

**Title:** Depression, sleeping pattern & suicidal ideation among medical students in Bangladesh: A cross-sectional pilot study

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### **Abstract**

**Background:** Depression is a major morbidity and the most common mental disorder among the medical students in medical schools globally. Undergraduate students suffer stress more due to their academic curriculum than the students of other faculties. In low resource settings like Bangladesh, there is a dearth in research on mental health of undergraduate medical students. This pilot study was conducted to add to the existing limited evidence by reporting the prevalence of depression, describing sleeping pattern & suicidal tendencies among medical students. Relevantly, we have investigated to the overall mental health status among the medical students in Bangladesh.

**Methods:** This cross-sectional study was conducted in two medical colleges of Dhaka in between July 2013 to December 2013, among 221 Bangladeshi medical students from first to fifth year. By convenient sampling technique, data were collected by a pretested, structured, self-administered questionnaire and analysis was done by SPSS 18.0 version. Depression were assessed by validated PHQ-9 tool among the respondents. Goldberg's General Health Questionnaire (GHQ-28) was used for assessing overall mental health status.

**Results:** Depression was found in 38.9% of participants with 3.6%, 14.5%, 20.8% of being either severe, moderate and mild depression respectively. 17.6% medical students had suicidal tendency

or attempted suicide at least for once after attending medical school. The sleeping hours were inadequate and altered after starting this stressful academic course. 33.5% medical students had poor mental health status. There was a statistically significant association between poor mental health status with age group of less than 22 years and initial academic study year (1st to 3rd of MBBS).

**Conclusion:** The findings are suggestive of a higher prevalence of depression among early year medical students and marginal predominance in males. Suicidal tendency is also higher. These calls for further investigation with situation analysis, qualitative explorations and surveys to explore the burden of such disorders in Bangladesh.

**Key words:** Medical student, mental health, depression, sleeping pattern, suicidal ideation, Bangladesh

## 1. Introduction

Medical students all over the world suffer from mental stress due to the nature of their education (Dyrbye et al. 2006; Garg et al. 2017; Kindermann et al. 2019; Melaku et al. 2015). A medical student encounters academic stressors and stresses due to personal, social, emotional, physical and family factors (Bergmann et al. 2019; Dyrbye et al. 2006). Multiple psychological transitions are faced by a student in the process of becoming a doctor (Bergmann et al. 2019). In developed countries, studies showed a higher amount of stress among medical students as evident by their symptoms of depression (Dyrbye et al. 2006). Depression is a major morbidity and the most common mental disorder among the medical students in medical schools (Adhikari et al. 2017; Dyrbye et al. 2006). Undergraduate medical students suffer stress more due to their academic curriculum than the students of other subjects (Hill et al. 2018; Melaku et al. 2015; Pereira et al. 2015).

In Bangladesh, the length of undergraduate medical education curriculum is much longer (5 years course +1 year Internship) than the other bachelor degrees (normally 4 years) (BMDC 2018; Zavlin et al. 2017). This lengthy schooling is also considered as a predictor for developing depression & anxiety (Mao et al.2019). Alarmingly, many Bangladeshi medical students had recently committed suicide (Shah et al. 2017; Shahnaz et al. 2017; Yeasmin 2018). Previous studies in other countries have shown that stress, depression and anxiety among undergraduate students remain underdiagnosed in more than 50% of cases. Additionally, they are often undertreated, resulting in an increased psychological morbidity, affecting their career and life (Adhikari et al. 2017; Bergmann et al. 2019; Dyrbye et al. 2006). Therefore, it is essential to investigate the prevalence of depression among the medical students in Bangladesh; so that they can be screened, diagnosed, and treated effectively. The medical students are the future health workforce who will contribute to the development of a healthy population in a country. Despite the rigor of studies available on different other diseases, there is a paucity of evidence on the mental health status of medical students in Bangladesh.

Therefore, the present study was undertaken with the objectives to assess the prevalence of depression, suicidal tendency, sleeping pattern and overall the mental health status of medical students among students of two medical colleges of Dhaka city.

## **2. Methods**

### **2.1 Study Design**

This study was a cross sectional study conducted, between July to December 2013, at one public & one private medical college in Dhaka. Only Bangladeshi medical students from first to fifth year were included by convenient sampling method if they were available and provided written informed consent for the interview, had no diagnosed mental health disorders, non-pregnant, not known as a drug abuser and not receiving treatment for any long-term health complications.

### **2.2 Sample size**

We assume that 18% medical students have symptoms of moderate to severe depression in developing countries (Dyrbye et al. 2006). Considering 95% confidence level and 5% precision, we needed approximately 220 medical students to estimate their depression status in Bangladesh (Cochran et al.2007; Krejcie et al. 1970) We collected data from 227 participants including 3% lost to follow-up. Due to inconsistency and missing values, 6 data were discarded and finally 221 sample sizes were used for analysis.

### **2.3 Data collection technique**

A pre-tested, structured, self-administered questionnaire was used to collect data. Validated PHQ-9 (Patient Health Questionnaire-9) was used to assess depression among medical students. The PHQ-9 is the depression module, which scores each of the nine DSM-IV criteria as "0" (not at all) to "3" (nearly every day), used to monitor the severity of depression (Depression Severity: 0-4 none, 5-9 mild, 10-14 moderate, 15- 27 severe) and response to treatment. Overall mental health status was assessed by Goldberg's General Health Questionnaire (GHQ-28) which is self-reporting tool consists of four set of questions (A,B,C,D) each having seven items related to somatic symptoms, anxiety/insomnia, social dysfunction, severe depression experienced in last 2 weeks (Goldberg et al. 1972). The questionnaire was prepared in English consisting of 51 questions and translated to Bengali and then back translated to English to see any inconsistencies. For data collection, Bengali version was used. Quality assurance of the collected data was done by the study lead. The data were analysed by SPSS 18.0 version.

### **2.4 Statistical Analysis**

In descriptive analysis, both central tendency (i.e. percentage, mean and frequency) and dispersion statistic (range, standard deviation) were calculated for participant demographic characteristics among different study groups. For nominal/categorical variables, Fisher's exact (if cell frequency less than 5) or chi-square test and for continuous variable, two sample independent t-test performed to see the observe relationship with study groups. We considered  $p < 0.05$  (two-tailed) as the margin of statistical significance for all test. All the data were entered, managed, clean by study team and analyzed using SPSS software by statistician (FA).

### **2.5 Ethical considerations**

Ethical approval was obtained from Department of Public Health, American International University - Bangladesh. Each participant provided written informed consent. Detailed study related information includes objectives, brief methods and data confidentiality procedure were provided by a printed handout. Privacy & confidentiality of the respondents during data collection were maintained strictly.

### 3. Results

#### 3.1 Demographic information

Among 221 respondents, 38.9% (86) were male and 61.1% (135) were female. 26.7% (59) students were in their 1st + 2nd year (first professional student), 51.6% (114) were in 3<sup>rd</sup> + 4th year (second professional student) and 21.7% (48) were in 5th year (final professional student). The mean age ( $\pm$ SD) of study subjects was 22.18 ( $\pm$  1.65) years (ranges between 18-26 years). 51.6% of the participants were from the government medical college and 48.4% (107) were from the private medical college. Of the total participants, 78.2% (173) of medical students came from a nuclear family, 10.9% (24) were from joint family and 10.9% (24) were from single parent family. 62.0% (137) respondents were staying full-time in the hostels most of the time (**Table 1**). 12.2% students had diagnosed family history with depression or other common mental health disorders. Excellent relationship with parents, siblings, family members, friends were with 59.3%, 49.3%, 28.1%, 39.8% respondents respectively, good relationship with parents, siblings, family members, friends was 26.7%, 31.7%, 42.5%, 35.7%, mixed relationship with the consecutive relations were 5.4%, 4.5%, 6.8%, 9.0% and the rate of bad/very bad relationship with parent, sibling, other family members and friends were very less. Of the students, 3.2% were married, 57.9% were unmarried single, 32.1% were unmarried- in a relationship/affair & 5.9% students described their relationship as unmarried- complicated. 30.3% students were satisfied with their present relationship, 9.0% were not satisfied; 9.0% said their interest in sexual relationship significantly decreased in last one year, 68.3% said this interest remained the same and this interest was fluctuating to 22.2% respondents. Majority (78.3%) respondents said they willingly came to this study field though 21.7% students said they did not rather pressured by parent/ family members to take this academic field. 82.4% said their future ambition or career interest is related to their study field (MBBS). 62.9% respondents were satisfied with their last academic result and 37.1% said the opposite. 38.0% respondents mentioned internet browsing (mostly social media) as their way to passing leisure time, 13.1% mentioned sleeping, 9.5% stated reading novels, books, 3.6% travelling, 14.9% hanging out with friends, 8.2% listening music, 7.7% showed interest in other activities (photography, painting, eating, mobile gaming, shopping) and 5.0% said they have no leisure time.

Variable	N	%
Sex		
Female	135	61.1
Male	86	38.9
Study year		
1 <sup>st</sup> year	36	16.3
2 <sup>nd</sup> year	23	10.4
3 <sup>rd</sup> year	41	18.6
4 <sup>th</sup> year	73	33.0

	5 <sup>th</sup> year	48	21.7
Family type			
	Nuclear	173	78.2
	Joint	24	10.9
	Single parent	24	10.9
Type of medical college			
	Government	114	51.6
	Private	107	48.4
Staying hostel			
	Full time	137	62.0
	Part time	32	14.5
	Outside	52	23.5

Table 1: Demographic characteristics of medical students

### 3.2 Mental health status & prevalence of depression

33.5% medical students had poor mental health status indicated by GHQ-28 (**Table 2**). This table also shows the level of depression among the respondents based on PHQ-9. Severe (Scored  $\geq 15$ ), moderate (scored 10-14), and mild (scored 5-9) depression were found in 3.6%, 14.5% and 20.8% of medical students, respectively. 61.1% of the medical students did not have a depression. Overall, different degree of depression was found in 38.9% of medical students. Additionally, the percent distributions of the students' reported self-esteem were high (30%), moderate (38%), and low (10%), fluctuating (22%). 40.3% of the respondents had overall dissatisfaction from their life. Low energy or fatigability was high in 9%, moderate in 27.1% and low in 35.4% of the students. 29.9% of the respondents stated they feel tired and exhausted most of the time, 53.4% had occasional tiredness and 16.7% had rarely tiredness and exhaustion. 39.8% students had tendency to fear a lot with silly matters, 19.0% had frequent tendency to such actions and majority 91 (41.2%) had never experience this fear. 24.0% of students described their mood as a roller coaster (frequent rise and fall of emotion), 17.6% stated their mood as a long, dark tunnel (feeling helpless, doesn't know what is going on around), a bumpy road (often gets emotional but has control over it) was described by 43.0% respondents and 15.4% described the state of their mood as smooth ride (everything is fine on mind). 15.8% respondents experienced delusion (a false belief that doesn't correspond to the actual fact) or hallucination (hears, see, taste or smell something which does not exist actually) at least once and 84.2% respondents never experienced such events. Of the participants, 19.9% stated they a recent traumatic event (in last one year), such as divorce of parent/ sibling, death of a family member/ loved one, relationship break up etc. 47.1% students had feeling of out of control i.e. losing judgment. 10.0% students tended to avoid other people and 53.4% respondents had this tendency to someone or a specific group of people.

Variable	N	%
Mental health status [GHQ-28 (Score >23)]		
Good	147	66.5
Poor	74	33.5
Prevalence of depression based on PHQ-9 items (last 2 weeks symptoms)		

No depression (0-4)	135	61.1
Mild (5-9)	46	20.8
Moderate (10-14)	32	14.5
Severe (15- 27)	8	3.6
Depressive symptoms for last 1 month		
Persistence of sadness/low mood		
Yes	59	26.7
No	162	73.3
Loss of interest or pleasure		
Yes	83	37.6
No	138	62.4
Trouble on concentrating/remembering things		
Yes	144	65.2
No	77	34.8
Self-esteem		
Low	22	10.0
Moderate	84	38.0
High	66	30.0
Fluctuates (a little)	38	17.0
Fluctuates (a lot)	11	5.0
Fatigue		
Low	78	35.4
Moderate	60	27.1
High	20	9.0
Fluctuates (a little)	45	20.4
Fluctuates (a lot)	18	8.1
Life is not worth living		
Yes	89	40.3
No	132	59.7
Attempted suicide or plan of suicide		
Yes	39	17.6
No	182	82.4
Tendency of self-blaming		
Low	60	27.2
Moderate	75	33.9
High	45	20.4
Fluctuates (a little)	31	14.0
Fluctuates (a lot)	10	4.5
Change in appetite		
Increased	39	17.6
Normal	147	66.6
Decreased	35	15.8

Table 2: Mental Health and depression criteria status of students

### 3.3 Suicidal tendency

17.6% students had attempted/planned for suicide at least for once during their medical studentship. The trends of suicidal thoughts/attempts were more in lower academic years (31.3% in 1<sup>st</sup> year, 24.3% in the second year, 22.8% and in 3<sup>rd</sup> year) students than the higher academic years (13.3% in 4<sup>th</sup> year and 7.7% in 5<sup>th</sup> year) (**Figure 1**). Relevantly, 40.3% medical students said they feel *life is not worth living* and 132 (59.7%) said the opposite. Self-blame was high in 20.4% respondents, moderate in 33.9% and low in 27.2% respondents whereas it fluctuates a lot in 4.5% respondents and fluctuates a little in 14.0% respondents. The medical students who came to medical study willingly (without any pressure from the family) had less tendency (33.30%) to suicide and satisfaction with last academic result/performance (66.70%) had same result. In this study, Relationship with family and friends had no relation with suicidal thoughts as suicidal tendency was more in those who had either excellent or good relationship with their family (parent, siblings, other members) and friends (**Figure 2**).Of the participants, those who had inadequate sleep were more prone to suicidal tendency. Relevantly, those who had depression symptoms (87.20%) were more prone to suicidal thoughts/attempts.

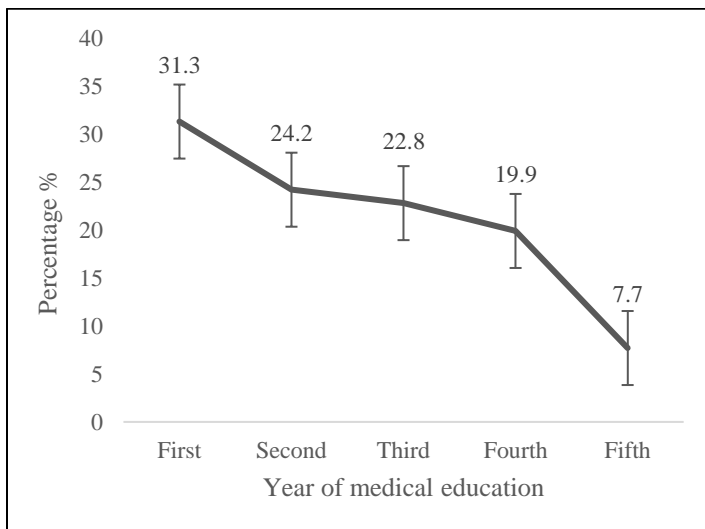


Figure 1: Suicidal trend of medical students by educational year

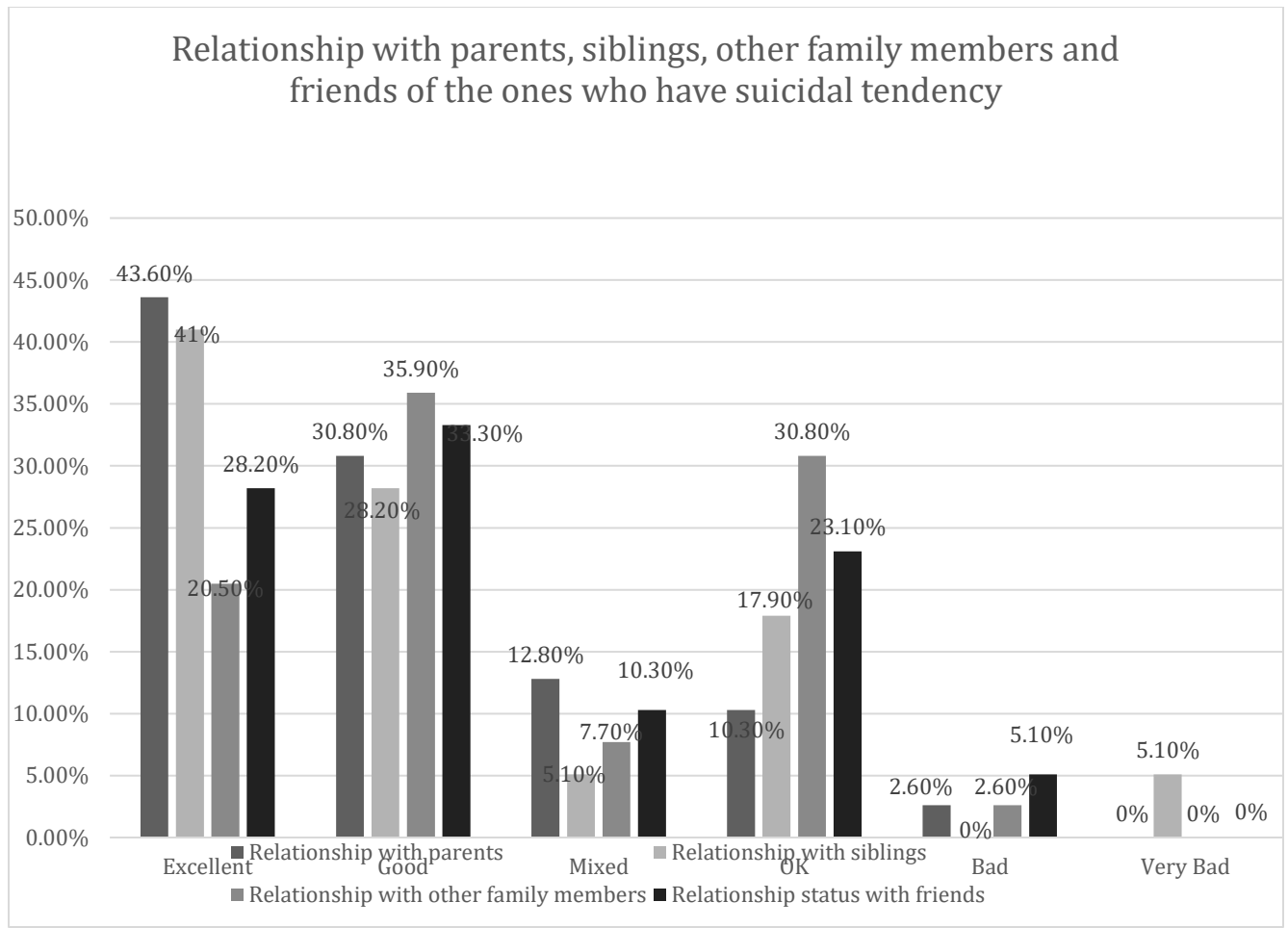


Figure 2: Suicidal tendency of medical students with relationship with family and friends

### 3.4 Sleeping pattern of medical students

**Figure 3** shows that 44.8% students had average sleep for 6-8 hours in a normal working day, 26.2% had sleep of 4-6 hours, 19.0% had 8-10 hours, 6.3% had above 10 hours and below 4 hours sleep observed in 3.6% respondents. Inadequate sleep (4-6 hours) was found in 46.2% medical students, 2-4 hours' sleep was found in 28.5% students, 15.4% had sleep of 6-8 hours, 4.1% respondents had sleep of 8-10 hours, 1.4% had above 10 hours and 4.5% had sleep of below 2 hours during examination. More than half of the respondents (57.8%) described alterations of sleep cycles after starting MBBS course. During vacation or holidays inadequate sleep (4-6 hours) was found in 7.2% respondents, 10.0% had sleep of 6-8 hours, 28.5% respondents had sleep of 8-10 hours, 28.5% had 10-12 hours sleep, 16.3% had sleep of above 12 hours and 8.6% had sleep of below 4 hours. Also, 14.5% respondents had events like nightmares, 10.4% had tossing/turning and 5.4% had experience of frequent walking in most of the nights. 119 (53.8%) respondents had no difficulty in falling asleep at night, occasional difficulties were found in 63 (28.5%) respondents and 39 (17.6%) respondents had difficulties in falling asleep often.



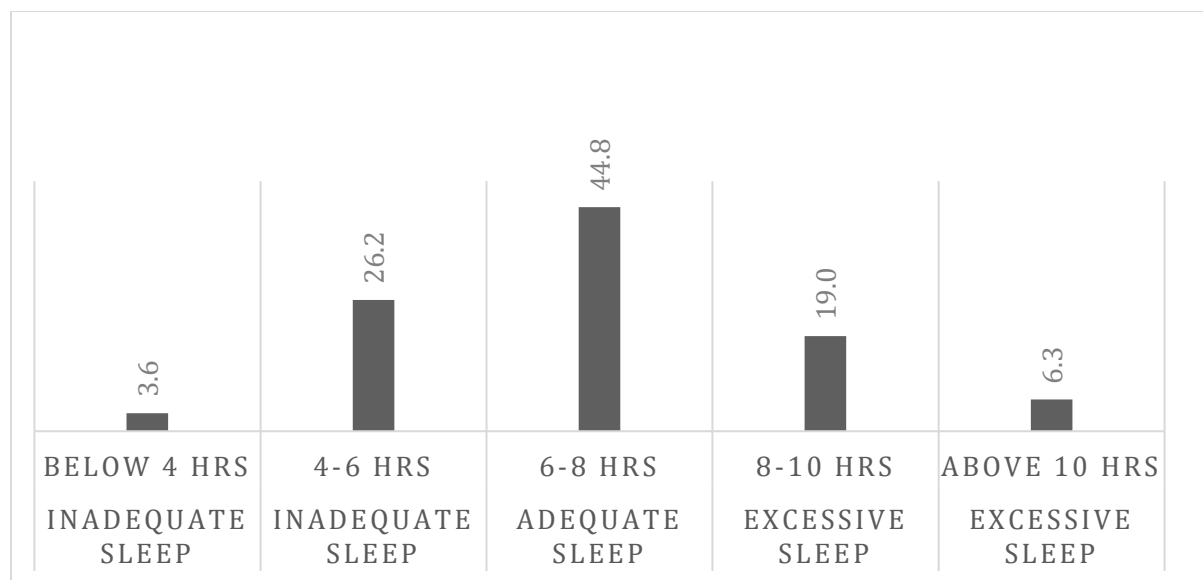


Figure 3: Sleeping pattern of medical students in a normal day

### 3.5 Association of mental health status with demographic variables

Male medical students had a poorer mental health status (55.4%) than the female medical students. However, the difference was statistically non-significant ( $p = 0.13$ ). Poor mental health status was more prevalent (68.9%) in government medical college than in private medical college (31.1%) & the difference was statistically non-significant ( $p = 0.10$ ). Poor mental health status was more prevalent (79.7%) in students staying in the hostel than those living non-hostel residence. However, the difference was statistically non-significant ( $p = 0.15$ ). Poor mental health status was significantly associated with academic year of the study period. 1st to 3rd year medical students had a poorer (82.4%) mental health status than the 4<sup>th</sup> to 5<sup>th</sup> year medical students ( $p = 0.001$ ). (Table 3)

Characteristics	Mental health status		p-value
	Poor (n=74)	Good (n=147)	
Male	55.4	30.6	0.130
Government Medical	68.9	42.9	0.103
Stay in hostel	79.7	74.8	0.150
1 <sup>st</sup> -3 <sup>rd</sup> Academic study year	82.4	26.5	0.001

Table 3: Association of mental health status with socio demographic factors of medical students (Note: p-value was calculated using chi-square test)

## 4. Discussion

This study was a brief analysis of the presentation of overall mental health status, depression severity, suicidal ideation, sleeping pattern and socioeconomic demographics of medical students undergoing MBBS training in Bangladesh. The responding sample of 221 undergraduate medical students represents both government and private medical colleges in the country. The mean age of the participants was 22 years with a female predominance and an almost equal distribution of students from both government and private colleges. Majority of the students (78%) in this study belonged to a nuclear family.

Globally medical students have a higher prevalence of depression, suicidal ideation and burnout than the general population, likely due to an extreme academic, psychosocial and existential stressor required to adapt with new college and intense academic schedule. This study reports that a high proportion of Bangladeshi medical students suffer from mental health problems. The symptoms include persistent sadness or mood swings, lack of pleasure or interest, lack of concentration and memorization, diminished self-esteem, suicidal ideation, self-blaming tendency, low energy, poor sleep, poor mental health status, and depression. This makes an important point that despite being reported since long time, they continue to be common among medical students and this may translate into higher rate of mental health problems among physicians in future (WHO 2007). Brazeau et al found in their study that medical students begin medical training with better mental health indicators than similar-age college graduates in the general population (Brazeau et al. 2014). However, medical students' learning environment and training process lead to the deterioration of mental health due to extreme distress and burnout relative to aged-matched students of other disciplines. The authors described this distress to be “nurture” rather than a “nature” problem (Brazeau et al. 2014).

According to the most recent National Mental Health Survey 2019, 16.8% of the adult population in Bangladesh are suffering from mental health problem (NIMH Face Sheet 2019). In our study, we found the prevalence of poor mental health status among medical students to be 33.5%, which is higher than the general population. This is comparable with the findings of two studies conducted at Iran, using SCL-90-R questionnaire, where 20% and 25% of medical students were having poor mental health status, respectively (Nojomi and Gharayee 2007; Sohrabi et al. 2019). In consistent with other study, our study found that poor mental health status was significantly associated with students' academic year of study, which mean medical students with lower age group are more vulnerable to poor mental health (Rotenstein et al. 2016). Moreover, male students had a higher rate of poor mental health suggesting its relationship with sex of the medical students.

Various studies conducted at different parts of the world reported the prevalence of depression among medical students to be 15-65% (Mao et al. 2019). Our analysis showed that depressive symptoms among medical students, when stratified by severity, are predominantly mild and moderate; however, overall, cumulative percent of depression was 39%. This is comparable with the findings of a study conducted among Malaysian medical students, where the prevalence of depression was 33.6% using the CES-D scale (Sherina et al. 2004). A systematic review had conducted among medical students which showed an estimated prevalence of depression or depressive symptoms was 27% (Rotenstein et al. 2016). Alim et al. found higher prevalence (81%) of depression, anxiety or stress alone or in combination among first year medical students of a public medical college in Bangladesh (Alim et al. 2015). Besides, the prevalence of depression of our study was relatively lower than the prevalence reported in another study among university

students – 46.8% in Bangladesh (Hossain et al. 2019). In our study, although statistically non-significant, poor mental health was more prevalent in public medical college (69%) as compared to private college (31%). On the other hand, two different studies conducted among medical students revealed the prevalence of 23% and 12%, respectively (Brazeau et al. 2014). In contrast, a study from southern Indian reported the prevalence of depression 48.4% (Kumar et al. 2017). This wide range of prevalence of depression can be attributed to variations in the types of scales used in the screening and different socio-demographic, geographic backgrounds of participating students.

Interestingly, depression was significantly higher among students in the lower age group and those studying in the first year of MBBS. This is in consistent with a study conducted in Pakistan reporting higher rates of depression among students in earlier phases of medical carrier (Uttra et al. 2017). Moreover, Puthran et al. have found a reduced tendency of depression in later years of the medical course (Puthran et al. 2016). These findings indicate that increased levels of mental disorders among medical students may not be only due to an extreme academic stress, but from individual characteristics of the students selected through a competitive medical admission test. In addition, clinical students might be getting more satisfaction or feeling more fulfilment from their professional choice as they take ownership of the patient care. On the other hand, some available literature gives contrasting picture of increase in the rates of depression as the student moves towards higher level of academics in medicine (Brazeau et al. 2014).

We speculate that the lower burden of depression among third term students (pre-clinical students) in this study can be attributed to good academic and student friendly atmosphere in the institution that helps the students to cope with factors precipitating depression. We found that 65% of the students had trouble with concentration and memorization; however, our study was inconclusive in finding the influence of depression on the medical students' academic performance and their well-being. However, increasing prevalence of depression among students suggest that from early years of training, an open, supportive and non-stigmatized communication should exist between students and the institution. In addition, how different degrees of depression affect lives of medical students should be investigated in studies with longer follow-up period.

Medical students also have a higher rate of suicidal ideation and suicide rate, and lower quality of life than age-matched population (Schwenk et al. 2010). In our study, suicidal ideation among first year medical students found 31.3% which is considerably higher, but it gradually came down to 7.7% with 5th year students. Previous research has reported a prevalence of suicidal ideation in medical students ranges from 9-48% (Kosik et al. 2017). Many factors have been reported to contribute in the suicidal ideation including specific behavioural and personal characteristics, coexisting mental health problems, susceptibility to heavy curricular burdens, decreased life satisfaction and all of them together may lead to burnout, anxiety and depression (Kosik et al. 2017). Depression is particularly reported as a key risk factor responsible behind suicidal ideation, which was also higher in our study. A longitudinal study conducted in Norway found that life satisfaction in medical students starts to drop at the beginning of their medical training and remain low until graduation (Mitsui et al. 2014). In our study, low self-esteem among medical students was 11% which may have contributed to their increased suicidal ideation. Past studies showed that low self-esteem is associated with suicidal ideation (Kjeldstadli et al. 2006). Moreover, in our study, 40% of the medical students reported as “life is not worth living,” 27% students had

persistent low mood or sadness (one of the three major criteria of depression), 20% of them had a tendency to self-blame, and 38% had a loss of interest or pleasure in the things they used to enjoy.

The increasing rate of mental health problems, and suicidal ideation and rates among medical students have been widely discussed on the research ground; still it has not fostered similar interest among medical educators. Students may engage in potentially harmful ways of coping such as drug abuse, excess alcohol consumption, and despite their training and better access to care they don't seek help for depression. Using mental health care services and depression is associated with stigma among the students. A study found stigma as a key barrier to seeking mental health care by 30% of first- and second-year students and this may lead to their seeking of an inappropriate and potentially dangerous approaches such self-prescribing antidepressants (Schwenk et al. 2010). Focus should be placed on specific risk factors associated with medical students' mental health problems and appropriate preventive programs need to be instituted to mitigate those risk factors and fire enthusiasm for prevention among the educators. The key step can be to change the "cultures and values of medical education, with a focus on support, role modelling, and mentorship by both faculty members and fellow students. We acknowledge that the findings of this study cannot be generalisable because of limited sample size, convenient sampling technique and involvement of two medical colleges only from one city. Further nationwide exploration is needed.

## **6. Conclusion**

The findings are suggesting to prevalence of depression among early year medical students, with marginal male predominance. Suicidal tendency is also higher with inadequate sleeping hours. Overall mental health status is not satisfactory. Considering the limitations of this study, the results are concerning & these calls for further investigation with situation analysis, qualitative explorations and surveys to explore the burden of such disorders to design appropriate interventions for early detection, treatment, prevention & creating awareness on mental health disorders among medical students & young physicians.

## **Conflict of interest**

The authors declare no competing interest.

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## Authors Contribution

MTH drafted the protocol, tool, translated the tool, analysed and prepared the draft report. RDG supported in data collection and reviewed the manuscript. NAM, AG, RNN, MSTHK supported in tool development, data collection and took part in primary analysis. FA, SH prepared the tables and result part. VP prepared the discussion segment; HRM, KNK critically reviewed the manuscript. SY supported data collection and reviewed the manuscript. NI supervised this project.

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