

Cross -Sectional Study of 'Abnormal Body Mass Index As A Risk Factor for Premenstrual Syndrome' In Adolescent Girls of NCR

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Abstracts: Background And Objectives: Adolescent period is characterized by profound psychological, behavioural and hormonal changes. Adolescents with high body mass index are susceptible to a host of metabolic functional abnormalities and clinical problems. The aim of this study was to evaluate association between occurrence of PMS and body mass index (BMI) if any, in adolescent girls. **Methods:** This cross sectional study was conducted on 407 healthy adolescent girls in 12-18 years age group. Study Tool used is the widely accepted premenstrual syndrome self evaluation questionnaire by Allen Lawrence. The participants were asked to fill in responses for each premenstrual symptom before, during and after menstruation, stating intensity grading from 0-4. Data was analyzed by using SPSS software version 16. Chi- square and student's t-test were used for statistical calculations. **Result:** In the study, mean observed body mass index was found to be 22.86 +/- 5.22 kg/m². The study revealed that PMS occurred in 63.2% of the participants and Occurrence of PMS was significantly high (p<0.05) in participants with high BMI. **Conclusion:** This study revealed that PMS occurs in a high proportion of adolescent age group. Furthermore, this study reveals that high body mass index is positively associated with PMS. [Swati NJIRM 2014; 5(4) :30-35]

Key Words: body mass index, premenstrual syndrome, adolescence,

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Introduction: Adolescence is the age group that represents a transitional phase of physical and mental development between childhood and adulthood. According to the World Health Organization (WHO), adolescents are individuals in 10-19 year age group. It represents one of the critical transitions in the life span and is characterized by a tremendous pace in growth and change that is second only to that of infancy. Biological processes drive many aspects of this growth and development, with the onset of puberty marking the passage from childhood to adolescence¹. This period is very crucial and characterized by profound psychological, behavioural and hormonal changes. As the adolescents constitute a significant section of our population, problems of this phase may contribute to a large proportion of morbidity in national populace.

Menstruation is a normal physiological phenomenon and an important indicator of female adolescent health². However, data on experiences of menstruation and its impact on the health status and school performance among adolescents in developing countries are scant³.

Premenstrual syndrome (PMS) is a term used to describe physical, cognitive, affective, and behavioural 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 [4]. Premenstrual syndrome (PMS) has a disruptive influence on the interpersonal relationships, social interactions, work performance, emotional well-being and overall health-related quality of life of school going girls who otherwise would lead more productive lives^{5,6}.

Modern age is characterized by a fast food culture, and unhealthy eating habits are rampant especially in adolescent age group of urban population. This leads to abnormal body mass index and other health related problems⁷. The occurrence of obesity among adolescents aged 12 to 19 years has increased from 5.0% to 18.1%^{8,9}. Adolescents with high body mass index are susceptible to a host of metabolic, functional, clinical and social problems.

Hence there is a need for studying occurrence of PMS in adolescent age group and abnormal body mass index as a risk factor for it.

Material and Methods: This cross sectional study was conducted in schools of National Capital Region (NCR) from July to October, 2013 on adolescent girls of 12-18 years age. The study tool comprised of a modified version of pre-validated, self evaluated, structured questionnaire (originally designed by Allen Lawrence), available in English language and translated into Hindi language also. The study was approved by the institutional ethical committee and the principals of schools; and a prior informed written consent was obtained from the parents. Confidentiality of data was ensured and the students were informed about the nature and purpose of study. Voluntary participation was sought.

Information sought in the questionnaire included personal and socio-demographic profile, dietary history, level of physical activity, birth history, medical history, menstrual history, details of premenstrual symptoms and anthropometric measures. Detailed menstrual history was sought, including age of menarche, duration of menstrual cycle and menstrual flow and details of pre menstrual symptoms including occurrence of pain, nervous tension, mood swings, irritability, anxiety, depression, forgetfulness, confusion, dizziness, insomnia, weight gain, abdominal bloating, fatigue & weakness, nausea & vomiting, breast tenderness, headache & backache, food craving, palpitation, crying. The students were asked to fill in responses for each specified symptom of premenstrual syndrome under three headings-week before period, during period and week after period in the appropriate box and graded from 0-4 where, Grade 0 indicated absence of symptoms; Grade 1: presence of mild symptoms; Grade 2 indicated presence of moderate symptoms that could be managed whereas Grade 3 referred to presence of severe symptoms wherein daily activities were mildly compromised. Grade 4 represented disabling symptoms with compromised daily activities. Information about age at menarche of the mother and birth history of the student was also asked to be filled with help from parents, but answer to this question was not mandatory.

The inclusion criteria for the study were adolescent age girls who had attained menarche

and were willing to participate voluntarily. Exclusion criteria were incompletely filled forms and history of medical, surgical and gynaecological illness. A total of 450 girls volunteered to participate in the study, out of which 18 students did not submit responses to questionnaire, 20 questionnaires were found to be incompletely filled and 5 participants were excluded on the basis of exclusion criteria. Overall, a total of 407 questionnaires were taken into consideration. The final PMS score was calculated by subtracting total symptom score of week after period from that of week before period.

PMS syndrome was classified on the basis of the final score thus derived as per the criteria mentioned in the Table 1.

Table 1: Classification of PMS Symptoms on the basis of PMS Score

PMS Score	PMS Rating / Classification
0-18	No PMS
19-25	Mild – Moderate PMS
26-45	Moderate – Severe PMS

The participants' height and weight were measured. Body mass index was calculated as the individual's body mass in kilograms divided by the square of her height in meters (kg/m^2). The classification of subjects in under weight , normal weight , overweight and obese categories was done according to the International Obesity Task Force (IOTF) and World Health Organization (WHO) which has defined 23 and 27.5 kg/m^2 ¹⁰ adult equivalent cut offs to define overweight and obesity for Asian children from the age of 5 to 18 years (Table 2)

Table 2: Classification of Body Weight on the basis of BMI

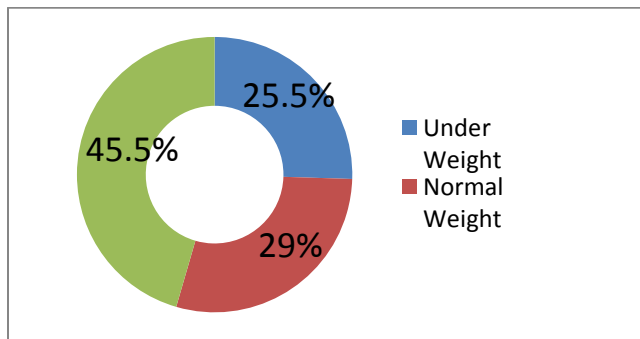
BMI (Kg/m^2)	Classification
<18.5	Under Weight
18.5 – 22.9	Normal Weight
23 – 27.5	Over Weight
>27.5	Obesity

Statistical Analysis: Data was compiled and analyzed by using SPSS software version 16. The data related to age and body mass index are shown

as mean ± standard deviation (SD). Chi-square test was used for testing association and student's t-test was used for comparison of results among groups. p-value less than 0.05 was considered significant.

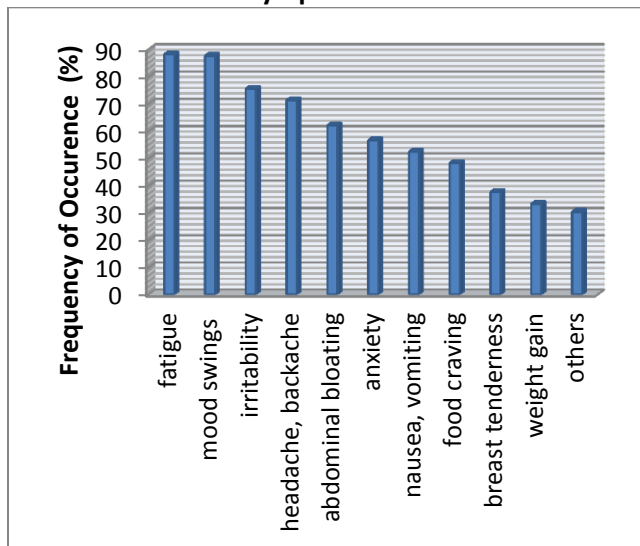
Result: Total numbers of participants considered for study were 407. Mean (±SD) age of studied subjects was 15.01 +/- 1.58 years. Mean BMI was estimated at 22.86 +/- 5.22 kg/m². Out of the total study sample of 407 school girls, 25.5% students were underweight, 45.5% were overweight (including obese category) and 29% subjects were in the normal weight category.

Figure 1: Distribution of Subjects According To BMI



In the sample population under consideration, 63.2% girls reported one or more symptom of premenstrual syndrome while 36.7% had no such symptoms.

Figure 2: Frequency Distribution of Premenstrual Symptoms



It was found that fatigue, mood swings, irritability and headache were the commonest symptoms of PMS reported by the adolescent study population.

Figure 3: Occurrence of PMS Symptoms In Underweight Subjects

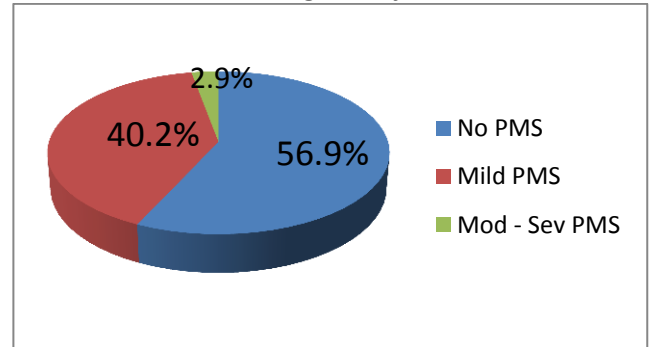


Figure 4: Occurrence of PMS Symptoms In Normal Weight Subjects

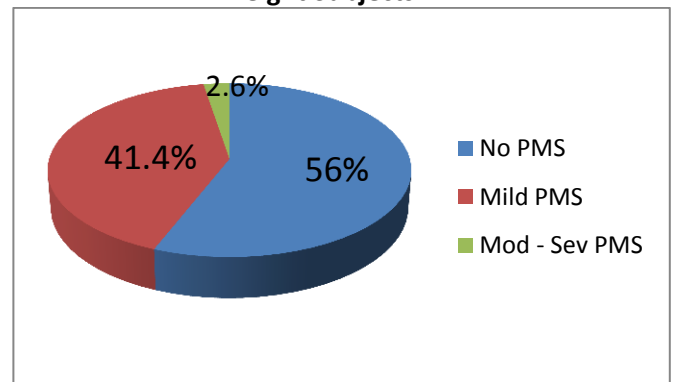
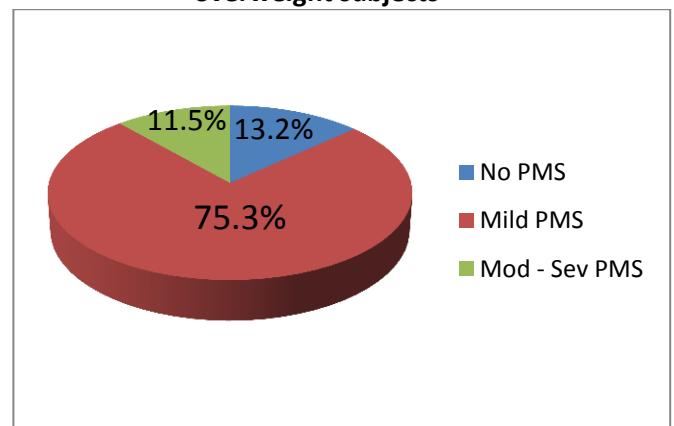


Figure 5: Occurrence of PMS symptoms in overweight subjects



The occurrence of premenstrual symptoms in underweight, normal weight and overweight category of subjects has been depicted in the figures 3, 4, and 5. It was found that in the overweight category of participants, occurrence of

PMS symptoms was much higher in both the mild (75.3%) and moderate to severe (11.5%) category 5. Analysis showed a significant (<0.05) positive association between high BMI and occurrence of premenstrual syndrome. It was found that although PMS symptoms were slightly more in underweight subjects than in normal weight subjects, the association was not significant.

Table 3: Association between PMS Symptoms and Body Weight

% in BMI	Without PMS %	With PMS %	p-value
Under Weight (25.5%)	56.9%	43.13%	>0.05* NS
Normal Weight (29%)	56%	44%	>0.05* NS
Over Weight (45.5%)	13.2%	86.8%	<0.05** (0.0001) Significant

*p Value >0.05: Non significant, **p Value< 0.05: Significant

Discussion : Most of the studies conducted before the last decade have focused mainly on dysmenorrhoea as a only feature of premenstrual syndrome¹¹, however current studies suggest that systemic symptoms like nausea, vomiting, palpitation, weight gain, dizziness, mood swings are an essential part of premenstrual syndrome which contribute to the discomfort in a big way¹².

The findings of this study showed occurrence of pre menstrual syndrome in 63.3% of studied female adolescent population. This result is similar to study reported by Wong LP in 2011 on rural adolescent girls who found that 63.1% participants were having premenstrual symptoms¹³. Likewise, a study done by Derman et al in 2004 suggested that 61.4% of adolescent girls met DSM (IV) criteria for pre menstrual syndrome¹⁴. Related studies in Iran show that about 60% of adolescent girls and women in reproductive age suffer from pre menstrual syndrome^{15, 16}. A higher prevalence of 78.5% and 76% was reported in Saudi Arabia¹⁷ and China¹⁸ respectively in a study among female medical students, while a much lower occurrence rate of 16.4% and 17.3% was observed in United Arab Emirates¹⁹ and American women aged from 18-45 years²⁰ respectively.

Different biological and psychological factors have been suggested for the aetiology of the syndrome, including abnormal serotonin action, presence of progesterone, exercise habits, altered endorphin modulation of gonadotrophin secretion, smoking, use of alcohol, altered transcapillary fluid balance and a diet rich in beef or caffeine containing beverages²¹. A myriad of studies have emphasized the importance of examining the cultural context in menstrual experiences²².

The current study revealed that among total participants 45.5% were overweight. Out of these overweight adolescents significant number of girls (86%) had one or more symptoms of premenstrual syndrome. Similar findings of a significant association between premenstrual symptoms and high body mass index were reported by Amany Edward Seedhom et al (2013) who observed that 93.4% of overweight students had premenstrual syndrome²³. Masho SW et al (2005) suggested that obese participants had nearly a three-fold increased risk for PMS than non-obese participants²⁴. Elizabeth R et al (2010) performed a study in a subset of women aged 27-44 years observed a strong linear relationship between BMI at baseline and risk of incident PMS, with each 1 kg/m² increase in BMI associated with a significant 3% increase in PMS risk²⁵. On the contrary, Tomoko Fujiwara et al reported that premenstrual symptoms did not show any significant relation with BMI²⁶.

Adiposity may also be related to PMS through a variety of hormonal, neural, and behavioural mechanisms. Obesity may alter neurotransmitter function through its effect on oestrogen and progesterone.

Certain other studies have found that women with PMS or menstrual symptoms are more likely to be overweight and obese than women without PMS²⁷.

Limitations of study: The limitation in this study was that data was collected in schools situated in urban area, and adolescent girls who had left school, never attended school and rural adolescent girls could not be studied. Therefore observations cannot be generalized to nationwide.

Conclusion & Recommendations: The findings of this study suggest that PMS occurs in a high proportion of adolescent girls. It also indicates that overweight or high body mass index is associated with PMS. There are very few previous studies to evaluate relationship between BMI & PMS especially in adolescent girls. More detailed studies are needed to elucidate this co-relation as occurrence of PMS in adolescent age groups may have a marked impact on psychosocial aspect. PMS increases absenteeism, decreases academic performance, disrupts social activity and interferes with normal growth process. There is an increasing need for creating social awareness amongst young girls and their parents regarding adoption of a healthy lifestyle and need for maintenance of healthy weight. Also, it is essential to introduce this subject in school life to make young girls come out and try treatment if needed.

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