RESEARCH ARTICLE

A study of the impact of stress on health and education among the first MBBS students in a medical college of West Bengal during the pandemic

Arunima Chaudhuri¹, Suhrita Paul², Parthasarathy Sinha¹

¹Department of Physiology, Burdwan Medical College, Burdwan, West Bengal, India, ²Department of Pharmacology, Burdwan Medical College, Burdwan, West Bengal, India

Correspondence to: Arunima Chaudhuri, E-mail: arunimachaudhuri4u@gmail.com

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ABSTRACT

Background: The medical students of today will be doctors of tomorrow. Hence, attention to their mental health is of immense importance to make them ready for multiple unprecedented challenges in the future. Aims and Objectives: This study aims to study the effect of perceived stress of the first MBBS students on general health profile and performance in oral and practical examinations during conduction of the foundation course. Materials and Methods: This quasi-experimental cross-sectional study was conducted in a Government Medical College of West Bengal in the Department of Physiology. All 200 students of the first MBBS batch participated in the present study. The students were divided into two groups according to presumptive stressful life events scale scores: Group I (subjects having presumptive stressful life events scale scores more than 200: 66); Group II (subjects having presumptive stressful life events scale scores more than 40 up to 200: 134). Perceived stress scores, body mass index, and waist/hip (W/H) ratio were calculated. Pulse rate, systolic and diastolic blood pressure were measured and blood groups were estimated. Two theory examinations and three oral examinations were conducted. Feedback from students was taken regarding the teaching-learning program and feedback provided to them. Results: Presumptive stressful life events scale scores (309.41 ± 118.87 vs. 153.63 ± 34.11; P < 0.001**) and perceived stress scale scores (19.69 ± 5.22 vs. 16.84 ± 3.9; P < 0.001**) were significantly higher in Group I as compared to Group II. Subjects of Group I had higher W/H ratio (0.88 ± 0.08 vs. 0.847 ± 0.074; P = 0.01*), pulse rate (80.97 ± 4.8 vs. 77.28 ± 4.87; P < 0.001**), and systolic blood pressure (SBP) (123.26 ± 5.24 vs. 120.93 ± 6.19; P = 0.006**) as compared to Group II. Students of Group II performed significantly better in oral examinations as compared to students of Group I. Conclusions: The performance of students in oral examinations was negatively correlated with perceived stress scores. An increase in perceived stress levels increased pulse rate, SBP, and W/H ratio in the first MBBS students.

KEY WORDS: Perceived Stress; Performance in Examination; Health Profile; Medical Students

INTRODUCTION

Coronavirus disease 2019 (COVID-19) pandemic has the potential to significantly affect the mental health of medical professionals as well as medical students, as they are in the frontline during this hour of crisis.[1,2] Medical education is inherently stressful and in the hour of present crisis, students have to stay back home and continue their studies online.[1-6] Their resilience may be further compromised by isolation and loss of social support, risk or infections of friends and relatives, and unsettling changes in the working conditions. Medical students are, therefore, especially vulnerable to mental health problems, including stress, anxiety, and depression.[1,2] Studies have demonstrated that there is a lack of awareness of own mental health problems among
health-care professionals and psychological problems be more prevalent among younger age group.\textsuperscript{5-7}

There is increasing concern about the mental health of health care workers treating and caring for patients with COVID-19 worldwide. The goal of a narrative review was to provide up-to-date information on potential mental health risks associated with the exposure of health professionals to the COVID-19 pandemic. There is a consensus in all the relevant literature that health-care professionals are at an increased risk of high levels of stress, anxiety, depression, burnout, addiction, and post-traumatic stress disorder, which could have long-term psychological implications.\textsuperscript{2}

In the long run, this tragic health crisis should significantly enhance our understanding of the mental health risk factors among the health professionals who are facing the COVID-19 pandemic. Reporting information such as this is essential to plan future prevention strategies. Protecting health-care professionals are indeed an important component of public health measures to address large-scale health crises. Thus, interventions to promote mental well-being in health-care professionals exposed to COVID-19 need to be immediately implemented, and to strengthen prevention and response strategies by training health-care professionals on mental help and crisis management.\textsuperscript{3}

The medical students of today will be doctors of tomorrow. Hence, attention to their mental health is of immense importance to make them ready for multiple unprecedented challenges in the future. Hence, it is important that medical schools not only care about students’ mental health but also implement strategies to support their understanding of crisis management, self-mental care, and other principal measures to strengthen their coping skills and mental preparedness.\textsuperscript{1,8}

Medical students perceive greater stress due to the huge pressure of the MBBS curriculum and this adversely affects their mental and physical well-being.\textsuperscript{9-14} The new curriculum for undergraduate medical education has been implemented in 2019. The foundation course is an important milestone in the present curriculum. The objective of the course is to sensitize the fresh medical students with the required knowledge and skills that will make them familiar with the new professional environment. The COVID-19 pandemic has brought a huge challenge among medical educators and students. The new students could only join their classes from February 2021 instead of August 2020. As per the directive of the National Medical Commission, the period for completion of the first MBBS course along with the foundation course has been shortened and the foundation course needs to be implemented during the first 5 months along with the regular curriculum. All these have imposed extra challenges for students and medical educators amid the present pandemic. The present quasi-experimental cross-sectional project was conducted to study the effect of perceived stress on general health profile and performance in examinations, of the first MBBS students in a medical college of East India.

MATERIALS AND METHODS

This pilot project was conducted in a Government Medical College of West Bengal in the Department of Physiology after taking Institutional Ethical Clearance (Memo No: BMC/I.E.C/147 dated 23/11/2020) and informed consent of the subjects in 2 months (all our students were 18 years or above age group).

Inclusion Criteria

The 1\textsuperscript{st} year medical students of Burdwan Medical College of 2020–2021 batch willing to participate in the study.

Sample Size

Two hundred medical students are studying in Burdwan Medical College in the 1\textsuperscript{st} year. The first MBBS batch was chosen as in different studies, this group is more vulnerable to mental health problems.

The sample size was calculated at calculator.net. Confidence level 95%; margin of error 5%; population proportion 50% (this is followed if not sure); sample size came to 132. All 200 students of the first MBBS batch participated in the present study.

Methods [Figure 1]

This quasi-experimental cross-sectional study was conducted in a span of 2 months between February 2021 and April 2021 on newly admitted MBBS students of the batch 2020–2021. Introduction to the concept of stress and stress management is a part of the foundation course.\textsuperscript{15} A major portion of the foundation course was conducted by the department of physiology. The foundation course program was pre-planned.

**Figure 1:** Flow chart Showing Methodology

<table>
<thead>
<tr>
<th>Two hundred students of First MBBS Batch (68 Females, 132 Males):</th>
<th>PSLES scores calculated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group I: Subjects having PSLES scores more than 200 (N=66)</td>
<td>Group II: Subjects having PSLES scores more than 40 and less than 200 (N=134)</td>
</tr>
<tr>
<td>PSS, Body Mass Index and Waist/Hip ratio were calculated. Pulse rate, Systolic and Diastolic Blood Pressure were measured in supine position. Blood Groups estimated. Two theory and three oral examinations were conducted. Feedback from students were taken regarding the teaching learning program and feedback provided to them</td>
<td></td>
</tr>
<tr>
<td>Results of Group I and Group II compared using unpaired T- test.</td>
<td></td>
</tr>
</tbody>
</table>
and implemented as per guidelines. The foundation course is a 1-month course, but due to the present pandemic, the National Medical Commission has asked to conduct the foundation course in the first 5 months for the current first MBBS batch.

Faculties were trained for conducting the teaching-learning program by the medical education unit of the institution. Lesson plans, multiple-choice questions (MCQs), and questionnaires were designed and pre-validated. Students were provided with the teaching-learning modules and competencies to be taught 2 days before all sessions. The teaching-learning sessions were made interactive and self-directed learning was encouraged in all sessions. In the present study, we followed flipped classroom-assisted self-directed learning as the teaching-learning method.

The Medical Council of India in 2019 has implemented learner-centered models as well as competency-based curriculum. Competency-based medical education provides an effective outcome-based strategy where various domains of teaching including teaching-learning methods and assessment form the framework of competencies. The Medical Council of India has laid the basic framework for the revised undergraduate medical curriculum. Flipped classroom teaching, self-directed learning, and lecture classes combined may be more effective in implementing the new competency-based medical education.[15]

Flipping the classroom is a practice of assigning the students with study material before the class. In the class, face-to-face time for more engaging and active learning strategies is further used. As medical educators are able to successfully flip a lecture, they can gain new teaching perspectives, and this is very essential to effectively engage in curricular reform.

A flipped classroom focuses instructors to think more critically about what to present and how to present. The following are the positive outcomes of a flipped classroom:
1. It is a more interactive classroom. Students may go through interactive cases together in small groups. They may come up with diagnoses based on the patient’s chief complaints
2. It helps the students to learn at their own pace, which is a very important component of competency-based medical education. Students can get time to read additional materials required and may slow down or speed up at certain areas, as and when necessary
3. Students can review study materials in a stepwise fashion. This may help to better recall of different aspects of knowledge later on.

During active learning students have ownership of their learning for meaningful outcome of learning experiences? The flipped classroom provides opportunity and time for face-to-face engagement. This aligns prior knowledge obtained with experiences and helps to prepare the learners for better practice. These experiences collectively help to build confidence of the learner and provide opportunities to support development of self-efficacy. It also creates an environment of inquiry and open questioning.[16] This may help students in developing self-directed learning skills that are essential for patient care and more so with evidence-based medicine. Taking all these into considerations, flipped classroom-assisted self-directed learning was used as the teaching-learning method in the present study.

The students were first asked to fill up the presumptive life events stress scale (PSLES) and their scores were calculated. More than 200 is considered as severe stress and scores between above 40 up to 200 as moderate.[17] Subjects were divided into two groups according to PSLES scores: Group I (subjects having PSLES scores more than 200: 66) and Group II (Subjects having PSLES scores more than 40 up to 200: 134). Sixty-six subjects were in Group I and 134 were in Group II.

Perceived stress scale (PSS) scores of these two groups were calculated using Sheldon Cohn’s scale.[18] Weight, height, and body circumference around the umbilicus and hip were recorded. Body mass index (BMI) and waist/hip (W/H) ratio were calculated. Subjects were asked to take rest for 15 min and resting pulse rate, SBP and DBP were measured in the supine position. Blood groups was the students were estimated (different studies have demonstrated that subjects with blood group O perceive more stress, so the blood group of the students was estimated).

Two theory examinations and three oral examinations were conducted in this period of 2 months. Theory examinations were MCQ based and questions were set from must-know areas. The topics on which the examinations were conducted included the following: Stress management, AETCOM, medical profession, and roles of a physician to the society, history of medicine, basic life support and first aid, history of outbreaks, epidemics and pandemic, infection control practices – hand washing, decontamination, use of PPE, language skills, and computer skills. Feedback from students was taken regarding the teaching-learning program and feedback provided to them regarding their physical and mental health and performance in examinations conducted in this period. Faculties and residents of the department of physiology collected the data. The group divisions according to the PSLES scores were not revealed to the students and the faculties and residents who were collecting data in the study to prevent bias. Thus, double blinding was done. Students were taught stress management techniques (progressive muscle relaxation) in the foundation course and were asked to practice daily for 20 min.

The perception of students in regard to the usefulness of teaching-learning sessions was assessed using a questionnaire
at the end of the sessions. The questionnaire comprised the following items:

Question 1: Were you satisfied with the teaching-learning sessions and found them helpful in understanding the topic effectively?
Question 2: How many hours do you study on your own?
Question 3: Do you feel that regular assessment conducted and feedbacks provided to you were helpful?
Question 4: Do you want feedback of your performance along with elaborate keys?
Question 5: Do you need online support in addition to the traditional curriculum?
Question 6: Among the subjects of the first MBBS taught to you, which one are you most interested in studying?
Question 7: Did the faculties help the learner to clear his/her doubts, if not state the reason in a few words?

Statistical Analysis

Unpaired $t$-test was used to compare different parameters of the two groups. Correlation coefficient was calculated to see the correlation of perceived stress scores and performance in the examinations. Normality of the distribution was checked before applying unpaired $t$-test.

RESULTS

Two hundred first MBBS students participated in the present study. Sixty-six subjects were in Group I (33%) and 134 were in Group II (67%). The groups were age and sex matched. There were 132 male students and 68 female students in the first MBBS batch. Following were the percentages of different Blood groups of subjects of Group II: Blood group A – 14.39%; Blood group AB – 9.84%; Blood group B – 38.64%; Blood group O – 37.12%. Following were the percentages of different Blood group of subjects of Group I: Blood group A – 19.11%; Blood group AB – 11.76%; Blood group B – 29.41%; Blood group O – 39.70%. PSLES (309.41 ± 118.87 vs. 153.63 ± 34.11; $P < 0.001**$) and PSS (19.69 ± 5.22 vs. 16.84 ± 3.9; $P < 0.001**$) were significantly higher in Group I as compared to Group II. Subjects of Group I had higher W/H ratio (0.88 ± 0.08 vs. 0.847 ± 0.074; $P = 0.01*$), pulse rate (80.97 ± 4.8 vs. 77.28 ± 4.87; $P < 0.001**$), and SBP (123.26 ± 5.24 vs. 120.93 ± 6.19; $P = 0.006**$) as compared to Group II. Students of Group II performed significantly better in oral examinations as compared to students of Group I [Table 1].

**Table 1: Comparison of different parameters of Group I and Group II**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Group I ($n=132$)</th>
<th>Group II ($n=68$)</th>
<th>$P$-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSLES</td>
<td>153.63 ± 34.11</td>
<td>309.41 ± 118.87</td>
<td>$&lt; 0.001$**</td>
</tr>
<tr>
<td>PSS</td>
<td>19.69 ± 5.22</td>
<td>16.84 ± 3.9</td>
<td>$&lt; 0.001$**</td>
</tr>
<tr>
<td>W/H</td>
<td>0.88 ± 0.08</td>
<td>0.847 ± 0.074</td>
<td>0.01*</td>
</tr>
<tr>
<td>BMI kg/m²</td>
<td>22.605 ± 3.2</td>
<td>22.605 ± 3.2</td>
<td>0.99</td>
</tr>
<tr>
<td>Pulse (beats/min)</td>
<td>80.97 ± 4.8</td>
<td>77.28 ± 4.87</td>
<td>$&lt; 0.001$**</td>
</tr>
<tr>
<td>SBP (mm of Hg)</td>
<td>120.93 ± 6.19</td>
<td>123.26 ± 5.24</td>
<td>0.006*</td>
</tr>
<tr>
<td>DBP (mm of Hg)</td>
<td>77.9 ± 4.98</td>
<td>79.14 ± 5.11</td>
<td>0.108</td>
</tr>
<tr>
<td>Theory examination 1 (%)</td>
<td>90.8±1.39</td>
<td>90.6±1.15</td>
<td>0.217</td>
</tr>
<tr>
<td>Theory examination 2 (%)</td>
<td>95.57±2.2</td>
<td>95.37±2.01</td>
<td>0.524</td>
</tr>
<tr>
<td>Oral examination 1(%)</td>
<td>84.13±9.07</td>
<td>81.34±9.07</td>
<td>0.04*</td>
</tr>
<tr>
<td>Oral examination 2 (%)</td>
<td>85.1±9.94</td>
<td>81.7±11.24</td>
<td>0.0397*</td>
</tr>
</tbody>
</table>

BMI: Body mass index, W/H: Waist/hip, PSLES: Presumptive life events stress scale, PSS: Perceived stress scale, SBP: Systolic blood pressure, DBP: Diastolic blood pressure, $*P<0.05$: Statistically significant difference, $**P<0.001$: Statistically highly significant difference

DISCUSSION

Two hundred first MBBS students participated in the present study and were divided into two groups as per PSLES scores. Sixty-six subjects were in Group I (33%) and 134 were in Group II (67%). PSS (19.69 ± 5.22 vs. 16.84 ± 3.9; $P < 0.001**$) was significantly higher in Group I as compared to Group II. Subjects of Group I had higher W/H ratio (0.88 ± 0.08 vs. 0.847 ± 0.074; $P = 0.01*$), pulse rate (80.97 ± 4.8 vs. 77.28 ± 4.87; $P < 0.001**$), and SBP (123.26 ± 5.24 vs. 120.93 ± 6.19; $P = 0.006**$) as compared to Group II.

Velusami et al. in 2020 conducted a study to evaluate the foundation course program. The evaluation was done using a pre-designed questionnaire and inputs were obtained from all faculty members. Kirkpatrick framework level 1 was used in the study for evaluation. Feedback was received from the faculty members by force-field analysis and students using a 5-point Likert scale. Values above 75% were considered to reflect good consensus and below 75% to reflect poor consensus. The range of consensus score was between 73.7%...
In the present study also, we observed a significant increase in perceived stress levels in students of Group II compared to students of Group I. In Group II, PSS was negatively correlated with performance in oral examinations as compared to students of Group I. In Group II, PSS was negatively correlated with performance in oral examinations as compared to students of Group I.

Saeed et al. conducted a cross-sectional study to determine the prevalence and factors associated with perceived stress in medical students. Questionnaire based on the Kessler 10 psychological distress instrument was used for the collection of data. Students with severe stress constituted 33.8%. In the present study, 34% of students had high PSLES scores and PSS scores. The study by Saeed et al. concluded that stress level in medical students is high and implementation of stress management strategies was advocated. In the present study in the foundation course, the students were taught stress management strategies and were made aware of mental health problems. Students of Group II performed significantly better in oral examinations as compared to students of Group I. In Group II, PSS was negatively correlated with performance in the oral examination with r values: –0.022; –0.0268; and –0.156, and in Group I, PSS was also negatively correlated with results of oral examinations with r values –0.098; –0.06; and –0.152, respectively. Learning to cope with stress may improve the performance of students.

We had conducted a study on 2019–2020 first MBBS batch to study the effectiveness of flipped classroom-assisted learning and observed that the Department of Physiology of Burdwan Medical College was able to successfully implement the online module of teaching during the lockdown period following the COVID-19 pandemic. In the present study also, we could successfully implement the teaching-learning module and both students and faculties were satisfied with the outcome.

A study was conducted by Gupta et al. in 2011 on 30 undergraduate medical students. According to the PSS, they were divided into three groups: High, moderate, and low stress. Heart rate variability, and galvanic skin resistance, subject to a computer game stressor were the measured variables. Students were then instructed to undertake meditation sessions and were tested for the same parameters at intervals of 3–6 weeks from the pre-test. The study indicated usefulness of meditation program for individuals with moderate or high stress. In the present study, we also observed significantly low pulse rate, SBP, and W/H ratio in students having lower stress levels.

**Strength and Limitations of this Study**

This was a cross-sectional study and conducted in a short span of 3 months in a single center. All two hundred 1st year students participated in the study and double binding was done to prevent bias. Stress levels were assessed using two scales and five examinations were conducted to assess the students. The lesson plans for the classes were validated, blue printing for assessment was done. All questions and questionnaires were pre-validated.

**CONCLUSIONS**

The performance of students in oral examinations was negatively correlated with perceived stress scores. An increase in perceived stress levels increased pulse rate, SBP, and W/H ratio in the first MBBS students. Implementation of stress management strategies in the foundation course may help the students to remain physically and mentally healthy.

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