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Original Article

Assessment of Depression status and its impact on academic performance of undergraduate medical students of Bangladesh

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Abstract

Background: Mental health is essential for the well-being of both individuals and communities. Undergraduate medical students travel medical course with tremendous psychological stress because of new environment, language difficulties, curricular overload and frequent examinations. This may hamper their academic performance and mental strength. This study aimed to assess the depression status and academic performance of undergraduate medical students of Bangladesh.

Methods: This cross-sectional study was performed among 1921 undergraduate medical students from five medical colleges in Bangladesh, who were selected using convenience sampling method. The study was conducted from July 2023 to June 2024. For assessment of depression level Patient Health Questionnaire (PHQ-9) was used. The academic performance of the students was self-reported by students as passed (regular/irregular) MBBS professional examinations.

Results: It was found that out of 1921 medical students, 18.4%, 34.6%, 27.6%, 14.5% and 4.8% had minimal, mild, moderate, moderately severe and severe depression respectively. Various sociodemographic factors were discovered to have an impact on different categories of depression severity. The combined percentages of moderate depression and moderately severe depression and mean depression scores were found significantly higher among female students than the male medical students. But the severe depression was significantly higher in male students than the female students. Majority of the participants passed regularly (>90%) in their professional examinations. Different categories of depression level have been observed to have an impact on academic performance.

Conclusion: The results of this study indicate that undergraduate medical students experience varying levels of depression. Various socio-demographic factors have been found to be significantly associated with different levels of depressive status. Additionally, academic performance has been shown to be influenced by these various levels of depression. Therefore, it is essential to address depression in order to enhance their academic success and mental resilience, ultimately leading to the development of competent physicians who can serve the community effectively.

Keywords: Psychological stress, Depression status, Academic performance, Undergraduate medical student, Mental health.

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Introduction:

The World Health Organization defines mental health as 'a state of well-being in which an individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and is able to make a contribution to his or her community'.[1] Mental health is essential for the well-being of both individuals and communities. Medical college is considered stressful due to the heavy workload, extensive study hours, frequent exams and lack of leisure hours. Medical college students deal with a lot of challenges that can be detrimental to

their mental health and lead to things like depression, poor academic performance, or dropping out of medical college.[2,3,4] At the onset of medical college, the mental health of medical students is comparable to that of their non-medical peers.[5] Numerous studies have indicated that this kind of depression starts to show signs as early as the first year of medical college.[4] Unfortunately, a number of studies suggest that students' depression level worsens during the course of undergraduate medical training.[7,8,9] In order to succeed during their training time, students must exhibit specific personal attributes assertiveness, the capacity to decline requests, confrontational abilities, self-esteem, and interpersonal relationships.[10] Ignorance of these attributes could endanger student's depression status, academic performance and eventually, the quality of care they give patients in clinical practice[11] Global prevalence rates of moderate to severe depression are reported to be 60.8 %.[12] In Bangladesh, the prevalence of depression has been found to be as high as 54,3 % among first year MBBS students of a public medical college.[13]

Understanding depression status and the relationship between depression status with socio-demographic characteristics and academic performance among undergraduate medical students is essential for both educators and healthcare institutions. This research aims at identifying the pattern, prevalence and severity of depression status among undergraduate medical students and its impacts on their academic achievements. By addressing these issues comprehensively, it is expected to provide valuable insights that can help to develop support systems and interventions to enhance the overall well-being and academic success of these future healthcare professionals.

Methods:

This descriptive type of cross-sectional study was conducted from 1st July 2023 to 30th June 2024 over a one year period among all four phases of undergraduate medical students. Data were collected from five medical colleges of Bangladesh. Out of the five, one government and two non-government medical colleges were located in Dhaka, and one government and one non-government medical colleges were located outside the Dhaka. Convenience sampling technique was adopted in this study to collect data. The sample size was 1921. Out of 1921, there were 515 students in the first phase, 500 in the second, 453 in the third, and 453 in the fourth phase. A self-administered semi structured questionnaire was used to collect data from the students. Depression was measured using the Patient Health Questionnaire (PHQ-9). A 4-point Likert scale serves as the foundation for this 9-item tool. The appropriate values for the scales are: not at all = 0, a few days = 1, more than half the days = 2, and almost every day = 3. The PHQ-9 total score for the nine items ranges from 0 to 27.With score "0-4" indicates minimal depression, "5-9" indicates mild depression, "10-14" indicates moderate depression, "15-19" moderately severe depression and "20-27" indicates severe depression. The instrument was pretested in medical colleges other than the study area. The instruments were further developed and finalize based upon the result of the pretesting. The students gave their prior permission before the study was conducted. Data was manually checked and edited after collection, and then these were processed and analyzed by using 'Statistical Package for Social Science' Version 19 (SPSS -19). Relationship between depression status with socio-demographic characteristics and academic performance were measured by appropriate statistical tests.

Results:

Table1: Socio-demographic characteristics of undergraduate medical students

Distribution of medical students by	**Male**	**Female**	**Others**
1) Gender	729 (37.5%)	1195 (96.2%)	**4 (0.2%)**
	Married	**Unmarried**	**Widow**
2) Marital status (n=1921)	48(2.5%)	1867(97.4%)	2 (0.1%)
	Government	**Non- government**	
3) Ownership of medical college (n=1921)	908 (47.2%)	1013 (52.8%)	

	Dhaka			**Outside Dhaka**	
4) Location of medical college (n=1921)	1355 (70.5%)			566 (29.5%)	
	Hostel		**With family**	**Mess**	
5) Residence (n=1921,multiple response)	1220 (60.5%)		662(32.9%)	133 (6.6%)	
	Family		**Self**	**Other sources**	
6) Source of educational expenditure (n=1921,Multiple response)	1804 (80.9%)		400 (17.9%)	26 (1.2%)	
	Up to 50,000 Tk	50,000-100,000 Tk	100,000-500,000 Tk	500,000-10,00000 Tk	1000000-2000000 Tk
7) Monthly family income (n=1496)	914(61.1%)	454(30.3%)	119(8%)	7(0.5%)	2(0.1%)
	Tuition	**Coaching**	**Others**	**None**	
8) Involvement in income generating activities(n=1921,multiple response)	335 (17.1%)	73 (3.7%)	41 (2.1%)	1514 (77.1%)	

It was revealed that the majority of the participants were female, unmarried, and from non-government medical colleges of Dhaka. The majority (80.9%) of them continued their education, remaining in hostels, and their educational expenditure was borne mainly by their family and 17.9% participants contributed by themselves. The majority of the participant's monthly family income was less than or equal to 50,000 taka, and the majority did not engage in any income-generating activities.

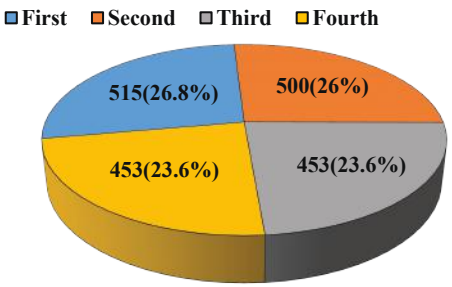

Figure 1 Distribution of the medical students by their academic phase (n = 1921)
It was revealed that majority of the participants were from first academic phase.

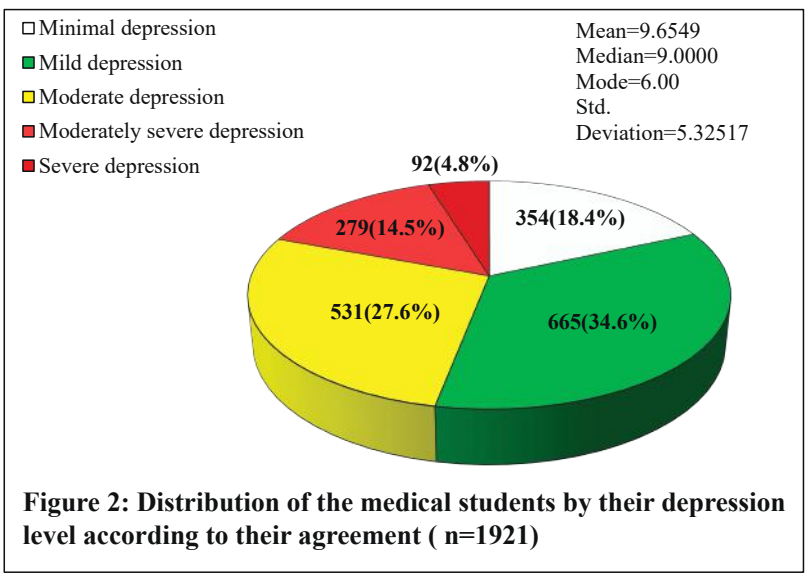

Figure 2: Distribution of the medical students by their depression level according to their agreement (n=1921)

It was revealed that out of 1921 medical students, 18.4%, 34.6%, 27.6%, 14.5% and 4.8% had minimal, mild, moderate, moderately severe and severe depression respectively. The mean and standard deviation of their depression score were 9.6549 and 5.32517 respectively.

Table 2: Distribution of medical students by their gender and depression level (n=1917)

Gender	Depression level					Statistical inference
	Minimal	Mild	Moderate	Moderately severe	Seve re	
Male	152 21.1%	277 38.5%	165 22.9%	89 12.4%	37 5.1%	Pearson Chi -Square = 22.660 df =4 P value (2 sided) = .000
Female	202 16.9%	386 32.2%	365 30.5%	189 15.8%	55 4.6%	
	Depression score					Statistical inference
	n	Mean	Standard deviation			
Male	720	9.0903	5.42096			F = .000 (P of F = .988) t = -3.612, df =1915, P of t =.000
Female	1197	9.9950	5.24261			

It was revealed that the combined percentages of moderate depression and moderately severe depression and mean depression scores were higher among female students than the male medical students. But the severe depression was slightly higher in male students than the female students. And these differences were statistically highly significant both by chi-square test (P=.000) and independent sample t test (P=.000).

Table 3: Distribution of medical students by their depression level and location and ownership of medical colleges (n=1921)

Location of medica l colleges	n	Depression level		Statistical inference
		Mean	Standard deviation	
Dhaka	1355	9.6598	5.31032	F = .000 (P of F = .986) t = .063, df =1919, P of t =.950
Outside Dhaka	566	9.6431	5.36523	
Ownership of medical colleges	**n**	**Depression level**		**Statistical inference**
		Mean	**Standard deviation**	
Govt.	908	9.4659	5.19201	F = 1.259 (P of F = .262) t = -1.473, df =1909, P of t =.141
Non govt.	1013	9.8243	5.43873	

It was revealed that that there was no significant difference of mean depression score of the medical students of Dhaka and outside Dhaka (P=.950).Also the mean depression score of the medical students of the government and non-government medical colleges were not statistically significant (P=.141)

Table 4: Distribution of medical students by their marital status and depression level (n=1919)

Marital status	Depression level					Statistical inference
	Minimal depression	Mild depression	Moderate depression	Moderately depression	Severe	
Married	8 16.7%	15 31.3%	15 31.3%	7 14.6%	3 6.3%	Pearson Chi -Square = .709 df =4 P value (2 sided) = .950
Unmarried	346 18.5%	650 34.7%	514 27.5%	272 14.5%	89 4.8%	
	Depression score					Statistical inference
	n	Mean	Standard deviation			
Married	48	10.0625	5.82513			F = .334 (P of F = .563) t = .539, df =1917, P of t =.590
Unmarried	1871	9.6424	5.31549			

It was revealed that the percentage of moderate and moderately severe depression were higher in married students than the unmarried medical students. Similarly, the mean score of depression were higher in married medical students than the unmarried students. But these differences were not statistically significant (P=.950 and P=.590 respectively).

Table 5: Relation between the medical students' depression level with their academic phases (n =1921)

Depression level	Academic phase of the students				Statistical inference
	First (n=515)	Second (n=500)	Third (n=453)	Fourth (n=453)	
Minimal	94 26.6%	92 26.0%	90 25.4%	78 22.0%	Pearson Chi -Square = 11.216 df =9 P value (2 sided) = .261
Mild	178 26.8%	17 8 26.8%	156 23.5%	153 23.0%	
Moderate	141 26.6%	137 25.8%	123 23.2%	130 24.5%	
Moderately severe	74 26.5%	71 25.4%	63 22.6%	71 25.4%	
Severe	28 30.4%	22 23.9%	21 22.8%	21 22.8%	
Mean (Std. dev.)	9.7592 (5.44662)	9.4780 (5.22687)	9.4768 (5.19892)	9.9095 (5.42105)	F=.764, df=3 (BG) & 1917 (WG), P =.514

It was revealed that combined percentages and mean score of of minimal, mild, moderate, moderately severe and severe depression scores were highest among students of first academic phase than the other academic phases. Though the percentages of minimal, mild, moderate and moderately severe and severe depression level and the mean depression score did not differ statistically both by chi-square test (P=0.261) and one way ANOVA (P= 0.514).

Table 6: Relation between the medical students' depression level with their monthly family income (n =1921)

Table 6 : Relation between the medical students' depression level with their monthly family income (n =1921) Depression group	Income in taka			Sta tistical inference
	</=50000	50001 - 100000	>100001	
Minimal	179 50.6%	75 21.2%	100 28.2%	Pearson Chi -Square value = 5.855 df = 8 P value (2 -sided) = .663
Mild	303 45.6%	173 26.0%	189 28.4%	
Moderate	262 49.3%	118 22.2%	151 28.4%	
Modera tely severe	126 45.2%	65 23.3%	88 31.5%	
Severe	44 47.8%	23 25.0%	25 27.2%	

It was revealed that that minimal, mild, moderate, moderately severe and severe depression level were higher among low income groups. Although these depression levels differ widely from lower to both middle and higher income groups but these depression levels did not differ widely between middle and higher income group. But these differences were statistically not significant (chi-square=5.855, df= 8, P=.663)

Table 7: Distribution of medical students by their way of passing in the professional examinations

Way of passing in prof. exam.	Professional examination					
	1st Prof.		2nd Prof.		3rd Prof.	
	Frequency	%	Frequency	%	Frequency	%
Regular	844	92.95	411	90.53	359	90.66
Ir regular	64	7.048	43	9.471	37	9.343
Total	908	100	454	100	396	100

It was revealed that majority of the students passed regularly in their professional examinations.

Table 8: Distribution of medical students by their level of depression in the professional examinations

Exam.	Regularity in passing	Frequency (%) of depression level		Statistical inference
		Minimal or Mild or Moderate	Moderately severe or Severe	
1st prof.	Regular	687 (81.4%)	157 (18.6%)	Pearson Chi -Square value = 6.064, df = 1, P va lue (2 -sided) = 0.014
	Irregular	44(68.8%)	20(31.3%)	
2nd prof.	Regular	325(79.1%)	86(20.9%)	Pearson Chi -Square value = 0.516, df = 1, P value (2 -sided) = .473
	Irregular	36(83.7%)	7(16.3%)	
3rd prof.	Regular	287(79.9%)	72(20.1%)	Pearson Chi -Square value = 1.895, df = 1, P value (2 -sided) = 0.169
	Irregular	26(70.3%)	11(29.7%)	

It was revealed that majority of the students passed regularly in their professional examinations.
Moderate or moderately severe depression level were higher among the students who passed irregularly in in 1st and 3rd professional examinations professional examinations. But these differences were statistically significant only in 1st professional examination.

Discussion:

As per the 2019 Global Burden of Diseases (GBD) study, mental diseases have become one of the top 10 global causes of burden since 1990[14].The current study showed that (Figure 2), 18.4%, 34.6%%, 27.6%, 14.5% and 4.8% had minimal, mild, moderate, moderately severe and severe depression respectively. Thus it indicates that percentage of medical students suffering from depression is notably high. These results were remarkably comparable to those of Karim et al. (2022)[15]. He studied 840 medical students from four public medical colleges in Bangladesh who were chosen at random for the study. He found that 340 (40.49%) had mild depression, 164 (19.52%) had moderate depression, 61 (7.26%) had moderately severe depression, and 17 (2.02%) had severe depression. Of the total, 258, 30.71% had minimal depression. Except for the minimal depression other categories were found nearly equal. These little variation may be due to small sample size and also because only public medical colleges were included. Using DASS surveys, Aghajani Liasi et al. (2021) analyzed medical students at Islamic Azad University of Tehran in 2017[16]. He found that 4 students (4.2%) had extreme severe, 6 students (6.3%) had severe, 13 students (13.5%) had moderate and 13 students (13.5%) had mild depression. The small sample size (120 students) and varied measuring scale could be the cause of the little discrepancy. Shawahna et al., 2020) carried out a study among the medical students in a major university in the West Bank of Palestine[17]. In her study out of 286 students, minimal depression was among 162 (56.6%), mild depression was among 58 (20.3%), moderate depression was among 40 (14.0%) and severe depression was among 26 (9.1%) students. These contrast findings may be due to different measuring scale (BDI-II) and small sample size.

Table 2 showed that the mean depression score was higher among female students than the male medical

students. And these differences were statistically highly significant both by chi-square test (P=0.000) and independent sample t test (P=0.000). Azad et al., (2017) in his study in a private medical college of Rawalpindi found that the frequency was more among the female than male students and gender is significantly associated with depression (P=0.3)[18]. Kebede et al. (2019) in his study at St. Paul Hospital millennium medical college, Addis Ababa, Ethiopia found the frequency of depression was slightly more in female than male students although different measuring scale were used (HADS SCALE)[19]. But Shawahna et al. (2020) in her study found no significant association with gender (P= 0.163). This may be due to smallness of sample size and different scale of measurement[17].

Table 3 showed students of the non-government medical colleges had higher mean depression score (7.5617) than the students of government medical colleges (6.3877), but this difference was not statistically significant (P=.141). According to a study by Ahad et al. (2021), 122 students (60.70%) and 169 students (55.23%) in two government and three private dentistry colleges in North India were found to be depressed[20]. They also reported that there was no statistically significant difference in depression rate between government and private medical college students, according to the chi-square test (chi-square=1.48, P=0.223).

According to Table 4, married medical students had a higher mean depression score (10.0625) than unmarried students (9.6424). The value of P=.590 indicates that these differences were not statistically significant. Abed and Abd El-Raouf (2021) surveyed 597 medical students at the Benha Faculty of Medicine at Benha University for their study[21]. He found during his investigation that 499 students were unmarried and 8 students were married. For married students, the mean (±SD) depression score was 11.38 (5.6), while for unmarried students, it was 11.79. The variation in results could be attributed to the small sample size. However, they found that there was no statistically significant difference (P= 0.146) of depression score between married and unmarried students. But Shawahna et al. (2020) in her study found the similar picture with the current studies that the median depression score were higher among the married than unmarried students and the difference were not statistically significant (P=0.762)[17].

Table 5 showed the percentage and mean depression score of the students with their academic phases. The percentages of different depression level did not differ statistically by chi-square test (P=.261) among the students of different academic phases and the mean depression score of the students of different academic phases was also not statistically significantly different by one way ANOVA (P=.514). Shawahna et al. (2020) found in their study that BDI-II scores were significantly (P-value < 0.01) lower for students in the clinical stage (academic years 4 to 6) than for students in the basic stage (academic years 1 to 3)[17].Although the mean PHQ 9 score in the current study was greater in the pre-clinical than in the clinical stages, there was no significant difference (P=.514) between the two phases. This could be brought on by being in a new setting, making friends outside of one's family, or experiencing a novel teaching-learning procedure. In his research, Ahad et al. (2021) found that the prevalence of depression increased during the first year, decreased very slightly during the second, and then continued to rise until the final year[20]. However, in the current study, the mean score trended higher in the first phase, decreased somewhat in the second, remained stable in the third, and increased in the final phase. Ahad et al. found, in line with the current study, that there was no discernible difference in the prevalence of depression (P= 0.052) between clinical and preclinical students (Phase 1 & 2)[20].

In this study it was observed (Table 6) that, minimal, mild, moderate, moderately severe and severe depression level were higher among low income groups. Although these depression levels differ widely from lower to both middle and higher income groups but these differences were not statistically significant (chi-square=5.855, df=8, P=.663). Shawahna et al. (2020) discovered findings that were nearly identical to the current study[17]. In her study, she observed that while students' median depression scores were higher in lower-class groups than in higher-class groups, these differences were not statistically significant (P=0.194). Aghajani Liasi et al. (2021) noticed no significant association (P=0.56) between depression and financial status, which is

consistent with the findings of the current research[16].

Majority of the students (90%) passed regularly in their professional examination (Table 7) but with the different category of that minimum or mild or moderate depression level were higher among the students who passed regularly in 1st and 3rd professional examinations. On the other hand, moderate or moderately severe depression level were higher among the students who passed irregularly in 1st and 3rd professional examinations professional examinations. But these differences were statistically significant only in 1st professional examination (table 8). Thus the study indicates that the level of depressions are more who passed irregularly in their professional examinations. Similar findings were found by Shawahna et al. (2020) that there was negative correlation (Correlation coefficient −0.05) with GPA score (out of 4, GPA is divided into >3 and<3) but this correlation was not statistically significant (P= 0.335)[17]. In her study she also found that students who had higher GPA and those who did not fail any subject during their medical studies had significantly (P-value < 0.05) lower BDI-II scores and GPA remained significantly associated (P value < 0.01) in multiple linear regression analysis. These findings is similar in case of moderate or moderately severe depression of the current study. Aghajani Liasi et al. (2021) found no significant relationship between students' academic average and depression (P= 0.46).This may be due to smallness of sample size (120)[16].

Conclusion:

Based on the findings of the present study it can be concluded that a number undergraduate medical student suffers from varying degrees of depression. The combined percentages of moderate depression and moderately severe depression and mean depression scores were significantly higher among female students than the male medical students. But the severe depression was significantly higher in male students than the female students. Location and ownership of medical colleges did have any significant relationship with depression status. Although different categories of depression level had been found between married and unmarried students, among different academic phases and different monthly income group but their significant relationship was not established. Overall the academic achievements of the students appeared good. However the study revealed that moderate and moderately severe depression were found higher among the irregularly passed students Therefore, addressing depression is essential for enhancing their academic performance and mental resilience, which will ultimately aid in developing competent physicians who can effectively support the community.

Authors' Statements:

Ethical approval:

The ethical approval of the protocol was taken from Institutional Review Board of Centre for Medical Education and individual consent regarding interview and recording the response was obtained from the interviewee.

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Author's Contribution:

1.Dr. Inamur Rahman: Drafting of the article

2.Professor Dr. Kazi Khairul Alam: Conceptualiation, data analysis and supervision.

3.Dr. Mesbah Uddin Noman: Providing access to necessary resources and and creating figures and tables.

4.Dr. Faruk Ahommed: helps in data collection and questionnaire preparation.

5.Dr. Abul Kashem Shakir Ahmed: helps in data collection and questionnaire preparation.

6.Dr. Mohammad Saiful Islam: Conceptualiation, data collection and questionnaire preparation.

7.Professor Dr. Md. Abdal Miah: Supervision and correction of article

8.Dr. Mohammad Mohibur Rahman: Providing access to necessary resources and manuscript drafting.

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