

ORIGINAL RESEARCH

Depression, anxiety, stress, and suicidal behavior among Bangladeshi undergraduate rehabilitation students: An observational study amidst the COVID-19 pandemic

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Abstract

Background and Aims: Common mental health symptoms (CMHS) like depressive moods, anxiety, and stress are the underlying causes of suicidal behavior. The incidence of suicide is higher among Bangladeshi students. Due to the pandemic, students of health/rehabilitation sciences are at the most significant risk. This study aimed to measure the prevalence rate and predicting factors for depression, anxiety and stress, suicidal ideation, and suicide attempts in Bangladeshi undergraduate rehabilitation students.

Methods: This cross-sectional study included data from 731 participants. Descriptive analyses estimated prevalence, and multivariate logistic regression models identified the factors associated with CMHS and suicidal behavior after adjusting the confounders.

Results: The result shows a high prevalence of moderate to very severe CMHS and a higher risk of suicidal ideation among rehabilitation students. Sociodemographic factors, illness, behavior, institution, and subject-related issues were identified as the predicting factors of CMHS and suicidal behavior. The students suffering from mental health symptoms reported suicidal ideation and attempted at a significantly higher rate.

Conclusion: To deal with CHMS and suicide risk, a holistic, supportive approach from government and academic institutions are essential for minimizing the predicting factors identified by this study. The study is helpful for the government regulatory body and policymakers to take immediate steps for preventing CMHS and suicidal behavior among rehabilitation students in Bangladesh.

KEYWORDS

anxiety, Bangladesh, COVID-19 pandemic, depression, rehabilitation, stress, suicidal behavior, undergraduate student

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1 | INTRODUCTION

Physiotherapists, Occupational therapists, and Speech and Language therapists are the three significant professionals representing a rehabilitation team.¹ Bangladesh has a few (about 12/million) rehabilitation professionals, and they are poorly regulated, merely recognized, and have yet to be included in mainstream health services.²⁻⁵ The country started the undergraduate program in rehabilitation since her independence as a part of the government initiative. The development's initiatives include unification of course curriculum, determining eligibility criteria, and regulating education, employment, and clinical practice through the government regulatory body.^{2,6} However, most of these initiatives are poorly monitored and filed on official paper only without proper implementation. As a result, large-scale rehabilitation services are provided and patronized by nongovernment organizations as a charity model. Qualified professionals mainly serve in private chambers, but lack of regulation, physician dominance, and professional conflict with physicians drag them to challenges and lower their credibility.² However, the strength of the rehabilitation professionals arises from the extensive service demand: 10%–15% of the population are persons with disabilities,⁷ increment of the elderly population,⁸ and survivors of non-communicable disease.⁹

Students of rehabilitation have the dream of serving as a health professional inspired by this colossal service demand. The undergraduate programs are affiliated with the university, and the professional scope of health service contribution for the imposed social demand motivates them to enter a rehabilitation degree program. Gradually, they observe poor staffing, a lower standard of the educational environment, and poor regulation.⁶ These professional issues and comparative inequality with other health professionals are driving factors for depressive symptoms. There is a higher chance of developing mental health symptoms or even suicidal behavior among rehabilitation students. The reason might not be solely professional issues, but mental health issues are a growing concern among university students in Bangladesh. These common mental health symptoms (CMHS) can be evident through depression, anxiety, and stress.

In Bangladesh, depression, anxiety, and stress prevalence are as high as 54.3%, 64.8%, and 59.0%, respectively.¹⁰ Previous studies suggested that other factors, academic environment, and subject-related future worries are strongly associated with mental health problems in Bangladeshi undergraduate universities.^{10,11} Additionally, the COVID-19 pandemic poses an enormous threat to the mental health of the world population. This unprecedented situation has victimized students by putting them at a higher risk of mental health problems.¹² A study conducted among Bangladeshi university students suggested that at the time of the COVID-19 pandemic rise, 62.9%, 63.6%, and 58.6% of university students showed depression, anxiety, and stress symptoms, respectively.¹³

CMHS is found to be the underlying factor for most suicide cases.¹⁴⁻¹⁷ The incidence of suicide is even higher among the

student cohort in Bangladesh.^{18,19} Specifically, health science students are at the most significant risk,²⁰ and this pandemic fueled the fire. Our previous study among Bangladeshi rehabilitation professionals and Pakistani rehabilitation students revealed a remarkably high prevalence of CMHS.^{6,21} Given this high prevalence among these cohorts suggested additional study among Bangladeshi rehabilitation students. Therefore, the current study aimed to (1) measure the prevalence rate of depression, anxiety and stress, suicidal ideation, and suicide attempt; (2) identify the factors predicting depression, anxiety, stress, suicidal ideation, and suicidal attempt among undergraduate rehabilitation students in Bangladesh.

2 | MATERIALS AND METHODS

2.1 | Participants and data collection

This cross-sectional study was conducted between January 7 and March 27, 2021. We have collected data from the students studying Bachelor of Science in Physiotherapy, Occupational Therapy, and Speech and Language Therapy. Students from all the institutes of Bangladesh had participated in this study. A margin of 2.5% error, a confidence level of 95%, and a response distribution of 50% were used to calculate the sample size to target a population of 1200 students and secure a minimum sample size of 675 participants. This sample size calculation technique was found suitable in a previous Bangladeshi study.²² However, 800 undergraduate rehabilitation students were invited by email provided by respective institutes. By giving a 94.1% response rate, 753 students have filled and submitted the provided questionnaire prepared by the "Google Form" platform. However, we have considered data from 731 participants who answered all the questions consistently for the final analysis.

2.2 | Sociodemographic, behavior, health, and study subject-related factors

A wide range of sociodemographic, behavioral, and health-related factors, study subject, institute, and future career-related factors were included in the self-reported questionnaire.

The sociodemographic factors asked in the questionnaire comprised of age, gender, relationship status, family type, resident type, monthly family income, regular religious practice (yes/no), regular exercise habit (yes/no), smoking habit (yes/no), average hours of sleep per night, the satisfaction of sleep quality (yes/no), and hours of daily social media use. In this section, participants were asked if they had suffered from physical and mental conditions in the past year, if they had had a hard time last year and if they had COVID-19. Participants were also asked if they take any anti-psychotic drug or sleeping pill. All these questions have a dichotomous answer (yes/no).

Study subject, institute, and future career-related factors include study year (first to final year), satisfaction regarding the academic environment, and academic result. Participants were asked questions about subject suitability and their future, for example, (a) do you think rehabilitation is suitable for you, (b) did you know about rehabilitation before you were admitted here, (c) do you think the future of rehabilitation science (RS) bright, (d) will you change this subject if get an opportunity, (e) do you suffer from identity crisis or inferiority complex as a rehabilitation student, (f) do you think admitting here was a right decision? Furthermore, participants were also asked about a future career question and the persons who influenced them to admit to RS (specify what RS is). Finally, participants were asked two more general questions: (a) Do you think the mental health problems you are suffering are COVID-19 related, (b) Do you think that the mental health problems you are suffering are subject related.

2.3 | Depression, Anxiety and Stress Scale (DASS-21)

This study used the Bangla version Depression, Anxiety, and Stress Scale-21 (DASS-21)^{10,13,23} to assess depression, anxiety, and stress. Predefined thresholds for mild, moderate to severe, or extremely severe symptom levels were used to categorize depression, anxiety, and stress levels. For depression symptoms, cutoff points were as follows: normal 0–9, mild 10–13, moderate 14–20, severe 21–27, and extremely severe +28. For anxiety, 0–7, 8–9, 10–14, 15–19, and +20 points were considered as normal, mild, moderate, severe, and extremely severe symptoms, respectively. Stress symptoms were categorized as normal (0–14), mild (15–18), moderate (19–25), severe (26–33), and extremely severe +34.^{6,13}

2.4 | Suicidal behavior

To measure suicidal behavior, a suicidal behavior questionnaire contained two items that were included: (1) suicidal ideation (have you seriously considered suicide in the last 12 months?), and (2) attempted suicide (have you attempted suicide in last year?).^{11,24,25} The response options were yes and no.

2.5 | Data analysis

SPSS version 22.0 software was applied for data analysis. For descriptive analysis, moderate, severe, and very severe were combined to calculate depression, anxiety, and stress scores on the DASS-21.^{6,26,27} Descriptive statistics (e.g., frequencies, percentages, and χ^2 /Fisher's exact tests) were used for categorical data. After adjusting the confounders, multivariable logistic regression models were employed to identify the factors associated with mental health symptoms. The results were interpreted with 95%

confidence intervals (CIs) and p values. We consider a p -value less than or equal to 0.05 as significant.

3 | RESULTS

3.1 | Prevalence of mental health symptoms, suicidal ideation, and suicide attempt

The prevalence of moderate to very severe depression, anxiety and stress were 44.2%, 50.5%, and 31.3%. However, 14% mild, 22% moderate, 10% severe, and 11% very severe depression; 8% mild, 24% moderate, 10% severe, and 16% very severe anxiety; 13% mild and moderate, 11% severe, and 7% very severe stress symptoms were recorded in this study. On the other hand, 16.3% of participants had suicidal ideation in the last year, and 3% attempted suicide. Details can be found in Tables 1, 2, and Figure 1.

3.2 | Sociodemographic, behavior, and health-related factors, and mental health symptoms and suicidal ideation

Around half (48.56%) of the participants were female; the mean age was 22.20 (SD = 2.33). Significantly higher prevalence has been found among female participants for depression ($p = 0.050$), anxiety ($p = 0.008$), stress ($p = 0.001$) and suicidal ideation ($p = 0.025$). In this study, 76% of students were single, 80% have come from a nuclear family, 39% lived in their own house, 45% were from a middle-class family (monthly family income 15,000–30,000 [currency?]), 46% were from rural villages. However, those who lived in a rented house reported anxiety ($p = 0.027$) and stress ($p = 0.006$) at a higher rate. Similarly, participants from middle-income family showed higher stress symptoms ($p = 0.050$) and suicidal ideation ($p = 0.005$).

A total of 68% of participants said they do not perform regular exercise, 69% practice religion, and only 7% smoke regularly. Statistically, a significantly higher rate of depression, anxiety, stress, and suicidal ideation has been found in those who do not perform the exercise and religious practice regularly, $p = 0.001/0.023$, $p = 0.008/0.111$, $p < 0.001/0.001$, and $p = 0.026/0.022$, respectively for depression, anxiety, stress, and suicidal ideation.

In this study, 50% of participants said that they had suffered from physical illness last year, while 40% and 70% had faced mental health conditions and hard times, respectively. Though 30% of the participants were not satisfied with their sleep quality, only less than 7% use sleeping pill or similar drugs. Only 33% of participants said they used to sleep <7 h at night, and 18.2% spent >6 h on screen. However, all the participants mentioned above showed a statistically significant higher prevalence of depression, anxiety, stress, and suicidal ideation. Details can be found in Table 1.

TABLE 1 Descriptive analysis

Variables	N (%)	Depression		Anxiety		Stress		Suicidal ideation	
		Yes, n (%)	p value	Yes, n (%)	p value	Yes, n (%)	p value	Yes, n (%)	p value
Total	731 (100)	323 (44.2)	-	369 (50.5)	-	229 (31.3)	-	119 (16.3)	-
Subject			0.269		0.519		0.474		0.675
Physiotherapy	561 (76.85)	256 (45.6)		288 (51.3)		181 (32.3)		93 (16.6)	
Occupational therapy	60 (8.21)	26 (43.3)		31 (51.7)		19 (31.7)		11 (18.3)	
Speech therapy	110 (15.04)	41 (37.3)		50 (45.5)		29 (26.4)		15 (13.6)	
Gender			0.050		0.008		0.001		0.025
Female	355 (48.56)	170 (47.9)		197 (55.5)		133 (37.5)		69 (19.4)	
Male	376 (51.44)	153 (40.7)		172 (45.7)		96 (25.5)		50 (13.3)	
Age group			0.964		0.342		0.825		0.247
≤20	148 (20.25)	66 (44.6)		80 (54.1)		48 (32.4)		22 (14.9)	
21–24	499 (68.26)	221 (44.3)		252 (50.5)		157 (31.5)		88 (17.6)	
≥25	84 (11.5)	36 (42.9)		37 (44)		24 (28.6)		9 (10.7)	
Relationship status			0.899		0.118		0.100		0.470
Single	560 (76.6)	245 (43.8)		276 (49)		166 (29.6)		86 (15.4)	
In a relationship	102 (13.95)	46 (45.1)		50 (49)		34 (33.3)		20 (19.6)	
Married	69 (9.4)	32 (46.4)		43 (62.3)		29 (42)		13 (18.8)	
Family type			0.533		0.125		0.296		0.208
Nuclear	590 (80.7)	190 (32.2)		306 (51.9)		190 (32.2)		101 (17.1)	
Joint	141 (19.3)	39 (27.7)		63 (44.7)		39 (27.7)		18 (12.8)	
Resident type			0.143		0.027		0.006		0.149
Rented	213 (29.14)	106 (49.8)		124 (58.2)		85 (39.9)		39 (18.3)	
Own	292 (39.95)	124 (42.5)		137 (46.9)		81 (27.7)		38 (13)	
Hostel/mess	226 (30.92)	93 (41.2)		108 (47.8)		63 (27.9)		42 (18.6)	
Family income (BDT)			0.331		0.050		0.362		0.005
≤15,000	167 (22.85)	81 (48.5)		97 (58.1)		58 (34.7)		40 (24)	
15,000–30,000	330 (45.14)	146 (44.2)		165 (50.0)		95 (28.8)		51 (15.5)	
≥30,000	234 (32.01)	96 (41.0)		107 (45.7)		76 (32.5)		28 (12.0)	
Permanent address			0.701		0.996		0.786		0.311
Village	336 (45.96)	143 (42.6)		169 (50.3)		104 (31.0)		48 (14.3)	
Town	237 (32.42)	109 (46.0)		120 (50.6)		78 (32.9)		40 (16.9)	
Semi-town	158 (21.61)	71 (44.9)		80 (50.6)		47 (29.7)		31 (19.6)	
Perform 30 min physical exercise			0.001		0.008		<0.001		0.026
No	502 (68.67)	243 (48.4)		270 (53.8)		183 (36.5)		92 (18.3)	
Yes	229 (31.33)	80 (34.9)		99 (43.2)		46 (20.1)		27 (11.8)	
Regular religious practice			0.023		0.111		0.001		0.022
No	224 (30.64)	113 (50.4)		123 (54.9)		90 (40.2)		47 (21.0)	
Yes	507 (69.36)	210 (41.4)		246 (48.5)		139 (27.4)		72 (14.2)	
Smoking habit			0.684		0.354		0.461		0.193
No	678 (92.75)	301 (44.4)		339 (50.0)		210 (31.0)		107 (15.8)	
Yes	53 (7.25)	22 (41.5)		30 (56.6)		19 (35.8)		12 (22.6)	

TABLE 1 (Continued)

Variables	N (%)	Depression		Anxiety		Stress		Suicidal ideation	
		Yes, n (%)	p value	Yes, n (%)	p value	Yes, n (%)	p value	Yes, n (%)	p value
<i>Got physical illness last year</i>			0.004		<0.001		<0.001		0.013
No	365 (49.9)	142 (38.9)		143 (39.2)		83 (22.7)		47 (12.9)	
Yes	366 (50.1)	181 (49.5)		226 (61.7)		146 (39.9)		72 (19.7)	
<i>Got mental illness last year</i>			<0.001		<0.001		<0.001		<0.001
No	434 (59.4)	139 (32)		165 (38)		85 (19.6)		33 (7.6)	
Yes	297 (40.6)	184 (62)		204 (68.7)		144 (48.5)		86 (29)	
<i>Passed hard time last year</i>			<0.001		<0.001		<0.001		<0.001
No	220 (30.1)	47 (21.4)		66 (30)		29 (13.2)		6 (2.7)	
Yes	511 (69.9)	276 (54)		303 (59.3)		200 (39.1)		113 (22.1)	
<i>Use sleeping pill</i>			<0.001		<0.001		<0.001		<0.001
No	680 (93.02)	287 (42.2)		327 (48.1)		199 (29.3)		100 (14.7)	
Yes	51 (6.98)	36 (70.6)		42 (82.4)		30 (58.8)		19 (37.3)	
<i>Satisfied with sleeping quality</i>			<0.001		<0.001		<0.001		<0.001
No	216 (29.55)	144 (66.7)		151 (69.9)		115 (53.2)		58 (26.9)	
Yes	515 (70.45)	179 (34.8)		218 (42.3)		114 (22.1)		61 (11.8)	
<i>Night time sleeping hour</i>			0.001		0.006		<0.001		<0.001
Normal 7–9	449 (61.42)	181 (40.3)		213 (47.4)		112 (24.9)		53 (11.8)	
More than normal >9	38 (5.2)	12 (31.6)		14 (36.8)		10 (26.3)		7 (18.4)	
Less than normal <7	244 (33.38)	130 (53.3)		142 (58.2)		107 (43.9)		59 (24.2)	
<i>Onscreen time</i>			<0.001		0.003		0.003		0.001
<2	92 (12.6)	28 (30.4)		37 (40.2)		22 (23.9)		19 (20.7)	
2–4	310 (42.4)	127 (41)		142 (45.8)		82 (26.5)		31 (10.0)	
5–6	196 (26.8)	87 (44.4)		110 (56.1)		70 (35.7)		37 (18.9)	
>6	133 (18.2)	81 (60.9)		80 (60.2)		55 (41.4)		32 (24.1)	
<i>Got COVID-19</i>			0.527		0.177		0.604		0.394
No	688 (94.12)	302 (43.9)		343 (49.9)		214 (31.1)		110 (16.0)	
Yes	43 (5.88)	21 (48.8)		26 (60.5)		15 (34.9)		9 (20.9)	
<i>Study year</i>			0.432		0.134		0.610		0.036
First	310 (42.41)	135 (43.5)		160 (51.6)		102 (32.9)		60 (19.4)	
Second	162 (22.16)	67 (41.4)		80 (49.4)		45 (27.8)		28 (17.3)	
Third	141 (19.29)	61 (43.3)		61 (43.3)		42 (29.8)		12 (8.5)	
Forth/final	118 (16.14)	60 (50.8)		68 (57.6)		40 (33.9)		19 (16.1)	
<i>Satisfy with academic environment</i>			<0.001		0.120		<0.001		0.261
No	238 (32.56)	131 (55)		130 (54.6)		98 (41.2)		44 (18.5)	
Yes	493 (67.44)	192 (38.9)		239 (48.5)		131 (26.6)		75 (15.2)	
<i>Academic result</i>			0.001		0.320		0.004		0.050
Excellent	50 (6.84)	19 (38)		29 (58)		15 (30)		6 (12)	
Good	300 (41.04)	113 (37.7)		140 (46.7)		75 (25)		37 (12.3)	
Fair	131 (17.92)	72 (55)		70 (53.4)		51 (38.9)		24 (18.3)	

(Continues)

TABLE 1 (Continued)

Variables	N (%)	Depression		Anxiety		Stress		Suicidal ideation	
		Yes, n (%)	p value	Yes, n (%)	p value	Yes, n (%)	p value	Yes, n (%)	p value
Poor	33 (4.51)	22 (66.7)		20 (60.6)		17 (51.5)		9 (27.3)	
Not applicable	217 (29.69)	97 (44.7)		110 (50.7)		71 (32.7)		43 (19.8)	
<i>Do you think rehabilitation is a suitable subject for you</i>			0.028		0.481		0.097		0.006
No	87 (11.9)	48 (55.2)		47 (54)		34 (39.1)		23 (26.4)	
Yes	644 (88.1)	275 (42.7)		322 (50)		195 (30.3)		96 (14.9)	
<i>Know about your subject before admission</i>			0.036		0.132		0.982		0.808
No	472 (64.6)	222 (47)		248 (52.5)		148 (31.4)		78 (16.5)	
Yes	259 (35.4)	101 (39)		121 (46.7)		81 (31.3)		41 (15.8)	
<i>Future of your subject bright</i>			0.007		0.058		0.001		0.087
No	165 (22.57)	88 (53.3)		94 (57)		69 (41.8)		34 (20.6)	
Yes	566 (77.43)	235 (41.5)		275 (48.6)		160 (28.3)		85 (15)	
<i>Intension of changing your subject</i>			0.002		0.270	229 (31.4)	0.042	119 (16.3)	0.014
No	588 (80.4)	243 (41.4)		290 (49.4)		174 (29.6)		86 (14.7)	
Yes	143 (19.6)	80 (55.9)		78 (54.5)		55 (38.5)		33 (23.1)	
<i>Identity crisis as rehabilitation student</i>			0.001		0.002		<0.001		0.001
No	350 (47.88)	125 (35.7)		156 (44.6)		80 (22.9)		40 (11.4)	
Yes	381 (52.12)	198 (52)		213 (55.9)		149 (39.1)		79 (20.7)	
<i>Inferior complexity as rehabilitation student</i>			0.001		<0.001		<0.001		<0.001
No	552 (75.51)	206 (37.3)		258 (46.7)		141 (25.5)		74 (13.4)	
Yes	179 (24.49)	117 (65.4)		111 (62)		88 (49.2)		45 (25.1)	
<i>Get a suitable job after completing course</i>			0.001		0.153		0.005		0.001
No	149 (20.38)	84 (56.4)		83 (55.7)		61 (40.9)		38 (25.5)	
Yes	582 (79.62)	239 (41.1)		286 (49.1)		168 (28.9)		81 (13.9)	
<i>Do you think it was right decision to choice rehabilitation</i>			<0.001		0.045		<0.001		<0.001
No	117 (16)	70 (59.8)		69 (59)		55 (47)		32 (27.4)	
Yes	614 (84)	253 (41.2)		300 (48.9)		174 (28.3)		87 (14.2)	
<i>Will you change profession after graduation</i>			0.001		0.368		0.006		<0.001
No	615 (84.13)	255 (41.5)		306 (49.8)		180 (29.3)		84 (13.7)	
Yes	116 (15.87)	68 (58.6)		63 (54.3)		49 (42.2)		35 (30.2)	
<i>Were you bound to admit here</i>			<0.001		0.002		0.027		0.366
No	558 (76.33)	226 (40.5)		264 (47.3)		163 (29.2)		87 (15.6)	
Yes	173 (23.67)	97 (56.1)		105 (60.7)		66 (38.2)		32 (18.5)	
<i>COVID pandemic causing mental health symptoms</i>			<0.001		0.012		0.905		0.984
No	497 (68)	192 (38.6)		235 (47.3)		155 (31.2)		81 (16.3)	
Yes	234 (32)	131 (56)		134 (57.3)		74 (31.6)		38 (16.2)	
<i>Subject causing mental symptoms</i>			<0.001		<0.001		<0.001		0.001
No	597 (81.67)	225 (37.7)		280 (46.9)		157 (26.3)		84 (14.1)	
Yes	134 (18.33)	98 (73.1)		89 (66.4)		72 (53.7)		35 (26.1)	

Note: Sociodemographic, illness, behavior, institution, subject-related factors and depression, anxiety, stress symptoms, and suicidal ideation. Bold faces are significant at 5% significance level.

TABLE 2 Descriptive analysis

Variables	Suicidal ideation		p value	Suicide attempt		p value
	Yes (%)	No (%)		Yes (%)	No (%)	
All	119 (16.3)	612 (83.7)	-	22 (3.0)	709 (97.0)	-
<i>Depression symptoms</i>			<0.001			<0.001
No	24 (5.9)	384 (94.1)		3 (0.70)	405 (99.3)	
Yes	95 (29.4)	228 (70.6)		19 (5.9)	304 (94.1%)	
<i>Anxiety symptoms</i>			<0.001			0.003
No	25 (6.9)	337 (93.1)		4 (1.10)	358 (98.9%)	
Yes	94 (25.5)	275 (74.5)		18 (4.90)	351 (95.1)	
<i>Stress symptoms</i>			<0.001			<0.001
No	38 (7.6)	464 (92.4)		5 (1.0)	497 (99.0)	
Yes	81 (35.4)	148 (64.6)		17 (7.40)	709 (92.6)	

Note: Mental health symptoms with suicidal ideation and suicide attempt.
 Bold faces are significant at 5% significance level.

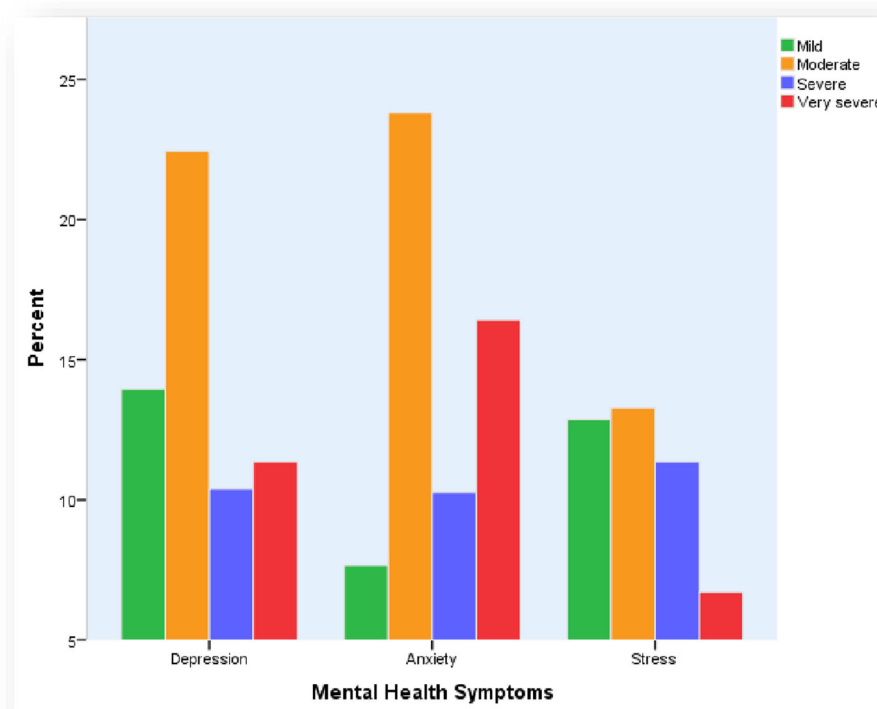


FIGURE 1 Percent of participants experiencing mental health symptoms, stratified by severity using DASS-21 (depression, anxiety and stress) (N = 731)

3.3 | Study subject, institute and future career-related factors, mental health symptoms, and suicidal ideation

In this study, 42% of students were in the first year (old and new first year), and a statistically significant number thought about committing

suicide in the last year ($p = 0.036$). On the other hand, one-third of the participants were not satisfied with the academic environment of their respective institutes, and a high number of them were suffering from depression and stress symptoms ($p \leq 0.001$). A total of 77% of the participants were optimistic about the future of their study subjects, and less number of them reported depression and stress ($p = 0.007$ and

$p = 0.001$). About 20% of students want to change their study subject if a chance is given, and most of them reported depression, stress, and suicidal ideation ($p = 0.002$, $p = 0.042$, $p = 0.014$).

Additionally, the participants were questioned whether they are suffering from identity crisis and inferiority complex as RS students. Surprisingly, 52% and 24% answered yes, respectively. A 16% of participants said that admitting to this subject was not correct. Unsurprisingly, a significantly high number of these subgroup participants reported all mental health symptoms with suicidal ideation. Table 1 depicts the statistics in detail.

Finally, one-third of the participants thought that the mental health problems they were suffering from were due to the COVID-19 pandemic, while one-fourth thought these were due to the subject they were studying. However, those who thought the mental health problems they are suffering from due to their subject have reported in significantly high rate for all the given mental health problems ($p \leq 0.001$) and suicidal ideation ($p = 0.001$). Detailed results can be found in Table 1.

3.4 | Multivariable analysis

Multivariable logistic regression suggested that being female, living in a rented house, not performing physical exercise, physical illness, facing mental health conditions, and challenging times, using the sleeping pill or similar drugs, sleeping less than regular hours, dissatisfaction with sleeping quality, high onscreen time (>6 h), inferiority complex, poor academic performance and changing profession after graduation were statistically significantly associated with mental health symptoms and suicidal ideation. Furthermore, from the logistic regression, it has been revealed that subject-related mental health was the common factor for all given mental health symptoms and suicidal ideation. Details have been given in Tables 3–6.

3.5 | Association between mental health symptoms and suicidal behavior

It was revealed that a higher portion of participants who were suffering from mental health symptoms reported suicidal ideation and attempted suicide. The regression analysis suggested that depression and stress symptoms were the statistically significant predictors of suicidal ideation (odds ratio [OR] = 2.96, 95% CI = 1.7–5.2, $p \leq 0.001$; OR = 2.97, 95% CI = 1.7–5.0, $p \leq 0.001$). On the other hand, stress was significantly associated with suicide attempts (OR = 3.64, 95% CI = 1.1–12.5, $p = .040$; Tables 7 and 8).

4 | DISCUSSION

This study found a high prevalence of moderate to very severe CMHS and a higher risk of suicidal ideation among Bangladeshi rehabilitation science students. These higher levels of prevalence and risk were clustered by gender, resident type, family income, physical

exercise, institute related-factors, and psychological health-related factors. The students suffering from mental health symptoms reported suicidal ideation and attempted at a significantly higher rate. The study is helpful for the government regulatory body, and policymakers take an immediate step for preventing CMHS and suicidal issues.

A recent systematic review and meta-analyses suggested that the global prevalence rate of depression and anxiety among health science students was 28% and 34%, respectively.^{28,29} Another systematic review suggested that the prevalence of depression and anxiety in South Asia during this pandemic was 34% and 41%, respectively.³⁰ In contrast, we found that about 50% of the participants were suffering from moderate to very severe types of depression and anxiety symptoms, which is much higher than the global and pandemic time rate in South Asia. Similar to our study, another evaluation conducted during the pandemic among Bangladeshi medical college students also suggested that 50% and 65% of the participants were suffering from at least a mild type of depression and anxiety, respectively.³¹ Furthermore, an additional study conducted during the pandemic among Indian medical students revealed that around one-third were suffering from mild to very severe types of anxiety and stress, while 50% reported mild to very severe depression.³² Another study conducted during the pandemic in the United States among medical college students reported a lower rate of depression (24%) and anxiety (30%) prevalence.³³ Prepandemic Bangladeshi data-based systematic review estimated up to 31% prevalence of CMHS among the general population.³⁴ Our previous study with Bangladeshi rehabilitation professionals (not students) found the prevalence of depression, anxiety, and stress 51.0%, 58.6%, and 33.6%, respectively.⁶ CMHS was associated with economic stressors, professional and employment-related factors in that study.⁶

A 2016 systematic review and meta-analysis suggested that the overall global prevalence of suicidal ideation among medical students was 11.1% (95% CI: 9.0%–13.7%).³⁵ Another recent systematic review revealed that the annual prevalence of suicidal ideation amongst adolescent students was 14.0% (95% CI: 10.0%–17.0%). A prepandemic Bangladeshi study suggested that the annual prevalence of suicidal ideation in university students was 14.7%.³⁶ However, recent reports suggested that the prevalence of suicidal behavior has been significantly increased globally since last year due to the pandemic.^{37,38} Nonetheless, a study conducted in the pandemic among undergraduate Bangladeshi university students found that the annual prevalence of suicidal ideation was 12.8%.³⁹ A similar study among healthcare workers and the general population found the prevalence of suicidal behavior at 6.1%.⁴⁰ In contrast, we found a significantly higher prevalence of suicidal ideation (16.3%) and suicidal attempts (3.0%) among rehabilitation students in Bangladesh. Our study also revealed that above half of the participants suffer from an identity crisis as rehabilitation students. However, one-third of the participants were not satisfied with the academic environment, and one-fourth suffered from inferiority complex as rehabilitation students. Further, many rehabilitation students thought they were suffering

TABLE 3 Logistic regression analysis of the variables with depression

Variables	Adjusted odds ratio	95% Confidence interval	p value
<i>Gender</i>			
Female	1.492	1.032–2.158	0.033
Male	Reference		
<i>Perform 30 min physical exercise</i>			
No	1.450	0.973–2.162	0.068
Yes	Reference		
<i>Regular religious practice</i>			
No	1.087	0.732–1.615	0.679
Yes	Reference		
<i>Got physical illness last year</i>			
No	Reference		
Yes	0.912	0.634–1.311	0.618
<i>Got mental illness last year</i>			
No	Reference		
Yes	1.604	1.089–2.362	0.017
<i>Passed hard time last year</i>			
No	Reference		
Yes	2.623	1.693–4.063	<0.001
<i>Use sleeping pill</i>			
No	Reference		
Yes	2.406	1.148–5.042	0.020
<i>Night time sleeping hour</i>			
Normal (7–9 h)	1.461	0.942–2.265	0.090
More than 9 h	0.385	0.157–0.944	0.037
Less than 7 h	Reference		
<i>Satisfied with sleep quality</i>			
No	2.677	1.687–4.249	<0.001
Yes	Reference		
<i>Onscreen time</i>			
<2 h	Reference		
2–4 h	1.238	0.688–2.230	0.476
5–6 h	1.571	0.850–0.850	0.149
>6 h	2.397	1.214–4.730	0.012
<i>Satisfy with academic environment</i>			
No	Reference		
Yes	0.771	0.512–1.161	0.213
<i>Academic result</i>			
Excellent	Reference		
Good	0.597	0.287–1.240	0.167

TABLE 3 (Continued)

Variables	Adjusted odds ratio	95% Confidence interval	p value
Fair	1.203	0.541–2.677	0.651
Poor	1.549	0.503–4.769	0.446
Not applicable	0.825	0.393–1.731	0.612
<i>Study subject suitability</i>			
No	2.092	1.018–4.303	0.045
Yes	Reference		
<i>Know about your subject before admission</i>			
No	0.978	0.666–1.437	0.911
Yes	Reference		
<i>Future of your subject bright</i>			
No	1.443	0.858–2.427	0.167
Yes	Reference		
<i>Intension of changing your subject</i>			
No	1.051	0.586–1.886	0.867
Yes	Reference		
<i>Identity crisis as rehabilitation student</i>			
No	Reference		
Yes	0.973	0.652–1.451	0.894
<i>Inferior complexity as rehabilitation student</i>			
No	Reference		
Yes	1.668	0.982–2.832	0.050
<i>Get a suitable job after completing course</i>			
No	0.826	0.477–1.431	0.496
Yes	Reference		
<i>Were you bound to admit here</i>			
No	0.777	0.497–1.214	0.267
Yes	Reference		
<i>Do you think it was right decision to choice rehabilitation</i>			
No	0.993	0.519–1.900	0.984
Yes	Reference		
<i>Will you change profession after graduation</i>			
No	Reference		
Yes	1.302	0.704–2.405	0.400
<i>COVID pandemic causing mental health symptoms</i>			
No	Reference		
Yes	1.599	1.086–2.356	0.017
<i>Subject causing mental symptoms</i>			
No	Reference		
Yes	3.598	2.010–6.441	<0.001

Note: Bold faces are significant at 5% significance level.

TABLE 4 Logistic regression analysis of the variables with anxiety

Variables	Adjusted odds ratio	95% Confidence interval	p value
<i>Gender</i>			
Female	1.525	1.078–2.158	0.017
Male	Reference		
<i>Resident type</i>			
Rented	1.420	0.908–2.220	0.124
Own	1.126	0.741–1.712	0.578
Hostel/mess	Reference		
<i>Family income (BDT)</i>			
≤15,000	1.984	1.232–3.195	0.005
15,000–30,000	1.254	0.851–1.847	0.253
≥30,000	Reference		
<i>Perform 30 min physical exercise</i>			
No	1.214	0.834–1.767	0.312
Yes	Reference		
<i>Got physical illness last year</i>			
No	Reference		
Yes	1.745	1.240–2.454	0.001
<i>Got mental illness last year</i>			
No	Reference		
Yes	2.137	1.471–3.105	<0.001
<i>Passed hard time last year</i>			
No	Reference		
Yes	1.682	1.124–2.516	0.011
<i>Use sleeping pill</i>			
No	Reference		
Yes	3.165	1.400–7.156	0.006
<i>Night time sleeping hour</i>			
Normal (7–9 h)	Reference		
More than 9 h	0.265	0.116–0.603	0.002
Less than 7 h	0.732	0.485–1.106	0.138
<i>Satisfied with sleep quality</i>			
No	2.290	1.484–3.536	<0.001
Yes	Reference		
<i>Onscreen time</i>			
<2 h	Reference		
2–4 h	1.163	0.673–2.007	0.588
5–6 h	1.670	0.936–2.980	0.083
>6 h	1.736	0.916–3.291	0.091

TABLE 4 (Continued)

Variables	Adjusted odds ratio	95% Confidence interval	p value
<i>Future of your subject bright</i>			
No	0.887	0.560–1.405	0.609
Yes	Reference		
<i>Identity crisis as rehabilitation student</i>			
No	Reference		
Yes	1.010	0.688–1.482	0.961
<i>Inferior complexity as rehabilitation student</i>			
No	Reference		
Yes	1.063	0.647–1.746	0.811
<i>Were you bound to admit here</i>			
No	Reference		
Yes	1.368	0.910–2.057	0.132
<i>Do you think it was right decision to choice rehabilitation</i>			
No	Reference		
Yes	1.271	0.726–2.224	0.401
<i>COVID pandemic causing mental health symptoms</i>			
No	Reference		
Yes	1.084	0.750–1.567	0.668
<i>Subject causing mental symptoms</i>			
No	Reference		
Yes	1.714	0.999–2.941	0.050

Note: Bold faces are significant at 5% significance level.

from mental health issues because they were studying rehabilitation. Unsurprisingly, a large number of these subgroup students reported mental health symptoms and suicidal ideation. Our regression models suggested that suicidal ideation is more than two times higher among participants who wanted to leave the profession after completing their degree in a rehabilitation program (study subject-selection reasons). These subject-selection reasons explained the higher prevalence rates of suicidal ideation among Bangladeshi students.¹¹ Additional research is warranted to find in-depth relations between subject-related factors and suicidal behavior. Besides subject-related factors, this study revealed a range of subgroups associated with CMHS and suicidal behavior. In line with the previous study findings,^{13,41–47} this study also found gender, resident type, monthly family income, regular exercise, regular practice of religion, facing hard times and mental health issues, sleeping pill use, sleeping quality, sleeping hour and onscreen time factors were associated with CMHS and suicidal behavior.

A systematic review and meta-analysis concluded that CMHS undermine suicide globally.⁴⁸ A study using the psychological autopsy

TABLE 5 Logistic regression analysis of the variables with stress

Variables	Adjusted odds ratio	95% Confidence interval	p value
<i>Gender</i>			
Female	1.808	1.215–2.688	0.003
Male	Reference		
<i>Resident type</i>			
Rented	1.852	1.131–3.031	0.014
Own	1.330	0.823–2.148	0.244
Hostel/mess	Reference		
<i>Perform 30 min physical exercise</i>			
No	1.872	1.199–2.923	0.006
Yes	Reference		
<i>Regular religious practice</i>			
No	1.423	0.948–2.137	0.089
Yes	Reference		
<i>Got physical illness last year</i>			
No	Reference		
Yes	1.388	0.946–2.036	0.093
<i>Got mental illness last year</i>			
No	Reference		
Yes	2.100	1.409–3.130	<0.001
<i>Passed hard time last year</i>			
No	Reference		
Yes	1.949	1.177–3.225	0.009
<i>Use sleeping pill</i>			
No	Reference		
Yes	2.044	1.026–4.071	0.042
<i>Night time sleeping hour</i>			
Normal (7–9 h)	Reference		
More than 9 h	0.495	0.202–1.212	0.124
Less than 7 h	1.230	0.794–1.905	0.354
<i>Satisfied with sleep quality</i>			
No	2.115	1.353–3.305	0.001
Yes	Reference		
<i>Onscreen time</i>			
<2 h	Reference		
2–4 h	0.905	0.478–1.715	0.760
5–6 h	1.345	0.696–2.598	0.377
>6 h	1.190	0.580–2.441	0.634
<i>Satisfy with academic environment</i>			
No	1.235	0.808–1.887	0.330
Yes	Reference		

TABLE 5 (Continued)

Variables	Adjusted odds ratio	95% Confidence interval	p value
<i>Academic result</i>			
Excellent	Reference		
Good	0.415	0.183–0.937	0.034
Fair	0.690	0.289–1.648	0.404
Poor	1.121	0.366–3.434	0.841
Not applicable	0.665	0.294–1.503	0.327
<i>Future of your subject bright</i>			
No	0.968	0.576–1.625	0.901
Yes	Reference		
<i>Intension of changing your subject</i>			
No	1.530	0.836–2.801	0.168
Yes	Reference		
<i>Identity crisis as rehabilitation student</i>			
No	Reference		
Yes	1.264	0.822–1.944	0.285
<i>Inferior complexity as rehabilitation student</i>			
No	Reference		
Yes	1.471	0.862–2.511	0.157
<i>Get a suitable job after completing course</i>			
No	0.775	0.445–1.348	0.366
Yes	Reference		
<i>Were you bound to admit here</i>			
No	Reference		
Yes	0.903	0.574–1.421	0.659
<i>Do you think it was right decision to choice rehabilitation</i>			
No	Reference		
Yes	1.001	0.540–1.857	0.996
<i>Will you change profession after graduation</i>			
No	Reference		
Yes	0.883	0.493–1.581	0.675
<i>Subject causing mental symptoms</i>			
No	Reference		
Yes	2.212	1.272–3.847	0.005

Note: Bold faces are significant at 5% significance level.

method in Bangladesh revealed that CMHS was not significantly associated with suicide among the younger population. However, CMHS was associated with older adults' suicide.⁴⁹ A case-control psychological autopsy study conducted in Bangladesh suggested that psychological disorders, immediate life events, and previous suicide

TABLE 6 Logistic regression analysis of the variables with suicidal ideation

Variables	Adjusted odds ratio	95% Confidence interval	p value
<i>Gender</i>			
Female	1.736	1.069–2.822	0.026
Male	Reference		
<i>Family income (BDT)</i>			
≤15,000	2.843	1.491–5.422	0.002
15,000–30,000	1.429	0.803–2.541	0.225
≥30,000	Reference		
<i>Perform 30 min physical exercise</i>			
No	1.617	0.926–2.824	0.091
Yes	Reference		
<i>Regular religious practice</i>			
No	1.222	0.740–2.017	0.433
Yes	Reference		
<i>Got physical illness last year</i>			
No	Reference		
Yes	0.829	0.515–1.333	0.439
<i>Got mental illness last year</i>			
No	Reference		
Yes	2.987	1.782–5.006	<0.001
<i>Passed hard time last year</i>			
No	Reference		
Yes	4.970	2.016–12.252	<0.001
<i>Use sleeping pill</i>			
No	Reference		
Yes	2.528	1.156–5.528	0.020
<i>Night time sleeping hour</i>			
Normal (7–9 h)	Reference		
More than 9 h	0.806	0.284–2.285	0.685
Less than 7 h	1.590	0.921–2.745	0.096
<i>Satisfied with sleep quality</i>			
No	1.031	0.594–1.790	0.913
Yes	Reference		
<i>Onscreen time</i>			
<2 h	0.243	0.114–0.520	<0.001
2–4 h	0.640	0.308–1.326	0.230
5–6 h	0.697	0.314–1.547	0.374
>6 h	Reference		

TABLE 6 (Continued)

Variables	Adjusted odds ratio	95% Confidence interval	p value
<i>Study year</i>			
First year	1.694	0.748–3.837	0.206
Second year	1.661	0.780–3.535	0.188
Third year	0.565	0.234–1.365	0.204
Final year	Reference		
<i>Academic result</i>			
Excellent	Reference		
Good	0.934	0.303–2.882	0.906
Fair	1.858	0.558–6.184	0.313
Poor	1.897	0.453–7.953	0.381
Not applicable	1.191	0.353–4.024	0.778
<i>Do you think rehabilitation is a suitable subject for you</i>			
No	1.208	0.544–2.684	0.643
Yes	Reference		
<i>Intension of changing your subject</i>			
No	Reference		
Yes	0.790	0.376–1.662	0.535
<i>Identity crisis as rehabilitation student</i>			
No	Reference		
Yes	1.591	0.924–2.738	0.094
<i>Inferior complexity as rehabilitation student</i>			
No	Reference		
Yes	0.841	0.437–1.619	0.604
<i>Get a suitable job after completing course</i>			
No	1.449	0.772–2.721	0.248
Yes	Reference		
<i>Were you bound to admit here</i>			
No	Reference		
Yes	0.903	0.574–1.421	0.659
<i>Do you think it was right decision to choice RS</i>			
No	Reference		
Yes	0.778	0.365–1.658	0.515
<i>Will you change profession after graduation</i>			
No	Reference		
Yes	2.207	1.102–4.420	0.026
<i>Subject causing mental symptoms</i>			
No	Reference		
Yes	0.796	0.415–1.525	0.491

Note: Bold faces are significant at 5% significance level.

TABLE 7 Logistic regression analysis of the mental health symptoms with suicidal ideation

Variables	Adjusted odds ratio	95% Confidence interval	p value
<i>Depression symptoms</i>			
No	Reference		
Yes	2.959	1.673–5.233	<0.001
<i>Anxiety symptoms</i>			
No	Reference		
Yes	1.665	0.951–2.917	0.075
<i>Stress symptoms</i>			
No	Reference		
Yes	2.966	1.752–5.020	<0.001

Note: Bold faces are significant at 5% significance level.

attempts were associated with suicide.⁵⁰ Our study found that depression and stress symptoms significantly predicted suicidal thought; however, only stress symptoms significantly predicted suicide attempt(s). In line with our findings, a recent study found that depression and stress were significantly associated with suicidal behavior among Chinese university students.⁵¹ Additionally, a 2017 systematic review and meta-analysis also suggested that depression was associated with suicidal behavior among university students.⁵²

Recent systematic reviews and meta-analyses suggested that the prevalence of COVID-19 pandemic time CMHS and suicidal behavior was higher among different cohorts worldwide.^{12,53} Previous studies have found the association between COVID-19 related factors and CMHS and suicidal behavior among students and young adults in Bangladesh.^{54,55} Furthermore, another systematic review and meta-analysis confirmed that COVID-19 related factors were associated with suicidal behavior among Bangladeshi.⁵⁶ However, we did not find a significant association between COVID-19 related factors and CMHS and suicidal behavior among rehabilitation students. Subject-related factors might outweigh the impact of COVID-19 among this cohort. Additional study is warranted to find the in-depth relation between COVID-19 related factors, subject related factors, and CMHS and suicidal behavior among rehabilitation students in Bangladesh.

Universal limitations of cross-sectional study and methods bias of self-reported data collection must be recognized for this study. We did not take the participants' family history of mental health symptoms and suicidal behavior that could confound the result in this study. Data regarding substance abuse could further strengthen the study result. Additionally, limitations of subjective questions used in this study must be acknowledged. Despite these limitations, this study sets baseline evidence from a lower-middle-income country regarding the prevalence and predicting factors for CMHS and suicidal behavior among rehabilitation students.

TABLE 8 Logistic regression analysis of the mental health symptoms with suicide attempt

Variables	Adjusted odds ratio	95% Confidence interval	p value
<i>Depression symptoms</i>			
No	Reference		
Yes	3.469	0.821–14.655	0.091
<i>Anxiety symptoms</i>			
No	Reference		
Yes	1.329	0.371–4.757	0.662
<i>Stress symptoms</i>			
No	Reference		
Yes	3.643	1.063–12.486	0.040

Note: Bold faces are significant at 5% significance level.

5 | CONCLUSION

This study reported a significantly high prevalence of CHMS and suicidal behavior among Bangladesh's relatively less prioritized student cohort. Sociodemographic factors, illness, behavior, institution, and subject-related issues were identified as the predicting factors of CMHS and suicidal behavior. To deal with CHMS and suicide risk, a holistic, supportive approach from government and academic institutions is essential to reduce this study's identified predicting factors. Implementing appropriate government regulation on the rehabilitation profession can ensure career dignity, social status, and better job opportunities, which helps minimize CHMS and suicide risk.

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CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

ETHICS STATEMENT

All procedures were approved by the Ethical Review Committee of Uttara Adhunik Medical College and Hospital (UAMC-IRB-2020/12). Prospective observational trial registration was obtained from the World Health Organization endorsed Clinical Trial Registry-CTRI/2021/01/030297 (Registered on January 6, 2021). The study was conducted following the Helsinki declaration.

AUTHOR CONTRIBUTIONS

Mohammad Ali: Conceptualization; data curation; formal analysis; writing—original draft. Funding acquisition: Not applicable.
Mohammad Ali, Zakir Uddin, Kazi M. Amran Hossain, Turjo Rafid

Uddin: Resources; writing–review and editing. **Zakir Uddin:** Supervision. All authors have read and approved the final version of the manuscript. Dr. Mohammad Ali had full access to all the data in this study and takes complete responsibility for the integrity of the data and the accuracy of the data analysis.

DATA AVAILABILITY STATEMENT

Data were available from the corresponding author upon reasonable request.

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