associated with work productivity impairment and increased absenteeism and thus poses a potential economic burden.<sup>14</sup> In the present study also, 33% of subjects sought leave for their symptoms of PMS, which accounted to the loss of attendance and learning-impaired sessions.

A study was done to assess the relationship between premenstrual symptoms, menstrual pain, irregular menstrual cycles, and psychosocial stress among Japanese college students by Kazuhiko Yamamoto et al. The results suggest that psychosocial stress is independently associated with premenstrual symptoms and the experience of irregular menstrual cycles among college students, implying that changes in the functional potentiality of women as a result of stress are related with changes in their menstrual function.<sup>15</sup> The results of the present study are consistent with the findings of the above study where PMS had a negative impact on QoL. However, we have excluded subjects with irregular menstrual cycles and data were collected during cycles that fell during nonexam period.

Premenstrual syndrome adversely affected the learning process and physical and mental well-being in subjects, and preventive and curative strategies were adopted for the management of PMS; however, it was not taken as a part of the study.

There existed a fear of symptoms of PMS, which made the girls apprehensive every month prior to the beginning of menses. Hence, it adds to the poor performance and lifestyle not only during the period of menses but also week prior to menses.

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