RESEARCH ARTICLE

Correlation of Body mass index with premenstrual syndrome and age at menarche in medical students

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ABSTRACT

Background: The female reproductive cycle encompasses various physiological phenomenon and menstruation being one such is associated with various problems affecting the quality of life. Premenstrual syndrome (PMS) is one of them. Body mass index (BMI) is considered a modifiable risk factor for PMS and is also related to the age at menarche.

Aim and Objectives: To determine the correlation of BMI with PMS and the age of onset of menarche among medical students.

Materials and Methods: The cross-sectional study was conducted at a Medical College at Gangtok, among 100 consenting participants after obtaining due permission from the Institutional Ethics Committee. Apart from demographic details, height and weight were recorded along with age of onset of menarche. The presence or absence of PMS was evaluated using Calendar of Premenstrual experiences, a self-reported dairy measure of PMS developed by Mortola et al.

Results: Mean age of participants was 20.7 years and at mean age of 12.5 years they attained menarche. Girls who had either low or high BMI attained menarche at a higher age, but the difference was not significant (P = 0.142). Association between PMS and BMI was poor (0.027, P = 0.869). The correlation analysis found a poor negative correlation (−0.052, P = 0.606) between BMI and age at menarche. The correlation between age at menarche and the presence of PMS was positive (0.182, P = 0.07).

Conclusion: PMS was seen in 53% of the study population, but only 24% had a high BMI. Deviated BMI from normal had menarche at a higher age and there was a poor correlation between the BMI and PMS.

KEY WORDS: Body Mass Index; Menarche; Premenstrual Syndrome

INTRODUCTION

The female reproductive cycle encompasses various physiological phenomenon and menstruation is one such. Although physiological, it is associated with various problems affecting the physical as well as mental well-being. Premenstrual syndrome (PMS) is one of them. PMS comprises physical, emotional, behavioral, and cognitive symptoms. This collection of symptoms a woman experiences 1–2 weeks before menstruation and the symptoms clear with the onset of menstrual flow. Moderate-to-severe PMS is seen in 8–20% of the females in their reproductive age. The success rate of treatment is <60%. Several studies have shown that females with PMS are overweight than their counterpart without PMS. Body Mass Index (BMI) is considered a modifiable risk factor for PMS and is also related to the age at menarche. A significant negative impact is seen in women with premenstrual disorder affecting their quality of life as well as their work productivity.

Apart from genetic predisposition BMI has been implicated in various studies as a cause of PMS. Characterization of PMS is difficult due to many symptoms associated with it.
In the luteal phase of the menstrual cycle there occurs a cluster of emotional, somatic, and behavioral symptoms—the PMS, which depending on the severity can qualitatively affect women’s day-to-day activities. Many studies have been conducted on PMS, however, the exact etiology of the condition remains unknown.[1,11,12]

PMS, apart from its somatic, cognitive, emotional, and behavioral symptoms it is also found to adversely impair and interfere with personal relationships as well as normal life activities.[3,13]

Current pharmaceutical treatment options for PMS have a very low efficacy on clinical improvement of the condition (i.e. <60%).[5] identifying other nonpharmacological intervention options like ways of preventing the development of the condition is important. In this context, certain modifiable factors in the etiology of PMS have been identified in few earlier population-based studies which include hormonal, neural, and behavioral processes in the development of both obesity and PMS. Studies also indicate that women with PMS are more likely to be overweight and obese than their counterparts without PMS.[6-10,14]

MATERIALS AND METHODS

This study was conducted among 100 consenting female medical students of various academic levels after due approval from the Institutional Ethics Committee. Demographic details, height, and weight were recorded along with the age of onset of menarche. The presence or absence of PMS was evaluated using Calendar of Premenstrual experiences, a self-reported diary measure of PMS developed by Mortola et al. and all data were recorded. A list of 26 symptoms comprising somatic, behavioral, cognitive, and emotional features that are commonly seen in premenstrual disorders were given to the participants, and self-assessment of either the presence or absence of it was done.[15] The presence of PMS was based on the occurrence of symptoms beginning within 14 days before the onset of menses, symptoms ending within 4 days after onset of menses, and symptoms absent in the week after menses ends. Apart from this presence of at least one physical/behavioral and one affective menstrual symptom, was taken into account. The overall symptom severity of moderate or severe was estimated depending on the impact on one or more life activities and social relationships.[16] BMI was graded using the Asian Classification giving 5 classes. Grade I-<18.5 kg/m², Grade II-18.5–22.9 kg/m², Grade III- 23–24.9 kg/m², Grade IV- 25–29.9 kg/m² and Grade V- > 30 kg/m².

RESULTS

The total students who participated in the study was 100 female students. The youngest student was 17 years of age and the eldest was 24 years of age. The mean age of participants was 20.7 years and at mean age of 12.5 years, they achieved menarche. More than 50% of girls had symptoms related to PMS (Table 1). Girls who had either low BMI or high BMI achieved menarche at a higher age (>13 years), however, the difference was not significant (P = 0.142). Association between PMS related symptoms and BMI was very poor (0.027, P = 0.869) [Table 2]. The correlation analysis found a negative but poor correlation (~0.052, P = 0.606) between BMI and age at menarche [Figure 1]. The correlation between age at menarche and the presence of PMS was also poor, though positive (0.182, P = 0.07) [Figure 2].

DISCUSSION

In the female reproductive age group along with the various pubertal changes, PMS is a common entity which a substantial number of females experience. The present study was conducted on 100 consenting female medical students of different academic levels to find the correlation of BMI with PMS and age at menarche. The mean age of the study population was found to be 20.7 years. The mean age of menarche was found to be 12.5 years in the present study population. Females of the present study population showed a higher age of menarche than the mean age in the extremes of BMI. In this study around 50% of the study population had PMS. The present study population showed a poor correlation between BMI and PMS (P = 0.869). We in this study also found a negative but a poor correlation between age at menarche and BMI. A poor but positive correlation was observed between the age of menarche and PMS.

PMS in this study is found to be higher than those recorded in other studies. Some studies have reported that about 8–20% of reproductive-aged women were affected by moderate-to-severe PMS.[3,4,14] Poor correlation was observed in the present study between BMI and PMS but in a study done by Elizabeth et al. they found a strong linear relationship between BMI and incidence of PMS which was demonstrated by the fact that each 1 kg/m² increase in BMI was associated with a significant 3% increase in risk of PMS.[17] In another study by Mai et al. they found that a significant positive relation exists between BMI and PMS. In their study females with high BMI experienced severe PMS than those females with low BMI.[18] In a cross-sectional study to determine the association between obesity and PMS using random- digital

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (mean)</td>
<td>20.7±1.264</td>
</tr>
<tr>
<td>Age at menarche (mean)</td>
<td>12.57±12.41</td>
</tr>
<tr>
<td>BMI (mean)</td>
<td>22.85±3.8475</td>
</tr>
<tr>
<td>Girls with PMS (n)</td>
<td>53 (53%)</td>
</tr>
</tbody>
</table>

BMI: Body mass index, PMS: Premenstrual syndrome
dialing method they found that the females with BMI > or = 30 had a three-fold increase in the PMS than the non-obese women. In our study, we found a negative but a poor correlation between age at menarche and BMI but in a population study done by Mandel et al. they found that the age at menarche was significantly and inversely correlated with BMI (P < 0.001). This study also found a positive but poor correlation between age at menarche and PMS. In a study done in Brazil, the prevalence rates for PMS were found to be higher in women whose age at menarche was less than 11 years but the results did not show any statistical significance. In a study by Karajibani et al. they found significant relationship between the mean age at menarche and BMI, and also between the PMS and the age at menarche in high school girls. In another study conducted on 170 adolescent girls between the age group of 18 and 25 years found no significant relation between BMI and age at menarche. One study done in school-going females pointed out that there was a significant number of absenteeism from school and hampering of daily activities in females with dysmenorrhea and PMS.

The strength of study is that it is novel in its approach of assessing students training to become healthcare professionals with a higher level of knowledge of physiology of the human body and its cyclical hormonal changes and thus are perceived to be more sensitive towards appreciating the impact of the same. The main limitation of this study is that despite the fact that it was done to establish the co-relation if any between BMI and PMS, but the differing food preferences and habits, differing exercise habits and activity level, past medical and treatment history of the participants were not taken into consideration.

CONCLUSION

PMS was seen in 53% of the study population but only 24% had a high BMI. Deviated BMI from normal had menarche at a higher age and there was a poor correlation between the BMI and PMS. PMS being a common condition which can affect the daily activities of the female, maintaining a normal BMI should be considered as one of the modifiable risk factors in the management of PMS.

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