

Correlation between High Body Mass Index and Premenstrual Syndrome in Iranian University Students

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Abstract

Introduction: Despite numerous shared underlying factors between high body mass index (BMI) and premenstrual syndrome (PMS), there are very little studies on cooccurrence of these disorders. Thus, the aim of this study was to evaluate the prevalence of PMS in overweight women compared with normal weight controls. **Materials and Methods:** This study was a cross-sectional study. Participants were 291 university student women. The survey tool was a questionnaire containing 14 questions regarding PMS screening and another questionnaire included questions concerning demographic data. Weight and height of participants were measured in kilograms and meters. We considered BMI of more than 25 as obese. The PMS screening questions were designed based on diagnostic and statistical manual IV-TR criteria. Collected data were analyzed using the frequency tables and percentiles for describes and Chi-square test for inferences. **Results:** From 291 women who participated in this study, 80 cases had BMI more than 25 and 211 cases had BMI <25. In addition, 196 cases had PMS symptoms in the luteal phase of menstruation. PMS symptoms in overweight women were more than in those with BMI below 25 (83.7% vs. 61.1%). These differences were statistically significant ($P < 0.001$). **Conclusion:** High BMI may be a risk factor for occurrence of PMS.

Key words: Body mass index, obesity, overweight, premenstrual syndrome, women

INTRODUCTION

Since the description of premenstrual syndrome (PMS) by Frank, in 1931,^[1] several studies have evaluated different aspects of this disorder. PMS is characterized by increasing in depression, irritability, fatigue, and anxiety in luteal phase of menstrual cycle. It affects between 3 and 6% of all childbearing women.^[2] Several factors have been suggested to correlate with the emergence of PMS. These factors include social factors,^[3] genetic,^[4] abnormality in endocrine system including progesterone,^[5-7] estrogen^[6-9] testosterone,^[10] thyroid hormones,^[11,12] change in micronutrients including calcium,^[13-15] magnesium,^[14,16] vitamins,^[14,15,17,18] insulin resistance,^[19] changes in brain neurotransmitters including endogenous opioids,^[20-22] serotonin,^[23,24] norepinephrine,^[23,25] gamma amino butyric acid,^[26] substance abuse including

alcohol,^[27] and nicotine,^[28] psychological factors including stress,^[29] depression,^[30] and personality disorders.^[31,32]

One of the factors suspected to influence on PMS is high BMI. Masho *et al.* (2005) in a cross-sectional study using random digit dialing method of 874 women aged 18–44 years old evaluated the correlation between obesity and PMS severity. The results of this study showed that obese women had three-fold increased risk of PMS than non-obese ones.^[33]

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Bertone-Johnson *et al.* (2010) in their study compared body mass index (BMI) of 1057 women aged 27–44 years old with PMS and a group of 1968 women as controls. They concluded that there is a strong positive relationship between BMI and having PMS.^[34] Reed *et al.*^[35] and Bryant and Truesdale^[36] in their studies found that dietary intake and appetite increased during the luteal phase of menstruation in PMS patients. Moreover, finally, Swati *et al.* (2014) in their study evaluated 407 adolescent girls for relationship between BMI and PMS. They reported a significant positive relationship between BMI and the prevalence of PMS.^[37]

As there is little evidence on correlation of PMS and high BMI and there is no any similar study in Iranian patients; this study was performed to evaluate this issue.

MATERIALS AND METHODS

This study was a cross-sectional study. Participants were 291 university student women who lived in Shahid Beheshti University dormitory (Tehran, Iran). They voluntarily selected to contribute in the study. The trial was performed in accordance with the Declaration of Helsinki and subsequent revisions and approved by the Ethics Committee of Shahid Beheshti University of Medical Sciences. Informed consents were obtained before entering into the study from the patients. The survey tool was a questionnaire containing 14 questions regarding PMS screening and questions concerning demographic data. Participants' weight and height were measured in kilograms and meters. The PMS screening questions were designed based on the Diagnostic and Statistical Manual IV-TR^[38,39] criteria. The questionnaires were completed by interview. BMI was defined as the individual's weight (kg) divided by the square of his or her height (meter). Collected data were analyzed using the Statistical Package for the Social Sciences (SPSS) software version 17. We used the frequency tables and percentiles for describes and Chi-square test for inferences.

Table 1: Correlation between BMI and PMS in participant women

Index	BMI >25(%)	BMI <25 (%)	Total
PMS	67 (83.75)	129 (61.1)	196
No PMS	13 (16.25)	82 (38.9)	95
Total	80 (100)	211 (100)	291

BMI: Body mass index, PMS: Premenstrual syndrome

Table 2: Correlation between BMI and increasing in appetite and weight in participant women

Index	BMI >25 (%)	BMI <25 (%)	Total
Increased appetite and weight in luteal phase	59 (73.8)	97 (46)	156
No increased appetite and weight in luteal phase	21 (26.2)	114 (54)	135
Total	80 (100)	211 (100)	291

BMI: Body mass index, PMS: Premenstrual syndrome

RESULTS

From 291 women who participated in this study, 80 cases had BMI more than 25 and 211 cases had BMI <25. Analysis of the study data indicated that from 291 participants, 196 cases had PMS symptoms in the luteal phase of menstruation. PMS symptoms in overweight women were significantly more than those with normal weight [Table 1].

Furthermore, from 291 participants, 156 cases had increasing in appetite and weight in the luteal phase of menstruation [Table 2].

Both PMS and increasing in appetite and weight were more common in those with BMI above 25. These differences were statistically significant ($P < 0.0001$).

The mean age of participants was 20.1 with standard deviation of 2.1. Mean age at menarche was 13.6 with standard deviation of 1.48. There were no correlations between these recent two indexes and PMS symptoms.

DISCUSSION

The present study was performed to evaluate any correlation between high BMI and PMS symptoms. The results of the study indicated a positive correlation between PMS and high BMI. This finding is in accordance with findings of Masho *et al.*,^[33] Bertone-Johnson *et al.*,^[34] and Swati *et al.*^[37] Furthermore, the correlation between PMS and increasing in appetite and weight during luteal phase of menstruation is in agreement with Reed *et al.*^[35] and Bryant and Truesdale^[36] findings.

We suggest that high BMI can affect PMS by several ways. Low socioeconomic status is a risk factor in both high BMI^[39] and PMS.^[3] On the other hand, obesity can cause a wide range of endocrine abnormalities. Production of estrogen, progesterone, and androgens in obese women is higher than in normal weight women.^[40] This may lead to PMS.^[5-10] There is also a bilinear connection between high BMI and thyroid dysfunction.^[41] Thyroid dysfunction is correlated to PMS too.^[11,12] Obesity can connected to PMS through precipitating insulin resistance.^[42]

Calcium and Vitamin D deficiency were seen in both obesity^[43] and PMS.^[13-15,17] High BMI can be associated with

PMS through psychological factors. High BMI can lead to PMS due to act as stressor because it reduces self-esteem.^[44] High BMI is more common in depressed patients so this can connect this factor to PMS.^[45] Since PMS patients have an increased appetite in the luteal phase of menstruation, hence high BMI is perhaps not its cause but its consequence. Finally, all of these factors may be coincidental and lead to both high BMI and PMS.

CONCLUSION

Premenstrual syndrome could positively be related to high BMI.

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