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. Among the various professional courses, undergraduate medical education is considered one of the most stressful courses. 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. 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...
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%. Systematic reviews have been conducted on studies reporting anxiety and depression among medical students from different parts of the world. 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. 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). 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.

Sample size calculation
Based on the previous literature, the prevalence of the psychological morbidities among undergraduate medical students was 28.4%. With 5% absolute precision and 95% confidence interval, using the formula n=4pq/d^2, 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.

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).
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., showed that more than 50% of the study’s respondents suffered from either depression, anxiety, or stress. A similar study by Taneja et al., 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., 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. 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.

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. Stress reduction interventions, execution of a structured

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**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)        |
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 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)           |        |
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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