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RESEARCH ARTICLE

Psychosocial stress among the 1st year medical students and its relation to gender, exercise, and body mass index

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ABSTRACT

Background: Stress is body's response to danger or perceived threat. M.B.B.S. students, particularly, the 1st year students are more prone to stress due to hectic schedule, academic pressure, cultural and environmental change, and a large number of uncertainties. These factors make them ideal population to study stress. **Aims and Objectives:** The study was done to see if there is any relationship between the inventory to measure psychosocial stress (IMPS)-measured psychosocial stress score and gender, exercise, and body mass index (BMI) among the 1st year medical students. **Materials and Methods:** The study included 50 female and 44 male students aged 18-22 years. A questionnaire along with the IMPS was provided to them. The questionnaire dealt with anthropometric data and performance of exercise in terms of number of days per week. The data analyses used Unpaired *t*-tests, and χ^2-test was used to explore the linear relationship between stress score and BMI or exercise. **Results:** The number of male and female students getting stress score <9 were 14 (53.8%) and 12(46.2%), respectively. Similarly, 17 (42.5%) male and 23 (57.5%) female students had score between 10 and 19. 13 (46.4%) male students and 15 (53.6%) female students had stress score more than 30. The number of students with higher stress score among those who do exercise is significantly lesser than those who do not do exercise. The number of students whose stress score is ≥20, 10-19, and ≤9 and have normal BMI are 27.9%, 44.3%, and 27.91%, respectively. The number of students whose stress score is ≥20, 10-19, and ≤9 and have BMI ≤18.5 are 33.3%, 44.4%, and 22.2%. While that of who have BMI ≥25 are 333.3%, 33.3%, and 33.3%. No significant relationship was observed between psychosocial stress score and BMI. **Conclusion:** There is a significant association between IMPS-measured psychosocial stress score and exercise among the 1st year medical students. However, the study does not find any significant relationship between the psychosocial stress score and gender as well as BMI.

KEY WORDS: Psychosocial Stress; Inventory to Measure Psychosocial Stress; Body Mass Index; Exercise

INTRODUCTION

Stress can be defined as "a condition or feeling experienced when a person perceives that the demands placed on them exceed the resources the individual has available."[1] It occurs when a situation tests the capability of the person beyond his/her own ability to cope with it. It has physical and emotional effects which can create positive or negative influence on the individual. As a positive influence, stress can motivate a person to work at an optimum level. As a negative influence, it can bring about feelings of distrust, rejection, anger, and depression, which in turn can cause health problems such as headache, heart diseases, and stroke.

Psychosocial stress is defined as the accumulation of stress response leading to physical, psychological, and behavioral

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change.[2] The previous study has shown that higher education is very stressful and medical education being even more stressful as compared to other professional students.[3] The estimated prevalence of stress found in different studies on medical students was higher than that in general population. Prevalence of emotional disorder of 42.6% was found among medical students in a Malaysian private medical school.[4] A study done among 538 medical students in Nepal has shown that the prevalence of stress was 27%.[5] Another study conducted in Odisha, India, revealed that 53% of medical students were suffering from stress. In addition, they also reported that female students have higher stress score as compared to their male counterparts.[6]

The prevalence of stress was highest among the 1st year MBBS students (78.7%).[7] The sudden change in the workload, hectic schedule, and lifestyle may be, especially, daunting to the undergraduate medical students.[8] These factors make them ideal population to study stress.

Physical activity has proven benefit for physical and psychological well-being and is associated with reduced responsiveness to physical stress. Rimmele et al.[9] have suggested from their study that physical activity may provide a protective effect against stress-related disorders. Another study has shown that vigorous physical activity has a high stress-protective potential among medical students with high-stress level.[10]

Stress is believed to predispose medical students to a variation in body mass index (BMI) which may deviate from physiological range. Vermaand and Goyal[11] have found a positive correlation between stress and BMI, suggesting that stress increases the development of overweight/obesity. The study also showed that psychosocial stress, including both perceived stress and life events stress, was positively associated with weight gain but not weight loss.[12] However, a study conducted by Saat et al.[13] among the Malaysian medical students showed no significant relationship between stress and BMI.

Considering the high preponderance of 1st year medical students to stress, possible gender difference in coping and response to stress, significant role of physical activity or exercise in lowering stress, and influence of stress on eating habits affecting body weight and BMI, this study was done to see if there is any association between psychosocial stress score and gender, BMI, and exercise among the 1st year MBBS students.

MATERIALS AND METHODS

This study was conducted among the 1st year undergraduate students of Jawaharlal Nehru Institute of Medical Sciences, Imphal. A stratified random sample method was used. The sample size was calculated by the following formula: $n = (Z^2 \times p \times q)/E$, where n = the sample size, Z = 1.96, P = 19%, q = 1 - P = 81%, and E = 7.93%. Therefore, n = 94. This study included 50 female and 44 male students aged 18-22 years. The students suffering from any psychiatric illness or under any antidepressant or anxiolytic drugs were excluded from the study. Written consent was obtained from the participants after clearance from the Ethical Committee of the Institute. They were given verbal explanations about the topic and the aim of the study. A questionnaire along with the inventory to measure psychosocial stress (IMPS) was provided to them. The questionnaire dealt with anthropometric data and performance of exercise in terms of a number of days per week. IMPS was developed for use in assessing distress by measuring the amount of stress response such as physical, psychological, and behavior changes which a person under psychosocial stress experiences.[2] The subjects were asked to choose their answer from each of the 40 items of the IMPS from one of the followings: "Yes", "rather yes," "rather no," and "no." "No" and "rather no" were multiplied by zero, "rather yes" by one, and "yes" by two. The score was calculated by adding all of the numbers together, ranging from zero to eighty. We refer to the score measured using the IMPS as the stress score in this study.

BMI was assessed using a standardized weighing machine and height scale according to the following formula: BMI = Mass in kilogram/(height in meters)^2. It was classified according to the World Health Organization (WHO) International Classification and as per the "New updated WHO classification of BMI", a person with BMI ≤18.5 is underweight, 18.5-24.99 in normal, and ≥25 is overweight. The students were asked to answer about the performance of exercise as "yes "or "no" - "yes" if they do exercise for ≥2 days/week (≥45 min/day) and "no" if they do not or <2 days/week.

Statistical Analysis

The data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 22. Unpaired T-tests were used to test for differences in the means of IMPS-measured stress scores, BMI, and number of days of exercise. The χ^2-test was used to explore the linear relationship between stress score and BMI or exercise. All the values were expressed as a mean ± standard deviation, and $P < 0.05$ was considered as statistically significant.

RESULTS

Table 1 shows the mean value of age, height, weight, BMI, exercise, and stress score. The mean age of male and female students was 19.68 ± 1.03 year and 19.96 ± 0.88 years, respectively. The BMI of male was 21.59 ± 2.59 kg/m^2 as compared to female 19.90 ± 2.24 kg/m^2 which was statistically

significant. The average days of exercise in a week for male and female students were 2.23 and 1.20, respectively. The average stress score for male and female students was 15.55 ± 11.50 and 15.44 ± 7.76, respectively, which was not statistically significant.

Table 2 shows the comparison of levels of stress score between male and female students. The number of male and female students getting stress score <9 were 14 (53.8%) and 12 (46.2%), respectively. Similarly, 17 (42.5%) male and 23 (57.5%) female students had score between 10 and 19. 13 (46.4%) male students and 15 (53.6%) female students had stress score more than 30.

Table 1: The mean±SD values of demographic data, exercise, and stress score

Parameters	Male±SD	Female±SD	*P*
Age (year)	19.68±1.03	19.96±0.88	0.045
Height (cm)	168.22±7.462	156.38±5.26	0.013
Weight (kg)	60.84±9.809	48.50±5.87	0.002
BMI (kg/m^2)	21.59±2.59	19.90±2.24	0.001
Exercise (days/week)	2.23±1.27	1.20±0.45	0.000
Stress score	15.55±11.50	15.44±7.76	0.116

SD: Standard deviation, BMI: Body mass index

Table 2: Comparison of levels of stress score between male and female students

Stress score	Male (%)	Female (%)
≤9	14 (53.8)	12 (46.2)
10-19	17 (42.5)	23 (57.5)
≥30	13 (46.4)	15 (53.6)

Table 3: Comparison of exercise done (days/weeks) between male and female students

Exercise	Male (%)	Female (%)
Yes (≥2 days/weeks)	25 (73.5)	9 (26.5)
No (≤1 day/week)	19 (31.7)	41 (68.3)

Table 4: Relationship between exercise and stress score among the students

Exercise	Stress score			χ^2	d.f	*P*
	≤9 (%)	10-19 (%)	≥20 (%)			
Yes	15 (44.1)	14 (41.2)	5 (14.7)	9.307	2	0.010
No	11 (18.3)	25 (43.3)	23 (38.3)			

Table 3 shows the number of days of exercise per week done by the students. The number of male students who does exercise ≥2 days/week were 25 (73.5 %) and that of female students were 9 (26.5%). The number of male students who does exercise ≤1 day/week were 19 (31.7%) and female were 41 (68.3%).

Table 4 shows the relationship between exercise and stress score among the students. The number of students who does exercise and with stress score ≥20, 10-19, and ≤9 are 14.7%, 41.25%, and 44.1% respectively. While the number of students who does not do exercise and with stress score ≥20, 10-19, and ≤9 are 38.3%, 43.3%, and 18.3%, respectively. The number of students with higher stress score among those who do exercise is significantly lesser than those who do not do exercise.

Table 5 shows the relationship between stress score and BMI among the students. The number of students whose stress score is ≥20, 10-19, and ≤9 and have normal BMI are 27.9%, 44.3%, and 27.91%, respectively. The number of students whose stress score is ≥20, 10-19, and ≤9 and have BMI ≤18.5 are 33.3%, 44.4%, and 22.2% while that of who have BMI ≥25 are 333.3%, 33.3%, and 33.3%.

DISCUSSION

We observed in our study that, based on the level of stress score, the number of female students having higher stress score is more than that of male students (Table 2). The present study also shows that there is no marked difference in the mean IMPS-measured psychosocial stress score among the male and the female students. The present study found that the proportion of students with higher stress score is lesser among those who do exercise than those who do not do. Thus, our result reflects that exercise is associated with reduced stress. 44% of students with normal BMI have a stress score of 10-19, while the remaining students have stress score ≥20 (27.9%) and ≤9 (27.9%) (Table 5). The majority of students (44.4%) who are with BMI ≤18.5 also have stress score of 10-19. The proportion of students for the different levels of stress score is the same among the students with BMI ≥25. There

Table 5: Relationship between stress score and BMI among the students

BMI (kg/m^2)	Stress score			χ^2	d.f	*P*
	≤9 (%)	10-19 (%)	≥20 (%)			
Underweight (≤18.5)	4 (22.2)	8 (44.4)	6 (33.3)	0.939	4	0.919
Normal (18.5-24.9)	17 (27.9)	27 (44.3)	17 (27.9)			
Overweight (≥25)	5 (33.3)	5 (33.3)	5 (33.3)			

BMI: Body mass index

is no significant association between stress score and BMI in our study.

We observed in our study that, based on the level of stress score, the number of female students having higher stress score is more than that of male students (Table 2). The present study also shows that there is no marked difference in the mean IMPS-measured psychosocial stress score among the male and the female students. The previous study has also shown no association between student's gender and mental distress among the University medical students.[14] A statistically significant association between stress and gender was reported by Sani et al.[15] among the medical students in Saudi Arabia. A study conducted by Salam et al.[3] among the medical students in Malaysia observed that female students have more mean stress scores than males. Rahman et al.[16] found, from their study, that overall prevalence of stress was 53.3% in male student and 46.7% in female student and concluded that male students were more stressed than females. The difference between males and females in response to stressors could be due to gender differences in central stress responses which might be a result of computational roles subserved by the brain regions such as right parietofrontal cortex,[17] ventral striatum, and limbic cortex.[18] Kendler et al.[19] reported that women are more sensitive to depressogenic effects of interpersonal problems with individuals within their proximal network.

The present study found that the proportion of students with higher stress score is lesser among those who do exercise than those who do not do exercise. Our result, thus, reflects that exercise is associated with reduced stress. A study done by Gerber et al.[10] also suggested that vigorous physical activity has a high stress-protective potential among undergraduate students with high-stress levels. The previous study reported that trained men had significantly lower cortisol and heart rate responses to the stressor compared with untrained men.[9] In addition, trained men showed significantly higher calmness and better mood and a trend toward lower state anxiety during the stress protocol. Research from a cross-sectional study with 1324 nursing students shows that physical activity may decrease psychological distress.[20] In another cross-sectional study of 14,804 undergraduate students, Vankim et al.[21] found that those who met strenuous physical activity recommendations reported less perceived stress than those who did not meet this recommendation. Reduced psychological stress with physical activity may be probably related with endorphin release during exercise. Endorphins offer an appealing explanation for affective change associated with exercise. It has been proposed that the antistress effects of endorphins are possibly activated through inhibited peripheral sympathetic activity.[22] This inhibition may be due to an increasing dominance of the parasympathetic nervous system.

About 44% of students with normal BMI have a stress score of 10-19 while the remaining students have stress score ≥20 (27.9%) and ≤9 (27.9%) (Table 5). The majority of students (44.4%) who are with BMI ≤18.5 also have stress score of 10-19. The proportion of students for the different levels of stress score is the same among the students with BMI ≥25. There is no significant association between stress score and BMI in our study. Similar findings were also reported by Saat et al.[13] in their study carried out among 126 biomedical science students in Malaysia which found that there was no significant relationship between stress score and BMI. In another study conducted by Heba et al.,[23] it was reported that obese and underweight students recorded a higher rate of emotional problems compared with normal and overweight students, revealing a U-shaped relation between the BMI and emotional state. The results were in concordance with the studies conducted by Sani et al.[15] which demonstrated that BMI had a significant association with stress in medical students in Saudi Arabia and Gupta et al.[24] in which the correlation between BMI and PSS-I was found to be statistically significant (r = 0.362, $P < 0.01$) in male medical students in Kolkata.

Limitations

The study has some limitations. First of all, the sample size is not large. Second, as the IMPS-measured stress score were self-reported by students, it may have resulted in some reporting bias. However, we employed previously validated questionnaire in our study which should yield legitimate results. Another limitation of our study is non-inclusion of assessment of biomedical markers related to stress and exercise.

CONCLUSION

There is a significant association between IMPS-measured psychosocial stress score and exercise among the 1st year medical students. However, the study does not find any significant relationship between the psychosocial stress score and gender as well as BMI.

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