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Stress as a Risk Factor for Pre-Menstrual Syndrome in Adolescent girls

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ABSTRACT

Girls who reported with higher levels of stress in 10- 14 days before they got their periods were two to three times more likely to experience, irritation, mood swings, craving for specific food and as well as physical PMS symptoms such as bloating, low back pain, cramps, and headache, compared to girls who did not feel stressed early on in their cycles. Until now, very few studies addressed the association of perceived stress and pre-menstrual syndrome. Thus, the present study aimed to assess the association of perceived stress and PMS among adolescent school going girls of Aligarh city. The present comparative cross-sectional study conducted on 320 school going girls aged 14 - 17 years. Stratified random sampling technique was used to select the subjects. A pretested and self-structured questionnaire cum interview schedule was used to collect information regarding the demographic profile, BMI, menarche and PMS. Their stress levels were assessed and further categorized with the help of the Perceived Stress Scale – 10 (PSS- 10). Data analysis for the statistical test was done using SPSS version 21.0. Out of 320 subjects, 228 (71.2%) were suffering from PMS. Majority of PMS group subjects were experiencing more than one mild to moderate symptoms during or before their menstruation. Chi square test statistics indicate that there is a highly strong association between perceived stress and PMS. Hence, stress must be considered as a significant and important risk factor while identifying PMS. Stress reduction programs in school may be an effective prevention tool to overcome PMS.

1. Introduction

Pre-menstrual syndrome is defined by The American College of Obstetricians and Gynaecologists (ACOG) as a clinical condition characterized by the cyclic presence of physical and emotional symptoms unrelated to any organic disease that appear during the 5 to 12 days before menses in each of the three prior menstrual cycles and disappear within 2 - 4 days of the onset of menses, without recurrence until at least cycle day thirteen [1, 2-3]. Pre-menstrual syndrome is variously defined [4]. There is no single particular definition of the PMS, but it is generally accepted that any constellation of psychological and physical symptoms that recur regularly in the luteal phase of the menstrual cycle, remit for at least 1 week in the follicular phase and cause distress and functional impairment [5]. It is one of the most common menstrual disorders of adolescent girls of reproductive age.

Globally, the prevalence of Pre- menstrual syndrome among adolescents varies from 10% to 53%, depending on the population studied and diagnostic measures used [5 – 11]. While, in India, there is a higher prevalence of adolescent girls suffered from PMS such as in Lucknow city the prevalence is 65%[12], in West Bengal (61.5%) [13], Ujjain (39.6%) [14] and Gujarat (18.4 %) [15].The severity of premenstrual symptoms varies widely from individual to individual. The American Psychiatric Association (APA) concluded that severe PMS is a psychiatric disorder and introduced a new subset of PMS entitled “late luteal phase dysphoric disorder” (LLPDD). According to the APA’s definition, the essential feature of LLPDD is a pattern of clinically significant emotional and behavioural symptoms that repeatedly occur during the luteal phase of the menstrual cycle [16].

Perceived stress in the school going girls may take the form of academic stress. This involves multiple stressors such as academic demands, financial, time, health related and self-imposed type of stressor [17]. Academic demands component of perceived stress includes the student's perception of the wide-ranging knowledge required and in inadequate time to develop it [18]. Students especially girls report experiencing academic stress predictably, with the greatest sources of academic stress being found in taking and studying for examinations and with respect to grade competition and a large amount of content to master in a small amount of time [19]. All these will put a girl under ever increasing tension. These have been associated with negative health outcomes including depression and physical illness such as (lack of energy, loss of appetite, headache, sleep problems and gastrointestinal problems)[17, 20 – 21]. It is thus, conceived that academic stress experienced by students may be implicated as negatively affecting the pre-menstrual symptoms experienced by them. Therefore, the present study was aiming to assess the association between perceived stress and premenstrual syndrome among school going adolescent girls of Aligarh city. We hypothesized that

stress is a risk factor and has an association with premenstrual syndrome.

2. Methodology

This cross-sectional study was conducted at Aligarh, Uttar Pradesh. The study locale was divided into four zones based on urban morphology i.e., upper kot area, achaltal area, civil lines area and peripheral ring area. This division of Aligarh city into specific zones on the geographical layout was to ensure that the study to be representative of the whole city. From each zone, one senior secondary school was selected randomly. The total sample of 320 girls aged 14 to 17 was selected in the study during the period of July 2017 to April 2018. Before commencing the data collection, necessary approval for conducting the study from the Institutional Ethical Committee, Jawaharlal Nehru Medical College and Hospital, Aligarh Muslim University, Aligarh has been obtained. After identifying the schools, school authorities were approached for seeking necessary permission to conduct the study. Based on the signed consent and active cooperation of the school authorities; four schools, one from each region, were selected to include the population of students from all income groups and all religions. The inclusion criteria of the subjects were as follows: (1) Those who are willing to participate and cooperate in the study. (2) School girls from 14-17 years of age. (3) Those don't have any chronic illness. (4) Subjects residing in Aligarh for the past 5 years. Exclusion criteria were: (1) Under 14 years of age or above 17 years of age. (2) Still not achieved their menarche. (3) Migrants or girls from other states and districts. Stratified Random Sampling was taken into consideration for selecting a total of 320 students from these selected four schools and signed informed consent from the subjects were acquired. The numbers of subjects from four classes (class IXth to XIIth) were selected as per the list of students provided by class teachers. Twenty subjects (girls) from every class (9th, 10th, 11th and 12th) of age group (14 - 17 yr.) from each school were randomly selected. Similarly, for selecting the sections for a particular class, randomization was being followed. An element of randomness was introduced into this kind of sampling by using random numbers to pick up the first unit. Thus, through systematic sampling, only the first unit was randomly selected and the remaining units of the sample were selected at the 5th interval.

A pre-tested and self-structured questionnaire cum interview schedule (Cronbach's alpha = 0.865) was used to collect data regarding PMS. Both quantitative and qualitative data obtained through this questionnaire. Perceived stress scale (PSS-10) developed by Cohen, Kamarck&Mermelstein (1983) was used to measure the level of stress among the girls [22]. The PPS-10 items evaluate the degree to which subject believe their life has been unpredictable, uncontrollable, and overloaded during the previous month. This measures 10 items with 4 positive items and 6 negative items rated on a 5-point Likert scale. The sum of the responses indicates the total score. Overall scores on the PSS-10 can range from zero to forty (0–40). Respondents with PSS value of 0 – 7, 8 – 11, 12 – 15, 16 – 12 and > 20 were categorized as very low, low, average, high and very high stress level respectively. Both questionnaires were in the English language. The questionnaire was distributed to the subjects and any difficulty or clarifications related to the questionnaire were attended by the researcher. Body weight was measured by mechanical bathroom scale and care was taken to take the weight of the subjects by making them remove their shoes and also ensuring that the feet of each subject were placed properly on the scale (Accuracy± 0.5 kg). Height of the subjects was measured using a Stadiometer which was fixed against the wall with a nail at a height of 2 meters with accuracy ± 0.1 cm and the subjects made to stand against it ensuring that the subjects were barefoot with the hair flat.

Statistical analysis: Data analysis was done using SPSS version 21.0 and the results were calculated and expressed in percentages. Association among stress and PMS was assessed using Pearson's coefficient.

3. Results

Of the 320 subjects, PMS was diagnosed in 228 subjects (71.2%) and the demographic variables like the mean height, mean weight, mean BMI and mean menarcheal age of the total subjects (N=320), Non-PMS Group and PMS Group were shown in Table 1.

Table 1: Mean SD of height, weight and BMI of the total subjects (N= 320)

Parameters	Total sample (N=320)	Non- PMS group (n=92)	PMS group (n=228)
Height (Cm)	155.52 ±5.6	156.28 ±5.4	155.21 ±5.6
Weight (kg)	48.76 ±9.6	49.47 ±9.9	48.48 ±9.5
BMI (kg/m^2)	20.14 ±3.4	20.20 ±3.4	20.12 ±3.4
Menarcheal Age (years)	12.60 ±0.99	12.61 ±0.0	12.60 ±0.9

BMI classification of total sample, Non- PMS Group and PMS Group are shown in Table 2, there was no difference found between Non- PMS and PMS groups. Majority of subjects in both the groups had normal BMI (> - 2SD to +1SD) i.e. 76.1% and 77.6% respectively whereas 15.2% Non- PMS and 13.6% PMS subjects were overweight (> +1SD to +2SD).Only 5.4% of Non-PMS and 6.6% PMS subjects were in the category of Thinness (< - 2SD) and few subjects from both groups were obese (> +2SD).

Table 2: Distribution of subjects (PMS and Non-PMS) on the basis of BMI classification (WHO, 2007) [23]

BMI		Total sample (N=320)	Non- PMS Group (n = 92)	PMS Group (n = 228)
Thinness	< - 2SD	20 (6.3)	5(5.4)	15 (6.6)
Normal	> - 2SD to +1SD	247 (77.2)	70 (76.1)	177(77.6)
Overweight	> +1SD to +2SD	45 (14.1)	14(15.2)	31(13.6)
Obese	> +2SD	8 (2.5)	3(3.3)	5(2.2)
TOTAL		320 (100.0)	92(100.0)	228 (100.0)

(Figures in parenthesis indicate percentages)

The severity of PMS symptoms was rated by the participants based on their impacts on their daily lives, ranging from mild to moderate to severe. Mild symptoms were defined as not limiting routine activity. Symptoms were considered moderate if there were marked limitations with regard to daily and routine activity, and severe if the participants were unable to carry out the activities without discomfort. It was found that subjects were experiencing more than one mild to moderate symptoms during or before their menstruation. The reported premenstrual symptoms and their frequency among the 228 subjects are presented in Table 3. The four most common symptoms were backache (43.4%), irritation (40.3%), and lethargy (37.7%) and change of mood (36.8%). In most cases, these symptoms were rated as mild to moderate in severity. Other minor symptoms were headache (10.5%), tenderness of breast and abdominal bloating (9.7%). Depression (7.4%), craving for salty/ sweet foods (7.0%), Dehydration / unusual thirst (3.9 %), loss of appetite (2.6%), swelling of feet (2.6%) and insomnia (1.3%). It was noted that the majority of subjects surveyed have backache of moderate severity (72.7%) while in 27.2% the symptom was mild. Among the subjects with the symptom of irritation, 93.4% have mild severity whereas only in 6.5% the severity was moderate. But among subjects with symptoms of lethargy, the majority have mild severity and 29.1% have moderate severity while in 4.6% of subjects have severe symptoms.

Table 3: Prevalence of Symptoms of Pre-menstrual syndrome

PMS Symptoms	Number of subjects	Severity of symptoms		
		Mild	Moderate	Severe
Headache	24 (10.5)	15 (62.5)	8(33.3)	1(4.1)
Backache	99 (43.4)	27(27.2)	72(72.7)	0 (0)
Loss of appetite	6 (2.6)	5 (83.3)	1 (16.6)	0(0)
abdominal bloating	22 (9.6)	20 (90.9)	2 (9.1)	0(0)
Swelling of feet	6 (2.6)	6 (100)	0 (0)	0(0)
Tenderness of breast	22 (9.6)	22 (100)	0(0)	0(0)
Irritation	92 (40.3)	86 (93.4)	6 (6.5)	0(0)
Dehydration / unusual thirst	9 (3.9)	9 (100)	0(0)	0(0)
Change of mood	84 (36.8)	76 (90.5)	8 (9.5)	0(0)
Craving for salty/ sweet foods	16 (7.0)	16 (100)	0(0)	0(0)
Insomniac	3 (1.3)	3 (100)	0(0)	0(0)
Lethargy	86 (37.7)	57 (66.3)	25(29.1)	4 (4.6)

(Multiple responses; Figures in parenthesis indicate percentages)

Table 4 revealed that among PMS subjects, majority of subjects had very high stress score (>21) i.e. 118 (51.8) and 83 (36.4%) had high stress score (16 – 20). Only 16 (7%) had an average stress score whereas 9 (3.9%) and 2 (0.9%) had low and very low stress scores respectively. While among Non-PMS subjects' majority had average stress levels and 34.8% had high stress level. It was noted that only 9.8% of Non-PMS subjects had very high stress level and 14.1% had low stress levels which are contrary to PMS subjects. Chi square test statistics of 82.379 (sig value< 0.001) indicates that there is a highly strong association between perceived stress and premenstrual syndrome.

Table 4: Association of Perceived stress with PMS

Perceived Stress Scale- 10	Scores	Non- PMS Group	PMS Group
Very Low	0 – 7	3(3.3)	2 (0.9)
Low	8 – 11	13(14.1)	9(3.9)
Average	12 – 15	35(38.0)	16(7.0)
High	16 – 20	32(34.8)	83 (36.4)
Very High	> 21	9(9.8)	118 (51.8)
TOTAL		92(100.0)	228 (100.0)
χ^2 =81.006, df = 4, 0.000 p<0.001, Strongly significant			

(Figures in parenthesis indicate percentages)

4. Discussion

The present study was conducted to determine the association of stress and premenstrual syndrome among adolescent girls aged 14 – 17 years of Aligarh city. Data from four senior secondary schools focusing on this issue is scarce, however, worldwide many studies are published on this issue. The present study revealed that a considerably high proportion of subjects reported having more than one PMS symptoms. The four most common symptoms were backache, irritation, lethargy and change of mood which is similar to many studies [12, 24-25]. While mood swings were common among Pakistani girls [26]. Findings of the present study also indicate that the severity of PMS symptoms was mild among the majority of the subjects. Adolescent girls, however, were rarely concerned about these symptoms due to their low levels of severity.

High prevalence of PMS occurs among girls with high stress levels. Prolonged stress exposure could lead to persistent malfunctions of the neuroendocrine system and trigger PMS [27]. Adolescents are in the process of undergoing tremendous physical and psychological changes on their way to adulthood. Moreover, they frequently experience stress related to their studies, as well as their sexual and reproductive health [28]. With the help of the PSS, our sample population was categorized as very low stress (0 – 7), low stress (8 – 11), average stress (12 – 15), high stress (16 – 20) and very high stress (> 21) and we discovered more than half (51.8%) of the study population had very high stress levels. This shows that there is a highly significant association between perceived stress and premenstrual syndrome (p<0.001). As the stress level increases, there is a higher intensity of back pain, irritation, lethargy and change of mood during PMS. Increased stress level is accompanied by higher intensities of pain and discomfort during PMS. Similar results were reported by Ansong et al., 2019 [29], Covaliu et al., 2017 [30] and Ekpenyong et al., 2011 [31]. Girls who reported high levels of stress in the 10- 14 days before they got their period were two to three times more likely to experience, irritation, mood swings, craving for specific food and as well as physical PMS symptoms such as bloating, low back pain, cramps, and headache, compared to girls who did not feel stressed early on in their cycles [32].

5. Conclusion

Hence, stress must be considered as a significant and important risk factor while identifying PMS. Stress reduction programs in school may be an effective prevention tool to overcome PMS and some serious efforts should be made by the community of health professionals to modify prevailing cultural attitudes and overcome gender-biased detrimental decisions in the diagnosis and control of premenstrual syndrome.

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