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Depression, anxiety, and stress among undergraduate medical students: A cross-sectional study in Kancheepuram, India

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ABSTRACT

Background: Medical education is recognized as a stressful education that often negatively impacts academic performance, physical health, and psychological health. **Aims and Objectives:** Hence, the aims and objectives of this study was to assess the prevalence of depression, anxiety, and stress levels among undergraduate medical students. **Materials and Methods:** A cross-sectional study was conducted at tertiary medical college in Kancheepuram from November 1, 2019, to December 31, 2019. A total of 360 undergraduate medical students were recruited from the 1st year to the final year. Each year was considered a stratum, and from each stratum through simple random sampling, 90 students were selected. A self-administered, pre-designed, pre-tested anonymous questionnaire-depression anxiety and stress scale 21 was used for data collection. CoGuide software was used for statistical analysis. **Results:** Out of 360 medical students, 157 were male and 203 were female with a mean age of 19.98 ± 1.17. Sixty-six (18.33%) study participants had a family history of mental illness. The overall prevalence of depression was 48.33%, 60.56% had anxiety, and 27.22% had stress. Females were more affected than their male counterparts. The prevalence was significantly more among those having a family history of mental illness. **Conclusion:** The prevalence of depression was 48.33%, anxiety was 60.56%, and stress was 27.22%. Regular health education, stress counseling, and peer group sessions can reduce the level of mental distress among medical students.

Key words: Depression; Medical; Psychological; Stress; Students

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INTRODUCTION

Psychological conditions are often neglected due to their non-specificity in diagnosis, varied and subtle clinical presentation, chronic care and management, and huge range of myths and beliefs associated with social stigma.[1] Among the various professional courses, undergraduate medical education is considered one of the most stressful courses.[2] High set expectations from family members, friends, and society, and the responsibility of the well-being of the patients make the students feel enormous stress, which leads to negative psychological states such as anxiety and depression.[3,4] The medical profession is one of the most chosen professional courses because of its respected place and monetary benefits in Indian society. However, the students face the burden of a vast syllabus, peer competition, and the long duration of the course. These negatively impact their psychological health, leading to sleep deprivation, poor concentration, lack of motivation, confidence in handling patients, negative self-esteem, anxiety, depression, development of interpersonal conflict, substance abuse, suicidal ideations, etc. Early detection and timely intervention will prevent and reduce the impact of psychological problems and

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reduce the development of depression. This will ensure that the best comprehensive care is being delivered to the patients in the future and the student has a wholesome learning experience with career progression. Significant levels of psychological morbidity have been reported among undergraduate medical students ranging from stress, depression, anxiety, interpersonal problems, and suicidal ideation to psychiatric disorders. The previous studies have shown the prevalence of psychological morbidity among medical students ranging from 21.6% to 50%.[5-7] Systematic reviews have been conducted on studies reporting anxiety and depression among medical students from different parts of the world.[8-10] The present study was conducted in South India, where there is a lack of available literature. Hence, this study was conducted to find the prevalence of depression, anxiety, and stress levels among undergraduate medical students and various associated factors.

Aims and objectives

1. To estimate the prevalence of depression, anxiety, and stress levels among undergraduate medical students.
2. To identify the predictors and risk factors of depression, anxiety and stress levels among undergraduate medical students.

MATERIALS AND METHODS

A cross-sectional study was conducted at tertiary medical college in Kancheepuram from November 1, 2019, to December 31, 2019. Undergraduate medical students from the 1st year to final year MBBS were included in the study. A stratified sampling technique was followed. Each year was considered a stratum, and from each stratum through simple random sampling, 90 students were selected. The study was approved by the Institutional Ethics Committee, and informed written consents were obtained. The anonymity of the students was maintained throughout the study. Students who have joined the institute <6 months and those who had a physical illness during the study period were excluded from the study. Data collection was done using a self-administered, pre-designed, pre-tested anonymous questionnaire, and Depression Anxiety and Stress Scale 21.[11,12] The questionnaire contains three different scales to document negative emotional states such as depression, anxiety, and stress. The participants' smoking status was recorded, and smokers were those who had smoked at least once in the week before data collection. The frequency of smoking was reported as perceived by the participants (regular/occasional).[13] Those who had reported drinking alcohol at least once in the previous week of data collection were considered alcohol drinkers. Regarding the frequency of alcohol drinking, it was reported as perceived by the participants.[14]

Sample size calculation

Based on the previous literature, the prevalence of the psychological morbidities among undergraduate medical students was 28.4%.[15] With 5% absolute precision and 95% confidence interval, using the formula n=4pq/d2, and assuming a 10% non-response rate, the sample size was calculated to be 360.

Statistical methods

Depression, anxiety, stress, etc., were considered as primary outcome variables. Demographic details were considered as the primary explanatory variable. For normally distributed quantitative variables, the mean values were compared between study groups using an independent sample t-test (two groups). Categorical outcomes were compared between study groups using the Chi-square test. Univariate binary logistic regression analysis was performed to test the association between the explanatory variables and outcome variables. An unadjusted odds ratio along with 95% CI is presented. P<0.05 was considered statistically significant.[16]

RESULTS

A total of 360 subjects were included in the final analysis. The mean age was 19.98 years in the study population. The majority of the participants were female. Students from all 4 years were equally considered into the study as 90 (25.00%) from each batch. In our study population, day scholars were more in proportion. Family history of mental illness also was relatively less in the study participants. The history of smoking and drinking was minimal to consider. Out of 360 participants, 307 (85.28%) have siblings (Table 1).

Out of 360 study participants, 174 (48.33%) had depression. Among those who were depressed, 56 (15.56%) had mild depression, 72 (20%) had moderate depression, and 46 (12.78%) had severe or extremely severe depression. Among the study participants, 40 (11.11%) had mild anxiety, 104 (28.89%) had moderate anxiety, and 74 (20.56%) had severe or extremely severe anxiety. In the study population, 37 (10.28%) study participants had mild stress, 35 (9.72%) had moderate stress, and only 26 (7.22%) had severe stress or extremely severe stress (Table 2).

The univariate logistic regression analysis showed statistically no significant association with depression with many explanatory factors as presented in Table 3. The strongest association was found with a family history of mental illness (odds ratio=1.985, 95% CI 1.148–3.433, P<0.001) (Table 3).

Table 1: Summary of the demographic parameter (n=360)

Variables	Summary (%)
Age (in years)	19.98±1.17 (ranged 18–24)
Gender	
Male	157 (43.61)
Female	203 (56.39)
Years of study	
1st year	90 (25.00)
2nd year	90 (25.00)
3rd year	90 (25.00)
4th year	90 (25.00)
Residence	
Hostel	153 (42.50)
Day scholar	207 (57.50)
Family history of mental illness	
Present	66 (18.33)
Absent	294 (81.67)
History of smoking	
Yes	3 (0.83)
No	357 (99.17)
History of alcoholic drink	
Yes	4 (1.11)
No	356 (98.89)
Siblings	
Without siblings	53 (14.72)
With siblings	307 (85.28)

Table 2: Summary of depression, anxiety, and stress of grading scale (n=360)

Variables	Summary (%)
Depression grading scale	
Normal	186 (51.67)
Mild	56 (15.56)
Moderate	72 (20.00)
Severe	23 (6.39)
Extremely severe	23 (6.39)
Depression	
Absent	186 (51.67)
Present	174 (48.33)
Anxiety grading scale	
Normal	142 (39.44)
Mild	40 (11.11)
Moderate	104 (28.89)
Severe	38 (10.56)
Extremely severe	36 (10.00)
Anxiety	
Absent	142 (39.44)
Present	218 (60.56)
Stress grading scale	
Normal	262 (72.78)
Mild	37 (10.28)
Moderate	35 (9.72)
Severe	22 (6.11)
Extremely severe	4 (1.11)
Stress	
Absent	262 (72.78)
Present	98 (27.22)

The univariate logistic regression analysis had shown statistically no significant association of anxiety with any of the variables considered in this study (Table 4).

The univariate logistic regression analysis had shown statistically significant association with stress with many explanatory factors as presented in Table 5. The strongest association was found with a family history of mental illness (odds ratio=2.174, 95% CI 1.244–3.802, P=0.006) (Table 5).

DISCUSSION

This study was conducted to find the level of depression, anxiety, and stress among medical students. The study findings revealed that the overall prevalence of depression was 48.33%, 60.56% had anxiety, and 27.22% had stress. The factor associated with depression, anxiety, and stress among the study participants was associated with the year of study.

Similar findings have been reported in the past studies. A study by Iqbal et al.,[17] showed that more than 50% of the study's respondents suffered from either depression, anxiety, or stress. A similar study by Taneja et al.,[18] among medical students at New Delhi showed that 32% were depressed, 40.1% had anxiety, and 43.8% had stress. A study by Yadav et al.,[19] among medical students of Uttar Pradesh, showed that 57% had depression and 71% had anxiety. This prevalence was more among the 1st year medical students and in those who had a family history of mental illness. These findings are similar to the present study observations.

The students in clinical years faced more morbidity compared to the 1st years. Similar findings were shown by univariate logistic regression in the present study, which showed that students of 4th year of MBBS were more stressed and had anxiety compared to the 1st and 2nd years.

A study done in Karnataka, among 478 medical students using the WHO SRQ 20 Questionnaire, showed that 32.2% was the prevalence of mental distress.[20] Female students were more commonly affected, 1st year students and final year students were affected more, which is similar to the present study. A study in the neighboring state of Kerala showed higher depression scores among female students, which resembles the present study.[21]

The reason for the high prevalence of depression, anxiety, and stress among medical students can be attributed to various exposure factors such as high pressure to succeed, academic overwork, staying away from family members, and adjusting to clinical encounters.[22-24] Stress reduction interventions, execution of a structured

Table 3: Factors associated with depression in study population univariate logistic regression analysis (n=360)

Variables	Depression (%)		Odds ratio (95% CI)	P-value
	Present (n=174)	Absent (n=186)		
Age (in years) (Mean±SD)	19.95±1.24	20.01±1.11	0.959 (0.804–1.145)	0.646
Gender (Baseline=Female)				
Male	81 (46.55)	76 (40.86)	1.261 (0.830–1.914)	0.277
Female	93 (53.45)	110 (59.14)		
Years of study (Baseline=4th year)				
1st year	45 (25.86)	45 (24.19)	1.647 (0.910–2.982)	0.099
2nd year	50 (28.74)	40 (21.51)	2.059 (1.135–3.734)	0.017
3rd year	45 (25.86)	45 (24.19)	1.647 (0.910–2.982)	0.099
4th year	34 (19.54)	56 (30.11)		
Residence (Baseline=Hostel)				
Hostel	71 (40.8)	82 (44.09)	1.144 (0.753–1.738)	0.529
Day Scholar	103 (59.2)	104 (55.91)		
Family history of mental illness (Baseline=absent)				
Present	41 (23.56)	25 (13.44)	1.985 (1.148–3.433)	0.014
Absent	133 (76.44	161 (86.56)		
Siblings (Baseline=Without siblings)				
With siblings	146 (83.91)	161 (86.56)	0.810 (0.452–1.452)	0.479
Without siblings	28 (16.09)	25 (13.44)		

Table 4: Factors associated with anxiety in study population univariate logistic regression analysis (n=360)

Variables	Anxiety (%)		Odds ratio (95% CI)	P-value
	Present (n=218)	Absent (n=142)		
Age (in years) (Mean±SD)	19.89±1.15	20.12±1.2	0.849 (0.708–1.017)	0.076
Gender (Baseline=male)				
Male	92 (42.2)	65 (45.77)	1.156 (0.755–1.770)	0.504
Female	126 (57.8)	77 (54.23)		
Years of study (Baseline=4th year)				
1st year	59 (27.06)	31 (21.83)	2.489 (1.363–4.546)	0.003
2nd year	58 (26.61)	32 (22.54)	2.370 (1.301–4.319)	0.005
3rd year	62 (28.44)	28 (19.72)	2.896 (1.572–5.333)	0.001
4th year	39 (17.89)	51 (35.92)		
Residence (Baseline=Hostel)				
Hostel	88 (40.37)	65 (45.77)	1.247 (0.814–1.911)	0.311
Day scholar	130 (59.63)	77 (54.23)		
Family history of mental illness (Baseline=absent)				
Present	44 (20.18)	22 (15.49)	1.379 (0.786–2.420)	0.262
Absent	174 (79.82)	120 (84.51)		
Siblings (Baseline=Without siblings)				
With siblings	188 (86.24)	119 (83.8)	1.211 (0.672–2.184)	0.524
Without siblings	30 (13.76)	23 (16.2)		

orientation program that highlights expectations in each year, explaining the students regarding the evaluation process, how to cope, and how to get through each year without mental anguish are recommended. Starting a student counseling center in the college with a qualified psychologist and peer advisor is also highly recommended.

Other demographic variables such as age and gender were also considered, but no association with depression, anxiety, and stress was established for them.

Future multicentric studies focusing on various factors causing depression, anxiety, and stress among medical students are recommended. The influence of curriculum, peer group, and role of teachers and parents can be explored through these studies.

Limitations of the study

Since the level of depression, anxiety and stress levels were assessed among undergraduate medical students. The results of the study cannot be generalized to general population.

Table 5: Factors associated with stress in study population univariate logistic regression analysis (n=360)

Variables	Stress (%)		Odds ratio (95% CI)	P-value
	Present (n=98)	Absent (n=262)		
Age (in years) (Mean±SD)	19.91±1.13	20.01±1.19	0.927 (0.758–1.133)	0.457
Gender (Baseline=male)				
Male	45 (45.92)	112 (42.75)	1.137 (0.713–1.813)	0.589
Female	53 (54.08)	150 (57.25)		
Years of study (Baseline=4th year)				
1st year	21 (21.43)	69 (26.34)	1.652 (0.780–3.500)	0.190
2nd year	29 (29.59)	61 (23.28)	2.581 (1.254–5.309)	0.010
3rd year	34 (34.69)	56 (21.37)	3.296 (1.618–6.715)	0.001
4th year	14 (14.29)	76 (29.01)		
Residence (Baseline=Hostel)				
Hostel	32 (32.65)	121 (46.18)	1.770 (1.087–2.881)	0.022
Day scholar	66 (67.35)	141 (53.82)		
Family history of mental illness (Baseline=absent)				
Present	27 (27.55)	39 (14.89)	2.174 (1.244–3.802)	0.006
Absent	71 (72.45)	223 (85.11)		
Siblings (Baseline=Without siblings)				
With siblings	81 (82.65)	226 (86.26)	0.759 (0.404–1.425)	0.391
Without siblings	17 (17.35)	36 (13.74)		

CONCLUSION

Healthy medical students of today are healthy doctors of tomorrow. However, the overall prevalence of depression, anxiety, and stress is high (depression was 48.33%, anxiety was 60.56%, and stress was 27.22%) among undergraduate medical students. Peer education and psychological counselling can help in preventing morbidity caused due to depression, anxiety, and stress.

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REFERENCES

1. Kishore J. National Health Programs of India. 11th ed. New Delhi: Century Publications; 2014. p. 617.
2. Radcliffe C and Lester H. Perceived stress during undergraduate medical training: A qualitative study. Med Educ. 2003;37(1):32-38. https://doi.org/10.1046/j.1365-2923.2003.01405.x
3. Sarkar S, Gupta R and Menon V. Depression, anxiety and stress in medical students. J Ment Heal Hum Behav. 2017;22(2):88-96. https://doi.org/10.4103/jmhhb.jmhhb_20_17
4. Dyrbye LN, Thomas MR and Shanafelt TD. Medical student distress: Causes, consequences, and proposed solutions. Mayo Clin Proc. 2005;80(12):1613-1622. https://doi.org/10.4065/80.12.1613
5. Chandavarkar U, Azzam A and Mathews CA. Anxiety symptoms and perceived performance in medical students. Depress Anxiety. 2007;24(2):103-111. https://doi.org/10.1002/da.20185
6. Eller T, Aluoja A, Vasar V and Veldi M. Symptoms of anxiety and depression in Estonian medical students with sleep problems. Depress Anxiety. 2006;23(4):250-256. https://doi.org/10.1002/da.20166
7. Shah M, Hasan S, Malik S and Sreeramareddy CT. Perceived stress, sources and severity of stress among medical undergraduates in a Pakistani medical school. BMC Med Educ. 2010;10(1):2. https://doi.org/10.1186/1472-6920-10-2
8. Dyrbye LN, Thomas MR and Shanafelt TD. Systematic review of depression, anxiety, and other indicators of psychological distress among U.S. and Canadian medical students. Acad Med. 2006;81(4):354-733. https://doi.org/10.1097/00001888-200604000-00009
9. Salam A, Yousuf R, Bakar S and Haque M. Stress among medical students in Malaysia: A systematic review of literatures. Int Med J. 2013;20(6):649-655. https://doi.org/10.4103/AIHB.AIHB_62_17
10. Hope V and Henderson M. Medical student depression, anxiety and distress outside North America: A systematic review. Med Educ. 2014;48(10):963-979. https://doi.org/10.1111/medu.12512
11. Lovibond PF and Lovibond SH. The structure of negative emotional states: Comparison of the depression anxiety stress scales (DASS) with the beck depression and anxiety inventories. Behav Res Ther. 1995;33(3):335-343. https://doi.org/10.1016/0005-7967(94)00075-U
12. John R and Julie D. The depression anxiety stress scales (DASS): Normative data and latent structure in a large non-clinical sample. Br J Clin Psychol. 2003;42(2):111-131. https://doi.org/10.1348/014466503321903544
13. Husten CG. How should we define light or intermittent smoking? Does it matter? Nicotine Tob Res. 2009;11(2):111-121. https://doi.org/10.1093/ntr/ntp010
14. Townshend JM and Duka T. Attentional bias associated with alcohol cues: Differences between heavy and occasional social drinkers. Psychopharmacology (Berl). 2001;157(1):67-74. https://doi.org/10.1007/s002130100764
15. Konjengbam S, Laishram J, Singh BK and Elangbam V.

Psychological morbidity among undergraduate medical students. Indian J Public Health. 2015;59(1):65-66.

https://doi.org/10.4103/0019-557X.152872

16. BDSS Corp. Coguide Statistics software, Version 1.0. India: BDSS Corp; 2020.
17. Iqbal S, Gupta S and Venkatarao E. Stress, anxiety and depression among medical undergraduate students and their socio-demographic correlates. Indian J Med Res. 2015;141(3):354-357.

    https://doi.org/10.4103/0971-5916.156571
18. Taneja N, Sachdeva S and Dwivedi N. Assessment of depression, anxiety, and stress among medical students enrolled in a medical college of New Delhi, India. Indian J Soc Psychiatry. 2018;34(2):157-162.

    https://doi.org/10.4103/ijsp.ijsp_114_17
19. Yadav R, Gupta S and Malhotra AK. A cross sectional study on depression, anxiety and their associated factors among medical students in Jhansi, Uttar Pradesh, India. Int J Community Med Public Health. 2016;3(5):1209-1214.

    https://doi.org/10.18203/2394-6040.ijcmph20161386
20. Asha B and Anusha R. Prevalence of mental distress among medical students of a private college in south Karnataka. Int J Basic Appl Med Sci. 2015;5(2):164-168.
21. Roy P, Sailesh K and Doshi M. Depression, anxiety and stress among first year undergraduate medical students. Asian J Biomed Pharm Sci. 2015;5(45):37-38.

    https://doi.org/10.15272/ajbps.v5i45.716
22. Dahlin M, Joneborg N and Runeson B. Stress and depression among medical students: A cross-sectional study. Med Educ. 2005;39(6):594-604.

    https://doi.org/10.1111/j.1365-2929.2005.02176.x
23. Sreeramareddy CT, Shankar PR, Binu VS, Mukhopadhyay C, Ray B and Menezes RG. Psychological morbidity, sources of stress and coping strategies among undergraduate medical students of Nepal. BMC Med Educ. 2007;7(1):26.

    https://doi.org/10.1186/1472-6920-7-26
24. Khan MS, Mahmood S, Badshah A, Ali SU and Jamal Y. Prevalence of depression, anxiety and their associated factors among medical students in Karachi, Pakistan. J Pak Med Assoc. 2006;56(12):583-586.

    https://doi.org/10.1093/aje/163.suppl_11.s220-c

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RCK and KM – Concept and design of the study, statistical analysis, prepared first draft of manuscript; **BA and ACVS** – Interpreted the results; reviewed the literature and manuscript preparation; and **RCK and GSA** – Concept, coordination, and interpretation, preparation of manuscript, and revision of the manuscript.

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