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Original Article

Association of Body Mass Index, Menstrual Flow, Socio-economic and Educational Status with Psychological Stress Levels in Young Age Students

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ABSTRACT

Background and Aim: To determine the role of factors linked to the presence of perceived stress in students, after evaluating different aspects of mental health in college students. To evaluate and understand the psychological discomfort and reduce burden of it among young aged students. **Methods:** A total of 291 students fulfilling the inclusion criteria were recruited and Ethical approval was obtained from the institution. Written consent was obtained and all the participants were assured that their identity would be kept confidential. The study participants were asked to complete a questionnaire anonymously consisting of menstrual problems, socio-economic status, educational status and perceived stress scale. **Results:** Among 291 respondents of this study, 27.15% students are medical students and 31.62% are nursing students, 23.02% of the students are physiotherapy students and 18.21% are Art and science students. 53.26% are 1st and 2nd year students. 27.15% of the students have their family income between Rs. 20,000 – 49,999 and 24.4% of the students have their family income between Rs.10,000-19,999. 27.15% of the student's head of their families are graduates and majority of the head of their families (67.35%) are self-employed. **Conclusion:** This study reveals the relationship between socio-economic status (SES), Body Mass Index (BMI), menstrual problems and psychological stress, which can explain partly due to emotional eating as a coping strategy to overcome the psychological stress.

Key words: Body mass index, Menstrual cycle, Mental stress, Socio-economic status, Young college students, Coping strategy.

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INTRODUCTION

Menstruation is the significant indicator for the overall reproductive health of women. Through the existing literature, there was an increasing prevalence of infertility among women, wherein the number of women having difficulty in getting pregnant rose 65% over the normal in the past decade.[1] Menstrual cycle has a multi-hormonal effect, where the most important cause of menstrual cycle irregularity is functional hypothalamic amenorrhea that was associated with reduced gonadotropin-releasing hormone secretion and hypothalamic–pituitary–adrenal (HPA) axis dysregulation.[2-4] The incidence of these hormonal problems can lead to development of various chronic diseases including, infertility, heart disease, and type 2 diabetes.[5,6] Furthermore, the continuation of menstrual cycle irregularities occurring over long periods may result in early onset of menopause, which increases the risk of heart disease and osteoporosis. Irregular menstruation is found to be affected by several factors including, modifiable risk factors like Body Mass Index (BMI), Psychosocial stress, etc.[7,8] Higher stress levels have been shown to affect the HPA axis activity and the high BMI has been determined to influence the sex hormone-binding globulin (SHBG), free androgen index (FAI), testosterone, and insulin levels, thereby affecting the female wellbeing.[9,10]

The mental health issues among students are of growing concern in todays world as highlighted by many studies. The psychological discomfort of the students will be reflected in several ways including anxiety, stress, depression and sleeping disorders.[11,12] This poor psychological well-being can sometime associate with physical disorders leading to much more deterioration of person health and wellbeing.[13,14] According to the latest research, the preponderance of overweight and obesity has been increasing at a rapid pace over the last few decades, which is linked to psychological stress.[15-19] A progressive rise in prevalence is being observed among the lower socio-economic classes, indicating the increasing socio-economic inequalities in overweight and obesity. Overweight and obesity can have other psychosocial pathways

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than in adults due to the individual psychosocial stressors in their lives.[20-22]

Not much research is being conducted on the factors like BMI, menstrual flow and socio-economic and educational status and their effect on psychological health of college going students. With this intent, we aim to determine the role of these factors linked to the presence of perceived stress in students, after evaluating different aspects of mental health in college students, which could help to better evaluate and understand the psychological discomfort and reduce burden of it among young aged students.

MATERIALS AND METHODS

This was a cross sectional study conducted for three months duration (July 2019 to September 2019), in which 291 students from the various healthcare courses of a tertiary care hospital were invited to participate after taking necessary ethical permission form the institution. Female students aged between 18 and 25 years, who were willing to participate in the study were included. Young females with psychiatric problems, chronic illnesses, individuals with any other types of diagnosed pelvic pathologies like pelvic inflammatory disease, fibroids, etc., pregnant and lactating mothers were excluded from the study.

A total of 291 students fulfilling the inclusion criteria were recruited and Ethical approval was obtained from the institution. Written consent was obtained and all the participants were assured that their identity would be kept confidential. The study participants were asked to complete a questionnaire anonymously consisting of menstrual problems, socio-economic status, educational status and perceived stress scale. This questionnaire was designed by the authors, based on some previous similar studies. PSS10 was used to measure the individual stress levels, scores ranging from 0-13 were considered to indicate low perceived stress, 14-26 moderate perceived stress, and 27-40 high perceived stress (HPS).[23]

Statistical Analysis of Data

The data collected from the questionnaires was analysed using Statistical Package for Social Sciences (SPSS) for Windows, Version 24.0. The demographic data, menstrual patterns, and incidence of different menstrual disorders in the students were determined by descriptive statistics. The Chi-square test was used to compare the socio-economic status, educational status and stress levels in the students with various menstrual problems, and a $p<0.05$ was considered statistically significant. Correlation between stress and various menstrual problems was carried out via Spearman Pearson correlation coefficient.

RESULTS

Among 291 respondents of this study, 27.15% students are medical students and 31.62% are nursing students, 23.02% of the students are physiotherapy students and 18.21% are Art and science students. 53.26% are 1st and 2nd year students. The mean age was 20.00 ± 1.51 years and the mean weight was 54.92 ± 10.28 kg. The mean height was 157.18 ± 8.14 cms and the mean BMI was 22.28 ± 4.12. More than half of the students (58.08%) had their BMI in the normal limits (Table 1).

27.15% of the students have their family income between Rs. 20,000 – 49,999 and 24.4% of the students have their family income between Rs.10,000-19,999. 27.15% of the student's head of their families are graduates and majority of the head of their families (67.35%) are self-employed (Table 2).

Majority of the students (68.73%) have their menstrual flow ranging between 3-5 days and 65.64% of them have moderate amounts of menstrual flow (3-5 pads/days) (Table 3). 49.83% have moderate levels of perceived stress (Table 4). 66.7% people of high stress levels are associated with heavy menstruation, which was significant wit p value of 0.001 (Table 5).

Table 1: Anthropometric Measurements of the participants.

		Number of students	%
Weight	< 50 kg	133	45.70%
	51-60 kg	86	29.55%
	61-70 kg	50	17.18%
	>70 kg	22	7.56%
Height	< 150 cm	44	15.12%
	151- 160 cm	160	54.98%
	161- 170 cm	71	24.40%
	> 170 cm	16	5.50%
BMI (kg/m2)	Under weight	51	17.53%
	Normal	169	58.08%
	Over weight	56	19.24%
	Obese	15	5.15%

BMI: Body mass index

Table 2: Family income and education status.

		Number of students	%
Monthly family income	Less than Rs.1,000	22	7.56%
	Rs.1,000-2,499	16	5.50%
	Rs.2,500-4,999	14	4.81%
	Rs.5,000-9,999	22	7.56%
	Rs.10,000-19,999	71	24.40%
	Rs.20,000-49,999	79	27.15%
	More than Rs.50,000	67	23.02%
Education qualification of Head of the Family	Illiterate	22	7.56%
	Primary	68	23.37%
	High school	59	20.27%
	Higher Secondary	63	21.65%
	Graduation and above	79	27.15%
Employment of Head of the Family	Self-employed	196	67.35%
	Govt employee	30	10.31%
	Agriculture	8	2.75%
	Private employee	34	11.68%
	Others	23	7.90%

DISCUSSION

In the present study, we evaluated the association between the menstrual flow, BMI levels, socio-economic status and stress levels among young college students. Lower educational accomplishment students and lower strata socio-economic status students have been associated with higher odds of menstruation problems and perceived stress levels, which was in accordance with as study conducted by Kwak *et al*.[24] These findings can facilitate the development and implementation of health improvement programs targeted for women with menstruation problems and higher stress levels based on their socio-economic status.

Table 3: Information regarding menstrual flow of study participants.

Duration of Flow (Days)	Less than 2 days	17	5.84%
	3-5 days	200	68.73%
	5-7 days	69	23.71%
	More than 7 days	5	1.72%
Amount of Flow	Mild (≤ 2 Pads/days)	85	29.21%
	Moderate (3-5 Pads/days)	191	65.64%
	Heavy (≥ 6 Pads/days)	15	5.15%
Passage of clots during menses	Yes	144	49.48%
	No	147	50.52%

Table 4: Perceived stress scores of study participants.

Level of PSS	Number of students	%
Low	93	31.97%
Moderate	145	49.83%
High	53	18.21%
Total	291	100.00%

PSS: Perceived stress scale.

Students with higher BMI values will have elevated levels of insulin and testosterone, and a free androgen index, whilst the levels of SHBG will be decreased, leading to the hormonal changes that can cause menstrual irregularities and increased stress levels.[25] Essentially, the socio-economic status and obesity show an inversely proportional association in the developing countries leading to the increased concern. Hence, obesity in women with a low socio-economic status pose a risk for irregular menstruation and higher levels of perceived stress.[26]

Through the findings of this study, we recommend for efforts to educate patients on reproductive health, perceived stress and irregular menstruation, and the importance of early diagnosis and treatment must be informed.

CONCLUSION

This study revealed the relationship between socio-economic status (SES), body mass index (BMI), menstrual problems and psychological stress, which could be partly due to emotional eating as a coping strategy to overcome the psychological stress. By this study, we suggest for effective psychological interventions that can play an important role in maintain overall health of a female student and weight-management strategies, focusing on lower SES populations.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

Table 5: Association between perceived stress scores and menstrual history.

Menstrual cycle		Level of PSS score						n	Chi-square test	P
		Low		Moderate		High				
		n	%	n	%	n	%			
Average length of menstrual cycle	21- 24 days	17	35.42%	30	62.50%	1	2.08%	48		
	25-28 days	49	40.50%	49	40.50%	23	19.01%	121		
	29-32 days	19	21.84%	49	56.32%	19	21.84%	87	20.63	0.01
	> 32 days	8	22.86%	17	48.57%	10	28.57%	35		
	No	70	35.71%	100	51.02%	26	13.27%	196		
Duration of Flow (Days)	Less than 2	4	23.53%	9	52.94%	4	23.53%	17		
	3-5 years	75	37.50%	99	49.50%	26	13.00%	200	20.06	0.01
	5-7 years	13	18.84%	33	47.83%	23	33.33%	69		
	More than 7	1	20.00%	4	80.00%	0	0.00%	5		
Amount of Flow	Mild (≤ 2 Pads/days)	24	28.24%	46	54.12%	15	17.65%	85		
	Moderate (3-5 Pads/days)	68	35.60%	95	49.74%	28	14.66%	191	26.76	0.001
	Heavy (≥ 6 Pads/days)	1	6.67%	4	26.67%	10	66.67%	15		
Passage of clots during menses	Yes	28	19.44%	84	58.33%	32	22.22%	144	20.63	0.001
	No	65	44.22%	61	41.50%	21	14.29%	147		

P <0.05 was considered to be statistically significant. PSS: Perceived stress scale.

ABBREVIAITONS

HPA Axis: Hypothalamic–Pituitary–Adrenal Axis; **SHBG:** Sex Hormone-Binding Globulin**; FAI:** Free Androgen Index.

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