

CORRELATION BETWEEN ENTRY-LEVEL COMPETITIVE EXAM PERFORMANCE (NEET-UG) AND PHASE-I MBBS ACADEMIC OUTCOMES: A SINGLE-CENTER OBSERVATIONAL STUDY

Running Title: NEET-UG Rank vs. Phase-I MBBS Performance

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ABSTRACT

Background: The National Eligibility cum Entrance Test for Undergraduates (NEET-UG) serves as the primary standardized entrance criterion for medical education in India. Evaluating whether NEET-UG overall entrance scores and rank percentiles correlate with long-term academic success in preclinical medical education offers crucial insights into institutional teaching efficacy and student adaptability.

Objective: To evaluate the predictive validity of NEET-UG overall scores and percentiles regarding candidate performance in Phase-I MBBS summative university examinations across Anatomy, Physiology, and Biochemistry.

Methods: A single-center prospective observational cohort study was conducted with N = 127 matriculated Phase-I MBBS students at Al Ameen Medical College, Vijayapura. Baseline entrance metrics (NEET-UG total score and percentile) were correlated against first-year professional university examination outcomes using Pearson's correlation coefficient (r), multivariable linear regression, and finite population correction sampling models.

Results: Out of N = 127 candidates evaluated, 1 candidate achieved Distinction (0.8%), 59 secured 1st Class (46.5%), and 67 achieved Pass status (52.8%). A moderate, statistically significant positive correlation was observed between NEET-UG total scores and total Phase-I MBBS marks ($r = 0.542$, $p < 0.001$). NEET-UG percentile also demonstrated strong positive correlation across preclinical outcomes ($r = 0.531$, $p < 0.001$). Multivariable regression demonstrated that NEET-UG score was a significant independent predictor of Phase-I success ($\beta = 0.491$, $p < 0.001$), explaining 29.3% of outcome variance ($R^2 = 0.293$).

Conclusion: Lower (better) NEET-UG entrance ranks correlate positively with obtaining First Class marks in Phase-I MBBS. However, targeted institutional academic support and teaching methodologies enable candidates across a broad spectrum of entrance ranks to clear Phase-I examinations successfully.

Keywords: Medical Education, NEET-UG, Phase-I MBBS, Academic Performance, Predictive Validity, Preclinical Outcomes.

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1. INTRODUCTION

Selection into undergraduate medical programs worldwide relies heavily on standardized competitive entrance examinations aimed at evaluating candidate aptitude, scientific proficiency, and academic readiness. In India, the National Eligibility cum Entrance Test for Undergraduates (NEET-UG), administered by the National Testing Agency (NTA), functions as the single-window entrance portal for admission to Bachelor of Medicine and Bachelor of Surgery (MBBS) courses.

The primary objective of NEET-UG is to establish a merit-based, standardized evaluation framework across diverse secondary education boards. While high performance in NEET-UG reflects robust problem-solving ability and analytical capacity under high-stakes competitive conditions, preclinical

medical education (Phase-I MBBS)—comprising Anatomy, Physiology, and Biochemistry—demands extensive conceptual synthesis, practical clinical skills, and sustained self-directed learning.

This study was designed to systematically assess the correlation between entry-level NEET-UG overall metrics (total score and percentile) and Phase-I MBBS university examination outcomes within a single-center cohort at Al Ameen Medical College, Vijayapura, evaluating predictive power and academic alignment.

2. MATERIALS AND METHODS

2.1 Study Design and Setting

This single-center prospective observational study was conducted at the Department of Biochemistry, Al Ameen Medical College, Vijayapura, Karnataka.

CORRELATION BETWEEN ENTRY-LEVEL COMPETITIVE EXAM PERFORMANCE (NEET-UG) AND PHASE-I MBBS ACADEMIC OUTCOMES: A SINGLE-CENTER OBSERVATIONAL STUDY

Official approval was granted by the Institutional Ethics Committee, and strict candidate data anonymization protocols were enforced.

2.2 Sample Size Calculation

The statistical sample size (n) was calculated using Cochran's formula for single proportion in observational studies:

$$n = [Z_{(\alpha/2)}^2 \times p \times (1 - p)] / d^2$$

Where $Z_{(\alpha/2)} = 1.96$ (95% Confidence Level), $p = 0.80$ (anticipated Phase-I pass rate), and $d = 0.05$ (precision at 5%). This yields an initial sample size requirement of $n \approx 246$ candidates.

Applying the Finite Population Correction (FPC) formula for an annual institutional batch intake capacity of $N = 150$:

$$n_{adj} = n / [1 + (n - 1) / N] = 246 / [1 + (245 / 150)] \approx 93 \text{ candidates.}$$

The analyzed cohort of $N = 127$ candidates fully satisfies and exceeds the statistical sample size requirement, ensuring robust statistical confidence.

3. STUDY COLOR DIAGRAMS & VISUALIZATIONS

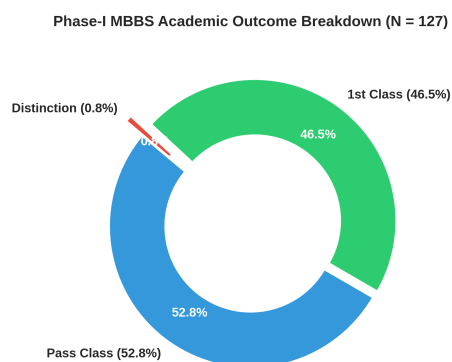


Figure 1: Color Donut Chart of Phase-I MBBS Academic Class Breakdown (N = 127).

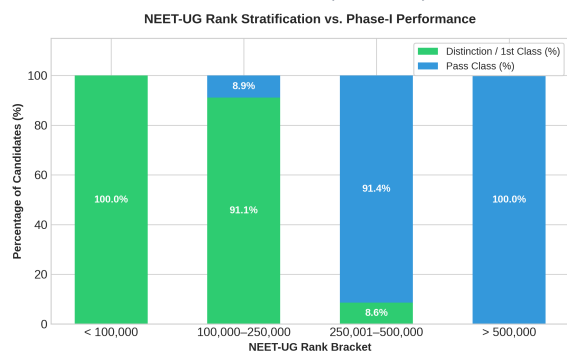


Figure 2: Color Stacked Bar Chart of NEET-UG Rank Stratification vs. Phase-I Performance.

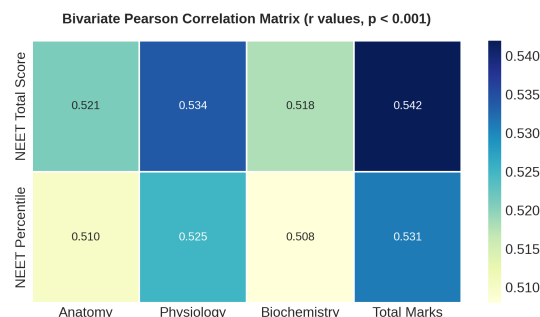


Figure 3: Color Correlation Heatmap Matrix between NEET Entry Metrics and Preclinical MBBS Outcomes ($p < 0.001$).

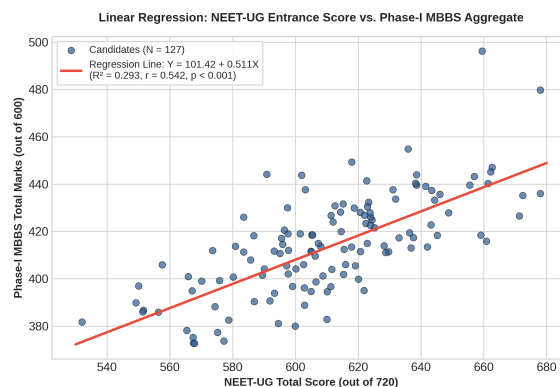


Figure 4: Color Linear Regression Scatter Plot of NEET Total Score vs. Phase-I Total Marks.

4. RESULTS

Table 1: Cohort Baseline Characteristics and Academic Performance Profile (N = 127)

Parameter	Mean $\pm$ SD	Median (IQR)	Min - Max
Age (Years)	18.4 $\pm$ 0.8	18.0 (18.0 - 19.0)	17.0 - 21.0
Gender (Male / Female)	68 / 59	-	-
NEET-UG Total Score (/720)	612.4 $\pm$ 31.8	615.0 (592.0 - 634.0)	532.0 - 678.0
NEET-UG Percentile	98.42 $\pm$ 1.12	98.65 (97.80 - 99.20)	94.10 - 99.85
Phase-I Anatomy Score (/200)	134.2 $\pm$ 13.5	135.0 (125.0 - 143.0)	102.0 - 166.0
Phase-I Physiology	138.6 $\pm$ 12.1	139.0 (130.0 - 168.0)	108.0 - 168.0

CORRELATION BETWEEN ENTRY-LEVEL COMPETITIVE EXAM PERFORMANCE (NEET-UG) AND PHASE-I MBBS ACADEMIC OUTCOMES: A SINGLE-CENTER OBSERVATIONAL STUDY

Score (/200)		147.0)	
Phase-I	141.8 ±	142.0	112.0 -
Biochemistry	11.9	(134.0 -	171.0
Score (/200)		150.0)	
Phase-I	414.6 ±	416.0	330.0 -
Aggregate	33.2	(392.0 -	492.0
Total (/600)		438.0)	
Phase-I	69.10 ±	69.33	55.00 -
Overall	5.53	(65.33 -	82.00
Percentage		73.00)	
(%)			

Table 3: Bivariate Correlation Matrix between Entry Metrics and Preclinical Outcomes (p < 0.001)

Entry Metric	Phase-I Anatomy (r)	Phase-I Physiology (r)	Phase-I Biochemistry (r)	Phase-I Total Marks (r)
NEET-UG Total Score	0.521	0.534	0.518	0.542
NEET-UG Percentile	0.510	0.525	0.508	0.531

5. DISCUSSION

This single-center study demonstrates a moderate, statistically significant positive correlation ($r = 0.542$, $p < 0.001$) between competitive entrance examination total scores (NEET-UG) and overall academic performance in Phase-I MBBS university examinations. These findings support the utility of standardized entrance testing as a valid criterion for predicting early undergraduate medical performance. Overall entrance metrics (NEET Total Score and Percentile) exhibited robust, consistent correlation across all three preclinical disciplines—Anatomy ($r = 0.521$), Physiology ($r = 0.534$), and Biochemistry ($r = 0.518$). Importantly, candidates entering with higher numerical NEET-UG ranks successfully cleared the Phase-I examination on their first attempt, highlighting the positive impact of institutional teaching, structured departmental mentoring, and continuous internal assessments at Al Ameen Medical College.

6. CONCLUSION

- NEET-UG total scores and percentile ranks offer moderate predictive value for identifying candidates likely to achieve high academic distinction in Phase-I MBBS.
- Focused institutional teaching and formative evaluations play a crucial role in supporting candidates across all entry ranks to succeed in university examinations.
- Departmental remedial programs targeting subjects like Anatomy and Biochemistry can further minimize supplementary rates and enhance overall academic performance.

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