

## Original Research Article

# Association of mood disorder and modifiable life-style risk factors in medical students: a cross-sectional study

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## ABSTRACT

**Background:** Bipolar disorder is one of the common chronic serious mental illness affecting 7 billion people in the world associated with significant morbidity which goes unrecognized. After extensive literature search, it was found that there is paucity of studies from the Indian setting that have addressed the issue of bipolar disorder.

**Methods:** The present study was carried out to screen for bipolar disorder among medical undergraduate students and its correlates. Due to non-availability of many studies from India, the proportion of 50% was taken as prevalence to calculate the sample size. With 95% confidence interval and 8% absolute error, a sample size of 126 was calculated using Epi Info. Study tools used were a semi structured questionnaire on socio-demographic profile of participants, Global Physical Activity Questionnaire (GPAQ) and Mood Disorder Questionnaire (MDQ). MDQ is a self-reporting screening instrument for bipolar disorder having a Cronbach's alpha coefficient of 0.83. Data was analyzed using chi-square test with p value <0.05 considered statistically significant.

**Results:** The study included 87.3% males and 12.7% females with mean age 21.26±1.23 years. Out of 126 participants, 17 (13.5%) were screened positive for bipolar disorder. Factors found to have statistically significant association with bipolar disorder were number of siblings, type of family, migration status of family, living in hostel, body mass index and physical activity of the participant.

**Conclusions:** The results suggest that medical students constitute a vulnerable group and there are certain risk factors other than academic stressors which predispose a medical student to mental illness.

**Keywords:** Body mass index, Depression, Mania, Medical students, Mood disorder, Physical activity

## INTRODUCTION

Mental and behavioural disorders accounts for 12% of the global burden of disease. The global prevalence among the adult population is estimated to be 10% and contribute to four of the ten leading causes of disability.<sup>1</sup> Bipolar disorder is a serious mental disorder characterized by episodes of depression, hypomania/mania and mixed episodes, with inter-episodic recovery.<sup>2</sup>

It affects 7 billion people in the world with a lifetime prevalence of 1-2.4% associated with significant morbidity and it frequently goes unrecognised.<sup>3,4</sup>

Bipolar disorder often has its onset during the college years. This means that students simultaneously face both the developmental spurt related changes of late adolescence and the challenge of adapting to a major mental illness. Medical school is inherently a stressful,

challenging academic experience, which may make medical students vulnerable to psychological illness.

The goal of medical education is to shape the budding physicians with knowledge and expertise to advance the science of medicine and promote public health. In India to become a physician large number of students go through the pressure of extensive selection process based on national competitive exam. The identified altruistic individuals then spend more than four years to gain knowledge and basic training in human anatomy, physiology, biochemistry, pathology, microbiology and clinical subjects. Once enrolled, students and schools make a mutual commitment intended to prepare students for a socially useful and personally fulfilling career. Based on these characteristics, one may anticipate medical school would be a time of personal growth, fulfilment, and well-being despite its challenges. Unfortunately, the educational process may have a negative effect on student's mental health, with a high frequency of depression, anxiety and stress.<sup>5,6,7</sup> Factors like, academic curriculum, sleep deprivation, student abuse, limited extra-curricular activities and indulgence in drug abuse have been hypothesized contributing to decline in medical student's mental health.

Increasing attention is being paid to mental health care concerns of medical students - a complex issue which may be associated with training-related stressors. It is important for the medical education system to take into account the health and well-being of the learners as part of the vision for improving medical education. In recognition of the importance of this issue and paucity of studies from Indian settings this study was conducted. The aim of the study was to screen medical undergraduate students for bipolar disorder and assess the associated risk factors.

## METHODS

### *Study design*

A cross sectional study was conducted among Medical undergraduate students, recruited from a tertiary hospital in East Delhi. Due to non-availability of many studies from India, the proportion of 50% was taken as prevalence (p) to calculate the sample size. With 95% confidence interval (CI) and 8% absolute error (d), a sample size of 126 was calculated using Epi Info. A list of students in all batch was prepared and using this the participants were selected randomly through random number generated by MS excel. Students with known medical history of psychiatric illness were excluded from the study.

### *Study tool*

Data was collected by using a predesigned and pretested questionnaire which included four sections, namely, socio-demographic profile, modifiable lifestyle risk

factors, mood disorder questionnaire (MDQ) and global physical activity questionnaire (GPAQ).

The MDQ is a tool used to screen bipolar disorder focusing on symptoms of hypomania and mania. These are the mood states that separate bipolar disorders from other types of depression and mood disorder.<sup>8</sup> It is a self-reporting screening instrument with a Cronbach's alpha coefficient of 0.83. It has three main questions and the first question has 13 parts, for a total of 15 questions. The MDQ was originally tested with adults, but it has also been studied in adolescents. The items in the tool are based on the Diagnostic and Statistical Manual of Mental Disorders (DSM)-IV criteria for bipolar disorder. In addition, meta-analysis has found that the MDQ is one of the best self-report tools for assessing hypomania or mania.<sup>9</sup> In order to screen positive for possible bipolar disorder all three parts of the following criteria should be met:

- Yes, to 7 or more of 13 items in question 1 AND
- Yes, to question 2 AND
- Moderate problem or serious problem to question 3

Those who were screened positive by MDQ were counselled and referred to the associated tertiary care hospital for complete clinical evaluation.

A standardise tool, GPAQ was used to measure the physical activity of the medical undergraduate students.<sup>10</sup> It collects information on the frequency in days and duration in minutes of moderate and vigorous intensity physical activity under three domains, at work; during transport; and at leisure (i.e., recreational activities). It comprised of 16 questions in total including one question on sedentary behaviour. Metabolic Equivalent Tasks (METs) were used to express the intensity of physical activity. Moderate-intensity activities were assigned a value of 4 METs and vigorous-intensity activities were assigned a value of 8 METs. The total MET score was computed as the sum of all MET-min/week. Total Physical Activity MET minutes per week <600 does not meet WHO recommendations.

### *Data collection*

The data was collected using the questionnaire by self-administration technique. The investigators were present to during self-administration of the tool to clarify any query that aroused. Body Mass Index (BMI) was derived from recording weight in kilograms and height in metres.

Weight was measured using portable analogue weighing machine with accuracy of 50 grams. Height was measured using a non-stretchable tape with the participant standing on a flat and firm surface to the nearest 0.1 cm. Using this, the patients were categorized as underweight (<18.5 kg/m<sup>2</sup>), normal or lean BMI (18.5-22.9 kg/m<sup>2</sup>), overweight (23.0-24.9 kg/m<sup>2</sup>) and obese (≥25 kg/m<sup>2</sup>) based on the revised consensus guidelines for India.<sup>11</sup>

### Statistical analysis

Data was analysed using SPSS software (version 19). Results were presented in simple proportions and percentages. Chi-square test or Fisher's Exact test (wherever required) was used to observe the differences between proportions. Two way tables were utilized to assess the relationship between dependent and independent variables. The results were considered statistically significant if "p" value was less than 0.05.

### RESULTS

A total of 126 medical undergraduates were included in the study. Out of 126 participants, 16 (12.7%) were females and 110 (87.3%) were males. The mean age ( $\pm$ SD) of the sample was  $21.26 \pm 1.234$  years with a range of 19-26 years. Amongst all Hindu religion was practiced most commonly followed by Sikh and Muslim. Details of socio demographic profile are depicted in Table 1.

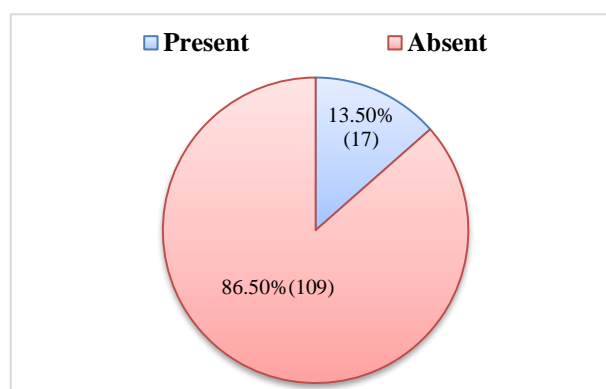
**Table 1: Socio-demographic profile of medical undergraduate student.**

Characteristics	n (%)	
Age	19-20	29 (23.0)
	21-22	83 (65.9)
	23-24	10 (8.0)
	25-26	4 (3.2)
Sex	Male	110 (87.3)
	Female	16 (12.7)
Type of Family	Joint	28 (22.2)
	Nuclear	98 (77.8)
Religion	Hindu	110 (87.3)
	Others	16 (12.7)
Socio-economic Status (Kuppu Swamy scale)	Upper	41 (32.5)
	Upper middle	79 (62.7)
	Lower middle	4 (3.2)
	Upper Lower	2 (1.6)
Siblings	Absent	76 (60.3)
	Present	50 (39.7)
Permanent Residence	Outside Delhi	65 (51.6)
	Within Delhi	61 (48.4)
Present Stay	In hostel	80 (63.5)
	With parents	46 (36.5)
Type of school	Private	86 (68.3)
	Public	40 (31.7)

The body mass index was calculated and categorised as normal, overweight and obese. More than two third (n=89) of the students had a normal or lean BMI, 23.8% (n=30) were over-weight and 5% (n=7) were obese. A history of substance use in last one month was also inquired. It was found that 28.5% (n=36) students reported intake of substance for more than one occasion in last one month. The physical activity based on GPAQ was calculated and categorised as adequate physical activity when the total physical activity MET minutes/ week were >600 and

inadequate when less than 600. Inadequate physical inactivity was found in 30.2% (n=38) students.

All the students were screened for mood disorder using MDQ, those who met all criteria were defined as positive for bipolar disorder. The prevalence of Bipolar Disorder among medical students in our study was 13.5% (n=17, Figure 1). Over all prevalence of bipolar disorder based on MDQ was more amongst those who had migrated to Delhi ( $\chi^2=4.872$ ,  $p=0.036$ ), were living in hostel ( $\chi^2=5.190$ ,  $p=0.029$ ), belonged to nuclear family ( $\chi^2=1.000$ ), had no or one sibling ( $\chi^2=4.524$ ,  $p=0.037$ ), higher BMI ( $\chi^2=5.2661$ ,  $p=0.021$ ) and history of inadequate physical activity ( $\chi^2=4.842$ ,  $p=0.044$ ). Table 2 depicts the association of sociodemographic and lifestyle modifiable risk factors with bipolar disorder.



**Figure 1: Bipolar Disorder among medical students (MDQ).**

### DISCUSSION

The journey of a medical student to becoming a medical professional is very stressful with a curriculum which is loaded with theoretical knowledge and demanding attainment of clinical skills. The presence of mental and psychological disorders can make the situation worse both personally and professionally, affecting all domains of learning causing student distress and subsequently deteriorating the quality of medical profession. Nimesh and Mohan in a regional forum, WHO SEAR reported that the prevalence of depressive symptoms among medical students to be higher than the general population within a range of 15-17%.<sup>12</sup>

The prevalence of Bipolar Disorder among undergraduate medical students in the present study was found to be 13.5%. In another cross sectional study conducted among medical students in New Delhi, India it was found out that overall prevalence of provisionally diagnosed depressive and major depressive disorder was 21.5% and 7.6%, respectively.<sup>13</sup> In an Egyptian study it was found that among mood disorders 15.5% of students had subclinical depressive symptoms, 8% were diagnosed as having major depressive disorder, 5.5% were diagnosed as having bipolar I disorder and 3% were having

dysthymia.<sup>14</sup> A questionnaire-based survey carried out among the first and third year undergraduate medical students in Nepal reported an overall prevalence of depression as 29.78%.<sup>15</sup> The difference in prevalence might be because they added first year students also

where as in our study we included third year undergraduates only. Academic stressors are considered as the main factor deteriorating the psychological and mental health of medical students.<sup>15</sup>

**Table 2: Association of sociodemographic and lifestyle modifiable risk factors with bipolar disorder.**

MDQ		Absent (%)	Present (%)	p-value
Religion	Hindu	95 (86.4)	15 (13.6)	1.000
	Others	14 (87.5)	2 (12.5)	
Permanent residence	Outside Delhi	52 (80)	13 (20)	0.036
	Delhi	57 (93.4)	4 (6.6)	
Currently living	In Hostel	65 (81.2)	15 (18.8)	0.029
	With Family	44 (95.7)	2 (4.3)	
Family Type	Nuclear	85 (86.5)	13 (13.3)	1.000
	Joint	24 (85.7)	4 (14.3)	
Sibling	Absent	60 (81.1)	14 (18.9)	0.037
	Present	49 (94.2)	3 (5.8)	
BMI	Normal	81 (91)	8 (9)	0.021
	Obese / overweight	28 (75.7)	9 (24.3)	
Substance use	No	76 (84.4)	14 (15.6)	0.391
	Yes	33 (91.7)	3 (8.30)	
Physical activity (GPAQ)	Adequate	80 (90.9)	8 (9.1)	0.044
	Inadequate	29 (76.3)	9 (23.7)	

Somers et al in a publication in 2006 noted the higher prevalence of anxiety and depression among medical students which indicates that students coping strategies and personal health deteriorate as they enter medical school.<sup>16</sup>

In the present study we noted that mood disorders were found to be significantly higher among those who stayed in hostel and those who doesn't have siblings, lack of support system as a coping strategy might be the reason for mood disorders being higher among them compared to those staying at home and having siblings. Unlike our study, absence of siblings was not found to have a significant impact on prevalence of depression in study conducted by Sindana S et al in a cross sectional study conducted in New Delhi, India.<sup>13</sup>

Our study also noted obesity or overweight and inadequate physical activity among medical students as significant contributors for mood disorder. A study conducted in United States among adults by Simon GE et al reported that obesity is associated with an approximately 25% increase in odds of mood and anxiety disorders.<sup>17</sup> In another study conducted among male university students in Saudi Arabia by AlQahatahni AA et al also showed a similar result with obesity being a significant factor associated with depression, anxiety and stress.<sup>18</sup> A review of various longitudinal studies and intervention studies suggest that obesity can lead to depression and suggests weight loss treatment to be

beneficial for improving mood. Authors propose health concern pathway and appearance concern pathway as reason for the complex relationship between obesity and depression. In health concern pathway depression in obese people is the result of functional impairment and poor self-rated health. In appearance concern pathway, body image dissatisfaction, repeated dieting, and stigma is the result of obesity more common in obese women belonging to higher socioeconomic class. They also propose several mechanisms including self-rated health, behavioural (poor exercise) or cognitive factors (negative thoughts), physiological or immunological factors and social factors like reduced support in bidirectional relation between obesity and depression.<sup>19</sup>

Similar to our study, a cross sectional study conducted by Deepthi R et al among 430 medical students and interns at Karnataka to assess mental health status and physical activity levels showed that the students who were highly active and minimally active in physical activity showed lower levels of depression and anxiety compared to low physical activity group. Author also suggested that the engagement in physical activity can be an important contributory factor in positive mental health of future doctors.<sup>20</sup> Exercise has neuroprotective effects as it regularises the brain-derived neurotrophic factor (BDNF) responsible for neurogenesis and improvement in cognitive function.<sup>21-23</sup> Animal studies have shown that increased physical activity causes changes in different neurotransmitters (serotonin and endorphins).<sup>24,25</sup> which



has a positive impact on the mood. The anxiolytic effects of exercise mediated by atrial natriuretic peptide have also been reported.<sup>26</sup> Similar to our study, hectic lifestyle, with lack of physical activity in undergraduate medical course was found to be one of the stress inducing factor among medical students.<sup>4</sup>

In a study conducted in Nepal by Basnet B et al depression was noted to be higher among females (32.43%) compared to males (28.07%).<sup>15</sup> In our study gender was not found to be significantly associated with mood disorders. An Indian study revealed that year of study of medical students had a significant association with the prevalence of depression. First year students had the highest prevalence of depression followed by second year students.<sup>13</sup> In the Nepal study also the prevalence of depression in first year students (36.74%) were higher compared to third year undergraduate students (22.22%).<sup>15</sup> Our study could not comment on this because our study participants included third year undergraduate medical students only.

The results of our study suggested that medical students constitute a vulnerable group for mood disorders and there are certain risk factors other than academic stressors which predispose a medical student to mental illness. Comprehensive mental health programs should give significant importance to the medical students as they form a vulnerable group. These programs should emphasize on screening, support groups, time management, healthy lifestyle and effective coping strategies. Leisure time physical activity, mentor or tutorial system as support system for student wellbeing should be implemented in all medical colleges and should be given same importance as the academic curriculum. Periodic screening should be conducted for mood disorders among medical students.

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