Bioscene

Bioscene
Volume- 21 Number- 02
ISSN: 1539-2422 (P) 2055-1583 (O)
www.explorebioscene.com

Screening for Depression in Medical Students: Prevalence, Contributing Variables, and Predictive Factors

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Abstract

Background: Overwhelming information, coping with the new environment, academics, and peer pressure are considered to be the most common factors among medical students who develop symptoms of depression. There is a paucity of literature to assess and address this issue among future physicians in South India. Thus, this study aimed to screen and determine the prevalence, contributing variables, and predictive factors of depression among medical students in a medical institution**. Methods**: This cross-sectional study included medical students of all the semesters enrolled at Maharajah Institute of Medical Science, Andhra Pradesh, during the 2021–2022 academic year. Two standardised scales were used in the study to measure different constructs: a self-administered questionnaire containing socio-demographic, academic, and stress-related variables, and a PHQ-9 form to screen for any symptoms of depression. A chi-square test and correlation were conducted to identify the predictors of depression. **Results:** About 69% of students had symptoms of depression to some degree based on the PHQ-9, and 31% had no symptoms. Gender, native place, language barrier, accommodation, food, peer pressure, and choice of MBBS (Bachelor of Medicine and Bachelor of Surgery) were found to be insignificant. There was a statistically significant association between socioeconomic status, smoking, alcohol, conflicts with friends, academics and their potential vulnerability to depression.Conclusion: The study concluded that there is a need to develop strategies to educate, counsel, and support medical students in obtaining stigma-free medical and therapeutic care for their general and mental well-being.

Key words: medical students, socioeconomic status, COVID-19, PHQ - 9, depression susceptibility.

Introduction

Depression is a normal physiological process associated with emotional, physical, or pathological inconvenience, but when sustained for a long period of time, affecting the mental status and the ability to perform daily activities. It leads to a more specific condition, the 'Major Depressive Disorder. The American Psychological Association defines anxiety as an emotion characterized by feelings of nervousness, distressed thoughts, and physical changes like rapid breathing and fast heart rate which later can develop into depression. (Yadav, B. K., et al., 2021).

It is a common mental disorder that cuts across age, gender, and socioeconomic status in India and across the world. The estimated global prevalence ranges from 3.2% to 4.7%, and the burden of depression has been increasing globally. (Yadav, B. K., et al., 2021). The World Health Organization's (WHO), world mental health survey found that the prevalence of mood disorders varied between nations, with a global average of 5.4% and a range of 0.8% to 9.6%. (Goldman L. 2020). The significance of depression is further magnified by its cause-and-consequence relationship with many non-communicable diseases (NCDs)and thus has a huge impact on individuals, families, and societies. According to the WHO, around 350 million people suffer from depressive disorder, which is considered to be the second most common cause of disability worldwide after ischemic heart disease. The prevalence of depression varies from 8–12% worldwide and in India, about 21.5% of medical students endure depression. (Steel Z, et al., 2014; Demyttenaere K et al., 2004; Reddy VM et al., 2004).

MBBS is a challenging degree that requires perseverance, consistent work, and a well-balanced emotional and intellectual quotient. Several studies suggest that medical students generally have higher levels of depression compared to students of other courses and general population. Various factors, like academic burden, competitive pressure among peers, and substance abuse, have shown a significant association with depression among medical students. (Steel Z, et al., 2014; Espey M. 2020 ; Allen J.2014). A few studies have observed a higher level of depression in female students compared to male students. (World Health Organization; Mitchell AJ 2009). Additionally, the use of social media has been found to have a profound impact on stress levels and the odds of having depression.(Ansseau M, 2008; Olfson M, 1997; Gururaj G, 2005).

Mental health issues among medical students are also often undisclosed owing to stigma due to various factors, such as apprehension of being poorly evaluated by the faculty, being mocked and receiving reduced respect from peers, or being perceived as unable to handle responsibilities.(Goldman L.2020). In order to avert the negative consequences of depression, it is essential to increase awareness among students, identify the factors that trigger depression, and address psychosocial needs as soon as possible. Students usually prioritize their

course work over their health, which has a detrimental effect on every aspect of their lives. There is a dearth of research on the factors that influence an individual's susceptibility to depression Hence, this study aimed to assess the prevalence of contributing factors and demographic variables that may trigger depression in medical students.

Materials and Methods

The present study is an observational and cross-sectional study conducted at a medical college in the southern part of India for a period of six months. Medical students of all the semesters were enrolled during the 2021–2022 academic year. Two standardized scales were used in the study to measure different constructs: a self-administered questionnaire containing socio-demographic, academic, and stress-related variables, and a PHQ-9 form to screen for any symptoms of depression. Written informed consent and Institutional ethics committee approval were obtained. Medical students from the 1st to the 8th semester who consented to participate in the study were screened for symptoms of depression. Any kind of pre-existing psychiatric disorder or undergoing treatment for psychiatric disorder (taking medications such as antidepressants or antipsychotics) or exams scheduled within two months of the day of study were excluded in order to prevent bias related to exam stress.

Predesigned, pretested, semi-structured questionnaire: This questionnaire includes sociodemographic variables like age, gender, socioeconomic status, relationships with friends and family, smoking and drinking habits. Academic variables consisting of academic burden, whether joining a medical course was their personal choice, experience of failure in the past year. Environmental and cultural factors like language barrier, levels of satisfaction regarding accommodation and food facilities. Presence of any other morbid conditions. The effects of COVID-19 and lockdown consequences were used to study the factors influencing depression.

Patient Health Questionnaire 9 (PHQ-9): It is a self-administered version of the PRIME-MD (Primary Care Evaluation of Mental Disorders), which helps diagnose the presence of major depressive disorder using modified Diagnostic and Statistical Manual Fourth Edition (DSM-IV) criteria.(Ganguli HC.2000). Using the mental health professional (MHP) re-interview as the criterion standard, a PHQ-9 score ≥ 10 had a sensitivity of 88% and a specificity of 88% for major depression. Apart from assessing the prevalence, it also helps to identify the severity of depression. PHQ-9 Scoring - The interpretation of depression is as follows: no depression [0-4], mild [5–9], moderate [10–14], moderately severe [15–19] and severe (20–27) depression.(World Health Organization.2002). For the purpose of analysis in the present study, the study subjects were categorized as those with

no symptoms of depression (PHQ-9 Score of 0-4) and those with likelihood of experiencing depression (PHQ-9 Score of 5-27).

Assuming the prevalence of Depression among medical students to be 21.5%, the sample size was calculated to be 351.

{$n=Z_\alpha^2 pq/L^2$; where α=5%, Z_α=1.96, p=21.5%=0.215, q=78.5%=0.785, L=20%×p=0.043}.

Statistical analysis: Descriptive statistics in the form of bar graphs were used to compare the sociodemographic characteristics, academics and other relevant factors of the participants. Chi square test were used to identify the associations between the variables and depression. Co-relation was calculated using SPSSv23.

Results

A total of 351 students who met the criteria, participated in the study. There were 68.38% women and 31.62% men respondents. Students in the study group were 20.81 years old on average, with a 2.32 standard deviation. The mean age of males was 21.33 with a standard deviation of 1.14, while that of females was 20.8, with a standard deviation of 1.64.

Table 1: Association between socio economic status and likelihood of experiencing depression in study subjects

Theme	**Parameter**	**Yes**	**No**	**p-value**
Gender	male	33	78	0.6585
	female	77	163	
Socio-economic status	low income household	23(25)	69(75)	**0.0266***
	high income household	36(40.45)	53(59.55)	
Place	rural	29(27)	78 (73)	0.2481
	urban	80 (33)	160 (67)	
Smoking	Non-smokers	109 (46.70)	233 (53.30)	**0.0012***
	smokers	8 (90)	1 (10)	
Alcohol	consumes	5 (100)	0	**0.0060***
	Does not consume	110 (32)	236 (68)	
Language barrier	present	30 (81)	7 (19)	0.0800
	absent	210 (68)	103 (33)	
Hostel	Satisfied	58 (32.40)	121 (67.60)	0.6500
	Not satisfied	51 (30)	118 (70)	

Food	Satisfied	34 (34)	66 (66)	
	Not satisfied	76 (30)	175 (70)	0.4901
Pressure from family / friends	present	13 (97)	44 (77.19)	
	absent	97 (32.99)	197 (67)	0.1202
conflicts with family / friends	present	7 14	46 86	**0.0020***
	absent			
MBBS – personal choice	yes	100 32.90	204 67.10	0.128
	no	10 21.7	36 78.3	

*indicates statistical significance

Table 2: Association between Semester of studyandlikelihood of experiencing depression in study subjects

Theme	**Parameter**	**Yes**	**No**	**p-value**
Semester	1st	36 (31)	79 (69)	
	3rd	42 (47)	48 (53)	**0.0003***
	5th	18 (29.50)	43 (70.5)	
	8th	14 (17)	71 (83)	
Hours of study	< 5hrs	98 (30.15)	227 (69.85)	**0.013***
	5 or more hours	14 (53.85)	12 (46.15)	
Overloaded by academic information	yes	59 (23.60)	191 (76.40)	**0.0001***
	no	51 (50.50)	50 (49.50)	**0.022***
Failure in exams	yes	50 (26.17)	141 (73.83)	
	no	60 (37.50)	100 (62.50)	

*indicates statistical significance *Yes - susceptible to depression *No - not susceptible to depression

Table 3: Association between presence of other health issues and symptoms of depression

Theme	Parameter	Yes	No	p-value
Association of any other health issues with depression	present	9 (21.43)	32 (78.57)	0.16
	absent	101 (48.10)	209 (51.90)	
Association of COVID 19 with depression	present	56 (25)	170 (75)	**0.0002***
	absent	54 43.55	70 56.45	

*indicates statistical significance *Yes - symptoms of depression *No - no symptoms of depression

Table 4: Summary Table for correlation between PHQ-9 Score and variables

Variables	PHQ-9 Score	p value
Age*?**	Correlation Coefficient (rho) = 0.15	0.007[1]
Gender		0.339[2]
Male	8.49 ± 5.60	
Female	7.85 ± 5.47	
Ration Card		0.155[2]
Yes	8.85 ± 6.05	
No	7.77 ± 5.29	
Smoker* **		0.015[2]
Yes	12.89 ± 6.03	
No	7.93 ± 5.45	
Alcohol		0.225[2]
Yes	11.20 ± 6.65	
No	8.01 ± 5.49	
Conflicts* **		0.001[2]
Yes	10.21 ± 5.51	
No	7.67 ± 5.43	
MBBS by Personal Choice		0.106[2]
Yes	7.88 ± 5.50	
No	9.15 ± 5.51	
Semester* **		<0.001[3]

Variables	**PHQ-9 Score**	**p value**
1st	8.54 ± 5.92	
2nd	6.13 ± 4.83	
3rd	7.79 ± 4.91	
4th	9.55 ± 5.50	
Study Hours/Day* **		0.002[3]
<5 Hours	8.24 ± 5.55	
5-10 Hours	4.88 ± 3.27	
>10 Hours	16.00 ± 4.24	
Feel Overloaded* **		<0.001[2]
Yes	9.09 ± 5.54	
No	5.49 ± 4.54	
Ever Failed* **		**0.012[2]**
Yes	8.75 ± 5.69	
No	7.22 ± 5.19	
Health Issues* **		**0.031[2]**
Yes	9.68 ± 5.76	
No	7.84 ± 5.45	
COVID 19 Infection* **		**0.004[2]**
Yes	8.54 ± 5.36	
No	7.18 ± 5.70	

****Significant at p<0.05, 1: Spearman Correlation, 2: Wilcoxon-Mann-Whitney U Test, 3: Kruskal Wallis Test*

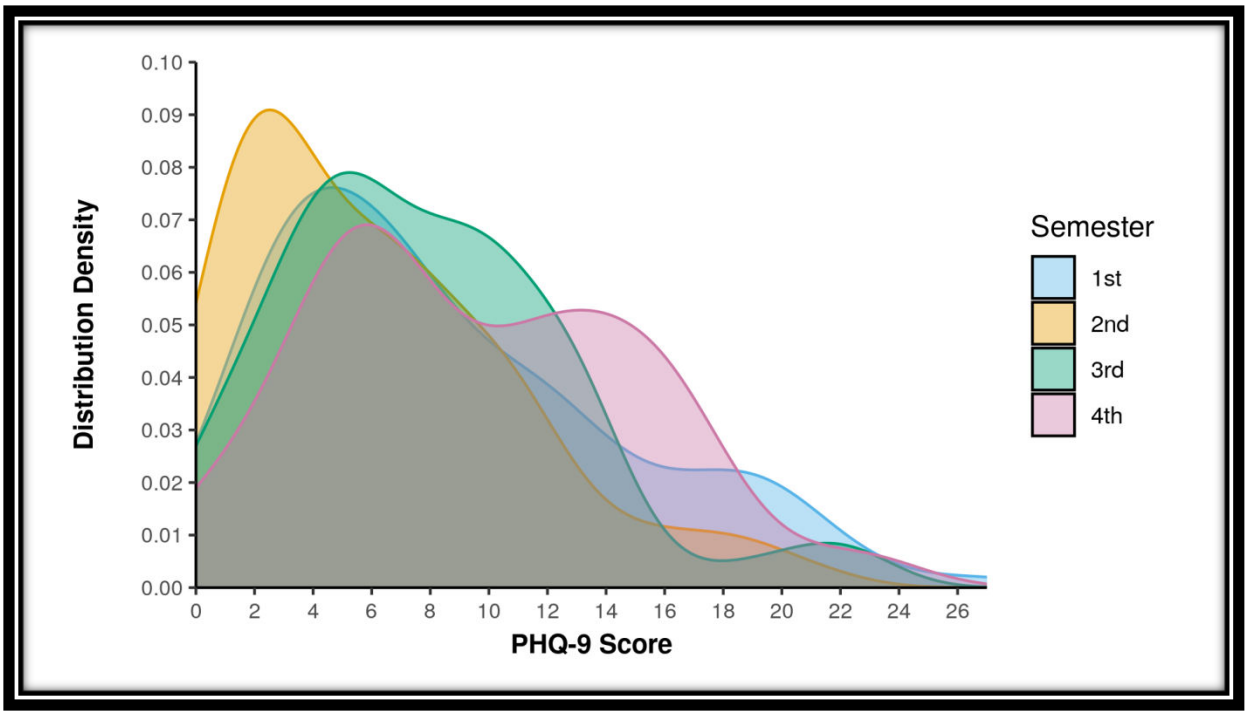

Fig 1

Discussion

Medical students are more likely to experience stress and depression than the general population. A meta-analysis found that 21% to 43% of medical students experience depressive symptoms.

The present study found 69% medical students to be positive for depressive symptoms. A systematic review estimated that the mean prevalence of depressive disorders in university students was 30.6%, which was considerably higher than rates reported in general populations. Epidemiological data suggested that the prevalence of depression increased by 18.4% from 2005 to 2015. (S Sidana , *et al*., 2012; Syeda Rubaba Azim, 2020).

The prevalence of depression in our study is close to the Vankar *et al*..2014, study, which reported the prevalence of self-identified depression at 64%. This is higher than the reported prevalence of provisionally diagnosed depressive and major depressive disorder in medical students of 21.5% and 7.6%, respectively, by Sidana S *et al*.2012., using the PHQ-9 questionnaire.

Gender and depression showed no significant association in the present study, similar to Sidana *et al.,* 2012 ; Vankar *et al*., 2014; Sharma *et al*., 2016, and Ganesh S. Kumar *et al*., 2017, reports in which the association between the grade of depression and sex was not statistically significant, whereas all these studies have a higher percentage of females with depressive symptoms, which might be due to their hormonal regulations.

Depression and socioeconomic status were found to be strongly correlated in the current study. Of the participants, 75% were from lower-class origins, and 59.55% from higher-class backgrounds suffered from depression. Findings from a meta-analysis by Lorant and colleagues, 2016 on socioeconomic disparities in depression unmistakably showed that people with lower socioeconomic status (SES) were more likely to have depression. Higher SES index scores function as depression-prevention factors. The present study confirms previous research findings by demonstrating the protective effect of a higher SES against depression.

Rural and urban students with depression symptoms constitute 72.89% and 66.66%, respectively. Stress can negatively impact the physical and psychological well-being of medical students and predispose them to many unhealthy addictions. With social media and other influences, students tend to fall prey to substances like alcohol and tobacco. The excessive amount of stress tempts the students into consequences such as cheating on exams, poor academic performance due to unplanned schedules, unnecessary conflicts, deviations, negligence, sleep problems due to overuse of phones, and low self-esteem, which leads to infrequent exercise, alcohol drinking, smoking, sleep disorders, and eating poorly. Prolonged inappropriate lifestyles affect brain reward system function, which results in depression and anxiety symptoms. The current study shows a significant association with smoking and alcohol habits, which can be related to unbearable and unmanageable stress among students.

The present study had no significant association with language or communication due to the advancement of software apps that are helping the students learn and understand any language.

Additionally, some students may find the psychological stress caused by the pandemic, COVID-19, challenging to adapt to the new teaching methods, such as online classes and online meeting apps. They may start to feel lagging behind compared to their peers, which is an additional anxiety and stress source.

Although medical students are expected to have a better perception and sufficient knowledge about COVID-19 transmission, course and prognosis, this study reveals an increasing magnitude of depression, which contradicts previous findings reporting lower anxiety levels among medical students when compared to their non-medical peers. Even though it may have contributed to a decrease in worry and panic, the deluge of information medical students receive about the virus's severity and their mandatory assignments during COVID season may have instead exacerbated anxiety and caused depressive symptoms. (Arjab Adhikari et al.,2017).

This study found that depression was significantly high in 8th semester students, followed by 5th semester and 1st semester students. Similar results were found in a study conducted by A. N. Supe et al.,2017, and Rahul Surve et al., 2020 at Aurangabad. Vankar *et al., 2014,* reported that the highest level of depression on PHQ-9 was seen in the 1st year, and also that 1st and 2nd year students had significantly higher levels of depression than 3rd and 4th year students, and Sharma *et al*., 2016reported a significantly higher prevalence of depression among the first-year students and also found a highly significant association between the year of the study and the depression levels.

Very few studies analysed the parameters such as overwhelming information, conflicts with family and friends, hours of study, and failures during semesters. The current study showed a significant association between depression and these parameters and needs to be studied further.

The present study showed Non-Minimal (0–4): 31%; Mild (5–9): 33%; Moderate (10–14): 22%; Moderately Severe (15–19): 10%; and Severe (20–27): 4%, which was similar to the study of Praveen Arun *et al*, 2021, where it was 35.4%. Vankar *et al*., 2014, found that 26.6% of the medical students scored ≥10 on the PHQ-9, which was slightly lower than our study.

In our study, mild symptoms of depression were found in 43% of students, moderate in 12%, and severe in 3% of students. The prevalence of severe depression was reported to be 7.6% by Sidana *et al.,* 2012 , Ganesh S. Kumar et al., 2017, reported the prevalence of mild, moderate, severe and very severe depression as 27.8%, 29.3%, 7.5%, and 6.7%, respectively. In a study conducted by Vankar et al.,2014, prevalence of moderate-to-severe depression was found to be 26.6%. Sharma et al., 2016 using Theoretical Depressive Experiences Questionnaire (TDEQ), in their study reported the prevalence of mild, moderate, and severe depression as 17.9, 7.07, and 6.06%. Tabalipa et al., 2015, using the Beck Depression Inventory in their study, reported the distribution of depression as follows: 28.2% mild to moderate, 4.2% moderate to severe, and 0.4% severe. (Sridhar Mangalesh et al., 2021; Kroenke, K et al., 2001)

A very few studies have observed that medical students access appropriate health care and potentially recognize the variables that affect their mental health despite their knowledge and the availability of treatment at close quarters. Since the statistical figures are alarming, further follow-up studies and investigations could provide a better understanding of the factors influencing the mental health of these students and aid in the planning of a well-being curriculum to help them cope with the challenges faced.

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Acknowledgments

We thank the DR YSR University Health Sciences for the financial support and participants of the study for their time and patience in filling up the questionnaire.

Presentations or Awards at a meeting

RVR presented a poster titled "Depression among medical students of a medical college in coastal Andhra Pradesh - A Cross Sectional Study" in E-Aegis 2021, The 7th Annual Edition Of Gandhi's Intermedical Symposium, Telangana,India.

Sources of Support and Funding

This study was supported by DR YSR University of Health Sciences, Andhra Pradesh for selecting and funding the project under the "Dr YSR undergraduate student research scholarship" scheme.

Conflict of Interest statement

The authors have no conflicts of interest to declare.

Author Contributions

RVR conceived the study and executed the project, SSP guided and supervised, ASTP, SG and AAR analyzed the data and drafted the manuscript. All the authors equally edited the manuscript for submission. All authors approved the final version of the manuscript and agree to be accountable for all aspects of this work.