

Pattern and Correlates of Depression among Medical Students: An 18-Month Follow-Up Study

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ABSTRACT

Background: Medical students are subjected to various challenges, which are possibly etiological in the onset and persistence of depression. There is inadequate research on the longitudinal pattern and correlates of the emotional health of medical students in India. We aim to delineate the longitudinal pattern of depression among medical students and the factors predictive of depression. **Methods:** An 18-month follow-up design with 350 students (2012 intake) from two medical colleges in Kerala, India, was employed. A semistructured questionnaire and the Patient Health Questionnaire 9 were administered 2, 8, and 18 months into the course. **Results:** Depression was present in 42.80%, 36.20%, and 42.50% of the students at the three assessments. Variables significantly associated with depression on univariate analysis were the course not being of the student's choice at the first assessment; having an unemployed parent (mother) at the second assessment; alcohol use and male gender at the third assessment. On multivariate analysis, male gender (OR = 1.95[1.11–3.41]) and the presence of depression at 2 months (OR = 2.30[1.31–4.05]) and 8 months (OR = 2.48[1.39–4.44]) were predictive of depression at 18 months. **Conclusions:** The high rates of depression and the pattern of high rates early in the course among the medical students contrasts with that reported from other countries. Early depression and male gender were predictive of depression later in the course. The implications of this are to be taken into consideration when undergraduate intervention programs are planned.

Key words: Depression, medical students, predictors


Key messages: Early depression was predictive of depression later in the course, and such medical students may be vulnerable to the multiple deleterious effects of depression. This presents important implications for the need to develop early and acceptable interventions. Male gender also emerged as a possible risk factor and requires closer examination.

Depression is one of the most common mental illnesses, with a prevalence of 16.2% in the general population.^[1] It contributes significantly to the

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global burden of disease and is an important cause of years lost due to disability.^[2] Medical education is challenging, and medical students have been shown to have a prevalence of depression higher than that in the general population.^[3] The effects of this are likely to be long-lasting and could explain why physicians have a high suicide rate.^[4] Depression is also documented to have negative effects on academic and work outcomes.^[5,6] Factors that could explain the increased levels of distress among medical students include life stressors and stressors related to a demanding learning environment.^[7] In order to prevent the negative consequences of depression in medical students, it is important to identify the factors responsible and address them as possible.^[8] There are no Indian studies with a longitudinal design examining the predictors of depression in medical students. The literature available shows higher rates of psychological distress among medical students in India than that seen in western studies. Singh *et al.* in 2011 found a prevalence of 49.1% depression among medical students. It was significantly higher in the first year (59.3%) and second year (65.6%), as compared with third (34.4%) and fourth year (37.2%).^[9]

Prevalence of depression and its associated factors was measured among 400 medical students in a medical college in Karnataka. One hundred students were selected from years 1 to 4; the overall prevalence of depression was found to be 71.25%.^[10]

In a study of 237 medical students in North India, there was a prevalence of provisionally diagnosed depressive disorder and major depressive disorder in 21.5% and 7.6%, respectively. Year of study and poor academic performance were associated with depression. First-year students reported the highest prevalence of depression.^[11]

This study was envisaged to study the longitudinal pattern of depression among medical students and the correlates of depression. The study also examined measures of burnout and empathy, which are not presented here.

SUBJECTS AND METHODS

Study Design

A longitudinal follow-up design was employed.

Study setting

The study was conducted in Dr. SMCSI Medical College, Karakonam, a college in the private sector that admits 100 students per year and Government Medical College, Kozhikode, in the public sector that admits 250 students per year. Students of the 2012

MBBS batch constituted the sampling frame for the study. All students who were willing to participate in the study and gave written informed consent were included in the study.

Sample size calculation

Assuming an alpha error of 0.05 and power at 80% and considering the prevalence of depression to be 21.5% in a similar setting^[11] and precision as 5%, the sample size was estimated to be 270. Given an expected nonresponse rate of 20%, all 350 students were invited to participate.

Data collection methods

The students were assessed thrice over a period of 18 months, with assessments being done 2, 8, and 18 months after entry into the MBBS course.

They were administered:

1. A semistructured questionnaire with sociodemographic variables (such as age, gender, parents' occupation, perceived support from friends and family, relationship status, etc.) and academic-related variables (such as medium of schooling, enrollment in residential coaching prior to the course, number of attempts prior to joining the course, whether joining the medical course was their personal choice, field of interest, experience of failure in the past year, etc.)
2. The Patient Health Questionnaire-9 (PHQ 9).

The PHQ 9 is a selfadministered diagnostic instrument, which scores each of the nine DSM-IV criteria for depression as "0" (not at all) to "3" (nearly every day). The PHQ 9 has been used in similar settings, both in India and other countries, to establish the prevalence of depression in medical students.^[8,12-15] A PHQ 9 score of ≥ 10 was taken to indicate the presence of depression.^[9] This cutoff provides that subjects are most likely to meet DSM-IV criteria for major depressive disorder (likelihood ratio ≥ 7.1) and has a sensitivity of 88% and a specificity of 88% for major depression.^[12] It was employed because of the ease of administration. In order to ensure confidentiality and to make comparisons over time, a code number system was used.

Study period

The study duration was from September 2012 to August 2014.

Analysis

The data collected was entered and analyzed using SPSS version 20. For continuous variables, mean and standard deviation were calculated, whereas frequencies and percentages were employed for

categorical variables. Chi-square tests were employed for calculating statistical significance for categorical variables. Analysis of variance (ANOVA) test for repeated measures was employed to examine trends in PHQ scores. Multivariate analysis was employed to predict depression employing variables significantly associated ($P < 0.05$) with depression on univariate analysis. The PHQ 9 score was dichotomized into presence and absence of depression using a cutoff of 10. For analysis, fields of interest were divided into person- and technical-oriented fields. Person-oriented specialties include family medicine, internal medicine, psychiatry, obstetrics and gynecology, pediatrics, and physical medicine and rehabilitation; technical-oriented fields include anesthesiology, dermatology, radiology, emergency medicine, otolaryngology, pathology, orthopaedics, ophthalmology and surgery.^[16] For the purpose of this study, nonclinical subjects were included with technical-oriented specialties.

If a student had left one question unanswered or marked more than one answer for a question, the scale containing that particular question was not calculated. A P value ≤ 0.05 was taken as significant at all stages.

Ethical considerations

The study was conducted according to the guidelines of the Helsinki declaration and after obtaining clearance from the Institutional Ethics Committee of the institutions on 09/10/12 and 23/10/12. Written informed consent was obtained from the students prior to data collection. The students were given the option of seeking help for any problems detected during the data collection process. The data was anonymized to ensure confidentiality.

RESULTS

Descriptive statistics

From September 2012 to August 2014, a total of 348 medical students who gained entry into the MBBS course were eligible for inclusion in the three longitudinal assessments. Data on depression was available for 325 (at 2 months), 279 (at 8 months), and 320 (at 18 months) students.

The mean age of the students was 18.81 (SD 0.92) years. About 204 (58.6%) of the students were female and 246 (70.7%) were students of the government medical college. The majority belonged to the Hindu faith. One (0.3%) identified themselves as not religious. A majority of the fathers were skilled workers, whereas a majority of mothers were unemployed. Overall, 269 (77.3%) had English as a medium of schooling and 278 (79.9%) had attended a residential coaching

program to prepare for the medical education entrance exam. A number of students ($n = 30$; 8.6%) indicated that they had not been interested in joining MBBS. A majority ($n = 265$; 76.1%) had got into the MBBS course on their second attempt.

At first assessment, 334 (96%) of the students were reportedly single and 77 (22.2%) had taken a student loan. At follow-up one and a half years later, 33 (11.6%) were in a romantic relationship and 62 (21.90%) had a student loan. After failing the exams at the end of the first year, 11.80% were in the additional batch. Psychiatry consultations were sought by 22 (7.60%) 8 months in to the course and by 7 (4%) at 18 months.

Surgery was the most popular field of interest at first assessment and second assessment, but by the third assessment, internal medicine had become more popular.

The highest proportion of depression [$n = 139$ (42.8%)] was at 2 months [Table 1]. The change in mean squares of depression over time on PHQ 9 was found to be significant on repeated measures ANOVA ($F = 1378.89$, $P < 0.01$).

Of the students assessed both at intake and 8 months, 113 were depressed at intake, and 53 (47.7%) did not report depression at 8 months. Of the students assessed at intake and 18 months, 45 out of the 102 (44.1%) who reported depression at intake had recovered at 18 months. About 60 (62.5%) of the students who endorsed depression at 8 months had reported depression at intake and 55 (57.6%) of those depressed at 18 months had reported depression at intake.

The variables found to be significantly associated with depression on univariate analysis were the course not having been of the student's choice at the first assessment ($P = 0.045$) and having an unemployed parent (mother) at the second assessment ($P = 0.025$). Alcohol use ($P = 0.025$), depression at 2 months ($P < 0.001$) and at 8 months ($P < 0.001$), and being male ($P = 0.001$) were significantly associated with

Table 1: Longitudinal Pattern of Prevalence of Depression (PHQ >10) in Medical Students

Variable	First MBBS-2 months n (%) $n=325$	First MBBS-8 months n (%) $n=279$	Second MBBS-18 months (%) $n=320$
Depression			
Present	139 (42.8)	101 (36.2)	136 (42.5)
Absent	186 (57.2)	178 (63.8)	184 (57.5)

PHQ – Patient health questionnaire, MBBS – Bachelor of medicine and bachelor of surgery

depression at the third assessment (18 months into the course) [Table 2]. Sociodemographic variables such as the age of the student, religion, employment of father, consumption of alcohol early in the course, negative life events, being in a romantic relationship, and perceived support of friends or parents were not significantly associated with the presence of depression at any of the assessments. However, the students reporting alcohol use were slightly more likely to report depression. Academic variables such as number of attempts to gain admission, attending a residential coaching program prior to admission, history of academic failures, type of college, student loans, field of interest (people oriented vs. technologically oriented), whether in additional batch, nature of clinical postings attended, and whether student felt the clinical training was rewarding were not significantly associated with depression.

After multivariate analysis employing logistic regression by enter method with variables significant at $P < 0.05$ on univariate analysis for depression at 18 months, male gender (OR = 1.95, 95% CI = 1.11–3.41) and the presence of depression at 2 months (OR = 2.30, 95% CI = 1.31–4.05) and 8 months (OR = 2.48, 95% CI = 1.39–4.44) were predictive of depression at 18 months [Table 3].

Table 2: Factors Significantly* Associated With Depression (2, 8, and 18 months into the course) in Medical Students on Univariate Analysis

Assessment	Characteristic	Depression status		Bivariate statistics	
		Present (%)	Absent (%)	OR	95% CI
At 2 months (n=325)	Course not of student's choice	12	18	2.16	1.00-4.64
		40%	60%		
At 8 months (n=279)	Unemployed mother	88	64	1.77	1.07-2.92
		57.9%	42.1%		
	Depression at two months	55	61	3.27	1.94-5.50
		47.4%	52.6%		
At 18 months (n=320)	Alcohol use	4	10	3.57	1.09-11.64
		28.6%	71.4%		
	Male gender	59	68	2.12	1.34-3.34
		64.8%	35.2%		
	Depression at 2 months	53	75	2.93	1.82-4.71
		41.4%	58.6%		
	Depression at 8 months	36	55	2.97	1.75-5.05
		39.6%	60.4%		

*Statistical significance P less than or equal to 0.05

Table 3: Multivariate analysis for predictors of depression at 18 months into the MBBS course

Factors	OR (adjusted)	df	95% CI	P
Alcohol use	1.80	1	0.47-6.97	0.393
Depression at 2 months	2.30	1	1.31-4.05	0.004
Depression at 8 months	2.48	1	1.39-4.44	0.002
Male gender	1.95	1	1.11-3.41	0.019

MBBS – Bachelor of medicine and bachelor of surgery

DISCUSSION

Depression is known to be prevalent among medical students, with higher rates than the general population.^[1,17,18] Our study found that the prevalence of depression was the highest (42.8%) very soon after entry into the course (2 months into first MBBS); this decreased to 36.2% at the end of first MBBS and increased again to 42.5% after an average of eight months exposure to clinical rotations.

Literature shows that the prevalence of depression among medical students in India is higher than that seen in western studies.^[8,9,11] Western literature reports lower levels of depression among students as 12.9% (16.1% female; 8.1% males)^[17] and ranging from 5.7% to 10.6% in another study by Quince *et al.* at Cambridge.^[19]

In India, Singh *et al.* found that 49.1% of medical students reported depressive symptoms with higher values in the first two years of the course.^[9] Other investigators in India and other southeast Asian countries have also reported such high figures.^[9,11,20] Sidana *et al.* replicated these findings, which was in keeping with the findings of this investigation.

In a Cambridge-based study, levels of depression steadily increased from the first year through to the third year of study,^[19] unlike our study where the levels of depression were highest soon after entry into the medical college. This could be postulated to be due to the possible difficulty coping with the bulk of the syllabus in the first year^[21] or the stress induced by the preparation for the highly competitive entrance exams prior to entering the medical school. In India, students often drop a year during which they are subject to rigorous residential entrance coaching.^[22] The average age and academic experience of medical students in India is less than that of students in western settings, making them possibly less equipped to cope with the rigors of medical education. It is interesting that there is no longitudinal increase in the prevalence of depression over time, unlike studies from other countries. Unlike western medical schools, where students are involved in clinical work and subjected to questioning during real-life rounds from the third year of training, in India, the students are largely only expected to learn from the clinical material available and are usually not given any clinical responsibilities. All these reasons may contribute to a levelling off or reduction in depression as the course progresses in our country.

In our study, depression was significantly more among males one and a half years into the course. This is not

consistent with higher rates of depression found in females in other studies.^[9,17,18,23] This may be possibly explained by an expectation of the length of the course, disillusionment about the course, and the added pressure on males in Indian societies to fulfil the role of breadwinners. Women in India are less likely to be expected to support their families financially. This is a novel finding and will require further exploration.

Current alcohol use was found to be significantly associated with the presence of depression at 18 months on univariate analysis. This association has been detected by other investigators.^[24] It may be postulated that either alcohol is etiologically related to depression or even that alcohol is being employed to ameliorate the negative affective state related to depression. However, alcohol use was not predictive of depression on multivariate analysis.

The course not being of the student's choice was also a risk factor for depression at entry. In India, there is high societal and parental pressure to get into the medical course leading some students to take up a course they do not necessarily like.^[25] This is in keeping with cultural norms, with offspring often being expected to follow family values and expectations, with less value attached to personal autonomy. Interestingly this lack of initial interest in joining the course was not correlated with depression later in the course, leading one to postulate that students were largely accepting of the choice they were obliged to make.

We are unable to fully explain the significance of having an unemployed mother leading to increased levels of depression at the second assessment. It could be postulated to be due to possible financial constraints or may be due to a type I error, given the large number of variables assessed and the absence of statistical corrections for the same.

A significant predictor of depression at 18-month follow-up, other than the male gender, was the occurrence of depression earlier during the course. Therefore, the presence of depression, a potentially identifiable and modifiable risk factor, early in the course predicts depression. The presence of depression later in the course has been detected in up to 1/5 of the students with initial depression by other investigators,^[26] demonstrating that early depression is a significant risk factor. This has important implications, as early unrecognized depression seems to be a significant risk factor for depression later on, which, in turn, may negatively impact quality of life and academic and social functioning.^[5,6] This is particularly important for these young people who are already set for a challenging course, requiring the attainment of a wide range of

competencies in cognitive, psychomotor, emotional and behavioral areas.

Strengths and limitations

Strengths

This was a study assessing depression in medical students from institutes both in the private and public sector. It utilized a longitudinal design, allowing the examination of predictors. A wide range of academic and sociodemographic variables was examined, multivariate analysis was conducted, and the sample size allowed for meaningful interpretations.

Limitations

The study population was drawn from a southern state in India and findings naturally may not pertain to other regions of the country or world. The PHQ9, though widely used to detect depression, is not a rater/clinician-administered interview schedule to diagnose depression.

Being a follow-up study, there was some attrition at each stage of the study.

Implications for future research

The findings give impetus to the urgent need to recognise and mitigate emotional distress in the form of depression to prevent adverse outcomes, such as depression later in the course. This indicates a need to sensitize students and faculty to signs of emotional distress in medical students, particularly early in their course. An examination of specific environmental and curriculum factors may also be valuable, as well as work on feasible and acceptable interventions for early recognition and amelioration of depression among medical students.

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Conflicts of interest

There are no conflicts of interest.

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