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Predictors of Depression and Anxiety among Medical Students

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ABSTRACT

Background: Medical undergraduates are more prone to emotional distress in comparison to the general population and non-medical undergraduates. This study aimed to identify the prevalence and factors associated with depression and anxiety symptoms among undergraduate medical students.

Methods: A cross-sectional study was conducted among 204 medical students in a medical institute in Kathmandu. Depression, Anxiety and Stress Scale-42 was used to identify the prevalence of depression and anxiety symptoms. The data were analyzed using multivariable logistic regression models.

Results: The prevalence of depression and anxiety symptoms was 30.9% and 38.7% respectively. Depression symptoms were more likely to be prevalent among fourth and fifth-year students, with an adjusted odds ratio (aOR 1.96, 95% CI: 1.03-3.75) compared to second and third-year students, and those who failed in the last academic examination (aOR 2.55, 95% CI: 1.28-5.09). Anxiety symptoms were more prevalent among male students (aOR 2.11, 95% CI: 1.04-4.27), those who were from the relatively less advantaged ethnic group (aOR 2.08, 95% CI: 1.04-4.16) and those who stayed outside the dormitory (aOR 2.90, 95% CI: 1.46-5.78).

Conclusions: The prevalence of depression and anxiety symptoms among medical students was high. Psychological support is needed to ensure the mental well-being of medical students.

Keywords: Anxiety; DASS-42; depression; medical students.

INTRODUCTION

Emotional distresses are prevalent among university students,[1] especially among those pursuing medical studies.[2] Medical students are more prone to anxiety and depression compared to the general population and their non-medical peers[2,3] as they must deal with stressors, including academic and familial pressure to succeed and financial difficulties. The presence of emotional distress poses detrimental effects on students' health, academic performance, career prospects, and quality of life. Previous studies showed that demographic and socioeconomic factors,[4-6] academic performance[4,7-9] and risk behaviors like alcohol consumption[10] are associated with the manifestation of depression and anxiety symptoms among medical students.

Few studies have assessed the factors associated with depression and anxiety among medical students in Nepal.[11,12] Hence, it underscores the necessity to understand the mental health of undergraduate medical students in Nepal. This study aimed to identify the prevalence and factors associated with depression and anxiety symptoms among undergraduate medical students in Kathmandu.

METHODS

A cross-sectional study was conducted among undergraduate medical students in a medical institute in Kathmandu, Nepal where every year more than 15,000 students from all over the country and abroad apply for Bachelor degree in Medicine and Surgery (MBBS) program.[13]

Prior to data collection, ethical approval (Ref: 256/075/076) from the institutional review committee of the Institute of Medicine, Tribhuvan University

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was taken. A written informed consent was obtained from the participants before the data collection and identifiers were not listed in the questionnaire to make it anonymous.

The sample size was determined using the formula for cross-sectional survey, $n = (Z^2pq)/d^2$ [14] where, n = desired sample size, Z= 1.96 at 95% confidence level, p=0.156[15] and d = 0.05. The required minimum sample size was 202. Assuming a non-response rate of 5%, the final sample size was 212. Among the three medical colleges affiliated with Tribhuvan University in Kathmandu valley, one institute was randomly selected for this study. All the MBBS students in their second to fifth year from the campus were recruited as study participants.

We used a self-administrated questionnaire to collect information on demographic, socio-economic, academic and behavioral factors. Depression and anxiety symptoms were dependent variables for the study. Depression, Anxiety and Stress Scale-42 (DASS-42) was used to measure depression and anxiety symptoms. DASS-42 is a psychological screening instrument having good differentiation. It is a test-retest validated tool and has desirable construct validity of student samples and has satisfactory internal consistency and concurrent reliability.[16] DASS-42 has been used to measure depression and anxiety symptoms in a previous study conducted in Nepal in similar populations and settings.[12] In the present study, we took only two subscales (depression and anxiety) for fulfilling the study purpose. Each scale contains 14 items. Each item is scored on a four-point Likert scale which ranges from zero (did not apply to me at all) to three (applied to me very much). Scores for depression and anxiety are calculated by summing the scores for the relevant items.[17] The definitions and measurements of the variables are described in Table 1.

Table 1. Study variables.

SN	Variables	Definitions of Variables	Measurements
A	Dependent variables		
1	Depression	Level of depression distinguished by Depression anxiety and stress scale (DASS-42)	Normal (1-9), Mild (10-13), Moderate depression (14-20), Severe depression (21-27) and Extremely severe depression (>27) as per DASS Scale No Depression (1-9); Depression (>9) as per DASS scale
2	Anxiety	Level of anxiety distinguished by Depression anxiety and stress scale (DASS-42)	Normal (0-7), Mild (8-9), Moderate anxiety (10-14), Severe anxiety (15-19) and Extremely severe anxiety (>19) as per DASS Scale No anxiety (0-7); Anxiety (>7) as per DASS scale
B	Independent variables		
B1	Demographic and socio-economic factors		
1	Age category (years)	Age group of the participants in completed years	19-22 years; 23-26 years
2	Sex	Sex of the participants	Male; Female
3	Caste ethnic group	Ethnicity of the participants	Relatively advantaged group (Brahmin/ Chhetri), Relatively less advantaged group (Janajati, Dalit, Muslim, Madheshi and others)
4	Family type	Type and composition of family	Nuclear; Joint; Extended
5	Father's education	Education status of participant's father	No formal education (Illiterate, Literate); Formal education (1-8 grade, 9-12 grade, Above 12)
6	Mother's education	Education status of participant's mother	No formal education (Illiterate, Literate); Formal education (1-8 grade, 9-12 grade, Above 12)
7	Family income	Total income of all the family members in a month	<195 US Dollar; 195 US Dollar -313 US Dollar); >313 US Dollar
8	Current living arrangement	Living arrangement participants had at the time of the survey	With parents; Without parents
9	Place of living	Place where participants stayed at the time of the survey	At dormitory; Outside dormitory

B2	Academic and behavioral factors		
10	Year of Study	Grade at which participants were studying at the time of the survey	Second, Third, Fourth and Fifth
11	Join course on own interest	Participants reported joining the course on his/her interest	Yes, No
12	Perceived parental pressure	Participants reported perceiving parental pressure to study	Yes, No
13	Failure in exam	Academic record based on the result of the last examination attempted by the participant	Yes, No
14	Relationship	Participants had a girlfriend or boyfriend at the time of the survey	Yes, No
15	Consumption of alcohol	Participants who consumed alcohol within one month preceding the survey	Yes, No

We surveyed from October to December 2018. Before the formal survey, we pretested the questionnaire among 21 medical students from another medical college in Kathmandu. The self-administered anonymous questionnaires were distributed to students in their respective classrooms. Before questionnaire distribution, an orientation session was conducted for the filling of the questionnaire. A total of 204 out of 214 participants responded to the questionnaire with an overall response rate of 95%.

The collected data were entered and cleaned in Microsoft Excel and transferred into SPSS version 23 (IBM Corp., Armonk, NY) for analysis. Descriptive statistics were used to report the demographic, socio-economic, academic and behavioral characteristics. Frequency tables with percentages were generated for categorical variables, while mean and standard deviation (SD) were calculated for continuous variables. Bivariate analysis using the Chi-square test was performed at first to identify candidate variables where variables having a p-value less than 0.15 were considered for multivariable logistic regression. A multivariable binary logistic regression model was then fitted with all the candidate variables to determine statistically significant variables associated with depression and anxiety symptoms at p-value<0.05. No multicollinearity was found among independent variables. The goodness of fit of the regression model was tested by the application of the Hosmer and Lemeshow chi-square test; the model was found to be a good fit (P >.05).

RESULTS

The mean age (±SD) of participants was 22.0±1.4 years. Three out of five (61.3%) participants were 19-22 years of age, 70.6% were male and 72% belonged to relatively advantaged caste ethnic groups. Over 85% of the participants were from the nuclear family. Among the participants' fathers and mothers, 63.2% and 38.2% respectively achieved above twelve years' education. About 60% of participants had a family monthly income above 313 US Dollars (40000 Nepalese Rupee). Over two-fifths of the participants (43.1%) lived with their parents, whereas nearly 65% stayed outside the dormitory. Of the participants, 26%, 25.5%, 24% and 24.5% were from the second, third, fourth and fifth years respectively. About 93% of the participants chose the field of study based on their interests, and 91.7% perceived no parental pressure on their study. Nearly three-fourths (73%) did not fail their previous examination, 34.3% were in a relationship and 51% of students consumed alcohol in the past month (Table 2).

Table 2. Distribution of the participants by socio-demographic, economic, academic and behavioral characteristics.

Characteristics		n(%)
Age	19 - 22 years	125(61.3)
	23 - 26 years	79(38.7)
Sex	Male	144(70.6)
	Female	60(29.4)
Caste ethnic group	Relatively advantaged group	147(72.1)
	Relatively less advantaged	57(27.9)
Family type	Nuclear	174(85.3)
	Joint	24(11.8)
	Extended	6(2.9)

Father education	Illiterate	6(2.9)
	Literate	18(8.8)
	1 - 8 grade	24(11.8)
	9 - 12 grade	27(13.2)
	Above 12	129(63.2)
Mother education	Illiterate	12(5.9)
	Literate	24(11.8)
	1 - 8 grade	35(17.2)
	9 - 12 grade	55(27)
	Above 12	78(38.2)
Family income	< 195 US Dollar	26(12.7)
	195 US Dollars - 313 US Dollars	61(29.9)
	>313 US Dollars	117(57.4)
Current living arrangement	With parents	88(43.1)
	Without parents	116(56.9)
Place of living	In dormitory	72(35.3)
	Outside dormitory	132(64.7)
Year of Study	Second	53(26.0)
	Third	52(25.5)
	Forth	49(24.0)
	Fifth	50(24.5)
Join course on own interest	Yes	190(93.1)
	No	14(6.9)
Perceived parental pressure	Yes	17(8.3)
	No	187(91.7)
Failure in exam	Yes	55(27.0)
	No	149(73.0)
Relationship	Yes	70(34.3)
	No	134(65.7)
Consumption of alcohol	Yes	104(51.0)
	No	100(49.0)

The prevalence of mild, moderate, severe, and extremely severe depression symptoms was 16.2%, 10.8%, 2.9% and 1% respectively. Similarly, the prevalence of mild, moderate, severe, and extremely severe anxiety symptoms was 16.2%, 14.7%, 4.9% and 2.9% respectively (Table 3).

In the bivariate analysis, caste ethnic group, current living arrangement, year of study, joined course on own interest, perceived parental pressure and failure in exam were associated with depression symptoms (P<0.15) (Table 4).

Table 3. Level of Depression and Anxiety symptoms among participants (n=204).

		Level of Morbidity (Mean± SD)	Total n(%)
Level of depression	Normal	4.30±2.99	141(69.1)
	Mild	11.39±1.27	33(16.2)
	Moderate	17.05±1.91	22(10.8)
	Severe	23.17±1.94	6(2.9)
	Extremely severe	30.50±2.12	2(1.0)
Level of anxiety	Normal	3.88±2.43	125(61.3)
	Mild	8.73±0.45	33(16.2)
	Moderate	11.97±1.42	30(14.7)
	Severe	17.50±1.65	10(4.9)
	Extremely severe	25.0±3.84	6(2.9)

Table 4. Bivariate analysis of factors associated with depression symptoms.

		Present n(%)	Odds ratio (95%CI)
Age	19 - 22 years	38(30.4)	0.94(0.51-1.73)
	23 - 26 years	25(31.6)	1
Sex	Male	45(31.3)	1.06(0.55 - 2.04)
	Female	18(30.0)	1
Caste ethnic group	Relatively less advantaged	23(40.4)	1.81(0.95 - 3.43)†
	Relatively advantaged	40(27.2)	1
Family type	Nuclear	57(32.8)	1.94(0.75-5.03)
	Joint/ Extended	6(20.0)	1
Father education	No formal education	8(33.3)	1.13(0.46-2.81)
	Formal education	55(30.6)	1
Mother education	No formal education	14(38.9)	1.55(0.73-3.27)
	Formal education	49(29.2)	1
Family income	< 313 US Dollar	30(34.5)	1.34(0.73 - 2.43)
	>313 US Dollar	33(28.2)	1
Current living arrangement	With parents	22(25.0)	0.61(0.33-1.12)†
	Without parents	41(35.3)	1
Place of living	Outside Dormitory	39(29.5)	0.83(0.45-1.55)
	At dormitory	24(33.3)	1

Year of Study	Fourth and fifth	37(37.4)	1.81(0.99-3.31)†
	Second and third	26(24.8)	1
Join course on own interest	No	8(57.1)	3.27(1.08-9.87)†
	Yes	55(28.9)	1
Perceived parental pressure	Yes	9(52.9)	2.77(1.01-7.55)†
	No	54(28.9)	1
Failure in exam	Yes	26(47.3)	2.71(1.42 - 5.18)†
	No	37(24.8)	1
Relationship	No	45(33.6)	1.46(0.77-2.78)
	Yes	18(25.7)	1
Consumption of alcohol	Yes	34(32.7)	1.18(0.65 - 2.15)
	No	29(29.0)	1

†p<0.15; CI: Confidence Interval; 1 US Dollar = 127.843 Nepalese Rupee; Percentage represents row percent

In the bivariate analysis, sex, caste ethnic group, family type, place of living, joined course on own interest, perceived parental pressure and failure in exam were associated with anxiety symptoms (P<0.15) (Table 5).

Table 5. Bivariate analysis of factors associated with anxiety symptoms.

		Present n(%)	Odds ratio (95%CI)
Age	19 - 22 years	50(40.0)	1.14(0.64-2.05)
	23 - 26 years	29(36.7)	1
Sex	Male	61(42.4)	1.71(0.90-3.26)†
	Female	18(30.0)	1
Caste ethnic group	Relatively less advantaged	28(49.1)	1.81(0.97-3.38)†
	Relatively advantaged	51(34.7)	1
Family type	Nuclear	71(40.8)	1.89(0.79-4.49)†
	Joint/ Extended	8(26.7)	1
Father education	No formal education	8(33.3)	0.76(0.31-1.89)
	Formal education	71(39.4)	1
Mother education	No formal education	14(38.9)	1.01(0.48-2.11)
	Formal education	65(38.7)	1
Family income	< 313 US Dollar	36(41.4)	1.21(0.68-2.14)
	>313 US Dollar	43(36.8)	1
Current living arrangement	With parents	37(42.0)	1.27(0.72-2.25)
	Without parents	42(36.2)	1
Place of living	Outside Dormitory	60(45.5)	2.32(1.24-4.34)†
	At dormitory	19(26.4)	1
Year of Study	Fourth and fifth	36(36.4)	0.82(0.46-1.44)
	Second and third	43(41.0)	1
Join course on own interest	No	10(71.4)	4.38(1.32-14.50)†
	Yes	69(36.3)	1
Perceived parental pressure	Yes	12(70.6)	4.29(1.45-12.72)†
	No	67(35.8)	1
Failure in exam	Yes	26(47.3)	1.62(0.86-3.03)†
	No	53(35.6)	1
Relationship	No	56(41.8)	1.46(0.80-2.69)
	Yes	23(32.9)	1
Consumption of alcohol	Yes	41(39.4)	1.06(0.60-1.87)
	No	38(38.0)	1

†p<0.15; CI: Confidence Interval; 1 US Dollar = 127.843 Nepalese Rupee; Percentage represents row percent

The multivariable logistic regression model revealed that the odds of depression symptoms were higher among fourth and fifth-year students, (aOR 1.96, 95% CI: 1.03-3.75) and those students who had a previous failure in the exam (aOR 2.55, 95% CI: 1.28-5.09). Furthermore, the odds of anxiety symptoms were higher among male students (aOR 2.11, 95% CI: 1.04-4.27), those students who were from the relatively less advantaged ethnic group (aOR 2.08, 95% CI: 1.04-4.16) and those students who stayed outside the dormitory (aOR 2.90, 95% CI: 1.46-5.78) (Table 6).

Table 6. Multivariate analysis of factors associated with depression and anxiety symptoms (n=204).

Factors	Depression symptoms	Anxiety symptoms
	aOR(95%CI)	aOR(95%CI)
Sex		
Male	-	2.11(1.04-4.27)*
Female		1
Caste ethnic group		
Relatively less advantaged	1.48(0.73-2.97)	2.08(1.04-4.16)*
Relatively advantaged group	1	1
Family type		

Nuclear	-	2.58(0.99-6.67)
Joint/Extended		1
Current living arrangement		
With parents	0.61(0.31-1.19)	-
Without parents	1	
Place of living		
Outside dormitory	-	2.90(1.46-5.78)*
In dormitory		1
Year of Study		
Fourth and fifth	1.96(1.03-3.75)*	-
Second and third	1	
Join course on own interest		
No	3.26(0.88-12.07)	2.52(0.65-9.73)
Yes	1	1
Perceived parental pressure		
Yes	1.96(0.59-6.50)	2.65(0.78-9.02)
No		1
Failure in exam	1	
Yes	2.55(1.28-5.09)*	1.39(0.69-2.79)
No	1	1

**Significant at p<0.05; Hosmer Lemeshow for depression symptom = 0.42 and Anxiety symptoms = 0.76; aOR: Adjusted Odds Ratio; CI: Confidence Interval*

DISCUSSION

We found that the prevalence of depression and anxiety symptoms were 30.9% and 38.7% respectively among medical students in Kathmandu, Nepal. The prevalence of depression symptoms was lower than the studies conducted on medical students in India (51.3%),[18] Pakistan (60%)[19] and Bangladesh (69.5%).[20] Interestingly, the findings on the prevalence of depression symptoms corroborate previous studies done among medical students in Nepal (29.9%),[12] and China (32.7%).[21] The magnitude of anxiety symptoms among medical students in the current study was higher than a study from China (27.2%)[21] but lower than another study from Nepal (41.1%)[12] and other South Asian countries like Pakistan (60%),[19] Bangladesh (61%)[20] and India (66.9%).[18] The possible reasons for the observed difference could be due to the existing socio-cultural differences among the countries as well as differences in the medical education system; further reasons need to be explored. Another possible reason might be ascribed to the difference in instruments and scales applied for the measurements.

We found students who were in their fourth and fifth years of study were more likely to suffer from depression symptoms than junior students. Similar findings were reported by a study in India[18] on medical undergraduates, which showed that the risk of depression symptoms increases significantly with an increase in the study year. Clinical posting for medical students starts from the fourth year of study when they have a night shift in the hospital which might impact their sleep quality. A positive relationship was corroborated by a study among medical undergraduates in Nepal between depression and sleep quality.[22] On the contrary, a meta-analysis reported that the risk of depression symptoms decreases with an increase in study years.[23] Therefore, the direction of association is inconsistent.

We found that students who had a history of failure in the examination had higher odds of suffering from depression symptoms, which was consistent with McCarty et al.'s longitudinal cascade model study that school failure predisposes young adult girls to depression.[24] Moreover, as described in the competency-based model of depression by Cole, negative feedback obtained as a result of impairments in the development of competence in social, academic, and behavioral domains might promote depression.[25] It could be explained that students who don't pass the exam, may experience feelings of grief, worthlessness, and negative thoughts, all of which create pressure, leading them to depression. Furthermore, mounting evidence shows that cognitive factors may make people more susceptible to the onset and recurrence of depressive episodes.

Our study found that male students were more likely to suffer from anxiety symptoms compared to females, while several other studies showed opposite results.[8,26] This underscores more research with larger sample size to understand the differences in vulnerability to anxiety symptoms. The relatively less advantaged ethnic groups were more likely to experience the symptoms of anxiety as compared to the relatively advantaged ethnic group. Interestingly, this was supported by another ethnography model study from Nepal.[27] Nepalese ethnic groups practice their patterns of socialization and acculturation, which shape not only their thoughts and feelings but also gender roles and behaviors. We hypothesize that cultural factors might make students from the relatively disadvantaged ethnic group more vulnerable to anxiety.

Students who lived outside the college dormitory were at greater risk of suffering from symptoms of anxiety than those who lived in the dormitory, different from an Indian study among dental undergraduates.[28] However, a study in Malaysia did not find an association between a place of living like a dormitory or outside a dormitory with anxiety symptoms.[6] Continuous peer support is

available for the students residing in the dormitory. Besides, they also have less frequent familial pressure to excel in their studies than the students residing outside the dormitory, probably with their parents or guardians. It is supported by another similar cross-sectional study which revealed that living with parents was significantly associated with increased anxiety.[29] These may help to explain our finding of the positive association between residing outside the dormitory and anxiety.

The study had some limitations. First, given the cross-sectional nature of the study, the association between different factors and anxiety as well as depression symptoms may not imply causation; second, the possibility of social desirability bias might occur due to the subjective nature of the instrument. Moreover, a self-administered survey for screening purposes rather than clinical diagnosis may overestimate the prevalence of depression and anxiety symptoms.

CONCLUSIONS

Nearly one-third (30.9%) of medical students had depression symptoms and 38.7% of students had anxiety symptoms. Higher years of study (college grade) and failure experience in the exam were associated with depression symptoms whereas being males, relatively less advantaged caste ethnic groups and staying outside the dormitory were associated with anxiety symptoms. We recommend the implementation of a tailored psychological support program, facilitated by the psychiatry and mental health departments within medical colleges, to address the specific needs of medical students.

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CONFLICT OF INTEREST

The authors declare no conflict of interest

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