Prevalence of depression and its relation to stress level among medical students in Puducherry, India

Background: Currently, depression among medical students is an important health issue at the global level. There is also a paucity of information on its relation to the stress level. Objective: The aim of this study is to assess the prevalence of depression and its relation to stress level and other factors among medical students. Materials and Methods: A cross-sectional study was conducted among medical students at a tertiary care medical institution in Puducherry, coastal south India. Beck Depression Inventory Scale was used for screening of depression and Cohen’s Perceived Stress scale to assess perceived stress level. Data on associated factors were collected by self-administered questionnaire. Results: The overall prevalence of depression was found to be 48.4% (215/444). According to the cutoff scores, 229 (51.6%) students scored as normal (0–9), 149 (33.6%) as mild (10–18), 60 (13.5%) as moderate (19–29), 3 (0.7%) as severe (30–40), and 3 (0.7%) students scored as very severe (>40) depression. Depression was significantly less among those with mild stress (adjusted odds ratio [OR] = 0.010) and moderate stress level (adjusted OR = 0.099) compared to severe stress level and those without interpersonal problems (adjusted OR = 0.448). Conclusion: Depression is more common among medical students. Stress coping mechanisms and improvement of interpersonal relationship may help to reduce depressive symptoms among medical students.

Keywords: Depression, India, medical students, perceived stress

Recently, the medical student population is increasing every year, especially in developing countries including India. Change in lifestyle because of urbanization and globalization coupled with high-level competition in the medical field could lead to increase in stress and depression among medical students. Depression in younger age group may lead to serious developmental and functional consequences like an academic failure or persistent psychosocial problems. There are studies which quantify the problem of depression among medical students in developing countries. However, there are few studies conducted in developed countries to ascertain the stress as an associated factor for depression and information in this regard is lacking from developing countries like India. Brazil study highlighted the fact that depressive symptoms were 7.43 times more among those with emotional stress. Some stressful life events related to social activities were associated with the higher depression scores for medical students. There are also various other factors such as social and interpersonal factors associated with depressive symptoms among the medical students. A Korean study showed that low levels of perceived interpersonal support increased the risk of depression by more than ten times. A recent study showed that age, study year, satisfaction with major, parental relationship, and mother’s education were also significantly associated with depression among medical students. Smoking, alcohol use, family history of depression, academic achievement, interpersonal problems, problems in the family were also found to be associated with depression among medical students. In view of this, the medical student population is increasing every year, especially in developing countries including India. Change in lifestyle because of urbanization and globalization coupled with high-level competition in the medical field could lead to increase in stress and depression among medical students. Depression in younger age group may lead to serious developmental and functional consequences like an academic failure or persistent psychosocial problems.

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ABSTRACT

Background: Currently, depression among medical students is an important health issue at the global level. There is also a paucity of information on its relation to the stress level. Objective: The aim of this study is to assess the prevalence of depression and its relation to stress level and other factors among medical students. Materials and Methods: A cross-sectional study was conducted among medical students at a tertiary care medical institution in Puducherry, coastal south India. Beck Depression Inventory Scale was used for screening of depression and Cohen’s Perceived Stress scale to assess perceived stress level. Data on associated factors were collected by self-administered questionnaire. Results: The overall prevalence of depression was found to be 48.4% (215/444). According to the cutoff scores, 229 (51.6%) students scored as normal (0–9), 149 (33.6%) as mild (10–18), 60 (13.5%) as moderate (19–29), 3 (0.7%) as severe (30–40), and 3 (0.7%) students scored as very severe (>40) depression. Depression was significantly less among those with mild stress (adjusted odds ratio [OR] = 0.010) and moderate stress level (adjusted OR = 0.099) compared to severe stress level and those without interpersonal problems (adjusted OR = 0.448). Conclusion: Depression is more common among medical students. Stress coping mechanisms and improvement of interpersonal relationship may help to reduce depressive symptoms among medical students.

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Recently, the medical student population is increasing every year, especially in developing countries including India. Change in lifestyle because of urbanization and globalization coupled with high-level competition in the medical field could lead to increase in stress and depression among medical students. Depression in younger age group may lead to serious developmental and functional consequences like an academic failure or persistent psychosocial problems.
the above, it is important to look for the association of these factors in depressive symptoms among the medical students.

The risk factor exposure may differ in different geographical locations and hence that its magnitude as causation for the depression may vary in different locations. In this context, identification of the magnitude of the problem and associated factors of depression helps in taking appropriate interventional measures among medical students. With this background, the present study was conducted to assess the prevalence of depression and its relation to stress level and certain associated factors among medical students.

**MATERIALS AND METHODS**

**Study design and setting**

A cross-sectional study was conducted during January 2012 to June 2013 among medical students at a tertiary care medical institution in Pondicherry, coastal south India.

**Ethical issues**

The study was approved by the scientific and ethical committee of the institute. Before permission was obtained from the Dean of the Institute. Written informed consent was obtained from the participants.

**Sample size estimation**

By considering the prevalence of depression among medical students as 71% and absolute precision at 5% level, sample size was 330. After adding a nonresponse rate of 10%, total required minimum sample size was 363.

**Sampling procedure**

The study included all the 500 medical students as subjects studying from the 1st to 5th year of the study. The participants were explained the objectives of the study before initiating the study. They were assured confidentiality and given the option to participate in the study. Subjects who refused to participate in the study or who were absent on the day of study and/or could not be contacted even after two visits were considered as nonrespondents.

**Study tools**

The Beck Depression Inventory Scale was used for screening depression among medical students which was tested and validated. This screening instrument assesses depressive symptoms based on subjective nature, and therefore, the participants had to be further evaluated to confirm the diagnosis. The cutoff value of 10 and above were considered to define the depression among medical students. According to the cutoff scores, students were classified as normal (0–9), mild (10–18), moderate (19–29), severe (30–40), and very severe (>40) depression.

The assessment of perceived stress level was performed using Cohen’s Perceived Stress scale and classified into low (0–11), average (12–15), high (16–20), and very high (21 and above) based on the total stress score.

**Method of data collection**

The investigators collected the data by using a self-administered semi-structured questionnaire which included variables on age, sex, class studying, social factors such as alcohol and tobacco use, interpersonal problems, family problems, family history of depression, and marks obtained in the previous examination. Perceived stress level and depression were assessed by using standard instruments. Any subject with at least one unit of alcohol intake at least once in the past 12 months was considered as alcohol user in the current study. The presence of family problem was assessed as any perceived worries by the subject regarding the particular family problem. The family history of depression was assessed based on earlier diagnosis among first or second degree relatives.

**Data analysis**

Data were entered and analyzed by using Statistical Package for Social Sciences (IBM PASW Statistics- version 19.0, Chicago) for windows. Data were expressed in terms of proportion or percentages. Univariate analysis was used to test the association between depression and variables. Multiple logistic regression analysis was carried out to look for the independent association of variables with the depression. The value of $P < 0.05$ was considered as statistically significant.

**RESULTS**

A total of 444 students participated in the study with a response rate of 88.8%. There were 228 (51.4%) males and 216 (48.6%) females. The overall prevalence of depression was found to be 48.4%. According to the cutoff scores, 229 (51.6%) students scored as normal (0–9), 149 (33.6%) as mild (10–18), 60 (13.5%) as moderate (19–29), 3 (0.7%) as severe (30–40), and 3 (0.7%) as very severe (>40) depression. Among those with depression, a majority (97.2%) had a mild and moderate degree of depression. It was found that 83.7% of the subjects (372/444) had moderate, high, and very high-stress level. The prevalence of depression was 84.8% (140/165) among the subjects who had moderate, high, and very high-stress level.

The present study showed that depression prevalence was similar in both sexes (Males-109/229 = 47.8% and Females- 106/216 = 49.1%) and the association between the grade of depression and sex was not statistically significant ($\chi^2 = 2.39, P = 0.793$) [Table 1]. The prevalence...
of depression was more in the 2nd year students (66.3%) compared to other class students and the difference found between the grade of depression and year of studying was statistically significant ($\chi^2 = 47.142, P = 0.001$) [Table 2].

About half (52.3%, 81/155) of those aged 17–18 years were depressed followed by 21–24 years (46.5%, 67/144) and 19–20 years (42.7%, 67/145). Depression was more common in the 2nd year of the study (66.3%, 59/99) followed by 4th year (58.1%, 53/92), 1st year (43.3%, 42/97), 3rd year (39.4%, 39/99) and 5th year (34.2%, 26/76) of the study and the difference was found to be statistically significant ($\chi^2 = 25.755, P = 0.000$). Prevalence of depression was found to be 54.8% (51/93) among subjects whose mothers education level was 1st to 12th standard compared to 46.7% (164/351) of the subjects whose mothers education level was graduation and above and it was not found to be statistically significant ($\chi^2 = 1.939, P = 0.164$).

Univariate analysis showed that year of studying, interpersonal problems, family problems that worries, stress level, and marks obtained in the previous examination were associated significantly with depression [Table 3]. Multiple logistic regression analysis where all the variables (age, sex, year of studying, education of father and mother, occupation of father and mother, current smoking, tobacco use, alcohol use, family history of depression, interpersonal problems, family problems, stress level and marks obtained in the previous examination) were included showed that having mild stress (adjusted odds ratio [OR] = 0.010) and moderate stress (adjusted OR = 0.099) level compared to high and very high (severe) stress and absence of interpersonal problems (adjusted OR = 0.448) were significantly associated with depression among medical students.

Table 1: Grading of depression according to sex

| Grading of depression (score range) | Male (%) | Female (%) | Total (%) |
|------------------------------------|----------|------------|-----------|
| Denial (0–4)                       | 55 (24.2)| 59 (27.3)  | 114 (25.7)|
| Normal (5–9)                       | 64 (28.1)| 52 (23.6)  | 116 (25.9)|
| Mild (10–18)                       | 77 (33.8)| 72 (33.3)  | 149 (33.6)|
| Moderate (19–29)                   | 28 (12.3)| 32 (14.8)  | 60 (13.5) |
| Severe (30–40)                     | 2 (0.9)  | 1 (0.5)    | 3 (0.7)   |
| Profound (>40)                     | 2 (0.9)  | 1 (0.5)    | 3 (0.7)   |
| Total                              | 228      | 216        | 444       |

$\chi^2=2.39, P=0.793$

Table 2: Grading of depression according to classes

| Grading of depression (score range) | 1st year (%) | 2nd year (%) | 3rd year (%) | 4th year (%) | 5th year (%) | Total |
|------------------------------------|--------------|--------------|--------------|--------------|--------------|-------|
| Denial (0–4)                       | 25 (21.9)    | 11 (9.6)     | 32 (28.1)    | 17 (14.9)    | 29 (25.4)    | 114   |
| Normal (5–9)                       | 30 (26.1)    | 22 (19.1)    | 28 (24.3)    | 14 (12.2)    | 21 (18.3)    | 115   |
| Mild (10–18)                       | 35 (23.5)    | 38 (25.5)    | 28 (18.8)    | 28 (18.8)    | 20 (13.4)    | 149   |
| Moderate (19–29)                   | 7 (11.7)     | 24 (40.0)    | 10 (16.7)    | 13 (21.7)    | 6 (10.0)     | 60    |
| Severe (30–40)                     | 0            | 2 (66.7)     | 1 (33.3)     | 0            | 0            | 3     |
| >40                                | 0            | 1 (33.3)     | 0            | 2 (66.7)     | 0            | 3     |
| Total                              | 97           | 98           | 99           | 74           | 76           | 444   |

$\chi^2=47.142, P=0.001$

This study showed that 48.4% of the medical students had depressive symptoms. The prevalence rate of depression in our study was found to be comparatively more than other studies.[5,6,9,13,17-22] A recent study from China reported the prevalence of depression as 11.7% which was lesser than our study.[13] The proportion of participants with severe (0.7%) and very severe depression (0.7%) in this study was lesser compared to another Indian study which reported it as 7.5% and 6.7%, respectively.[18] The study finding is consistent with another Indian study which showed the prevalence rate of depression among medical students as 45.3%.[19] A study from Pakistan also showed similar findings with the prevalence rate as 43.9%.[20] A recent study from Brazil found the prevalence of depression among medical students as 40.5% with 1.2% had very severe depressive symptoms.[21] The higher prevalence in our study compared to some of the above studies may be because of the methodological differences and socioeconomic background characteristics of the medical students.

Depression is comparatively more (66.3%) in the 2nd year in contrast to a French study which reported that depression is comparatively more in the 4th year with 44.3% prevalence rate.[23] Although other studies found the depression prevalence significantly more among females (8.1% among males vs. 16.1% among females,[9] 9% among males vs. 18% among females,[13] female gender vs. male gender with OR of 1.85[26]) this study could not find any statistical difference for the prevalence rate of 49.1% for females and 47.8% for males ($\chi^2 = 2.39, P = 0.793$). This observation may be because of other influencing factors affecting depression and different methodology adopted in other studies.

A study showed that parental relationship and mother’s education status were significantly associated with depression,
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The study showed that students with poor school performance had more chances of depressive symptoms with those who scored < 35% in the previous examination had 72.7% prevalence rate of depression. A study in Turkey showed that prevalence of depression was 62.9% among those with poor school performance students compared to an overall prevalence rate of 26.2%.[18] Another study showed that depression odds is 2.13 times higher among those with dissatisfaction for own academic performance compared to those who are not dissatisfied.[20] This study could not find the association of substance use with depressive symptoms in contrast to other studies.[8,21] This may be because of smaller sample size related to alcohol and tobacco use in this study.

The current study has got some limitations. The study findings may not be generalizable to students of other medical institutions because of difference in medical seat admission process and academic level policies. Due to the cross-sectional study nature, temporal relationship of the risk factors with depression may not be ascertained.[25] Certain factors such as physical activity level, sleep pattern were not analyzed. Adequate sample size, inclusion of all the classes, assessment of depression and stress level based on standard instruments, detailed evaluation of personal and social factors were the strengths of the study.

**CONCLUSION**

Depression symptoms are more common among medical students. About 83.7% of the medical students had moderate, high, and very high-stress level and the prevalence of depression was 84.8% (140/165) among the subjects who had moderate, high, and very high-stress level. Furthermore, prevalence was found to be more among those with interpersonal problems (70.4%) compared to those without interpersonal problems (40.7%). In view of the above, stress alleviation and improvement of interpersonal relationship may help to reduce the depressive symptoms in medical students.

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Nil.

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### Table 3: Prevalence of depression according to associated factors

| Associated factors                          | Number of students | Number of students with depression | Percentage of students with depression | χ², P  |
|--------------------------------------------|--------------------|-----------------------------------|---------------------------------------|--------|
| Current smoking                            |                    |                                   |                                       |        |
| Yes                                        | 12                 | 8                                 | 66.7                                  | 1.644, 0.200 |
| No                                         | 432                | 207                               | 47.9                                  |        |
| Current smokeless tobacco                   |                    |                                   |                                       |        |
| Yes                                        | 5                  | 3                                 | 60.0                                  | 0.271, 0.602 |
| No                                         | 439                | 212                               | 48.3                                  |        |
| Current alcohol use                        |                    |                                   |                                       |        |
| Yes                                        | 79                 | 34                                | 43.0                                  | 1.116, 0.291 |
| No                                         | 365                | 181                               | 49.6                                  |        |
| Interpersonal problems                      |                    |                                   |                                       |        |
| Yes                                        | 115                | 81                                | 70.4                                  | 30.107, 0.000* |
| No                                         | 329                | 134                               | 40.7                                  |        |
| Depression in the family                    |                    |                                   |                                       |        |
| Yes                                        | 75                 | 43                                | 57.3                                  | 2.869, 0.090 |
| No                                         | 369                | 172                               | 46.6                                  |        |
| Family problems that worries                |                    |                                   |                                       |        |
| Yes                                        | 128                | 75                                | 58.6                                  | 7.448, 0.006* |
| No                                         | 316                | 140                               | 44.3                                  |        |
| Stress level                               |                    |                                   |                                       |        |
| Low                                        | 72                 | 4                                 | 5.6                                   | 157.20, 0.000* |
| Moderate                                   | 207                | 71                                | 34.3                                  |        |
| High and very high (severe)                | 165                | 140                               | 84.8                                  |        |
| Marks obtained in previous examination     |                    |                                   |                                       |        |
| <35%                                       | 11                 | 8                                 | 72.7                                  | 10.044, 0.018* |
| 35%-59%                                    | 158                | 89                                | 56.3                                  |        |
| 60%-79%                                    | 228                | 99                                | 43.4                                  |        |
| ≥80%                                       | 47                 | 19                                | 40.4                                  |        |

*P<0.05 is considered as significant
Confl icts of interest
There are no conf licts of interest.

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