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# Predictors of high achievers in Indian medical undergraduates: Association with emotional intelligence and perceived stress

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## Abstract:

**BACKGROUND:** Today's Bachelor in Medicine, Bachelor in Surgery (MBBS) students will become Indian Medical Graduates in future. Emotional intelligence (EI) is an essential component in the making of an Indian Medical Graduate. There is increasing stress during medical training. The study was conducted to compare the association of EI score and perceived stress scale (PSS) among average and excellent undergraduate medical students. The secondary objective was to find the predictors of excellent academic performance.

**MATERIALS AND METHODS:** This descriptive cross-sectional study was conducted after institutional ethics committee approval. All 522 consented students studying in 2<sup>nd</sup>, 4<sup>th</sup>, 7<sup>th</sup>, and 9<sup>th</sup> semesters filled up established pre-validated questionnaires; Schutte self report EI test and Cohen's perceived stress scale. Sociodemographic details of the respondents were collected. Average attendance and marks of previous semester examinations of all included students were collected from academic cell of the institution. All students were grouped into three groups: average, good, and excellent performers from the marks collected. Comparison of EI scores and PSS scores was done between students in excellent and average groups using unpaired *t*-test.

**RESULTS:** Of the 94.9% of respondents, 78.2% of the students were included in the study. The mean EI and PSS scores were  $123 \pm 14.5$  and  $22.8 \pm 13.9$ , respectively. There was no statistically significant difference in EI scores between average and excellent performers ( $[123.8 \pm 18.7]$  vs.  $[127.7 \pm 16]$ ;  $P = 0.089$ ). Perceived stress was lower in excellent performers ( $[20.9 \pm 11.1]$  vs.  $[24.8 \pm 15.0]$ ;  $P = 0.01$ ). EI was associated with better performance in clinical year students. EI was negatively correlated to perceived stress.

**CONCLUSION.** Our study provides predictors of excellent academic performances among Indian medical undergraduates. This study suggests introduction of extracurricular activities in ongoing undergraduate curricular syllabus. It imparts awareness among students about the importance of attending classes. This study bestows higher EI and lower perceived stress to better academic performance.

## Keywords:

Academic achievement, better performance, Indian Medical Graduate, MBBS, predictors

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## Introduction

Great emphasis has been given on attitude, ethics, and communication in the recently published Competency-Based Undergraduate Curriculum for the Indian

Medical Graduate by the Medical Council of India. The Indian Medical Graduates coming out of a medical institute should be able to appreciate the sociopsychological, cultural, economic, and environmental factors affecting health and develop humane attitude toward the patients in discharging

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one's professional responsibilities and possess the attitude for continued self-learning.<sup>[1]</sup>

A collection of skills such as self-control, determination, self-motivation, and sensitivity to the feelings of others is known as emotional intelligence (EI).<sup>[2]</sup> It has five domains, namely knowing one's emotions, recognizing emotions in others, managing emotions, motivating oneself, and handling relationships.<sup>[3]</sup> In short, EI refers to a person's ability to recognize and regulate emotions in oneself and in others and involves skills such as motivation and determination, which plays an important role in achieving goals.<sup>[4]</sup> A review found that higher EI is correlated positively with better social relationships in children and adults, higher academic achievement, better relationships during work performance, and enhanced psychological well-being.<sup>[5]</sup> This new dimension of intelligence has received much attention as being more responsible for professional success than the intelligence quotient (IQ), the traditionally used measure of intelligence. It seems EI along with IQ is an essential component in the making of an Indian Medical Graduate. Worldwide, there have been many studies which report either a strong or weak relationship between EI and academic performance of medical students.<sup>[6,7]</sup> There have been few studies conducted in India which also show conflicting results regarding the same.<sup>[8,9]</sup> Different cultures, ethnicities, and socioeconomic statuses affect the EI levels of students.<sup>[10]</sup>

Furthermore, literatures suggest that there has been increasing stress during medical training.<sup>[11]</sup> Due to disorders related to stress, there is impairment of classroom functioning and thus deterioration of performance in medical students. These negative effects on training of medical students can ultimately lead to outcome-based failures in the society in long terms. Although there have been many studies published regarding the association of EI of medical students with their academic performance, there is scarce report on the relationship between EI, PSS, and academic performance in every academic year of undergraduate medical students. Thus, this observational study was conducted to compare the association of EI score and perceived stress scale (PSS) among average and excellent undergraduate medical students. The secondary objective was to find the predictors of excellent academic performance.

## Materials and Methods

A descriptive cross-sectional study was conducted at the Department of Physiology in a Private University of Odisha over a period of 5 months (February 2019–June, 2019). After obtaining approval of Institutional Ethics Committee, all undergraduate medical students in the first, second,

third, and final professional years were briefed about the study. Students giving written consent were included in this study. Convenient sampling technique was used and consented 522 students participated in the study.

All the students were given two established pre-validated questionnaires to fill up. Schutte Self-report Emotional Intelligence Test is a self-administered questionnaire containing 33 validated questions. The above-mentioned questionnaire was selected for this study because of good internal consistency (Cronbach's alpha of 0.90) and test-retest reliability ( $r = 0.78$ ).<sup>[12]</sup> Participants rated themselves in each of the 33 items, according to a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). Scores range from 33 to 165 with higher scores characterizing higher EI.<sup>[13]</sup> Perceived stress scale (PSS) is also an established questionnaire having 10 validated items. It has been chosen for this study because of good internal consistency with Cronbach's alpha value of 0.79 among Indian medical students and adequate intra-rater reliability.<sup>[14]</sup> Each of the 10 items consists of a 5-point Likert scale (0 = never to 4 = very often) which assess the perceived stress levels of the individuals pertaining to different situations during the past month. The total score varies from 0 to 40 where higher total scores indicate a higher level of perceived stress.<sup>[15]</sup> The sociodemographic details of the participants (age, area of residence, gender, type of schooling [government/public/private/international], parents level of education, parents employment status, and students' involvement in extracurricular activities [sports, societies and clubs, music, dancing, etc.]) were also collected. In addition, the participants' satisfaction regarding own choice of studying Bachelor in Medicine, Bachelor in Surgery (MBBS) (satisfied/unsatisfied) was also evaluated. The data were collected from all the MBBS undergraduate students in their 2<sup>nd</sup>, 4<sup>th</sup>, 7<sup>th</sup>, and 9<sup>th</sup> semester in small groups of 10 students each. The students with incomplete filled up questionnaires were excluded from the study. Of the 550 undergraduate students, 430 were finally included in the study as shown in Figure 1

The attendance report and the average marks of previous semester theory and practical examinations of all 430 students were collected from the academic cell of the institution (with authorized permission). All the passed students were grouped into three groups: average (50%–57.99%), good (58%–66.99%), and excellent ( $\geq 67\%$ ) according to their academic marks achieved in the semester ending examination. A comparison was done between the students in excellent and average groups.

## Statistical analysis

Quantitative data were represented in mean  $\pm$  standard deviation and qualitative data were represented in percentage. Unpaired *t*-test was applied to compare the



Figure 1: Flowchart showing final inclusion of students

mean EI scores and mean PSS in the students of excellent and average group. Students in good group may have overlapping with either of the groups, so they were not considered in the analysis. Chi-square was applied to compare the categorical variables between the two groups. Logistic regression analysis was done to find the predictors of good academic performance. Statistical Package for the Social Sciences, Version 20.0. IBM Corp. was used for all statistical analyses.

## Results

Of all the MBBS students, 94.9% of the students responded; however, 78.2% of the students were finally included in the study after exclusion due to incomplete questionnaire. Of the 430 MBBS students included in the study 143, 152, and 135 were in average, good, and excellent groups as shown in Figure 1. English was the mode of education till the 10<sup>th</sup> standard for most of the students (93.3%). Ninety-eight percentage of the participants were hostelries. The average EI scores and PSS scores of all the included students were  $123 \pm 14.5$  and  $22.8 \pm 13.9$ , respectively. Most of the sociodemographic details of the students have been described in Table 1.

The gender-wise comparison of EI and PSS among all the included students is described in Table 2. EI score was significantly higher in females, but moderate level of stress was seen in both the genders, the difference of which was statistically insignificant.

There was no statistically significant difference in the EI scores among students in excellent and average groups. The perceived stress was significantly higher in the students in the average group as represented in Table 3. Students in the 2<sup>nd</sup> semester and 4<sup>th</sup> semester were considered as preclinical years and 7<sup>th</sup> and 9<sup>th</sup> semesters were considered as the clinical years.

Table 1: Sociodemographic details of all included participants

Factors	n (%)
Age (years)	
<22	201 (46.7)
≥22	229 (53.3)
Gender	
Male	196 (45.6)
Females	234 (54.4)
Involvement in extracurricular activities	
Yes	267 (62.1)
No	163 (37.9)
Type of schooling	
Government/public	145 (33.7)
Private/international	285 (66.3)
Parents employment	
One parent employed	291 (67.7)
Two parents employed	139 (32.3)
Satisfied selecting MBBS	
Yes	326 (75.8)
No	104 (24.2)
Attendance (%)	
<65	161 (37.4)
≥65	269 (62.6)

Table 2: Gender wise comparison of emotional intelligence score and perceived stress score

Variables	Females (n=234)	Males (n=196)	T	P
EI	125±16	121±13	2.8	0.005*
PSS	23.9±14.2	21.7±13.5	1.63	0.1

\*Statistically significant. EI=Emotional intelligence, PSS=Perceived stress scale

Table 3: Comparison of emotional intelligence score and perceived stress score among excellent and average students

Variables	Excellent (n=135)	Average (n=143)	T	P
EI	127.7±16	123.8±18.7	1.7	0.089
PSS	20.9±11.1	24.8±15.0	2.45	0.01*

\*Statistically significant. EI=Emotional intelligence, PSS=Perceived stress scale

The comparison of EI scores and PSS scores in students of excellent and average groups in preclinical and clinical years showed that the stress was lower among students in the excellent groups both in preclinical years and clinical years. Although the EI scores were not significantly different in excellent and average group students among the preclinical years, but there was significant higher EI scores among the excellent group students in the clinical years. It is evident from Table 4 that both EI scores and stress were more among students of clinical years than the preclinical years.

Logistic regression revealed good attendance, single working parent, own choice of studying MBBS, and students involved in extracurricular activities and less stress score were the predictors of excellent academic performance in all medical students [Table 5]. High EI

**Table 4: Comparison of emotional intelligence score and perceived stress score among excellent and average students in preclinical and clinical years**

Course Year	EI score			PSS score		
	Excellent	Average	P	Excellent	Average	P
Preclinical years (n=153)	126.2±14.7	122.9±15.3	0.17	19.3±15.9	24.5±13.6	0.03*
Clinical years (n=125)	127.8±11.9	121.2±16.5	0.01*	21.6±9.9	25.3±10.3	0.04*

\*Statistically significant. EI=Emotional intelligence, PSS=Perceived stress scale

score is not a predictor of excellent academic performance in all medical students; in the clinical years only, EI score is also a predictor of good academic performance (odds ratio – 1.32, 95% confidence interval – 1.06, 1.60,  $P = 0.042$ ). EI score was inversely correlated to perceived stress ( $r = 0.38$ ,  $P = 0.026$ ).

## Discussion

The average perceived stress score of students in this study was lower than the average stress score of medical undergraduate students in studies conducted in South India and West Bengal.<sup>[16,17]</sup> One study from South India reported lower average stress scores than ours.<sup>[18]</sup> The average EI score found in our study was almost similar to a study conducted at Delhi among postgraduate students.<sup>[19]</sup> A study from Chennai reported lower average emotional scores than ours.<sup>[20]</sup> Different family background, college environment, and regional sociocultural factors may have been the cause for the differences seen in different parts of the country.

In this study, the average EI score is higher in females than males. Our findings are similar to the results of studies conducted in Srilankan medical undergraduate students.<sup>[21,22]</sup> Higher EI in females may be due to increased exposure to struggling house hold work and situations in females than men in childhood. However, many of the studies reported that there is no gender difference in EI.<sup>[19,20]</sup> These studies argue that the selection processes for medical school and kind of training given in medical schools are similar; thus, the same EI is found in both genders. Many studies reported higher perceived stress scores in females than males, but there was no statistically significant difference between the PSS score among females and males in this study.<sup>[16,23]</sup> Our results are similar to a study conducted in Malaysia which included medical undergraduate students of many countries.<sup>[24]</sup> This may be because of equal exposure to factors leading to stress among females and males.

From all the included participants, two groups were made according to their marks attained in the previous semester. The mean EI score of students in excellent and average groups was not significantly different. However, other studies reported strong positive relationship between EI and academic success among

**Table 5: Predictors for excellent performance in medical students by logistic regression method**

Variables	OR	95% CI	P
EI score >124	1.29	0.78-2.13	0.33
PSS score <17	2.72	1.99-3.71	0.001*
Female	1.14	0.72-1.79	0.59
Attendance >65%	1.98	1.06-2.57	0.03*
Single working parent	2.89	2.12-3.69	0.001*
Own choice of studying MBBS	2.32	1.70-2.87	0.02*
Involvement in extracurricular activities	1.06	1.005-1.110	0.03*

\*Statistically significant. EI=Emotional intelligence, PSS=Perceived stress scale, OR=Odds ratio, CI=Confidence interval

undergraduate students.<sup>[25]</sup> The mean perceived stress score was significantly lower in the excellent group than the average group. Foster *et al.* stated that there is a negative correlation between EI and perceived stress.<sup>[26]</sup> Thus, students with higher EI have a better way to cope with the surroundings and the circumstances, and thus, they may have lower stress which, in turn, can result in better academic performance.

While the mean EI score was not significantly different between the excellent and average groups in the preclinical years (students in the 2<sup>nd</sup> and 4<sup>th</sup> semesters), the mean EI score was significantly higher in the excellent group students in the clinical years (students in 7<sup>th</sup> and 9<sup>th</sup> semesters). Our report was similar with the Srilankan study conducted by Ranasinghe *et al.* where the EI score was not significantly different for students with different academic classes in the first year, but statistically significant difference was found in the final-year students.<sup>[21]</sup> The mean PSS score was significantly higher in students in the average group in both preclinical and clinical years. Our results are in agreement with a study conducted by Sohail where higher level of stress is associated with poor academic performance.<sup>[27]</sup> High level of stress in the medical students is attributed to stressors of daily life as well as to the additional stress of vast curriculum, course workload, lack of leisure time, material to be learned, and frequent academic examinations in a competitive environment which, in turn, has negative impact on the academic performance.

Higher EI was a predictor of better results in students of clinical years but not so in the preclinical years. Good results in the preclinical years are not associated with high EI which may be because of many factors. First, in our university, the fresher students are well taken care

of in the initial years, as they have left their homes and staying in the hostels for the first time. Second, they are not exposed to the vast curricular activities like the clinical years. Third, the positive emotions in preclinical students due to admission into a medical college also compensated for the medical curricular stress, which is more in the clinical year students. Hence, the students are not liable to cope to much adverse situations like the students of clinical years. In the latter group, the exposure to more emotionally demanding conditions such as packed curricular activity, patient's emotional behavior in the clinical setting, adjustments made during interpersonal relationship, and of course, the increasing age has a higher EI which impacts the better results.<sup>[28]</sup>

Bergmann *et al.* suggested that family ties were important support resources that cushion against permanent stress. Many students viewed that their family acted as a corrective support whenever they lost confidence into their academic ability. In this study, students having single working parents were the excellent scorers. We presume that when both the parents are working, there is less time for them to spare for interacting with their ward, whereas if one of the parents is not working, they do have enough time for interacting with their ward which, in turn, has lesser stress on the latter that leads to better results.<sup>[28]</sup>

In our study, students who were involved in extracurricular activities had better academic performance. Recently, a meta-analysis by MacCann *et al.* proposed three mechanisms for EI/academic performance link. Of the three, building social relationship at school was one of them. Our results are supporting the proposed mechanism of building social relationship with the link. It is obvious that students who are involved in extracurricular activities usually socialize more than that to those who are not involved in such activities, and thus, the former group has better results.<sup>[29]</sup> Another reason may be leisure activities that were perceived to facilitate recovery from academic stress and thus have better academic performance.<sup>[28]</sup>

Attendance more than 65% was a significant predictor of better academic performance. Our results are supported by many studies.<sup>[30,31]</sup> A recent study stated that attendance of the student is only the mandatory variable that must be monitored and regulated by corrective actions to achieve the better academic performance of the students.<sup>[31]</sup> Results of another study differed from our study where they concluded that attendance at in-class sessions is no longer a good marker for performance.<sup>[32]</sup> However, the attendance which we have considered is not only in lectures but also in small group teaching sessions such as practicals, tutorials, group discussions, and bedside teachings.

Students who were happy with the decisions of pursuing MBBS by their own choice performed better than those who did not choose the course by their choice.<sup>[21]</sup> The results of a Srilankan study were similar to that of our results. As the students doing MBBS by their choice were satisfied, they were less stressed and thus performed better.

### Limitations

There are few limitations in this study. First, it is a questionnaire-based study. Second, various subcomponents of EI have not been assessed. Third, as our institute is a private medical college where the financial background of students is usually good, the stress score level may not represent to the scenario in the government medical setups. However, our study is the first of its kind to find the association between EI, perceived stress, and academic performance involving undergraduate medical students from all the years.

### Future studies

Longitudinal study should be done to assess the change in EI score and PSS after incorporation of strategies to improve EI. Coping styles also can be assessed to find strategies of coping stress during undergraduate study duration.

### Conclusion

Good attendance, single working parent, own choice of studying MBBS, less perceived stress score, and students involved in extracurricular activities were the predictors of excellent academic performance in all undergraduate students. EI was associated with better performance in the clinical year students, but it was not so in the preclinical years. This study suggests the introduction of extracurricular activities in the curricular syllabus in the ongoing undergraduate medical training institutions. It also imparts the awareness among students about the importance of attending classes. This study gives an insight into the society that such courses should not be imposed on students. This study also bestows higher EI and lower perceived stress to better academic performance.

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### Conflicts of interest

There are no conflicts of interest.

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