INTRODUCTION

Undergraduate medical curriculum is very cumbersome and demanding compared to most of other discipline. Due to the exhausting medical training, the students experience burnout as they progress through their medical studies. As a result, incidences of mental illness like depression, anxiety, suicidal tendencies are very common. As a part of normal physiological homeostasis, our body tries to maintain psychological homeostasis by various mechanisms. However, when the degree of stress increases, interventions are required to maintain homeostasis.

It has been found that stress in medical students is common and process oriented. Also, stress and symptoms of anxiety and depression increase in initial years of medical studies. Medical students experience mental disturbances like depression throughout out their medical studies. According to a study by Bergmann, Christin et al., academic stress of medical students can also lead to personal challenges and affect private life in multiple ways. Academic stress is considered as an important predictor of poor mental health. A high level of suicidal tendency has been noted due to academic stress. The students have to be updated with an immense amount of information and have to memorize a lot of data in ability to cope up with the course within the duration available before exams leading to distress and students seem to be struggling to reach the demands of the medical curriculum. Medical students show high anxiety even in absence of examination. This shows that in addition to examination, factors like new learning environment, financial requirements, peer pressure, social interactions etc can also lead to stress.

According to WHO, Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity. Mental well being plays a very crucial role in overall academic as well as personal growth of students. Stress is an imbalance between the surrounding conditions required for survival and individual’s neurological and physiological ability to adapt to the new conditions. Stress is an emotionally unstable condition that hampers one’s ability to focus and function effectively. It retards person’s efficacy

IMPACT OF ACADEMIC STRESS ON MENTAL HEALTH OF UNDERGRADUATE MEDICAL STUDENTS-A CROSS SECTIONAL STUDY

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Abstract

Background: Medical students face many stressors during their study period. Stressors can be related to academics, physical, interpersonal relationships, out of which academic is most important. If interventions are not carried out, stress can lead to mental disturbances like anxiety. Our study aimed to evaluate stress among undergraduate medical students. Materials and Methods: Study was conducted among 534 MBBS undergraduate medical students. SSI scale and WHO well-being index scale was used for stress evaluation. Results: According to WHO wellbeing scale, poor wellbeing was seen in 41.9% of the students and good wellbeing was seen in 58.1% of the students. Mild total stress was seen in 39.5%, moderate total stress was seen in 60.1% and severe total stress was seen in 0.4% of the students. Mild academic stress was seen in 19.1%, moderate academic stress was seen in 62.4% and severe academic stress was seen in 18.5% of the students. Mild physical stress was seen in 45.1% of the students. Mild interpersonal relationship stress was seen in 50.2% of the students. Moderate environmental stress was seen in 59.7% of the students. Severe environmental stress was seen in 9.4% of the students. Conclusion: Early detection of stressors is essential among medical students for well being of students. Several stress management programmes have proved to be effective in reducing academic as well as overall stress in students and have also helped in early stress detection.
and productivity academically. Stress has been underdiagnosed and less talked about. It was long believed that students seemed to be least affected by any kind of stress but it has been seen that stress appears to be a lifestyle crisis affecting any individual regardless of their age.\(^{[11]}\) Compared to any other course undergraduates, medical undergraduate students are the most distressed group of students.\(^{[12]}\) We all are well aware that medical schooling is emotionally as well as physically taxing. Of course, some academic stress is necessary for healthy competition which encourages learning.\(^{[13]}\) However, parents’ expectations become a huge burden to the students,\(^{[13]}\) and also life changes such as family detachment and building of self-identity. Psychological stress often leads to depression. Undergraduate medical students whose mental health is despaired are unable to concentrate and acquire proper medical knowledge causing low academic performance and hampered medical skills.\(^{[14]}\)

Stress can be judged on different parameters like physical, interpersonal relationship, academic and environmental. Stress in medical students is caused by strenuous medical programs. The most pertinent issue is that they are required to learn excessive amount of new information within a short time lapse before their exams. Failure of early stress detection which affects physical and psychological mental health of medical students leads to rise in psychological morbidity affecting their careers and lives.\(^{[12]}\)

Psychological stress often leads to depression. Undergraduate medical students whose mental health is despaired are unable to concentrate and acquire proper medical knowledge causing low academic performance and hampered medical skills.\(^{[14]}\)

COVID 19 pandemic opened our eyes to this hidden issue of stress among medical students. Already stressed students were exposed to emotional stress; some were deputed for COVID duties which added to their woes. If medical curriculum is modified to address the issue of stress among medical students, it would benefit the students as well as society in long run.

Appropriate stress and time management is an important skill that a student must acquire which would even be helpful in the future.\(^{[15]}\) Simple, yet effective measures can be implemented by medical schools in future healthcare for combating stress.\(^{[16]}\) Though many studies have been conducted in foreign countries regarding stress among medical students, there is paucity of evidences regarding this matter among Indian medical schools. Our study is proposed to identify effect of stress on mental health of undergraduate medical students in India. If academic stress is identified in early stages, appropriate interventions can be undertaken for mental well-being of the students.

The aim of our study was to evaluate academic stress and its impact on mental well being of undergraduate medical students.

**MATERIALS AND METHODS**

Study was conducted at a Medical College after obtaining permission from the Institutional Review Board. Our study was cross sectional and educational study.

Sample size: The study population was 534 MBBS undergraduate medical students. Statistician was consulted for estimation of sample size. Taking Sd of 11.65 Sample mean =84.81. Population Mean of 86.3 Alpha 5% power 80% sample size was 480. Considering a drop out of 10% (i.e. 48 or 50) the total sample size was 530 however in the present study we have taken a sample size of 534.

The inclusion criteria were all undergraduate medical students who gave consent for the study. The exclusion criteria comprised of all students who did not give consent were excluded from the study. Incomplete questionnaires were excluded.

Data collection tools:

1. SSI (Student Stress Inventory) scale\(^{32}\) was used for evaluation of stress among medical students. Permission was taken from the inventors of the scale before administration. Overall reliability coefficient is 0.857, which is satisfactory. SSI scale also has good content validity with overall score of 0.805 (80.5%).\(^{32}\) The scale uses 4 elements to estimate the stressors among medical students—academic, physical, interpersonal relationship and environmental. The tool has 40 items with scale ranging from 1 to 4. SSI consists of 40 negative items to measure 4 subscales (10 items for each subscale) which are:

   - sub scale 1: Physical (10 items),
   - sub scale 2: Interpersonal relationship (10 items),
   - sub scale 3: Academic (10 items) and
   - sub scale 4: Environmental factor (10 items).

SSI has been designed with ordinal scale of the ‘Never’, ‘Somewhat frequent’, ‘Frequent’ and ‘Always’. The value mark given for each choice are 1 for ‘Never’, 2 for ‘Somewhat Frequent’, 3 for ‘Frequent’ and 4 for ‘Always’.

The administration process approximately took 15 to 20 minutes. The instructions were given clearly and precisely in order to make the respondents answer the questions honestly. Informed consent was taken before administration of the scale. Students were asked to fill basic demographic information before attempting the SSI. Scoring.

The 40 questions are rated on a 4-point likert scale.

<table>
<thead>
<tr>
<th>Table 1: Scoring Value for Student stress Inventory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ordinal Scale</td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>Never</td>
</tr>
<tr>
<td>Somewhat frequent</td>
</tr>
<tr>
<td>Frequent</td>
</tr>
<tr>
<td>Always</td>
</tr>
</tbody>
</table>

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Interpretation

### Table 2: Total SSI score analysis

<table>
<thead>
<tr>
<th>Total Score</th>
<th>Level of Stress</th>
</tr>
</thead>
<tbody>
<tr>
<td>40-80</td>
<td>Mild Stress</td>
</tr>
<tr>
<td>81-121</td>
<td>Moderate Stress</td>
</tr>
<tr>
<td>122-160</td>
<td>Severe Stress</td>
</tr>
</tbody>
</table>

### Table 3: Interpretation of total SSI score

<table>
<thead>
<tr>
<th>Mild Stress Score (40-80)</th>
<th>Moderate Stress Score (81-121)</th>
<th>Severe Stress Score (122-160)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Having a good of coping skills when feel stressed or feel that things are out of control. Having a positive attitude and high self efficacy. Having a good relationship with people and able to adapt in new environment</td>
<td>Having a moderate of coping skills when feel stressed or feel that things are out of control. Having a moderate attitude and high self efficacy. Having an average relationship with people and partially able to adapt in new environment</td>
<td>Having a bad of coping skills when feel stressed or feel that things are out of control. Having a bad attitude and high self efficacy. Having trouble in relationship with people and not able to adapt in new environment. Could cause severe health problem</td>
</tr>
</tbody>
</table>

2. WHO-5 wellbeing scale: A validated questionnaire consisting of five questions was administered to evaluate mental status of the medical students. This questionnaire is validated and is free to use. The WHO-5 questionnaire has 5 items with scale ranging from 0 to 5. It is a short questionnaire consisting of simple and noninvasive questions to determine the subjective well-being of the participants. It is free to use and has adequate validity. Scoring: The raw score is calculated by totaling the figures of the five answers. The raw score ranges from 0 to 25, 0 representing worst possible and 25 representing best possible quality of life. To obtain a percentage score ranging from 0 to 100, the raw score is multiplied by 4. A percentage score of 0 represents worst possible, whereas a score of 100 represents best possible quality of life. Both, scale and questionnaire were administered to students after their formative examination for better evaluation. Physical forms were used for administration.

* Statistical analysis: Statistician was consulted for data analysis. Data was analyzed using SPSS version 20.0.

**RESULTS**

Our study constituted 35.91% of males and 64.08% of females.

### Table 1: Scoring of subscales of SSI scale and WHO-5 wellbeing scale

<table>
<thead>
<tr>
<th></th>
<th>Physical</th>
<th>Interpersonal Relationship</th>
<th>Academic</th>
<th>Environmental</th>
<th>Total</th>
<th>Well Being Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>534</td>
<td>534</td>
<td>534</td>
<td>534</td>
<td>534</td>
<td>534</td>
</tr>
<tr>
<td>Median</td>
<td>19.00</td>
<td>18.00</td>
<td>23.00</td>
<td>22.00</td>
<td>84.00</td>
<td>15.00</td>
</tr>
<tr>
<td>Quartile</td>
<td>1st</td>
<td>16.00</td>
<td>15.00</td>
<td>20.00</td>
<td>76.00</td>
<td>11.00</td>
</tr>
<tr>
<td></td>
<td>3rd</td>
<td>22.00</td>
<td>23.00</td>
<td>28.00</td>
<td>93.00</td>
<td>17.00</td>
</tr>
</tbody>
</table>

The median value and inter quartile range of the physical stress was 19 and 16-22 respectively. The median value and inter quartile range of the interpersonal relationship stress was 18 and 15-23 respectively. The median value and inter quartile range of the academic stress was 23 and 20-28 respectively. The median value and inter quartile range of the environmental stress was 22 and 17-26 respectively. The median value and inter quartile range of total score was 84 and 76-93 respectively.
The median value and interquartile range of wellbeing index was 15 and 11-17 respectively.

<table>
<thead>
<tr>
<th>Total Score</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild Stress Score</td>
<td>211</td>
<td>39.5</td>
</tr>
<tr>
<td>Moderate Stress Score</td>
<td>321</td>
<td>60.1</td>
</tr>
<tr>
<td>Severe Stress Score</td>
<td>2</td>
<td>0.4</td>
</tr>
<tr>
<td>Total</td>
<td>534</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Mild total stress was seen in 39.5% of the students. Moderate total stress was seen in 60.1% of the students. Severe total stress was seen in 0.4% of the students.

Table 5: Total SSI score frequency

Mild academic stress was seen in 19.1% of the students. Moderate academic stress was seen in 62.4% of the students. Severe academic stress was seen in 18.5% of the students.

Table 6: Academic stress frequency

Mild physical stress was seen in 45.1% of the students. Moderate physical stress was seen in 51.7% of the students. Severe physical stress was seen in 3.2% of the students.

Table 7: Physical stress frequency

Mild interpersonal relationship stress was seen in 50.2% of the students. Moderate interpersonal relationship stress was seen in 44.6% of the students. Severe interpersonal relationship stress was seen in 5.2% of the students.

Table 8: Interpersonal relationship stress frequency
Mild environmental stress was seen in 30.9% of the students.
Moderate environmental stress was seen in 59.7% of the students.
Severe environmental stress was seen in 9.4% of the students.

Table 10: Correlation between academic, physical, interpersonal and environmental stress

<table>
<thead>
<tr>
<th></th>
<th>Physical</th>
<th>Interpersonal Relationship</th>
<th>Environment</th>
<th>Total Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spearman's rho</td>
<td>.023</td>
<td>.028</td>
<td>.054</td>
<td>.473</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.604</td>
<td>.515</td>
<td>.215</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>N</td>
<td>534</td>
<td>534</td>
<td>534</td>
<td>534</td>
</tr>
</tbody>
</table>

The Spearman correlation coefficient between academic performance and physical performance showed weak positive correlation between the two variables, but statistically it is not significant (p=0.605).

The Spearman correlation coefficient between academic performance and interpersonal relationship performance showed weak positive correlation between the two variables, statistically it is not significant (p=0.515).

The Spearman correlation coefficient between academic performance and environmental performance showed weak positive correlation between the two variables, but statistically not significant (p=0.215).

The Spearman correlation coefficient between academic performance and total performance showed moderate positive correlation between the two variables and statistically it is significant (p<0.001).

Table 11: Wellbeing index score.

<table>
<thead>
<tr>
<th>Well Being Index</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor Wellbeing</td>
<td>224</td>
<td>41.9</td>
</tr>
<tr>
<td>Good Wellbeing</td>
<td>310</td>
<td>58.1</td>
</tr>
<tr>
<td>Total</td>
<td>534</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Poor wellbeing was seen in 41.9% of the students.
Good wellbeing was seen in 58.1% of the students.

DISCUSSION

Our study focused on determination of academic stress on undergraduate medical students and evaluation of their mental wellbeing.
Our study constituted 35.91% of males and 64.08% of females.

Total sample size was 534 students. Table 4 shows the scoring of subscales of SSI scale and WHO-5 wellbeing scale. As far as total stress- combination of academic, interpersonal, environmental and physical stress is concerned, according to Table 5, our results indicate that 0.4% of students had severe stress, 60.1% had moderate stress whereas 39.5% of students had mild stress. The fact that more than half of the students had moderate stress, is of great concern. Our results are similar to a study by Saipanish R34, where 61.4% of students had stress and 2.4% had high level of stress. However according to a study by Firth J35, the level of stress and resultant emotional disturbance was 31.2% among medical students, which is lower than our results. This difference could be due to different medical system in their country. In a study by Shawaz Iqbal36 in Indian medical school, regarding stress, more than half of the students were affected by depression (51.3%), anxiety (66.9%) and stress (53%). These results are
similar to our results. Increased overall stress among medical students is of great concern as it may have long term chronic impaired effects on health of students and ultimately affect patient care later. Such students have moderate coping skills when under stress and often feel that things are out of control leading to lack of confidence and ultimately vicious cycle of stress develops. Introduction of stress management skills among stressed students would be of immense help. It has been found that introduction of various stress management training programs in different courses of mental health department can help in improvement of mental health of students. The SSI scale used by us determined the degree of academic, physical, interpersonal and environmental stress among undergraduate medical students. As far as academic stress is concerned, according to our results- Table 6, mild academic stress was seen in 19.1% of the students, moderate academic stress was seen in 62.4% of the students and severe academic stress was seen in 18.5% of the students. More than half of students have moderate academic stress. These students were stressed about financial problems due to college expenses, inadequate time management between studies and social activities, felt nervousness while in class presentation, dealing with deadlines, examinations. They gradually lost interest in courses, felt burden of academic overloads and felt difficulty in handling academic issues. Our results are similar to study by Razhenkova et al.6, according to which, out of all the stressors for medical students, academic stressors were more devastating than all. Academic stress undermines medical students' mental health and leads to asthenic, anxious, anxious-depressive disorders and emotional burnout.6

In our study (Table 10), the Spearman correlation coefficient between academic performance and total performance show moderate positive correlation between the two variables and statistically it was significant (p<0.001). This shows that academic stress is one of the major determinants of stress among medical students. It has been documented that stress management programmes are very effective in reducing academic stress and help students to reduce negative coping skills.8

As far as physical stress is concerned according to our results (Table 7), 51.7% of students had moderate physical stress and 3.2% had severe. According to a similar study, physical problems were found to be independent significant risk factors for outcome variable of stress.9 However in our study (Table 10), the Spearman correlation coefficient between academic performance and physical performance showed weak positive correlation between the two variables. In our study, (Table 8), mild interpersonal relationship stress was seen in 50.2% of the students, moderate interpersonal relationship stress was seen in 44.6% of the students and severe interpersonal relationship stress was seen in 5.2% of the students. In a similar study, it was found that interpersonal stress is inversely related to morale of medical students. Interpersonal skills are related to relationship of students with parents, friends, peers and faculty. In our study, the Spearman correlation coefficient between academic performance and interpersonal relationship performance showed weak positive correlation between the two variables, statistically it is not significant (Table 10).

Moderate environmental stress was seen in 59.7% of the students (Table 9) and severe environmental stress was seen in 9.4% of the students. Environment stress was related to transportation, hostel, pollution, inadequate hostel facilities, insecurity in a new place. Again in our study, the Spearman correlation coefficient between academic performance and environment performance showed weak positive correlation between the two variables, but statistically not significant (Table 10).

In our study, according to WHO wellbeing scale, poor wellbeing was seen in 41.9% of the students and good wellbeing was seen in 58.1% of the students (Table 11). More than 40% students have poor wellbeing which suggests that stress, mainly academic stress maybe responsible for decline in wellbeing of students. Study by Georgia Barbayannis et al has found significant correlation between poor academic stress and poor mental wellbeing of students.41 Academic stress maybe a dominant stress factor affecting mental wellbeing of medical students. Wellness is very important issue for medical students. For promoting wellbeing some curricular modifications in the form of promoting positive behaviors, extracurricular activities and providing resources to students can be helpful.42

Students exposed to various stressors try to use various coping mechanisms to reduce stress. Religious coping, active coping, positive reframing and planning were found to be most used coping strategies, whereas behavioral disengagement, denial and substance use were found to be least used ones.43 However, stress among medical students usually is chronic and many times coping strategies are inadequate, hence, regular and longitudinal stress management programs should be introduced in medical curriculum.

CONCLUSION

Stress is very common among undergraduate medical students. Academic stressors contribute maximum among all the stressors. Chronic academic stress can lead to poor mental wellbeing of the medical students. Hence, it is recommended to introduce stress management programs and address various stressors related to medical students. Acknowledgement: This study was supported by the Indian Council of Medical Research (ICMR).
Special thanks to all the faculty and students who participated in the study.

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Conflict of interest: NIL

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