Pharmacology Section

Assessment of Socio-economic Status and Personality Traits on Academic Performance of Second Year MBBS Students: A Cross-sectional Study from a Teaching Hospital of Eastern India

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ABSTRACT

Introduction: The skill and quality of doctors largely depend on their academic performances. Examination scores of medical students can be impacted by their personality and Socio-economic Status (SES). Identification of the effects of different personality traits and socio-economic profile on the academic results of medical undergraduates can help to identify the vulnerable groups and consider possible support by counselling, financial aids and policy formulation.

Aim: To assess the correlation of personality traits and SES with the academic performances of undergraduate medical student based on the marks scored in the second professional Bachelor of Medicine and Bachelor of Surgery (MBBS) examination.

Materials and Methods: An observational cross-sectional study of 10 months duration from May 2017 to February 2018 was done on 143 students of sixth semester (Part I) of MBBS course, in a Government Medical College of Kolkata, West Bengal, India. Participants filled up the Big Five Inventory (BFI) questionnaire that evaluates dimensions like extraversion, agreeableness, conscientiousness, neuroticism and openness, and the Kuppuswamy's SES scale form which considers education of the head of family, occupation of head and monthly family income. The examination marks were collected from the student's section of the institution. Demographic parameters of the population like age, gender and religion were considered. Data was tabulated in MS excel spreadsheet and a descriptive statistical analysis was performed. Any correlation of the study parameters with student's academic performance was determined through statistical analysis using Spearman correlation coefficient and p≤0.05 was considered significant.

Results: Among the participants of the study (n=143), a mean age of 21.53 years was observed with male:female ratio of 2.04; about 87.41% of the students were Hindu while rest were Muslim. The results showed conscientiousness (r=0.1842) and neuroticism (r=0.1799) were correlated with total academic score as well as openness to pathology (r=0.1783) and forensic medicine (r=0.2362). Higher SES positively affected the results in microbiology (r=0.1698). Occupation of the head of the family was correlated positively with total marks (r=0.1677) and performances in microbiology (r=0.2256) and pathology (r=0.1919).

Conclusion: Conscientious behaviour, an attitude of openness and even neuroticism, can contribute to better grades. Higher occupation of the head of the family may also contribute positively. Appropriate counselling to nurture beneficial personality traits and adequate guidance by mentors may help students achieve better academically.

Keywords: Bachelor of medicine and bachelor of surgery, Medical education, Personality test, Undergraduate

INTRODUCTION

India needs a large number of competent doctors to provide adequate health services [1-3]. The skill and quality of doctors largely depend on their academic performances during their undergraduate years, which can impact the quality of treatment served to the society [4]. Therefore, the factors influencing the academic performances of medical undergraduates are of considerable importance. The personality profile can impact the academic performance of an individual. The BFI scoring method is a widely accepted psychological test [5,6] that evaluates patient's personality into five dimensions like extraversion, agreeableness, conscientiousness, neuroticism and openness [7-9]. The very few observations that have investigated the influence of personality traits on academic achievements of medical students, have cited that high extroversion showed poor academic performance [10], and students with a preference for personality dimension 'Thinking' [11] and 'Conscientious Personality' may secure higher academic achievements [12]. However, these studies didn't examine all the BFI dimensions together.

The Kuppuswamy scale is commonly used to measure SES [13]. It classifies study populations into high, middle, and low SES, and is updated regularly for monetary inflation [14,15]. A number of studies on school children [16,17] and non professional undergraduate students have observed a positive influence of higher SES on academic performances, however, there is a lack of studies that included medical undergraduates as research participants [18].

While there have been a few studies conducted in Indian context that aim to evaluate the predictors of examination scores in medical students, studies examining the correlation of BFI personality traits and the socio-economic parameters of Kuppuswamy's (SES) scale to academic achievements are less [19-21]. Identification of the effects of different personality traits and socio-economic profile on the academic results of medical undergraduates may help to assess the specific needs or disadvantages of individual students or vulnerable groups. This can help to consider possible support by counselling, financial aids and policy formulation.

Therefore, in the present study, it was aimed to assess the academic performances of second year medical students based on personality traits using BFI scoring method and SES using the updated Kuppuswamy's socio-economic status scale.

The primary objective of study is to assess any correlation between the marks scored by medical undergraduate students in the subjects {Pathology, Pharmacology, Microbiology and Forensic and State Medicine (FSM), and the grand total} of the second professional MBBS examination, and their personality traits (extraversion, agreeableness, conscientiousness, neuroticism and openness) using BFI Scoring method. The secondary objective of the study was to assess any correlation between the marks scored in the subjects (Pathology, Pharmacology, Microbiology and FSM, and the grand total) of the second professional MBBS examination, and the parameters of SES (education of the head of family, occupation of head, monthly family income and total SES score) using the updated Kuppuswamy's socio-economic status scale.

MATERIALS AND METHODS

This observational cross-sectional study was conducted in the Department of Pharmacology at Calcutta National Medical College and Hospital, Kolkata, West Bengal, India (tertiary care government hospital) from May 2017 to February 2018. Before commencing the study, prior written permission of the Institutional Ethics Committee was taken (ref: CNMC/8, date: 25/04/2017).

Inclusion criteria: All students of sixth semester (Part I) of MBBS course, who have recently passed the second Professional MBBS examination and voluntarily submitted duly signed informed consent forms were enrolled in the project.

Exclusion criteria: Any student who did not consent to the study, did not complete the given forms or did not submit any of the forms were excluded from the study.

Sample size calculation: Sample size of 123 subjects were calculated using the formula

$$n = \{(Z\alpha + Z\beta)/C\}^2 + 3 \ (\alpha = 0.05, \ \beta = 0.2, \ r = 0.25)$$

Considering a predicted medium effect size, $C = 0.5 \times \ln(1+r/1-r)$ and Z=standard normal deviate) [22]. Considering a 20% drop out rate, a final sample consisting of 147 undergraduate students studying in 6th semester (Part I) of MBBS course was enrolled, of which 143 students (96 male and 47 female participants) completed the study. Subject recruitment was done by convenience sampling method.

Study Procedure

The students were provided the BFI questionnaire and updated Kuppuswamy's SES scale form in English and Bengali. The Bengali translation of the form was provided after backward and forward translation. They were provided one hour to fill up the same carefully and as accurately as possible. The English BFI questionnaire had satisfactory internal consistency (Cronbach's α>0.8) in terms of reliability and adequate convergent validity coefficient (r>0.70), whereas the Bengali version of the questionnaire had similarly acceptable reliability (Cronbach's α>0.7) and validity (convergent validity coefficient r>0.7) scores.

The BFI questionnaire employed 44 questions with five discreet graded responses on a Likert scale, where each question suggested a particular personality feature (e.g., handles stress well/is generally trusting etc.,). Score for each response ranged from 1 (Disagree strongly) to 5 (agree strongly) [23]. The big five factors are: extraversion that denotes sociable, enthusiastic, energetic nature; agreeableness for qualities like trust, compliance, modesty; conscientiousness for order, dutifulness and self-discipline; neuroticism that signifies anxiety, irritability and impulsiveness; and finally, openness that suggest curious, imaginative and artistic qualities [24].

In accordance with the standardised scoring instructions, the minimum and maximum scores possible for each item is as follows: extraversion (8-40), agreeableness (9-45), conscientiousness (9-45), neuroticism (8-40) and openness (10-50). Higher scores indicate stronger presence of the respective personality trait in the individual. The academic performance of the students is based on their subject marks in pharmacology, pathology, microbiology and FSM. The minimum and maximum scores possible for all subject is 0 and 150 except FSM for which the same is 0 and 100, with the maximum aggregate score of 550. The SES of the students is determined on the basis of their Kuppuswamy SES Scale score which scores student's SES on the criteria of education of head (score 1-7), occupation of head (score 1-10) and monthly family income (score 1-10). The monthly family income is revised depending on the Consumer Price Index numbers for Industrial Workers- (CPI-IW) value [25]. The CPI-IW is compiled by the Labour Bureau of India that measures the changes in the price level of a fixed basket of consumer goods and services bought by average working class family, and give an idea of prevailing inflation. The total composite SES scale score ranged from 3-29. The marks of the second professional MBBS examination were collected from the student's section of the institution.

STATISTICAL ANALYSIS

The archiving of data and statistical analysis was done in the Department of Pharmacology. Data was tabulated in MS excel spreadsheet and GraphPad Prism version 6.0 software was used for statistical analysis. In the present study, descriptive statistical analysis was performed to calculate the means along with their corresponding standard deviations (sd). To assess any correlation between academic performance and the different BFI traits or SES parameters, Spearman correlation coefficient was calculated. Spearman Correlation co-efficient was preferred in the present study as parameters like Kuppuswamy SES score presented data in ordinal scale; also, many of the data sets didn't follow normal distribution hence non parametric tests were appropriate. In all the statistical analysis, p≤0.05 was taken to be statistically significant.

RESULTS

In this study, 143 students submitted completed study questionnaires and were considered for the final analysis. There were 96 male and 47 female participants, the male: female sex ratio being 2.04. About 125 participants (87.41%) were Hindu by religion while 18 students (12.59%) were Muslim. The mean age of the participants was 21.53 years with standard deviation of 0.9224.

The general statistics of BFI personality trait scores, academic performances and SES of the students are represented in [Table/Fig-1].

While evaluating the relationship between the academic performances with the SES [Table/Fig-2], it was observed that the education of head of the family had no significant relationship with either the individual subject scores or total marks of the students (r=0.0852, p=0.3116). However, occupation of the head of the family of the respective students had positive correlation with the marks obtained in pathology (r=0.1919, p=0.0217) and aggregate (r=0.1677, p=0.0453), and significant association was noticed with the marks obtained in microbiology (r=0.2256, p=0.0067). However, there was no relationship with marks obtained in pharmacology (r=0.0738, p=0.381) and FSM (r=0.1314, p=0.1179) by the students. There was no significant relationship between monthly family income of the pupils with either the individual subject or total marks obtained (r=0.04831, p=0.5667). Finally, it was observed that only the scores in microbiology had significant correlation with the Kuppuswamy total scores (r=0.1698, p=0.0426). When the total SES was considered, it had no relationship with either the other subjects or the aggregate performance (r=0.08926, p=0.2891).

Parameters	Mean score (n=143)	Standard deviation
BFI Personality trait scores		
Extraversion	25.52	5.503
Agreeableness	31.92	5.9
Conscientiousness	29.75	5.702
Neuroticism	24.58	6.117
Openness	33.41	5.351
Individual subject marks		
Pharmacology	97.31	12.41
Pathology	95.73	10.66
Microbiology	95.15	9.806
FSM	56.67	6.943
Total	344.8	37.12
Kuppuswamy SES scale scores		
Education of head	5.916	1.051
Occupation of head	8.273	2.507
Monthly family income	10.32	2.642
Total	24.51	5.485

[Table/Fig-1]: General statistics of BFI personality trait scores, academic performances and Socio-economic Status (SES) of the students. (Test applied: Descriptive column statistics for mean±standard deviation (sd) with D'Agostino and Pearson normality test).

Individual subject marks (n=143)	Kuppuswamy SES scores (n=143)	Spearman's correlation coefficient (r)	p-value	Statistical significance
Pharmacology	Education of the head of the family	-0.009518	0.9102	ns
	Occupation of the head of the family	0.0738	0.381	ns
	Monthly family income	-0.05218	0.536	ns
	Kuppuswamy SES total score	-0.01404	0.8678	ns
Pathology	Education of the head of the family	0.09568	0.2557	ns
	Occupation of the head of the family	0.1919	0.0217	*
	Monthly family income	0.08746	0.2989	ns
	Kuppuswamy SES total score	0.112	0.183	ns
Microbiology	Education of the head of the family	0.1351	0.1076	ns
	Occupation of the head of the family	0.2256	0.0067	**
	Monthly family income	0.1234	0.1422	ns
	Kuppuswamy SES total score	0.1698	0.0426	*
Forensic and State Medicine	Education of the head of the family	0.08465	0.3148	ns
	Occupation of the head of the family	0.1314	0.1179	ns
	Monthly family income	0.03331	0.6929	ns
	Kuppuswamy SES total score	0.06956	0.4091	ns
Total marks	Education of the head of the family	0.0852	0.3116	ns
	Occupation of the head of the family	0.1677	0.0453	*
	Monthly family income	0.04831	0.5667	ns
	Kuppuswamy SES total score	0.08926	0.2891	ns

[Table/Fig-2]: Correlation between scores of different Kuppuswamy SES parameters and marks of all subjects as well as total marks of students.
Test applied: Spearman's rank correlation. ns=Non significant, *=p≤0.05, **=p≤0.01, ***=p≤0.001

On analysing the different BFI parameters with academic performances [Table/Fig-3], it was observed that extraversion personality trait score had no significant relationship with either the individual subject or total marks of the students (r=0.06955, p=0.4091). Once again, there was no significant correlation found between agreeableness and any of the academic performances that were considered in this study. However, conscientiousness had significant positive correlation with marks obtained by the students in Pharmacology (r=0.1805, p=0.031) and Pathology (r=0.1841, p=0.0277) as well as the total marks (r=0.1842, p=0.0276). It even had a very highly significant positive correlation with FSM scores (r=0.2806, p=0.0007). Microbiology was the only subject where the scores didn't have any relation with the above-mentioned personality trait. It was also observed that Neuroticism had positive correlation with marks obtained by the students in pathology (r=0.1932, p=0.0208), Microbiology (r=0.2003, p=0.0165) as well as the total marks (r=0.1799, p=0.0315), except Pharmacology (r=0.1491, p=0.0755) and FSM (r=0.1214, p=0.1485), where no correlation was found. Openness was positively correlated with marks obtained by the students in Pathology (r=0.1783, p=0.0332). It had even highly significant correlation with the FSM scores (r=0.2362, p=0.0045). However, no significant correlation was observed with pharmacology (r=0.1001, p=0.2344), microbiology (r=0.1038, p=0.2175) or the total marks (r=0.1489, p=0.0759) obtained.

Individual subject marks (n=143)	BFI personality trait scores (n=143)	Spearman's correlation coefficient (r)	p-value	Statistical significance
Pharmacology	Extraversion	0.08597	0.3073	ns
	Agreeableness	0.1032	0.2199	ns
	Conscientiousness	0.1805	0.031	*
	Neuroticism	0.1491	0.0755	ns
	Openness	0.1001	0.2344	ns
Pathology	Extraversion	0.09573	0.2554	ns
	Agreeableness	0.08326	0.3229	ns
	Conscientiousness	0.1841	0.0277	*
	Neuroticism	0.1932	0.0208	*
	Openness	0.1783	0.0332	*
Microbiology	Extraversion	-0.000955	0.991	ns
	Agreeableness	0.03292	0.6963	ns
	Conscientiousness	0.09384	0.265	ns
	Neuroticism	0.2003	0.0165	*
	Openness	0.1038	0.2175	ns
Forensic and State Medicine	Extraversion	0.1472	0.0793	ns
	Agreeableness	0.06569	0.4357	ns
	Conscientiousness	0.2806	0.0007	***
	Neuroticism	0.1214	0.1485	ns
	Openness	0.2362	0.0045	**
Total marks	Extraversion	0.06955	0.4091	ns
	Agreeableness	0.07833	0.3524	ns
	Conscientiousness	0.1842	0.0276	*
	Neuroticism	0.1799	0.0315	*
	Openness	0.1489	0.0759	ns

[Table/Fig-3]: Correlation between BFI personality traits and marks of all subjects as well as total marks of students.
Test applied: Spearman's rank correlation, ns=Non significant, *=p≤0.05, **=p≤0.01, ***=p≤0.001

DISCUSSION

Several scientific studies have observed that, the personality profile of the students play an important role in their academic performances [26]. They can even affect the future career or

speciality choices made by the individuals after completing their graduation in modern medicine [27]. The five-factor model considered in BFI personality test is a universally acclaimed effective method to analyse the personality profiles of individuals [28-30]. While BFI traits like neuroticism, conscientiousness and openness has been found related to academic results studies, that considered all the five dimensions of BFI in medical students of India were rare [11,12,31]. Similarly, many studies observed strong effects of SES of students on their academic achievements [16-18]. While the updated Kuppuswami SES scale is a widely accepted tool to evaluate the socio-economic characteristics of individuals [32]; studies on Indian medical students evaluating the different parameters of Kuppuswamis SES on exam scores were found to be lacking. The current project was undertaken to address these issues. As there are limited works where both the BFI personality profile and SES scores have been analysed simultaneously with respect to the academic scores of Indian medical students, the findings of the present study can provide valuable insights in this context.

In 1997, a study conducted on 785 medical students of five Flemish Universities of Belgium observed that out of the five personality traits, conscientiousness is a significant predictor of good final scores and the students who fare low in that dimension are less likely to be successful at examinations [33]. Conscientious people are generally organised, efficient and dutiful. They try to do any given task with discipline and dedication, aiming for achievement of distinction [34]. Hence, students manifesting high degree of this personality trait are generally dutiful and hardworking, leading to commensurate reflection in their academic grades. Similarly, another cross-sectional study conducted on 600 medical students of King Faisal University, Al-Ahsa, Saudi Arabia revealed that conscientious personality has highly significant association with high Grade Point Average (GPA) [12]. Observations of both these studies are comparable with the results of the present study.

A study conducted on 249 medical students in Iran revealed neuroticism had a direct negative effect on self-efficacy and hence, academic performance. Moreover, openness was found to have a positive effect on academic performance [35]. Similar results were found by another study conducted on 70 medical students in Belgaum, India [31]; as well as another cross-sectional observation on 122 medical students in Malaysia, that concluded neuroticism negatively affects and openness positively affects the academic results [36]. However, in current study, neuroticism was observed to be positively correlated with total marks achieved and also marks secured in individual subjects like pathology and microbiology. Neurotic persons are generally described to be moody, emotional, and susceptible to the feelings of stress, anxiety, guilt, envy, fear and worry. While such traits may lead to depression and negative performance at work as found by other studies, such emotions may also drive a person to work harder, and push the limits during trying times. This may be responsible for the positive correlation of neuroticism with the academic performance of the participants. Regarding openness, in the current project it was positively correlated with marks scored in subjects like pathology and forensic medicine, which is comparable with the findings of similar studies discussed above [31,35,36]. Individuals with high level of openness have a curious nature, and appreciate unusual ideas and art. They are more imaginative and adventurous. Thus, it may be implied that student with an open bent of mind can find interest and pleasure in pathology and particularly FSM, leading to improved grades in these subjects.

There is a dearth of studies that analyse the influence of Kuppuswamy's SES scale score directly on the academic performance of medical students in India. Among available literature, there was one study on 100 First Year MBBS students of ESIC Medical College, Faridabad, India which noted that students with lower Kuppuswamy's SES score had significantly lower self-concept scores [37]. Another study conducted on 1,262 medical undergraduates of The University of California, USA, that revealed students with socio-economic disadvantage had lower academic performances [38]. There are other studies which were conducted on mainly adolescent or secondary and higher secondary school students that reported similar observations; where higher SES of the family was related to better self-esteem, and/or higher academic achievements and aspirations [17,39,40].

On the contrary, there are a few observations that could not find any significant relationship between SES and academic performances. For example: A prospective survey of 172 sixth-year medical students at the Paris-Sud Faculty of Medicine found no association between parental SES and students' success in the National Ranking Exam (NRE) [41]. Another study conducted on the 691 undergraduate students at the University of Suleyman Demirel, Turkey reported that the variables related to the family like family income or parent's educational status are not strong predicators for the student's academic achievement [18].

In comparison to the above-mentioned observations, the current study observed that overall SES of the students did not have any significant relationship with their final aggregate marks. Regarding the individual criteria for evaluating the total SES score, only occupation of the head of the family was noted to have significant positive correlation with the marks secured in subjects like pathology and microbiology, as well as total marks. This may suggest that parents, who are also professionals or highly qualified in their respective occupational fields, may be providing better support and opportunities to their wards and may be also better oriented and involved towards their candidate's performances. They may also be better equipped financially and psychologically to provide tutelage to their children in their pursuit of the MBBS degree. Practical significance of the present study lies in the fact that, using the present study tools, important personality and socio-economic factors can be identified at an early stage in fresh medical undergraduate students; and appropriate measures like psychological counselling, one-on-one mentoring and financial aids can be provided to vulnerable students. Consistent results of such intervention may also aid in relevant policy formulation at administrative levels, which will be beneficial for future medical undergraduates.

Looking forward, further research specially into the effect of neuroticism and parent's occupational status on the academic performances of students may help substantiate the findings of the present study, as well as explore the different options to improve the situation.

Limitation(s)

There are some limitations of present study which include the inability to accommodate participants from all four professional MBBS years as well as different medical institutions, due to time and resource constraints. There can be several other variables that may affect the academic performances of medical students like medical conditions, housing environment, peer groups, hobbies and so forth; considering all of which was beyond the scope of the project. Further investigations to address these

issues may yield valuable insight into the other predictors of academic performances.

CONCLUSION(S)

The present study concludes that conscientious behaviour does help in better academic performance, and an attitude of openness also contributes to the better grades. Neuroticism though is considered in negative light as far as personality traits are concerned, may also sometimes benefit the academic achievements, as evident from the present study. Though the SES of the family has no major impact on overall grades, students from higher socio-economic background may have an advantage in subjects like microbiology; while the occupation of the parents may have a positive impact on the results of second professional MBBS examination.

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