

## Assessment Of Stress Among First Year Medical Students And Its Effect On Cognitive Performance- A Cross Sectional Study

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### Abstract:

**Background:** Medical profession is considered to be one of the most stressful curriculums. The course is mentally and physically demanding for its extensive curriculum. The first year in medical college poses many new challenges for the incoming student, requiring major adjustments to their lifestyle. Chronic stress is associated with poorer cognitive function, accelerated cognitive decline and increased risk of dementia. This study was taken up to assess the stress level among first year MBBS medical students using Medical Student Stressor Questionnaire (MMSQ) and its effect on their cognitive function using Montreal Cognitive Assessment (MOCA).

**Materials and method:** A hospital based cross sectional study was carried out among eighty (80) healthy 1<sup>st</sup> year medical students in AGMC & GBPH. Students with history of psychiatric disorder, neurodegenerative disorder, and history of taking antipsychotic or antiepileptic drugs were excluded from the study. Data were collected from the participants after obtaining their informed consent. A pre-designed case study format was used to collect the data. The MSSQ-20, validated questionnaire was used to identify the stress level among the students and sources of stress. Cognitive function was assessed using the MoCA scale. Data was analyzed using SPSS21.

**Results:** Eighty (80) healthy 1<sup>st</sup> year medical students participated in the study. 51.2% of them were female and 48.8% were male. Majority of the students were having moderate level of stress. 14% of the students had mild stress, 59% had moderate and 27% has high stress. Mean MoCA score was 26.44 (SD±2.07). 29.6% of the students were found to have mild cognitive impairment. Pearson correlation showed a negative correlation between stress level of the students and their cognitive function with r value -0.24 and the correlation was statistically (p value 0.029) significant.

**Conclusion:** Stress is highly prevalent among first year MBBS students and it has negative impact on the cognitive performance of the students. There is a need to emphasize on counseling the students about the stress management and adopting a healthy lifestyle in order to improve their quality of life.

**Keyword:** Cognitive function, Medical Student Stressor Questionnaire (MMSQ)

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### I. INTRODUCTION

Stress is the body's response to changes that requires physical, mental or psychological adjustments. It is a part of our daily life that enables us to survive in the face of challenging situations. But chronic stress often leads to various disorders due to disbalance in body's homeostasis. Medical profession is considered to be one of the most stressful curriculums. The course is mentally and physically demanding because of its vastness and diversity. Besides, dealing with human lives makes it even more challenging for the students. Various studies have shown that medical students experience stress impacting their learning process, leading to poor academic performance<sup>1</sup>. The first year in medical college is specially challenging for the incoming students, requiring major adjustments to their lifestyle. Several studies across the world reported various factors like long study hours, never ending syllabus, academic pressure, concern about the future, pressure from the parents, difficulties while dealing with human life [and so](#) on as responsible for prevalence of chronic stress among medical students<sup>2,3</sup>.

Stressful situations lead to secretion of stress hormones like cortisol. Long term rise in stress hormone level during chronic stress leads to development of psychological issues such as depression, sleep deprivation, disorders of concentration, impaired attention & decision making capability. Chronic stress also increases the

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risk of development of Hypertension, Diabetes Mellitus and many other lifestyle disorders. Excess stress among medical students often leads to poor academics & performance of clinical duties, low tolerance levels, drop out from the course, substance abuse, various non-communicable diseases. Increased rate of suicidal tendencies among medical students having stress is also noticed<sup>4</sup>. At an undergraduate level the commonest consequence of stress is poor academic performance due to affect of stress on cognitive function. Chronic stress can lead to cognitive decline and increased risk of dementia. The individuals who experience chronic stress has dysregulated endocrine function and pro-inflammatory effects which can impair the neural structure and function underlying cognitive performance<sup>5</sup>.

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Timely assessment of stress level and proper management of stress is essential for leading a healthy life. Various scientifically approved scales are available to measure stress level of the individual. One of the instruments that have been used to identify stressors among medical students is the Medical Student Stressor Questionnaire (MSSQ)<sup>6,7</sup>. This instrument has been validated across different countries including India. It is a freely available questionnaire that has specially been designed to assess the stress level among medical students. Many studies have been conducted in different parts of India to assess the depression, anxiety and stress level among medical students using MSSQ.

For assessment of cognitive function one of the validated instruments is Montreal Cognitive Assessment (MOCA) test<sup>8</sup>. This test consists of a set of questionnaires to assess different cognitive domains like visuospatial ability, memory, attention, language and orientation. MOCA is validated in different countries including India and is freely available in different Indian regional languages.

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In this study we planned to assess the stress level among first year MBBS medical students using MSSQ and its effect on their cognitive function using MOCA.

## II. METARIALS AND METHOD

**Study design:** Cross sectional study

**Study duration:** Three months, September 2023 to November 2023

**Study area/location:** Department of Physiology of Agartala Government Medical College.

**Study population:** First Year Medical students studying in Agartala Government Medical College.

**Sample size:** Based on the study conducted on medical students, lowest prevalence of stress among medical students of 94.52% has been considered<sup>9</sup> for calculating the sample size for the present study at 5% level of significance and with an absolute precision of 5.

$$N = \frac{z^2_{\alpha/2}pq}{D^2}$$

Where, N= Sample size

$Z_{\alpha/2}$  = 1.96 at 95% confidence interval

P= Prevalence (94.52%)

Q= 100-P (5.48%)

D= Absolute precision (5)

Hence by using the formula sample size calculated was ≈80.

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$$N = \frac{z^2_{\alpha/2}pq}{D^2}$$

**Sampling procedure:** First year medical students who suitably fulfilled the selection criteria were included for the study.

**Inclusion criteria:**

1. Healthy Medical students willing to participate in the study.

**Exclusion criteria:**

1. Students with history of psychiatric disorder.
2. Students on antipsychotic or antiepileptic drugs
3. History of neurodegenerative disorder.

**Study tools:**

1. **Medical students Stressor Questionnaires (MSSQ-20):** It is used to identify sources of stress of medical students and it measures severity of stress caused by these stressors. The tool consists of 20 items representing six stressor domains. These are academic related stressor (ARS), interpersonal related stressor (IRS), social related stressor (SRS), teaching and learning related stressor (TLRS), desire and drive related stressor (DDRS), and group activities related stressor (GARS).

2. **Montreal Cognitive Assessment Scale (MOCA):** It consists of a validated questionnaires assessing seven cognitive domain visuospatial ability, naming, memory, attention, language, abstraction skill and orientation.

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**Study procedure:**

Data were collected from the participants after obtaining their informed consent as per the inclusion criteria. Socio-demographic variables like name, age, sex, etc was noted as per the case study format.

A pre-designed case study format was used to collect relevant information, demographic data, and medical history. Using a standard questionnaire information was obtained regarding their fluency in the local language, the medium of education at the school level (immediately prior to medical school), family income, number of family members, religion, and whether or he/she currently resided in a hostel.

**MSSQ-20:** The MSSQ-20, a validated instrument was used to identify the stress level and sources of stress<sup>10</sup>. The questionnaire was administered in English, as it is the medium of instruction used in this institution. Respondents were asked to rate the severity of stress by themselves by choosing one among five alternatives:

- (1) Causing no stress at all: '0'
- (2) Causing mild stress: '1'
- (3) Causing moderate stress: '2'
- (4) Causing high stress: '3'
- (5) Causing severe stress. '4'

It was scored by assigning the value of 0–4 for each of the respective responses.

The tool consists of 20 items representing six stressor domains. These are academic related stressor (ARS), interpersonal related stressor (IRS), social related stressor (SRS), teaching and learning related stressor (TLRS), desire and drive related stressor (DDRS), and group activities related stressor (GARS).

The mean score (after summation of scores from all the items and division by 20) was taken as the indicator of overall stress. Mean item scores for individual students was calculated and graded into mild (0.01–1), moderate (1.01–2), high (2.01–3), and severe (3.01–4) categories of stress.

**MoCA:** Cognitive function was assessed using the MoCA scale. MoCA consists of 30 items divided into the domains of visuospatial ability, naming, memory, attention, language, abstraction skill and orientation. It was scored accordingly from 0 to 30 with a cutoff value of 26. A score of 26 or above was considered normal, 25 to 23 as mild cognitive impairment, 23 to 11 as moderate cognitive impairment, and 10 and below as severe cognitive impairment<sup>5,11</sup>.

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**Data analysis:** Data were analyzed using SPSS 20. Data were summarized using descriptive statistics like percentages for categorical data, means (standard deviation) and median for continuous data. A p value of < 0.05 was taken as significant.

### III. RESULTS

Eighty (80) healthy 1<sup>st</sup> year medical students participated in the study. 51.2% (n=41) of them were female and 48.8% (n=39) were male. Gender wise distribution of the study participants are shown in Fig.1. Mean age of the study participants and demographic variables of the study participants are mentioned in Table 1.

Majority of the students were having moderate to high level of stress. None of participants had severe stress. Stress level among the study participants is shown in Fig.2. Academic related stressor was found to be most important factor to cause stress among the students. The frequencies of the students found to be stressed in each domain are shown in Table 2.

29.6% of the students were found to have mild cognitive impairment. Mean stress score and MoCA score are shown in Table 3 and Fig.3. Pearson correlation showed a negative correlation between stress level of the students and their cognitive function with r value -0.24. The correlation was statistically significant (p value 0.029). Correlation between stress level and cognitive function is shown in Fig.4.

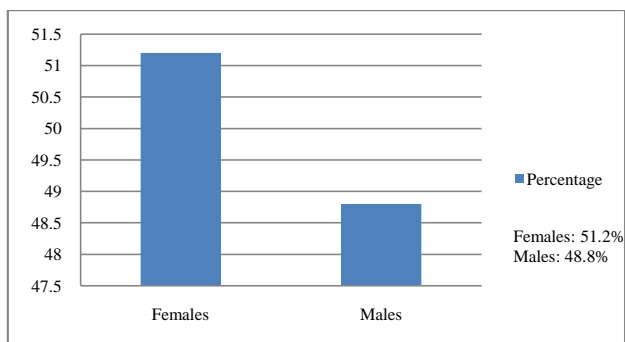


Fig.1. Gender wise distribution of the study participants

VARIABLES	FINDINGS
Age (Years)	18.82 (SD±1.03)
Females	51.2% (41)
Males	48.8% (39)
Addiction status	Nil

Table 1. Variables among the study participants

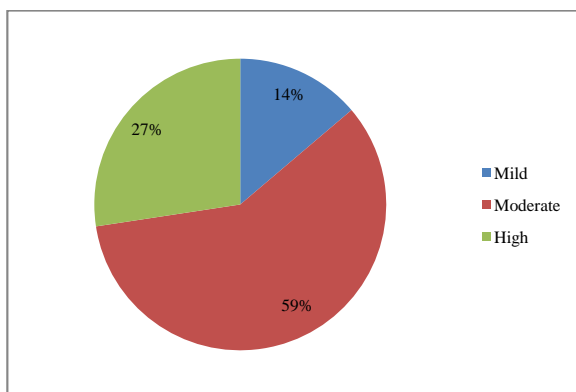


Fig.2. Stress level among the study participants

DOMAINS OF STRESS	PERCENTAGE OF STUDENTS
Academic related stressor	70%
Interpersonal related stressor	42%
Social related stressor	67%
Teaching and learning related stressor	45%
Desire and drive related stressor	38%
Group activities related stressor	56%

Table 2. The frequencies of the students found to be stressed in each domain

Variables	Mean	Std. deviation
Stress score	1.494	0.503
MoCA score	26.44	2.07

Table 3. Mean stress score and MoCA score

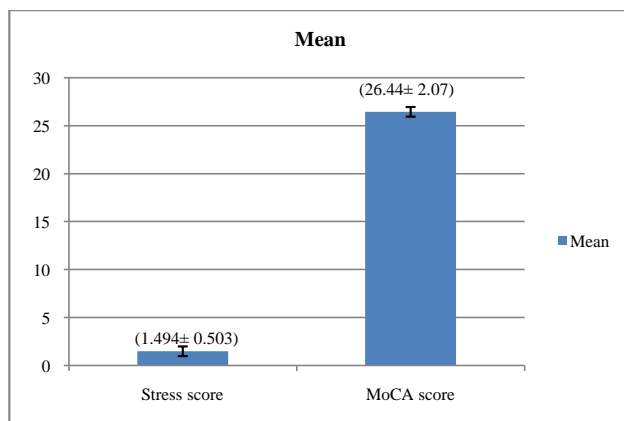


Fig.3. Mean stress score and MoCA score

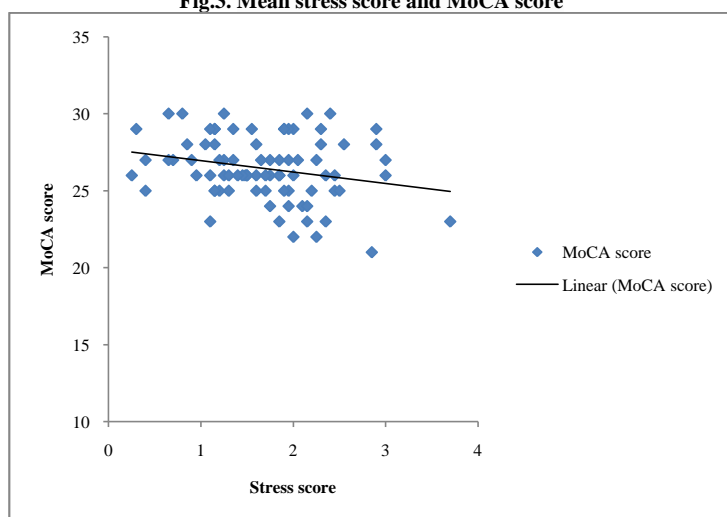


Fig.4. Correlation between stress level and cognitive function

#### IV. DISCUSSION

In this study first year medical students were assessed for stress and effect of stress on their cognitive function. Majority of the students were found to have moderate to high level of stress. Academic stressor was the main factor to cause stress among the students and there was a significant negative correlation between stress level and cognitive function.

Study conducted by Gupta S. et al supports the findings of this study. They found in their study that the prevalence of moderate and high stress among the medical students was 55.7% and 35.4% respectively. The overall prevalence of stress was estimated as 91.1%. Most of the students (94.9%) reported stress due to academic related factors<sup>12</sup>.

In a study conducted on 678 medical students showed overall proportion of anxiety stress and depression among the study subjects were 52.4%, 31.9% and 45.3% respectively<sup>13</sup>.

Another study conducted on medical students showed that most of the medical students had mild to moderate degrees of stress in all the domains of the MSSQ<sup>14</sup>.

In a study conducted on 329 medical students showed 52.4% of the students were having mild to moderate stress. Academic related stressor domain was the main source of stress among 88.6% students. Stress was significantly associated substance abuse. Stress was significantly but negatively correlated with academic achievement<sup>15</sup>.

Study conducted by Babar V. et al also confirmed the higher prevalence of stress among medical students and academic factor contributes as the most important stressor<sup>16</sup>.

Another study conducted on medical students showed that among 356 participants, 324 participants (91%) were suffering from high levels of stress. Factors such as curriculum vastness, frequency of examination, competition with peer, performance in examinations, and worry about future played major role in creating additional stress<sup>17</sup>.

All students enrolled in the study conducted by Kansgra T. et al had a moderate degree of stress. Academic-related stress (ARS) received the highest score followed by intrapersonal and interpersonal-related stressors (IRS) and group activities related stressors (GARS)<sup>18</sup>.

## V. CONCLUSION

Stress is highly prevalent among first year MBBS students and it has negative impact on the cognitive performance of the students. There is a need to emphasize on counseling the students about the stress management and adopting a healthy lifestyle in order to improve their quality of life. Interventions to improve the future doctor's wellbeing will have a positive impact on patient care and the society.

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