



A Retrospective Study on the Association between Academic Performance of Students in High School and First-Year Medical College: A Quantitative Analysis

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Accepted: 22-July-2026 / Published Online: 3-August-2026

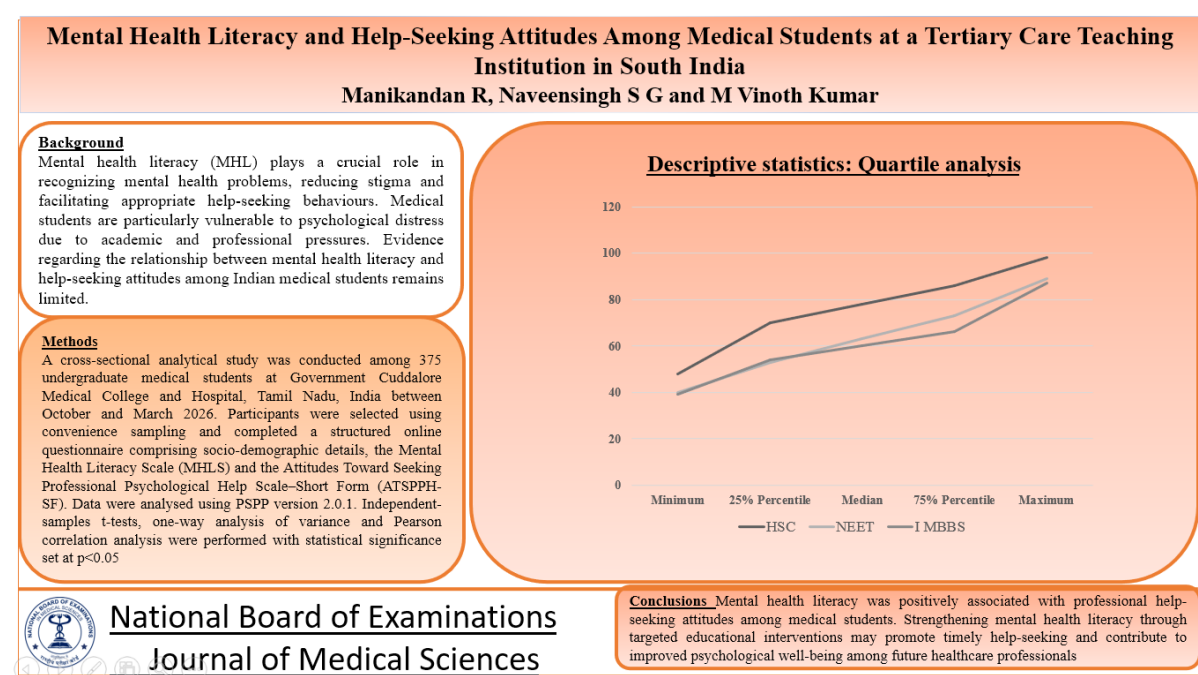
Abstract

Background: Getting into medical college is a highly competitive process; aspirants are focused mainly on attaining the eligibility criteria. Students who clear higher secondary exams (HSC) and qualify for the National Eligibility cum-Entrance Test (NEET) are getting admitted into medical colleges in India. The hypothetical question is: can we predict the academic performance of students in medicine by their school attainments? **Aim:** This study was done to identify the association between academic performance of students in high school and first-year medical college by doing quantitative analysis. Academic data of MBBS students who have recently appeared for first year university exams was collected retrospectively. Their academic data, which includes HSC, NEET-UG, and I-year MBBS university marks, were analysed. Descriptive statistics and odds ratios were done. **Results:** Students who score above average in the NEET exam are 3.25 times (OR-3.25) likely to score >60% in the first-year MBBS exam, at the same time, 67% of students who failed in the first-year MBBS university exam belonged to the below-average category in NEET. 83% of students who failed in the first-year MBBS exam have scored less than average marks in higher secondary school. **Conclusion:** The academic performance of students in both HSC and NEET can be considered in predicting their performance in medical college and to train the students effectively from the beginning itself.

Key words: National Eligibility cum-Entrance Test, Higher secondary exams (HSC), academic performance, higher education, university marks, medical students

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Graphical Abstract



Introduction

Admission criteria for medical colleges vary worldwide. Many medical schools rely heavily on student's high school grades in their admission process along with premedical entrance exams [1]. Research studies have sought to clarify admissions criteria that will predict success in medical, dental, and doctoral programs [2]. In India, the admission criteria were varied from time to time.

Entrance examinations and eligible criteria are generally set high in order to select the best students as doctors. The National Eligibility-cum-Entrance Test (NEET) was implemented by the Government of India in the year 2019 as a common entrance test. Particularly in India, medical college admissions are completely based on NEET examination scores, and the syllabus for the NEET exam includes Physics, Chemistry, and Biology subjects of higher secondary school. Students who are really good at studies are expected to perform well in higher secondary school

board exams also, though credentials are not given for HSC marks to enter into medical colleges.

In reality, students are trained to score maximum marks in entrance exams mainly by clearing structure based multiple-choice questionnaires. Students who are capable of getting coaching from the standard institutes are scoring more than others. This increases the diversity of students, which was evidenced by the exponential growth of coaching institutes and repeaters in NEET by getting training throughout the year to fit into selection criteria [2]. The hypothetical questions are that the students who entered into medical colleges,

Do all the eligible students academically perform well in medicine?

Can we predict the academic performance of students in medicine by their school attainments?

Hence, this study was undertaken to identify the association between the

academic performance of students in high school and medical college.

Materials and Methods

This retrospective study was conducted after obtaining ethical clearance from the Institutional Ethics Committee of Meenakshi Medical College Hospital & Research Institute (MMCH & RI). The Institutional Review Board certification number for this study is MMCH&RI IEC/FACULTY/04/OCT/23.

Permission was obtained from the administrative head to collect data from the institute's administrative office. The method of convenient sampling was employed. It is a single-centred study. The study population consisted of MBBS students who had recently passed the first-year MBBS university examination. Out of 250 students, 247 appeared for the exam, making the final sample size 247 students.

Data Collection

Higher secondary mark sheets and NEET score percentages, which were submitted during admission, were obtained from the admin office. The consolidated percentage of higher secondary school board examination marks in major subjects- Physics, Chemistry, and Biology (PCB)- was recorded. Similarly, the percentage of marks obtained in the NEET examination was collected. The first-year MBBS

university marks were obtained from the university office with proper approval, and the total percentage of marks obtained in the first-year MBBS university exam was calculated.

Grouping Criteria

For statistical analysis, students were categorized into two groups based on their average percentage of marks within each academic performance parameter- Higher Secondary (HSC), NEET, and First-Year MBBS.

Above Average: Students who scored above the calculated average percentage.

Below Average: Students who scored below the calculated average percentage.

Statistical Analysis

The data was analysed using GraphPad Prism 8. Q-Q (quantile-quantile plot) plot was generated, which is a visual tool used to compare probability distributions. Descriptive statistics, including mean, median, and quartile analysis, were conducted. Based on these, students were categorized into above-average and below-average groups for HSC, NEET, and first-year MBBS scores. The odds ratio (OR) was calculated to determine the association between different academic performance variables (Figure 1).

Results

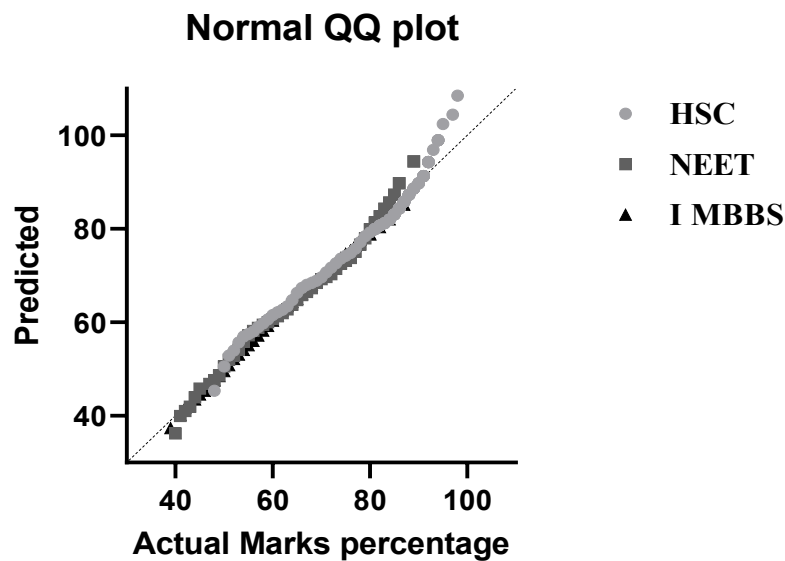


Figure 1. Q-Q plot between marks percentage distribution in HSC, NEET and I MBBS university exam

HSC: Higher secondary school marks percentage; NEET: UG Medical entrance exam marks percentage; I MBBS: First-year MBBS university exam marks percentage

The Q-Q plot showed that the percentage of Marks distribution in HSC and NEET was not distributed normally,

whereas 1st-year MBBS university marks have shown normal distribution (Figure 1).

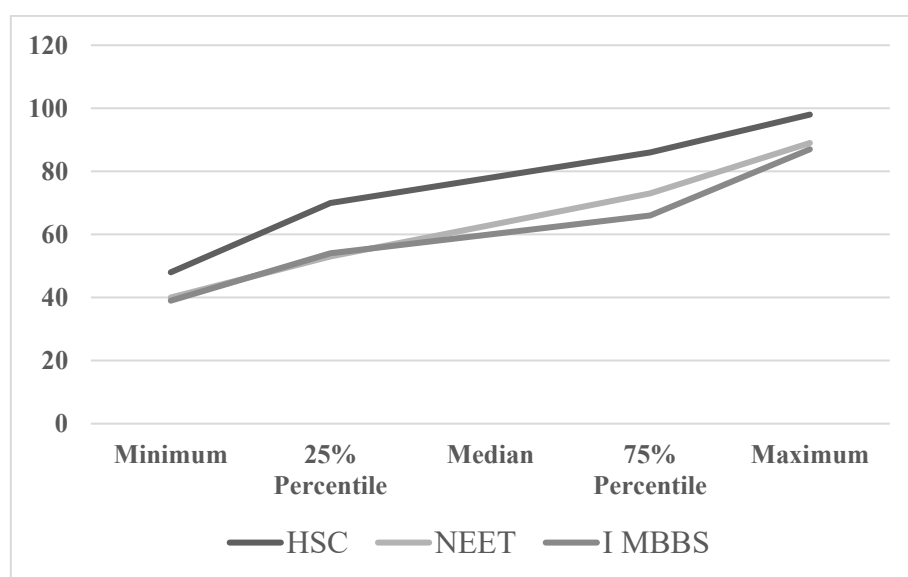


Figure 2. Descriptive statistics- Quartile analysis

Minimum and maximum marks percentages in both NEET and the first-year MBBS university exam were similar,

whereas the HSC marks percentage was higher than both, which showed the level of difficulty of all three exams (Figure 2).

Table 1. Odds ratio between NEET and I year MBBS marks percentage

Odds Ratio 3.25	NEET >60	NEET<60
I MBBS >60	85 (60%)	33 (31%)
I MBBS <60	57 ((40%)	72 (69%)
Total	142	105
P value (alpha=0.01)	<0.0001****	

NEET >60: Number of students who scored more than 60% in NEET (above average)

NEET <60: Number of students who scored less than 60% in NEET (below average)

I MBBS >60: Number of students who scored more than 60% in I year MBBS university exam

I MBBS <60: Number of students who scored less than 60% in I year MBBS university exam

Odds ratios >3 indicate strong positive association that students who scored >60% in the NEET exam are also

able to score >60% in the first- year MBBS university exam (Table 1).

Table 2. Odds ratio between Higher secondary and I MBBS marks percentage

Odds Ratio 1.81	HSC >77	HSC<77	Total
I MBBS >60	71	47	118
I MBBS <60	59	71	130
Total	130	118	248
P value	0.02*		

HSC >77: Number of students who scored more than 77% in HSC (above average)

HSC <77: Number of students who scored less than 77% in HSC (below average)

I MBBS >60: Number of students who scored more than 60% in I year MBBS university exam

I MBBS <60: Number of students who scored less than 60% in I year MBBS university exam

Odds ratios >1 indicate positive association that students who scored $>77\%$ in the HSC exam are also able to score

$>60\%$ in the first-year MBBS university exam (Table 2).

Table 3. Odds ratio between number of pass and fail with NEET marks percentage

Odds Ratio 3.146	Pass	Fail	Total
NEET $>60\%$	129	12 (23%)	141
NEET $<60\%$	82	24 (67%)	106
Total	211	36	247
P value	0.0039****		

OR >1 indicates a strong true positive. P value is significant ****. Students who scored $>60\%$ in NEET have a

high chance to get through the exam (Table 3).

Table 4. Odds ratio between number of pass and fail with HSC marks percentage

Odds Ratio 0.18	Pass	Fail	Total
HSC $>77\%$	140 (65%)	5 (16%)	145
HSC $<77\%$	76 (35%)	26 (83%)	102
Total	216	31	247
P value ($\alpha=0.01$)	0.0002****		

OR <1 it strongly identifies the true negative. Students who scored less than the average marks ($<77\%$) were more likely to fail in the first-year MBBS exam (Table 4).

Discussion

In this study, the mean, minimum, and maximum marks percentages of the NEET and first-year MBBS university exams were similar. The average

percentages of NEET and first-year MBBS university exams were also 60% . But the average percentage of HSC is 77% . This data showed that aspirants of medicine really score better in HSC, though credentials have not been given to enter into medical college. Besides, the similar median value of NEET and I MBBS may indicate that the difficulty level of both exams was more similar than HSC.

Students who score above average in the NEET exam are 3.25 times (OR-3.75) likely to score >60% in the first-year MBBS exam. At the same time, 67% of students who failed the first-year MBBS university exam belonged to the below-average category in NEET. These results in the current study claim that the level of difficulty in both the NEET and the IMBBS medical exams was similar.

Though no scientific studies have been conducted in India on NEET and medical college performance, as general international studies are available that sought their countries admission criteria for medical education. Studies done in the US and Portugal demonstrated that entrance exams used to determine admission to universities, such as the American College Testing (ACT) and Scholastic Aptitude Test (SAT), are considered to be the most accurate indicators of a student's performance in higher education [3, 4].

When comparing HSC marks with first-year MBBS to evaluate student's academic performance, OR = 1.79 indicates students who score more than average (>77%) in HSC were 1.79 times more likely to score more than average in I MBBS. At the same time, 83% of students who failed the first-year MBBS exam have scored less than average marks in higher secondary school. These results were supported by the findings of Silva P. et al. (2020), who claimed that high school grades can predict the dropouts/failures in university exams, though they cannot predict the overall performance of students in university [5]. A study that looked at the relationship between different entrance requirements and academic achievement at medical colleges in Pakistan found that MBBS professional exam scores and HSC scores

had a slight correlation, whereas entrance exam scores showed no correlation at all [6-8]. In a recent study done in the Philippines, it was recommended that the pre-entry grades (HSC) of the applicants are to be included in evaluating and ranking the candidates for admission [9].

The majority of research studies conducted worldwide have stated that the HSC marks percentage, in conjunction with the medical entrance exam, is an important admission criterion that improves students' performance at the higher secondary school level [10].

To our knowledge, in India this is the first study to report the correlation between higher secondary marks and NEET marks percentage with first-year MBBS academic performance in university exams.

Limitations: Being a single-centred study, these findings cannot be generalized as a whole. In the future, a multi-centre study can be done to check the reliability. There are many factors including socioeconomic status, Physiological factors and study habits as confounders- we add these aspects in future studies.

Conclusion

By having this knowledge that poor performers in HSC are expected to be slow learners in medical college, teachers can allocate resources accurately with effective predictions that train the students from the beginning itself. Small group teaching or extra classes can be conducted separately to enhance their academic performance without further delay.

Acknowledgement

We gratefully acknowledge the support and facilities provided by our

institute which were instrumental in the successful completion of this work.

Conflicts of interest

The authors declare that they do not have conflict of interest.

Funding

No funding was received for conducting this study.

References

1. Davies TA, Miller MB, Moore VA, Kaye EA. Predicting professional school performance with a unique lens: are there other cognitive predictors? BMC Med Educ. 2020 Jan 15;20(1):14. doi: 10.1186/s12909-020-1930-2.
2. Park HY, Berkowitz O, Symes K, Dasgupta S. The art and science of selecting graduate students in the biomedical sciences: Performance in doctoral study of the foundational sciences. PLoS One. 2018 Apr 3;13(4):e0193901. doi: 10.1371/journal.pone.0193901.
3. Baron J, Norman MF. SATs, achievement tests, and high-school class rank as predictors of college performance. Educational and Psychological Measurement. 1992 Dec;52(4):1047–55. <https://doi.org/10.1177/0013164492052004029>.
4. Ferrão M, Almeida L. Differential effect of university entrance score on first-year students' academic performance in Portugal. Assessment & Evaluation in Higher Education. 2019 May 19;44(4):610–22. <https://doi.org/10.1080/02602938.2018.1525602>
5. Silva, P. L., Nunes, L. C., Seabra, C., Balcao Reis, A., & Alves, M. (2020). Student selection and performance in higher education: admission exams vs. high school scores. Education Economics, 28(5), 437–454. <https://doi.org/10.1080/09645292.2020.1782846>
6. Iftikhar S, Cheema KM, Aziz I: MBBS admission criteria as predictor of academic performance in a medical college of Pakistan. Pak J Med Sci. 2023, 39:1706–1710. <https://doi.org/10.12669/pjms.39.6.6839>
7. Qazi MA, Anwar J, Moffat M. Predictive Ability and Stakeholders' Perceptions of the Selection Tools for MBBS in Women Medical College: A Mixed Methods Study. J Ayub Med Coll Abbottabad. 2020 Jan-Mar;32(1):78–82.
8. Ali R, Ali SK, Afzal A: Predictive validity of a uniform entrance test for the health professionals. Pak J Med Sci. 2019, 35:330–336. [10.12669/pjms.35.2.334](https://doi.org/10.12669/pjms.35.2.334)
9. Montalbo, Agnes Fernandez and Evangelista, Yolanda P. and Bernal, Merlene M., Admission Test as Predictor of Student Performance in Political Science and Psychology Students of Rizal Technological University (August 2018). Asia Pacific Journal of Multidisciplinary Research, Vol. 6, No. 3, August 2018, <https://ssrn.com/abstract=3533808>

10. Al-Qahtani MF, Alanzi TM. Comparisons of the predictive values of admission criteria for academic achievement among undergraduate students of health and non-health science professions: a longitudinal cohort study. Psychol Res Behav Manag. 2018 Dec 19;12:1–6.