



PREVALENCE OF STRESS AND DEPRESSION AMONG UNDERGRADUATE MEDICAL STUDENTS: A CROSS-SECTIONAL STUDY

Punith G D	Assistant Professor at Subbaiah institute of Medical Sciences, Shivamogga
Sneha Sri G R*	Assistant Professor at Subbaiah institute of Medical Sciences, Shivamogga *Corresponding Author
Dr Della	Senior Resident at JJM medical college, Davanagere

ABSTRACT

Medical education is academically demanding and exposes students to considerable psychological stress, which can adversely affect academic performance, interpersonal relationships, and overall well-being. This study aimed to estimate the prevalence of stress and depression among undergraduate medical students and identify factors associated with these conditions. A cross-sectional study was conducted among 250 undergraduate medical students in a tertiary care teaching hospital using convenient sampling after obtaining informed consent. Sociodemographic characteristics, academic profile, sleep duration, physical activity, screen time, and family support were assessed using a pretested semi-structured questionnaire, while validated screening instruments were used to evaluate perceived stress and depression. Data were entered into Microsoft Excel and analyzed using SPSS version 20. Descriptive statistics were expressed as frequencies, percentages, mean, and standard deviation, and associations were tested using the Chi-square test, with a p -value <0.05 considered statistically significant. The majority of students experienced moderate stress, while mild to moderate depression was observed in a substantial proportion of participants. Higher stress and depression scores were more common among female students, hostel residents, and those reporting inadequate sleep, prolonged screen time, and poor family support. Significant associations were observed between stress and poor academic performance as well as inadequate family support. The study concludes that stress and depression are common among undergraduate medical students, emphasizing the need for regular mental health screening, accessible counselling services, stress management programs, and institutional support systems to promote psychological well-being and improve academic performance.

KEYWORDS : Medical students, Stress, Depression, Mental health, Cross-sectional study.

INTRODUCTION

Mental health is an integral component of overall health and well-being, influencing an individual's ability to learn, work productively, cope with stress, and contribute effectively to society. Medical students represent a particularly vulnerable population because they are exposed to unique academic, psychological, and social challenges throughout their undergraduate training. The demanding medical curriculum, continuous examinations, extensive clinical responsibilities, competitive learning environment, and expectations from family and society contribute significantly to psychological distress among medical students.^{1,3}

Stress is defined as a state of psychological and physiological imbalance that occurs when environmental demands exceed an individual's coping resources. Although moderate stress may enhance motivation and improve performance, persistent or excessive stress adversely affects cognitive function, emotional stability, academic performance, and physical health. Chronic stress has been associated with impaired concentration, sleep disturbances, burnout, substance abuse, reduced empathy, poor interpersonal relationships, and increased risk of anxiety and depression among medical students.^{4,5}

Depression is one of the most common psychiatric disorders affecting young adults worldwide and is characterized by persistent sadness, loss of interest in previously enjoyable activities, fatigue, impaired concentration, feelings of worthlessness, disturbed sleep, altered appetite, and diminished functional capacity. Depression significantly affects academic achievement, professional development, interpersonal relationships, and quality of life. Furthermore, untreated depression increases the risk of self-harm, suicidal ideation, and suicide, making early identification and intervention essential among medical students.^{6,7}

According to the World Health Organization (WHO), depression is one of the leading causes of disability worldwide, affecting more than 280 million people. Mental

health disorders among adolescents and young adults are increasingly recognized as major public health concerns, accounting for a substantial proportion of the global burden of disease. Medical students experience psychological distress more frequently than individuals of similar age in the general population because of academic workload, frequent assessments, sleep deprivation, financial concerns, adjustment to hostel life, and uncertainty regarding future career opportunities.⁸

Several international studies have consistently demonstrated a high prevalence of stress and depression among undergraduate medical students. A systematic review and meta-analysis by Rotenstein et al. reported that approximately 27.2% of medical students experienced depression or depressive symptoms, while only a minority sought professional treatment.⁹ Similarly, another meta-analysis by Quek et al. found that medical students had substantially higher levels of psychological distress compared with non-medical students, emphasizing the need for institutional mental health support systems.¹⁰

In India, the implementation of the Competency-Based Medical Education (CBME) curriculum has introduced early clinical exposure, integrated teaching, self-directed learning, competency-based assessment, and continuous evaluation. Although these educational reforms aim to improve the quality of undergraduate medical education, they have also increased academic demands on students. Additional stressors such as adjustment to hostel life, financial difficulties, language barriers, reduced family support, social isolation, excessive screen time, inadequate physical activity, and preparation for postgraduate entrance examinations further contribute to psychological distress.¹¹

Previous Indian studies have reported varying prevalence of stress and depression among undergraduate medical students. Female students, first-year students, hostel residents, students with poor sleep quality, inadequate physical activity, limited family support, and lower academic

performance have consistently been identified as being at greater risk of psychological distress.¹²⁻¹⁵ However, institutional differences in academic environment, student support systems, and sociocultural factors necessitate local epidemiological evidence for developing effective mental health promotion strategies.

Early identification of stress and depression among medical students provides an opportunity for timely counselling, stress management interventions, peer support, faculty mentorship, and strengthening institutional mental health services. Periodic mental health screening, confidential counselling facilities, promotion of healthy lifestyle practices, and reduction of stigma associated with mental illness are important strategies recommended to improve psychological well-being and academic performance among medical students.¹⁶

Considering the growing burden of psychological distress among undergraduate medical students and the need for institution-specific evidence, the present study was undertaken to assess the prevalence of stress and depression among undergraduate medical students and to identify selected sociodemographic, academic, and lifestyle factors associated with these conditions.

OBJECTIVES

1. To determine the prevalence of stress and depression among undergraduate medical students.
2. To assess the severity of stress and depression among undergraduate medical students.
3. To determine the association between stress and depression among undergraduate medical students.

METHODOLOGY

The present institution-based cross-sectional study was conducted in the selected Medical Colleges of Karnataka, over a period of three months after obtaining approval from the Institutional Ethics Committee. Informed consent was obtained from all participants before enrolment in the study. Participation was voluntary, and confidentiality and anonymity of the collected information were maintained throughout the study.

The study population comprised all undergraduate MBBS students enrolled during the study period. All MBBS students were invited to participate in the study through google forms which were shared among students of selected medical colleges of Karnataka. Students who were willing to participate were included in the study. Students who declined participation, or submitted incomplete questionnaires were excluded from the final analysis.

Initially, questionnaires were shared to all eligible undergraduate MBBS students. Following data collection, all questionnaires were scrutinized for completeness and consistency. Questionnaires with missing or inconsistent responses were excluded during the data-cleaning process. After data cleaning, a total of 250 completed questionnaires were found suitable for analysis and constituted the final study sample.

Data were collected using a pre-designed, pre-tested, self-administered semi-structured questionnaire. The questionnaire consisted of two sections. The first section included information regarding socio-demographic characteristics and academic profile such as age, gender, year of study, place of residence, average sleep duration, physical activity, daily screen time, academic performance, and perceived family support. The second section comprised standardized instruments for assessing stress and depression.

Perceived stress was assessed using the Perceived Stress Scale-10 (PSS-10) developed by Cohen et al. The instrument consists of ten items scored on a five-point Likert scale ranging from 0 (Never) to 4 (Very Often), with total scores ranging from 0 to 40. Stress was categorized as Low (0–13), Moderate (14–26), and High (27–40) based on the total score.

Depression was assessed using the Patient Health Questionnaire-9 (PHQ-9), a validated screening instrument widely used to assess depressive symptoms. The PHQ-9 consists of nine items scored from 0 (Not at all) to 3 (Nearly every day), with a total score ranging from 0 to 27. Depression severity was classified as Minimal (0–4), Mild (5–9), Moderate (10–14), Moderately Severe (15–19), and Severe (20–27).

The primary outcome measures were the prevalence and severity of stress and depression among undergraduate medical students. Secondary outcome measures included the association of stress and depression with selected socio-demographic, academic, and lifestyle factors including age, gender, year of study, residence, sleep duration, physical activity, daily screen time, academic performance, and family support.

The collected data were entered into Microsoft Excel and analyzed using Statistical Package for the Social Sciences (SPSS) version 20.0. Continuous variables were expressed as mean $\pm$ standard deviation, whereas categorical variables were presented as frequency and percentage. Associations between categorical variables were assessed using the Chi-square test. A p-value <0.05 was considered statistically significant.

RESULTS

The present study included 250 undergraduate medical students after excluding incomplete questionnaires during the data-cleaning process. Female students constituted a slightly higher proportion (51.2%) than males (48.8%). Students from all four academic years participated, with the highest representation from the second MBBS (27.2%), followed by final MBBS (26.8%), third MBBS (25.2%), and first MBBS (20.8%). Nearly two-thirds of the participants (63.2%) were hostel residents, while 36.8% were day scholars.

Assessment of perceived stress revealed that moderate stress was the predominant level, affecting 72% of the study participants. High stress was observed in 22% of students, whereas only 6% reported low stress. The distribution of depressive symptoms showed that mild depression (37.2%) was the most common category, followed closely by moderate depression (34.8%). Minimal depressive symptoms were observed in 13.6% of students, while 12% had moderately severe depression and 2.4% had severe depression.

Analysis of factors associated with stress demonstrated that students who did not engage in regular physical activity had a higher prevalence of high stress (27.0%) compared with those who performed regular physical activity (17.3%). However, this association was not statistically significant ($\chi^2 = 2.92$, $p = 0.088$). Similarly, female students showed a higher proportion of high stress (25.0%) than male students (18.0%), but the association between gender and stress was not statistically significant ($\chi^2 = 1.63$, $p = 0.20$). Residence status also did not demonstrate a statistically significant association with stress, although hostel residents showed a slightly higher prevalence of high stress (22.8%) than day scholars (19.6%) ($\chi^2 = 0.39$, $p = 0.53$). Academic performance demonstrated a statistically significant association with stress levels. Students with poor academic performance had a markedly higher prevalence of high stress (37.2%) compared with students having average or good academic performance (18.4%) ($\chi^2 = 6.40$, $p = 0.01$). Family support showed a highly statistically significant

association with stress. Nearly half of the students reporting poor family support (45.7%) experienced high stress, compared with only 16.2% among those receiving moderate or good family support ($\chi^2 = 17.56, p = 0.001$).

Table 01. Sociodemographic Characteristics of Study Participants (N = 250)

Variable	Category	Frequency (%)
Gender	Male	122 (48.8)
	Female	128 (51.2)
Year of MBBS	First MBBS	52 (20.8)
	Second MBBS	68 (27.2)
	Third MBBS	63 (25.2)
	Final MBBS	67 (26.8)
Residence	Hostel	158 (63.2)
	Day Scholar	92 (36.8)

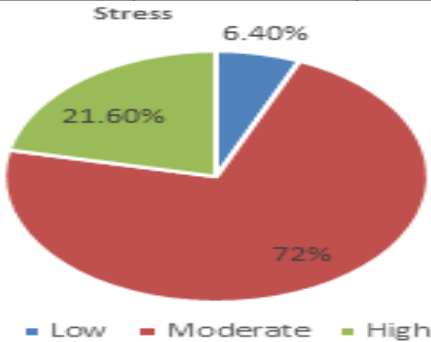


Figure 01. Distribution of Stress Among Medical Students (N = 250)

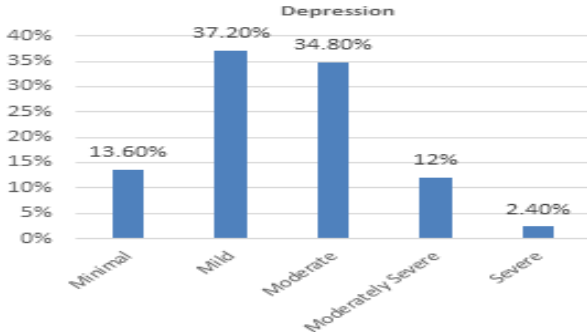


Figure 02. Distribution of Depression Among Medical Students (N = 250)

Table 02. Factors associated with stress among study participants (n=250)

	High Stress	Low/Moderate Stress	x ²	P-value
Physical Activity				
No	30 (27.0%)	81 (73.0%)	2.92	0.088
Yes	24 (17.3%)	115 (82.7%)		
Gender				
Male	22 (18.0)	100 (82.0)	1.63	0.20
Female	32 (25.0)	96 (75.0)		
Residence				
Hostel	36 (22.8)	122 (77.2)	0.39	0.53
Day Scholar	18 (19.6)	74 (80.4)		
Academic Performance				
Poor	16 (37.2)	27 (62.8)	6.40	0.01
Average/Good	38 (18.4)	169 (81.6)		
Family Support				
Poor	21 (45.7)	25 (54.3)	17.5	0.001
Moderate/Good	33 (16.2)	171 (83.8)		

DISCUSSION

The present cross-sectional study was conducted among 250 undergraduate medical students to assess the prevalence of

stress and depression and to identify factors associated with stress. Medical education is widely recognized as academically demanding, exposing students to continuous examinations, extensive curriculum requirements, clinical responsibilities, and social expectations. These factors contribute substantially to psychological distress, making mental health among medical students an important public health concern.

The present study included 250 undergraduate medical students, with a nearly equal distribution of male (48.8%) and female (51.2%) participants. Students from all years of MBBS were represented, ensuring adequate participation across different stages of medical education. Approximately two-thirds of the students were hostel residents (63.2%), while the remaining were day scholars.

A similar demographic distribution has been reported in several Indian studies. Iqbal et al. reported an almost equal gender distribution among medical students in North India, facilitating meaningful gender comparisons.¹² Likewise, Kumar et al. observed comparable participation across different years of MBBS, improving the representativeness of their findings.¹⁴ Such balanced distributions minimize selection bias and improve the generalizability of results.

The present study found that 72% of students experienced moderate stress, while 22% had high stress and only 6% had low stress, indicating that nearly one in every five medical students suffered from severe psychological stress. These findings are consistent with the systematic review conducted by Rotenstein et al., who reported that approximately one-third of medical students worldwide experience significant psychological distress during training.⁹ Although the prevalence estimates vary according to assessment tools and study settings, the consistently high burden highlights stress as a universal problem in medical education.

In India, Iqbal et al. reported that approximately 60–70% of undergraduate medical students experienced moderate to severe stress, which closely resembles the findings of the present study.¹² Similarly, Sreeramareddy et al. observed that academic workload, frequent examinations, and adjustment to hostel life were major contributors to elevated stress among medical students.¹³ Studies from Saudi Arabia by Abdulghani et al. also demonstrated that more than half of medical students experienced moderate or high perceived stress, particularly during examination periods.¹⁷ Comparable findings have been reported among medical students in Malaysia by Yusoff et al., suggesting that stress among medical students is a global phenomenon irrespective of geographical location.¹⁸ The predominance of moderate stress in the present study may be explained by continuous academic pressure, long study hours, competitive learning environments, frequent assessments, and concerns regarding future career prospects.

The present study demonstrated that 37.2% of students had mild depression, 34.8% had moderate depression, 12% had moderately severe depression, and 2.4% had severe depressive symptoms. These findings indicate that depressive symptoms are highly prevalent among undergraduate medical students. Rotenstein et al., in their landmark meta-analysis involving more than 120,000 medical students, reported a pooled prevalence of depression of approximately 27%, emphasizing that depression among medical students is substantially higher than in the general population.⁹ Iqbal et al. also observed that depressive symptoms increased progressively with academic workload and examination stress.¹² Comparable results were reported by Basnet et al. in Nepal and by Hope and Henderson in the United Kingdom,

demonstrating that medical students worldwide remain vulnerable to depression due to persistent educational stressors.^{15,19} The relatively high prevalence of mild and moderate depression observed in the present study suggests that a considerable proportion of students may benefit from early psychological intervention before progression to severe mental illness.

Students who did not engage in regular physical activity showed a higher prevalence of high stress (27.0%) compared with those who exercised regularly (17.3%). However, this association did not achieve statistical significance ($p=0.088$). Several previous studies have demonstrated an inverse relationship between physical activity and stress. Stubbs et al. reported that regular exercise significantly improves mood, reduces anxiety, and lowers stress levels through neurobiological mechanisms involving endorphin release.²⁰ Similarly, a study by Kumar et al. among Indian medical students observed significantly lower stress scores among students participating in regular sports and physical activity.¹⁴ Although the present study did not demonstrate statistical significance, the observed trend suggests a potentially protective role of physical activity. The lack of significance may be attributable to sample size, variation in exercise intensity, or reliance on self-reported physical activity.

Female students demonstrated a higher prevalence of high stress (25.0%) compared with male students (18.0%), although the association was not statistically significant ($p=0.20$). Several Indian studies have similarly reported higher stress among female medical students. Iqbal et al. found that female students experienced greater psychological distress owing to emotional sensitivity, academic expectations, and social responsibilities.¹² Likewise, Abdulghani et al. reported significantly higher stress scores among female students in Saudi Arabia.¹⁷ However, not all studies have observed significant gender differences. Sreeramareddy et al. found comparable stress levels between males and females after adjustment for academic variables.¹³ The absence of statistical significance in the present study suggests that although females tended to report greater stress, academic demands may exert a similar psychological burden on both genders.

Hostel residents exhibited slightly higher stress (22.8%) compared with day scholars (19.6%), although this difference was not statistically significant. Several investigators have proposed that hostel living may contribute to stress due to homesickness, adjustment difficulties, dietary changes, and reduced family interaction.²¹ However, studies from South India by Menon et al. reported findings similar to the present study, showing no statistically significant association between residence and perceived stress.²² The lack of significance may indicate that modern communication technologies and improved hostel facilities reduce the psychological impact of staying away from home.

One of the important findings of the present study was the statistically significant association between academic performance and stress. Students with poor academic performance exhibited a markedly higher prevalence of high stress (37.2%) compared with students having average or good academic performance (18.4%) ($p=0.01$). This observation is consistent with studies conducted by Yusoff et al., who demonstrated that academic stressors remain the strongest predictors of psychological distress among medical students.¹⁵ Similarly, Dyrbye et al. reported that poor academic achievement and repeated examinations significantly increase stress, burnout, and emotional exhaustion.¹⁶

Indian studies by Iqbal et al. and Kumar et al. have likewise shown that academic underperformance is closely associated

with elevated stress levels.^{12,14} The relationship between stress and academic performance is likely bidirectional. Excessive stress impairs concentration, memory, and decision-making, leading to poor academic outcomes, while poor academic results further increase psychological stress.

The present study identified family support as the strongest predictor of stress. Nearly half of students reporting poor family support experienced high stress compared with only 16.2% among those receiving moderate or good family support ($p=0.001$). This finding agrees with previous literature emphasizing the protective role of family support in maintaining psychological well-being. Cohen and Wills proposed the stress-buffering hypothesis, suggesting that emotional support from family mitigates the adverse effects of stressful life events.²³ Similarly, Indian studies by Sreeramareddy et al. and Menon et al. demonstrated that supportive family relationships significantly reduce stress, depression, and anxiety among medical students.^{13,22} International studies have also shown that students with stronger family support demonstrate greater resilience, better coping mechanisms, and improved academic performance.²⁴ The highly significant association observed in the present study reinforces the importance of maintaining family connectedness during undergraduate medical education.

CONCLUSION

The present study demonstrated a high prevalence of stress and depressive symptoms among undergraduate medical students, with moderate stress and mild to moderate depression being the most common findings. Poor academic performance and inadequate family support were significantly associated with higher stress levels, whereas physical activity, gender, and residence did not show statistically significant associations. These findings highlight the need for regular mental health screening, academic counseling, stress management programs, and strengthening family support systems within medical colleges. Early identification and timely psychological interventions can promote better mental well-being and improve both academic performance and overall quality of life among medical students.

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