



Depression, sleeping pattern, and 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 the mental health of undergraduate medical students. This pilot study was conducted to add to the existing limited evidence by reporting the prevalence of depression and describing sleeping pattern and suicidal tendencies among medical students. Relevantly, we have investigated the overall mental health status among the medical students in Bangladesh.

Methods This cross-sectional study was conducted in two medical colleges of Dhaka between July 2013 and December 2013, among 221 Bangladeshi medical students from first to fifth year. By the convenience sampling technique, data were collected by a pretested, structured, self-administered questionnaire and analysis was done by SPSS version 18.0. Depression was assessed by the validated Patient Health Questionnaire-9 (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%, and 20.8% being severe, moderate, and mild depression, respectively. 17.6% of medical students had suicidal tendency or attempted suicide at least once after attending medical school. The sleeping hours were inadequate and altered after starting this stressful academic course. 33.5% of medical students had poor mental health status. There was a statistically significant association between poor mental health status in the age group less than 22 years old 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. This calls for further investigation with situation analysis, qualitative explorations, and surveys to explore the burden of such disorders in Bangladesh.

Keywords Medical student · Mental health · Depression · Sleeping pattern · Suicidal ideation · Bangladesh

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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 the undergraduate medical education curriculum is much longer (5 years course plus 1 year internship) than the other bachelor degrees (normally 4 years) (Bangladesh Medical & Dental Council, BMDC 2018; Zavlin et al. 2017). This lengthy schooling is also considered as a predictor for developing depression and anxiety (Mao et al. 2019). Alarming, 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 other different 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 of assessing the prevalence of depression, suicidal tendency, sleeping pattern, and the overall mental health status of medical students among students of two medical colleges of Dhaka city in Bangladesh.

Methods

Study design

This study was a cross-sectional study conducted between July and December 2013 at one public and one private

medical college in Dhaka. Only Bangladeshi medical students from 1st to 5th year were included by the convenience sampling method if they were available and provided written informed consent for the interview, had no diagnosed mental health disorders, were not pregnant, not known as a drug abuser, and not receiving treatment for any long-term health complications.

Sample size

We assumed that 17% of medical students have symptoms of moderate to severe depression in developing countries (Dyrbye et al. 2006). Considering a 95% confidence level and 5% precision, we needed approximately 217 medical students to estimate their depression status in Bangladesh (Cochran 2007; Krejcie and Morgan 1970). Considering a 10% non-response rate, we intended to collect data from 239 medical students. However, we collected data from 227 participants. Due to inconsistency and missing values, six data were discarded and, finally, 221 data were used for analysis. The response rate was 92.5%.

Data collection technique

A pretested, structured, self-administered questionnaire was used to collect data. Validated Patient Health Questionnaire-9 (PHQ-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 a self-reporting tool consisting of four sets of questions (A, B, C, D), each having seven items related to somatic symptoms, anxiety/insomnia, social dysfunction, and severe depression experienced in the last 2 weeks (Goldberg 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, the Bengali version was used. Quality assurance of the collected data was done by the study lead. The data were analyzed by SPSS version 18.0.

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 tests and for continuous variables, two-sample independent *t*-tests were performed to observe the

relationship with study groups. We considered $p < 0.05$ (two-tailed) as the margin of statistical significance for all tests. All the data were entered, managed, and cleaned by the study team and analyzed using SPSS software by a statistician (FA).

Results

Demographic information

Among the 221 respondents, 38.9% (86) were male and 61.1% (135) were female. 26.7% (59) students were in their 1st or 2nd years (first professional student), 51.6% (114) were in their 3rd or 4th years (second professional student), and 21.7% (48) were in their 5th year (final professional student). The mean age (\pm standard deviation, SD) of study subjects was 22.18 (\pm 1.65) years (ranging between 18 and 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 a joint family, and 10.9% (24) were from a single-parent family. 62.0% (137) of respondents were staying full time in hostels most of the time (Table 1). 12.2% of students had diagnosed family history with depression or other common mental health disorders. Excellent relationship with parents, siblings, family members, and friends consisted of 59.3%, 49.3%, 28.1%, and

39.8% of respondents, respectively; good relationship with parents, siblings, family members, and friends consisted of 26.7%, 31.7%, 42.5%, and 35.7%; mixed relationships with the respective relations were 5.4%, 4.5%, 6.8%, and 9.0%; and the rate of bad/very bad relationships with parents, siblings, other family members, and friends were much lower. Of the students, 3.2% were married, 57.9% were unmarried single, 32.1% were unmarried or in a relationship/affair, and 5.9% of students described their relationship as unmarried or complicated. 30.3% of students were satisfied with their present relationship, 9.0% were not satisfied, 9.0% said their interest in sexual relationship significantly decreased in the last year, 68.3% said that this interest remained the same, and this interest was fluctuating in 22.2% of respondents. The majority (78.3%) of respondents said that they willingly came to this study field, though 21.7% of students said that they did not, and were, rather, pressured by parents/family members to take this academic field. 82.4% said that their future ambition or career interest is related to their study field (MBBS). 62.9% of respondents were satisfied with their last academic result and 37.1% said the opposite. 38.0% of respondents mentioned internet browsing (mostly social media) as their way to pass leisure time, 13.1% mentioned sleeping, 9.5% stated reading novels and books, 3.6% traveling, 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 that they have no leisure time.

Mental health status and prevalence of depression

33.5% of 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 (score ≥ 15), moderate (score 10–14), and mild (score 5–9) depression was found in 3.6%, 14.5%, and 20.8% of medical students, respectively. 61.1% of the medical students did not have depression. Overall, different degrees of depression were found in 38.9% of medical students. Additionally, the percent distributions of the students' reported self-esteem were high (30%), moderate (38%), low (10%), and fluctuating (22%). 40.3% of the respondents had overall dissatisfaction of 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 that they feel tired and exhausted most of the time, 53.4% had occasional tiredness, and 16.7% rarely had tiredness and exhaustion. 39.8% of students had a tendency to fear about silly matters, 19.0% had frequent tendency to such actions, and the majority (91, 41.2%) had never experienced this fear. 24.0% of students described their mood as a roller coaster (frequent rise and fall of emotions), 17.6% stated their mood as a long, dark tunnel (feeling helpless, does not know what is going on around them), a bumpy road (often gets emotional but has control over it) was described by 43.0%

Table 1 Demographic characteristics of medical students

Variable	No.	%
Sex		
Female	135	61.1
Male	86	38.9
Study year		
1st	36	16.3
2nd	23	10.4
3rd	41	18.6
4th	73	33.0
5th	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 in hostels		
Full time	137	62.0
Part time	32	14.5
Outside	52	23.5

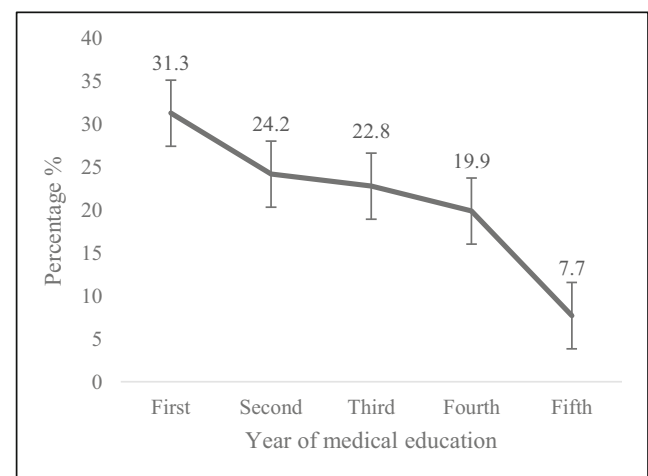
Table 2 Mental health and depression criteria status of students

Variable	No.	%
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 the last 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 with 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 planned 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

of respondents, and 15.4% described the state of their mood as a smooth ride (everything is fine in their mind). 15.8% of respondents experienced delusion (a false belief that does not correspond to the actual fact) or hallucination (hears, sees, tastes, or smells something which does not actually exist) at least once and 84.2% of respondents never experienced such events. Of the participants, 19.9% stated that they had a recent traumatic event (in the past year), such as divorce of parent/sibling, death of a family member/loved one, relationship breakup, etc. 47.1% of students had a feeling of being out of control, i.e., losing judgment. 10.0% of students tended to avoid other people and 53.4% of respondents had this tendency to someone in particular or a specific group of people.

Suicidal tendency

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

**Fig. 1** Suicidal trend of medical students by educational year

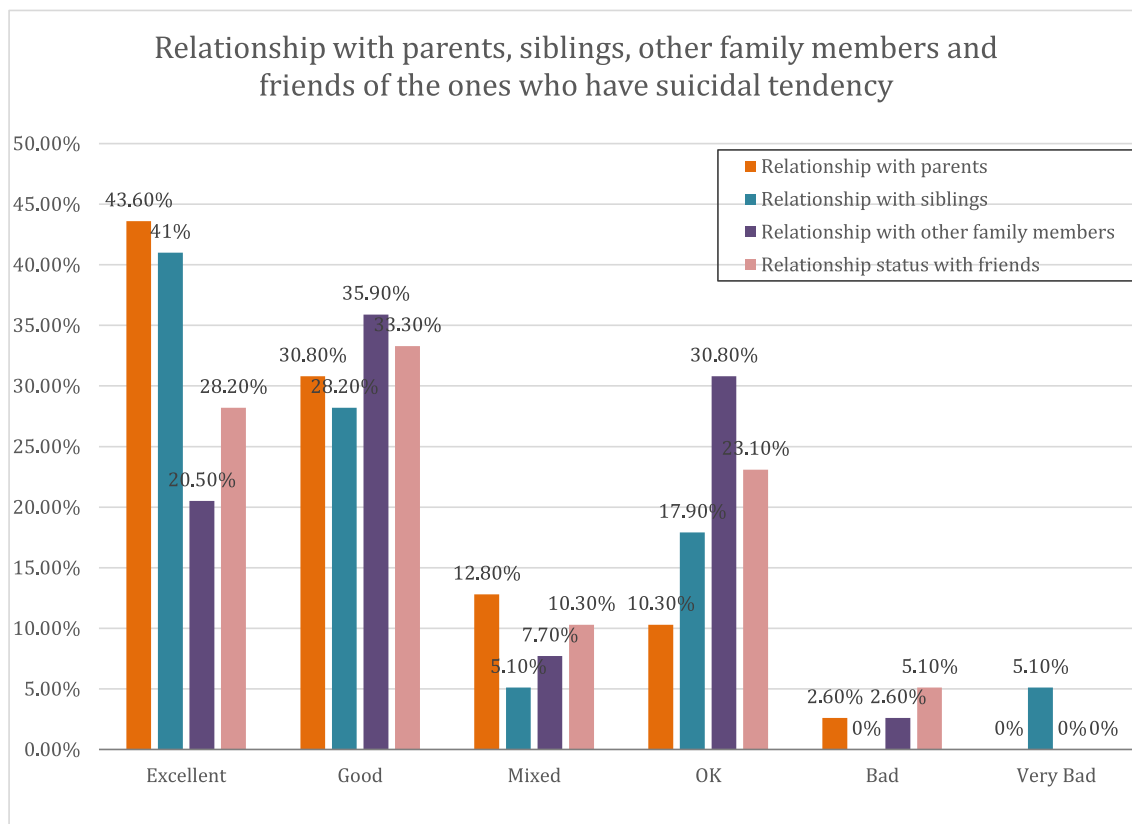


Fig. 2 Suicidal tendency of medical students in association with relationship with family and friends

prone to suicidal tendencies. Relevantly, those who had depression symptoms (87.20%) were more prone to suicidal thoughts/attempts.

Sleeping pattern of medical students

Figure 3 shows that 44.8% of students had an average of 6–8 h sleep in a normal working day, 26.2% had 4–6 h, 19.0% had 8–10 h, 6.3% had more than 10 h, and less than 4 h sleep was observed in 3.6% of respondents. Inadequate sleep (4–6 h) was found in 46.2% of medical students, 2–4 h of sleep was found in 28.5% of students, 15.4% had 6–8 h of sleep, 4.1% of respondents had 8–10 h, 1.4% had more than 10 h, and 4.5% had less than 2 h of sleep during examinations. More than half of the respondents (57.8%) described alterations of sleep cycles after starting their MBBS course. During vacation or holidays, inadequate sleep (4–6 h) was found in 7.2% of respondents, 10.0% had 6–8 h of sleep, 28.5% of respondents had 8–10 h of sleep, 28.5% had 10–12 h of sleep, 16.3% had more than 12 h of sleep, and 8.6% had less than 4 h of sleep. Also, 14.5% of respondents had events like nightmares, 10.4% had tossing/turning, and 5.4% had experience of frequent walking on most 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 often had difficulties in falling asleep.

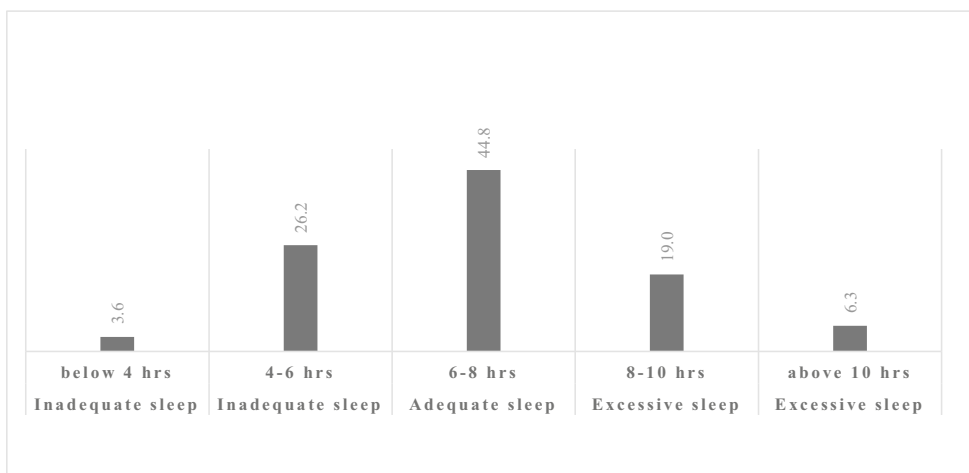
Association of mental health status with demographic variables

Male medical students had a poorer mental health status (55.4%) than female medical students. However, the difference was not statistically significant ($p = 0.13$). Poor mental health status was more prevalent (68.9%) in government medical college than in private medical college (31.1%) students, and the difference was not statistically significant ($p = 0.10$). Poor mental health status was more prevalent (79.7%) in students staying in hostels than those living in non-hostel residence. However, the difference was not statistically 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 4th to 5th year medical students ($p = 0.001$). (Table 3).

Discussion

This study was a brief analysis of the presentation of overall mental health status, depression severity, suicidal ideation, sleeping patterns, and socioeconomic demographics of medical students undergoing MBBS training in Bangladesh. The responding sample of 221 undergraduate medical students

Fig. 3 Sleeping pattern of medical students in a normal day



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. The 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 to new college education 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 for a long time, they continue to be common among medical students, and this may translate into a higher rate of mental health problems among physicians in future (World Health Organization, Regional Office for South-East Asia 2007). Brazeau et al. (2014) found in their study that medical students begin medical training

with better mental health indicators than similar aged college graduates in the general population. 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 a “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 suffers from mental health problems (NIMH Fact 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 that in the general population. This is comparable with the findings of two studies conducted in Iran, using the SCL-90-R questionnaire, where 20% and 25% of medical students had poor mental health status, respectively (Nojomi and Gharayee 2007; Sohrabi et al. 2019). In agreement with other studies, our study found that poor mental health status was significantly associated with students’ academic year of study, which means that medical students in lower age groups are more vulnerable to poor mental health (Rotenstein et al. 2016). Moreover, male students had a higher rate of poor mental health, suggesting a relationship with the gender of medical students.

Various studies conducted in 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, the cumulative percentage 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 conducted among medical students showed that the estimated prevalence of depression or depressive symptoms was 27% (Rotenstein et al. 2016). Alim et al. (2015) found a higher prevalence (81%) of depression,

Table 3 Association of mental health status with sociodemographic factors of medical students

Characteristics	Mental health status		p-Value
	Poor (n = 74)	Good (n = 147)	
Male	55.4	30.6	0.130
Government medical college	68.9	42.9	0.103
Staying in hostels	79.7	74.8	0.150
1st to 3rd academic study year	82.4	26.5	0.001

p-Values were calculated using the chi-square test

anxiety, or stress alone or in combination among 1st year medical students of a public medical college in Bangladesh. Besides, the prevalence of depression in our study was relatively lower than the prevalence reported in another study among university students, being 46.8% in Bangladesh (Hossain et al. 2019). In our study, although not statistically significant, poor mental health was more prevalent in public medical colleges (69%) as compared to private colleges (31%). On the other hand, two different studies conducted among medical students revealed prevalences of 23% and 12%, respectively (Brazeau et al. 2014). In contrast, a study from southern India reported that the prevalence of depression was 48.4% (Kumar et al. 2017). This wide range of prevalences of depression can be attributed to variations in the types of scales used in the screening and the different sociodemographic and geographic backgrounds of participating students.

Interestingly, depression was significantly higher among students in the lower age group and those studying in their 1st year of MBBS. This is consistent with a study conducted in Pakistan reporting higher rates of depression among students in earlier phases of their medical careers (Uttra et al. 2017). Moreover, Puthran et al. (2016) have found a reduced tendency of depression in later years of the medical course. 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 patient care. On the other hand, some available literature gives a contrasting picture of increase in the rates of depression as the student moves towards the 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 a good academic and student-friendly atmosphere in the institution, which 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 suggests that, from the 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 the lives of medical students should be investigated in studies with longer follow-up periods.

Medical students also have higher rates of suicidal ideation and suicide, and lower quality of life than the age-matched population (Schwenk et al. 2010). In our study, suicidal ideation among 1st year medical students found a rate of 31.3%, which is considerably higher, but it gradually reduced to 7.7%

among 5th year students. Previous research has reported a prevalence of suicidal ideation in medical students ranging from 9 to 48% (Kosik et al. 2017). Many factors have been reported to contribute to suicidal ideation, including specific behavioral 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 for 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 remained 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 that "life is not worth living", 27% of 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 research grounds; 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 do not seek help for depression. Use of mental healthcare services and depression is associated with stigma among the students. A study found stigma as a key barrier to seeking mental healthcare by 30% of 1st and 2nd year students, and this may lead to their seeking of 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 modeling, and mentorship by both faculty members and fellow students". We acknowledge that the findings of this study cannot be generalizable because of limited sample size, the convenience sampling technique, and the involvement of only two medical colleges from a single city. Further nationwide exploration is needed.

Conclusion

The findings of this study suggest a 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 and call for further investigation with situation analysis, qualitative explorations, and surveys to explore the burden of such disorders in order to design appropriate interventions for early detection, treatment, prevention, and creating awareness on mental health disorders among medical students and young physicians.

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Author contributions M.T.H. drafted the protocol, tool, translated the tool, analyzed, and prepared the draft report. R.D.G. supported the data collection and reviewed the manuscript. N.A.M., A.G., R.N.N., and M.S.T.H.K. supported the tool development, data collection, and took part in primary analysis. F.A. and S.H. prepared the tables and results section. V.P. prepared the discussion segment. H.R.M. and K.N.K. critically reviewed the manuscript. S.Y. supported data collection and reviewed the manuscript. N.I. supervised this project.

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Compliance with ethical standards

Conflict of interest The authors declare no competing interests.

Ethical considerations Approval was obtained from the ethics committee of American International University-Bangladesh. The procedures used in this study adhere to the tenets of the Declaration of Helsinki. Each participant provided written informed consent. Detailed study-related information, including objectives, brief methods, and data confidentiality procedure, was provided via a printed handout. Privacy and confidentiality of the respondents during data collection were maintained strictly.

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