

Elective Preferences and Their Influence on Career Perspectives among Undergraduate Medical Students

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ABSTRACT

Background: Electives introduced under the Competency-Based Medical Education (CBME) curriculum in India are intended to promote self-directed learning, broaden clinical and academic exposure, and facilitate informed career decision-making among undergraduate medical students. However, evidence regarding students' elective preferences and their influence on career perspectives remains limited.

Methods: A cross-sectional analytical questionnaire-based study was conducted among 189 MBBS students from three academic cohorts (2019–2020 to 2021–2022 batches) who had completed both elective blocks at a tertiary teaching institution. Data were collected using a validated semi-structured questionnaire (Cronbach's $\alpha=0.81$). Elective preferences, motivating factors, preference fulfilment, students' perceptions regarding electives, and changes in career interest across five professional domains were analysed using chi-square tests and paired *t*-tests, with effect sizes estimated using Cramer's V and Cohen's *d*.

Results: Pathology and Pharmacology were the most preferred disciplines in Block 1, whereas General Medicine and Surgery predominated in Block 2, with no significant variation across academic cohorts. Specialty

interest and improved subject understanding were the principal determinants of elective selection ($p<0.001$). Overall, 47.0% of students received their preferred electives in both blocks, while fulfilment differed significantly across allocation categories ($p<0.001$). Most participants reported improved understanding of career options (64.5%) and expressed strong support for structured pre-elective counselling (72.5%) and greater autonomy in elective selection (57.1%). Career interest increased significantly across all evaluated domains following elective participation ($p<0.001$), with the largest improvements observed in research and academic medicine.

Conclusion: CBME electives positively influence career awareness and broaden professional interests among undergraduate medical students. Optimising elective programmes through transparent allocation procedures, structured mentoring, pre-elective counselling, and greater flexibility in elective selection may further enhance educational outcomes and support informed career planning.

Keywords: Competency-based medical education; Career interest; Elective preferences; Motivational factors; Trend analysis; Undergraduate medical education.

INTRODUCTION

Electives are short, student-driven components of the medical curriculum that allow undergraduates to explore areas of personal or professional interest [1]. They promote self-directed learning, allowing students to gain knowledge and experience beyond the standard curriculum, while developing clinical skills, problem-solving, and critical thinking through early professional interactions [2, 3].

In India, undergraduate medical education was reformed under the Graduate Medical Education Regulations, 2019 of the National Medical Commission (NMC), introducing Competency-Based Medical Education (CBME) to promote student-centred learning, curricular flexibility, and holistic clinical and professional development. [4,5]. A key reform was the inclusion of electives during the final MBBS phase comprising a two-month period divided into two blocks of four weeks each (200 hours) which was later modified to 2 weeks each with limited student choice under institutional guidance [5-7]. Electives aimed to broaden the academic and clinical exposure by providing experiential learning and fostering self-directed study; though their impact on professional identity and career decisions is underexplored [2]. Globally, electives are categorized into types such as global health, project-based, career-oriented, directed or wellness electives [2,8], while Indian electives focus on basic sciences, laboratory work, community health, research, and supervised clinical care [2,6].

Despite the recognized educational benefits of electives, several challenges persist regarding their structure, accessibility, and long-term influence on career development [7,9]. Furthermore, although competency-based medical education has been implemented in India, empirical evidence on elective preference patterns, allocation outcomes, and their impact on students' career interests remains limited. Therefore, the present study aimed to evaluate elective preference patterns, factors influencing elective selection, fulfilment of elective

choices, students' perceptions of elective effectiveness and the allocation process, and the impact of elective postings on career interests among undergraduate medical students.

MATERIALS & METHODS

This was a cross-sectional analytical, questionnaire-based study conducted among MBBS students who had completed both elective blocks. The study included MBBS students from the 2019-2020 to 2021-2022 academic batches at ESIPGIMS and ESIC Medical College, Joka, who had completed both elective blocks. A census-based sampling approach was adopted, whereby all eligible students from three academic cohorts were invited to participate. A total of 189 students who voluntarily completed the questionnaire were included in the final analysis, with completion of the questionnaire considered as implied informed consent. Students who had not completed both elective postings, declined consent, or submitted incomplete questionnaires were excluded. Data were collected using a semi-structured online questionnaire in English developed after an extensive literature review [9-13]. Face and content validity were assessed by three medical education experts and minor revisions were made based on their feedback. The questionnaire was pilot tested among students not included in the final study and demonstrated acceptable internal consistency (Cronbach's $\alpha = 0.81$).

Elective postings were categorized into two blocks:

- Block 1: Pre-clinical, para-clinical, research-based, or laboratory electives
- Block 2: Clinical or supervised hospital-based electives

Elective allocation was based on merit determined by Phase III Part 1 examination results and seat availability (Figure 1). The questionnaire collected responses for elective subject and subtopic preferences, year-wise (2023-2025) trends, factors influencing elective choices, students' perceptions regarding career clarity,

influence on specialty choice, satisfaction with allocation process, impact of counselling sessions, and role of autonomy were assessed using structured response options (Yes/No/Not sure). Participants rated their interest in five career domains—Clinical Practice, Research, Public Health, Healthcare Administration, and Academic Medicine—before and after electives using a 5-point scale (1=lowest to 5=highest interest).

Statistical Analysis

Data were analysed using Microsoft Excel (Version 2301; Microsoft Corp., Redmond, WA, USA) and IBM SPSS Statistics for Windows (Version 26.0; IBM Corp.,

Armonk, NY, USA). Categorical variables were presented as frequencies and percentages. Differences in elective preferences across academic years were analysed using the chi-square test of independence. Effect size was assessed using Cramer's V. Motivational factors, fulfilment patterns, and perception responses were analysed using the chi-square goodness-of-fit test, with effect size calculated using Cramer's V. Career interest scores before and after electives were expressed as mean $\pm$ standard deviation and compared using paired t-tests. Effect size was calculated using Cohen's d. A p-value <0.05 was considered statistically significant.

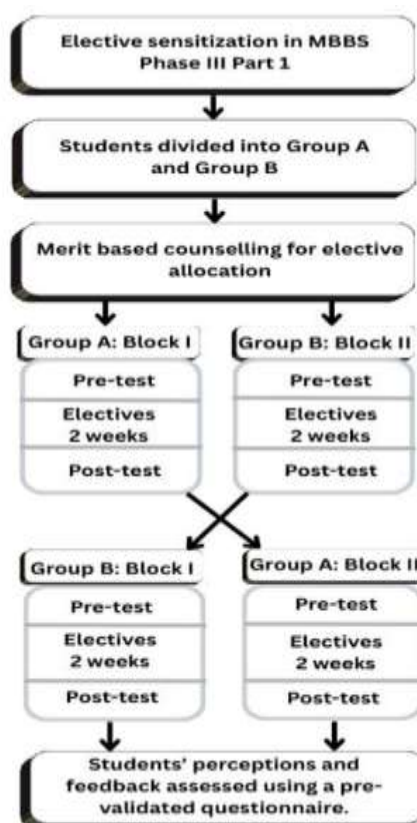


Figure 1: Flowchart showing the elective selection process

RESULT

A total of 189 MBBS students participated in the study, representing three academic batches: 60 students (31.7%) from 2019–2020 who completed electives in 2023, 72 students (38.1%) from 2020–2021 who completed electives in 2024, and 57 students

(30.2%) from 2021–2022 who undertook electives in 2025. The majority (46.2%, 87 students) were aged 25 years, followed by 23.1% (44 students) aged 23 years. Males comprised 53.8% (101 students) and females 46.2% (88 students).

Elective Preferences including year wise (2023- 2025) trends: Elective choices varied across disciplines and modules in both blocks (Tables 1 and 2). In Block 1, Pathology and Pharmacology were consistently the most preferred disciplines across all three cohorts, followed by Community Medicine, whereas Biochemistry, Physiology, Microbiology, and Forensic Medicine were less frequently selected. Although Biochemistry demonstrated a decline in preference after the initial year, overall discipline preferences remained largely stable across cohorts (Figure 2), with no statistically significant year-wise differences ($\chi^2=22.8$, $df=14$, $p=0.063$; Cramer's $V=0.24$). In Block 2, General Medicine and Surgery remained the most frequently chosen disciplines, followed

by Gynaecology and Orthopaedics, while Psychiatry and Ophthalmology attracted comparatively fewer selections. Preferences often clustered around specific modules, including Nephrology and Diabetology within General Medicine and operating theatre assistantship within Surgery. Similar to Block 1, clinical elective preferences showed no significant variation between cohorts ($\chi^2=18.6$, $df=16$, $p=0.29$; Cramer's $V=0.16$) (Figure 3). Overall, the absence of statistically significant year-wise differences and the small-to-moderate effect sizes indicate that elective preference patterns remained largely stable across academic batches, with only modest variation over time.

Table 1: Distribution of students' preferences for electives offered in Block 1 overall and across three academic years (2023-2025) (N = 189).

Broader Elective Discipline	Individual Elective Modules	Students' Preference of the Individual Elective Modules (N=189)	Students' Preference of the Broader Discipline (N=189)	Students' Preference of the Broader Discipline across years		
				2023 (n=60)	2024 (n=72)	2025 (n=57)
Anatomy	In Depth Exploration of Pelvic Organs in Cadaver and Articulated Pelvis in Female.	7 (3.7%)	19 (10.1%)	10 (16.7%)	3 (4.2%)	6 (10.5%)
	Sectional Anatomy	3 (1.6%)				
	Histology of GIT	0				
	In Depth Exploration of brain in a Cadaver	9 (4.8%)				
Physiology	Spirometry	0	5 (2.6%)	3 (5%)	1 (1.4%)	1 (1.8%)
	Laboratory Based Research Project (Preceptor Initiated)	5 (2.6%)				
Biochemistry	NABL Accreditation of Clinical Biochemistry Laboratory	4 (2.1%)	16 (8.5%)	3 (5%)	5 (6.5%)	8 (14%)
	Research	12 (6.3%)				
Pathology	Cytopathology	12 (6.3%)	55 (29.1%)	14 (23.3%)	25 (34.7%)	16 (28.1%)
	Quality Assurance in Haematology and Clinical Laboratory	8 (4.2%)				
	Histopathology And Frozen Section	13 (6.9%)				
	Haematopathology	22 (11.6%)				

Microbiology	Medical Virology and Molecular Microbiology	7 (3.7%)	7 (3.7%)	5 (8.3%)	1 (1.4%)	1 (1.8%)
Pharmacology	Basic Pharmacovigilance and Drug Safety Training Programme	21 (11.1%)	40 (21.2%)	12 (20%)	19 (26.4%)	16 (28%)
	Steps For Conducting a Clinical Trial of IND	19 (10%)				
Community Medicine	Research (Student Initiated)	25 (13.2%)	36 (19%)	9 (15%)	15 (20.8%)	12 (21%)
	Urban/Rural Community Experience	11 (5.8%)				
Forensic Medicine and Toxicology	Determination of Stature from different Anthropometric Measurements	3 (1.6%)	11 (5.8%)	4 (6.7%)	3 (4.2%)	4 (7%)
	Assessment of Dynamics of Doctor-Patient Relationship	3 (1.6%)				
	Study of Medical Cause for Certification of Death Certificates	6 (3.2%)				

Table 2: Distribution of students' preferences for electives offered in Block 2 overall and across three academic years (2023–2025) (N = 189).

Broader Elective Discipline	Individual Elective Modules	Students' Preference of the Individual Elective Modules (N=189)	Students' Preference of the Broader Discipline (N=189)	Students' Preference of the Broader Discipline across years	Broader Elective Discipline	Individual Elective Modules
				2023 (n=60)	2024 (n=72)	2025(n=57)
Psychiatry	Suicide Prevention Strategy	10 (5.3%)	10 (5.3%)	3 (5.0%)	3 (4.2%)	4 (7.0%)
General Medicine	Diabetology	12 (6.3%)	39 (20.6%)	12 (20%)	15 (20.8%)	12 (21.1%)
	HIV Infection	3 (1.6%)				
	Rheumatology	11 (5.8%)				
	Nephrology	13 (6.9%)				
Dermatology, Venereology & Leprosy	Acne Vulgaris	19 (10.1%)	19 (10.1%)	6 (10.0%)	7 (9.7%)	6 (10.5%)
Ophthalmology	Mechanism of Laminar Airflow OT	2 (1.1%)	8 (4.2%)	2 (3.3%)	3 (4.2%)	3 (5.3%)
	Categorization of disease profile of patients' presentation to EYE OPD	2 (1.1%)				
	OT Sterilization: Importance of	0				

	monitoring and record maintenance					
	Visual recovery of patients undergoing cataract surgery in the light of quantity & quality	4 (2.1%)				
ENT	Plastic surgery as applicable to Otolaryngology	3 (1.6%)	10 (5.3%)	3 (5.0%)	4 (5.6%)	3 (5.3%)
	Etiology and managements of sleep apnoea/snoring	1 (0.5%)				
	Recent developments in the diagnosis, pathogenesis and treatment of the ENT diseases	1 (0.5%)				
	Radiology, Imaging – CT and MRI and intervention radiology and angiography as related to ENT	5 (2.6%)				
Surgery	Informed consent for operation	0	29 (15.3%)	10 (16.7%)	11 (15.3%)	8 (14%)
	OT Assistant	29 (15.3%)				
Gynaecology	Preventive Oncology	8 (4.2%)	25 (13.2%)	8 (13.3%)	11 (15.3%)	6 (10.5%)
	High Risk Pregnancy	6 (3.2%)				
	Antenatal Foetal Surveillance	5 (2.6%)				
	Reproductive Medicine (Counselling and Work Up of Infertile couple)	4 (2.1%)				
	Family Planning	2 (1.1%)				
Paediatrics	Paediatric Intensive Care and Immunisation	17 (9%)	17 (9%)	5 (8.3%)	7 (9.7%)	5 (8.8%)
Anaesthesiology	Basic Life Support Training	5 (2.6%)	12 (6.3%)	4 (6.7%)	4 (5.6%)	4 (7.0%)
	Airway Management Training	4 (2.1%)				

	Oxygen Therapy Training	3 (1.6%)				
Orthopaedics	Orthopaedics Trauma and Fracture	20 (10.6%)	20 (10.6%)	7 (11.7%)	8 (9.7%)	6 (10.5%)



Figure 2. Year-wise trends in Block 1 subject preferences among undergraduate medical students (2023–2025). Percentage distribution of student preferences across Block 1 disciplines over three academic years.



Figure 3. Year-wise trends in Block 2 subject preferences among undergraduate medical students (2023–2025). Percentage distribution of preferences for Block 2 clinical disciplines across three academic years.

Motivational Factors Influencing Elective Preferences:

Factors influencing elective selection differed modestly between the two blocks (Figure 4). Interest in a specific specialty emerged as the most frequently reported motivator in both Block 1 (21.1%, 40/189) and Block 2 (30.2%, 57/189), followed by the desire for better understanding of the subject (23.8%, 45/189 and 21.7%, 41/189, respectively). Research opportunities were a more important consideration in Block 1 (17.5%, 33/189) than in Block 2 (7.9%, 15/189), whereas perceived career prospects had a greater influence in Block 2 (15.9%, 30/189)

compared with Block 1 (5.3%, 10/189). Other factors, including favourable work environment, peer influence, faculty or parental recommendation, and preference for a less hectic workload, were reported less frequently. Chi-square goodness-of-fit tests demonstrated significant variation in the distribution of motivational factors within Block 1 ($\chi^2=56.8$, $df=7$, $p<0.001$; Cramer's $V=0.21$) and Block 2 ($\chi^2=90.9$, $df=7$, $p<0.001$; Cramer's $V=0.26$), indicating small-to-moderate but meaningful differences in the factors driving elective selection.

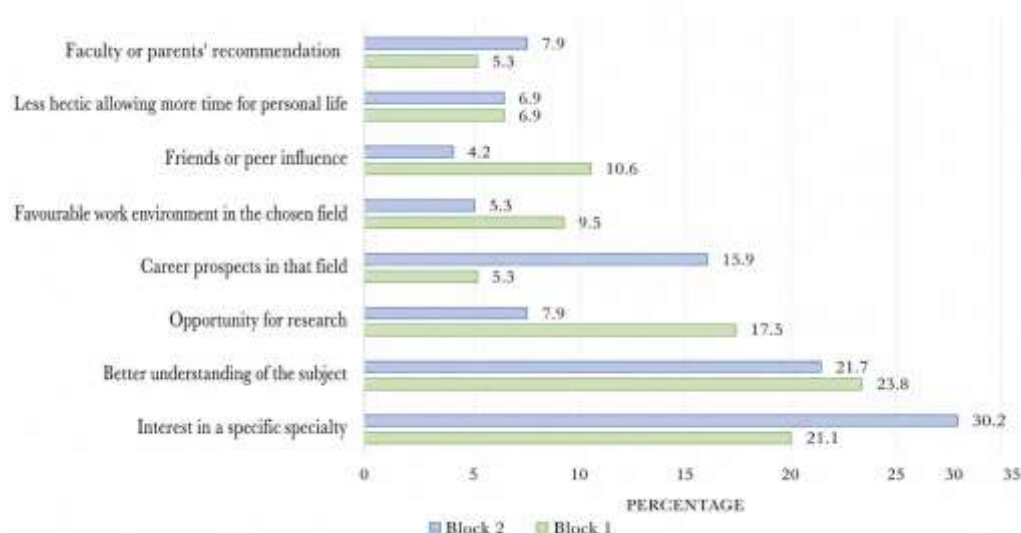


Figure 4: Factors influencing the elective preferences in Block 1 and Block 2. Values are presented as percentages.

Elective preference fulfilment analysis: Elective preference fulfilment among students is shown in Figure 5. Nearly half of the students (47%, 88/189) obtained their preferred electives in both blocks, while 25% (47/189) did not receive their preferred electives in either block. Partial fulfilment was observed in 17% (33/189) of students who obtained their preferred elective only in

Block 1 and 11% (21/189) only in Block 2. Overall, fulfilment of elective preferences varied significantly across categories ($\chi^2=45.9$, $df=3$, $p<0.001$), with a moderate effect size (Cramer's $V=0.28$), indicating meaningful differences in the extent to which students were allocated their preferred electives.

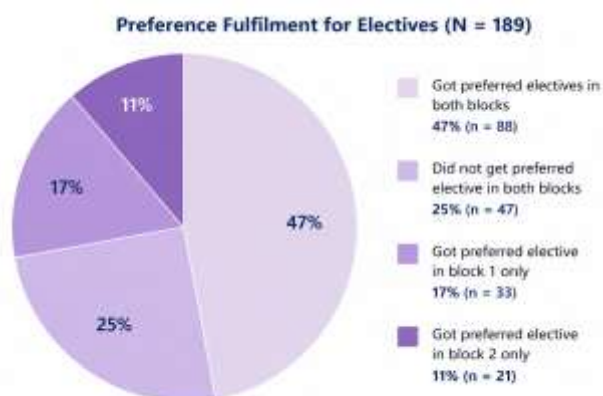


Figure 5. Fulfilment of preferred electives across two elective blocks (N=189).

Students' perception of effectiveness of electives and the allocation process: Students' perceptions regarding the impact of elective postings are presented in Figure 6. Students reported largely positive perceptions of elective postings. Improved understanding of career options was reported by 64.5% (122/189) of students, while 53.4% (101/189) were satisfied with the elective

selection process. The highest levels of agreement were observed for the usefulness of pre-elective counselling support (72.5%, 137/189) and increased autonomy in elective selection (57.1%, 108/189). In contrast, fewer students (44.4%, 84/189) reported that electives influenced their future specialty choice. Significant variation across response categories was observed for all perception

items, including understanding of career options ($\chi^2=77.3$, $p<0.001$), influence on specialty choice ($\chi^2=12.7$, $p=0.002$), satisfaction with the selection process ($\chi^2=27.6$, $p<0.001$), counselling support

($\chi^2=125.5$, $p<0.001$), and autonomy in selection ($\chi^2=42.8$, $p<0.001$), indicating clear and meaningful patterns in students' perceptions of the elective program.

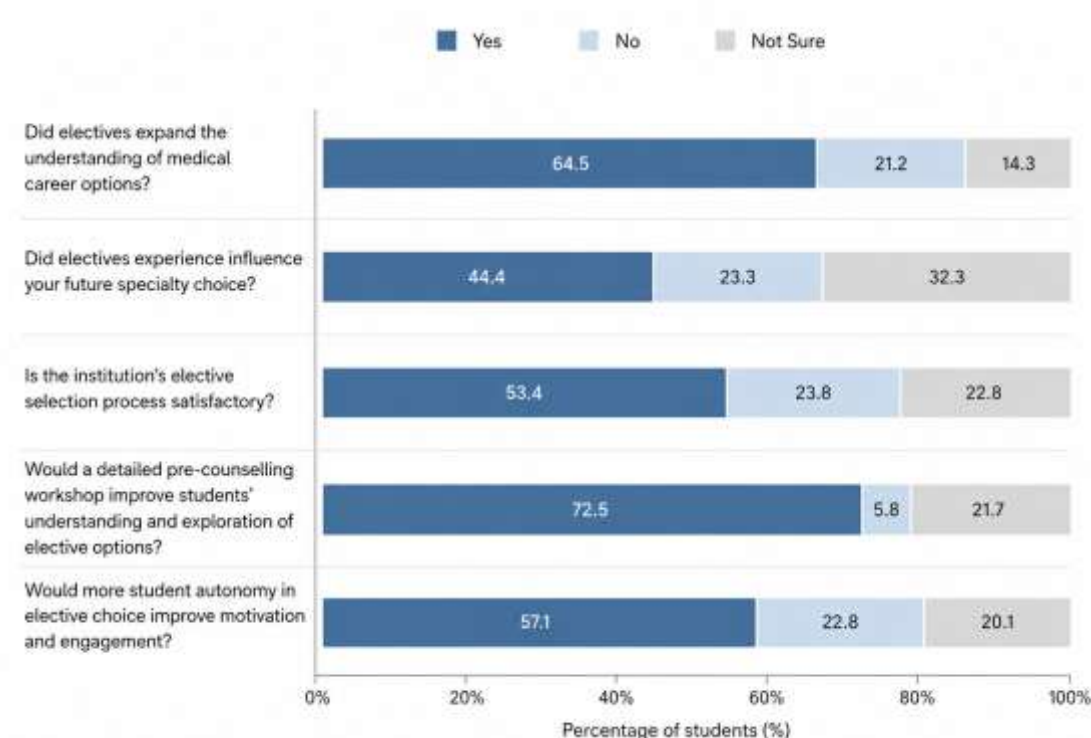


Figure 6. Student perceptions regarding elective effectiveness and allocation process (N=189).

Career interest scores before and after electives: Changes in career interest scores before and after elective postings are presented in Figure 7. Career interest increased across all domains following the electives, with the most pronounced increases observed in research and academic medicine, while smaller increases were noted in clinical practice, public health, and healthcare administration. Paired t-tests were used to compare pre- and post-elective career interest scores, and effect sizes were calculated using Cohen's d. Clinical practice increased from 4.36 ± 0.48 to 4.51 ± 0.61

($p<0.001$, $d=0.27$); research from 3.08 ± 0.88 to 3.71 ± 0.73 ($p<0.001$, $d=0.78$); public health from 1.86 ± 0.73 to 2.21 ± 0.82 ($p<0.001$, $d=0.45$); healthcare administration from 2.84 ± 0.83 to 3.07 ± 0.58 ($p<0.001$, $d=0.32$); and academic medicine from 2.52 ± 0.73 to 3.19 ± 0.79 ($p<0.001$, $d=0.88$). Effect size estimates values indicate small (clinical practice), small-to-moderate (healthcare administration), moderate (public health), and large effects (research and academic medicine), reflecting varying magnitudes of change in career interest following elective exposure.

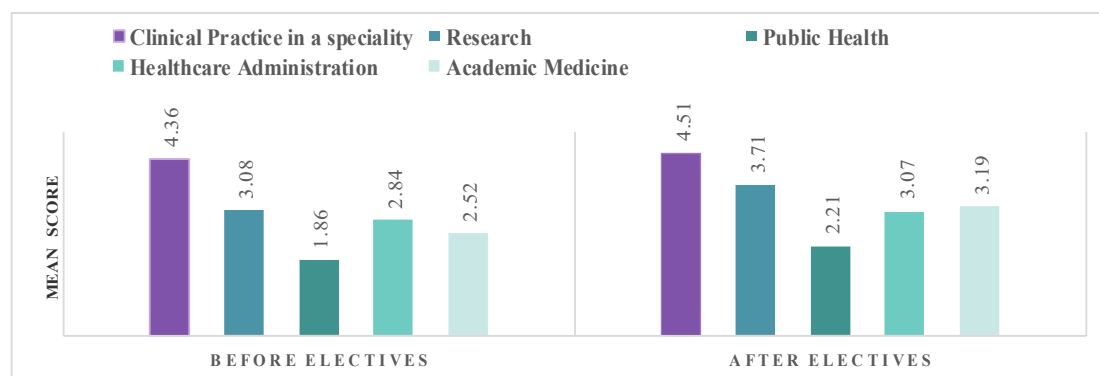


Figure 7. Changes in mean career interest scores before and after elective postings (N=189).

DISCUSSION

Medical electives represent an integral component of contemporary undergraduate medical education, providing experiential learning opportunities beyond conventional classroom teaching and facilitating exposure to diverse healthcare environments and professional roles [14-16]. Such exposure enables development of clinical competence, professional identity, and cultural sensitivity, thereby contributing to the formation of socially responsive and ethically grounded practitioners. Within the framework of competency-based medical education (CBME) introduced by the National Medical Commission (NMC), electives aim to promote student-centered learning, self-directed exploration, and informed career decision-making. However, the educational value of electives is influenced by student preferences, institutional infrastructure, and the effectiveness of allocation and mentorship processes [11,12,17]. The present study evaluated elective preference patterns, motivational drivers, allocation outcomes, and perceived educational impact among undergraduate medical students within the CBME framework.

A clear inclination towards diagnostic and laboratory-oriented disciplines with strong clinical linkage was observed in Block 1, with Pathology and Pharmacology consistently emerging as the most preferred electives. Modules such as Cytopathology, Haematopathology, Pharmacovigilance, and clinical trial-related activities were frequently selected, suggesting that students favour electives offering hands-on exposure,

diagnostic reasoning, and research relevance, consistent with previous CBME-based studies [7,9,10]. The increasing preference for student-initiated research within Community Medicine further reflects growing interest in research engagement among undergraduates. In contrast, foundational disciplines such as Anatomy, Physiology, Biochemistry, Microbiology, and Forensic Medicine attracted fewer preferences. Although Biochemistry showed a dip after the initial year, overall patterns remained largely stable. This suggests that students prefer disciplines with clearer clinical and diagnostic application, supporting recommendations to strengthen clinical integration within foundational sciences to enhance engagement. In Block 2, preferences shifted toward clinically oriented disciplines with General Medicine and Surgery consistently emerging as the most preferred specialties. Frequent selection of modules such as Nephrology, Diabetology, and operating theatre assistantship indicates strong interest in direct patient care, bedside learning, and hands-on clinical and procedural exposure consistent with earlier reports identifying Internal Medicine as a leading career preference among medical students [9,10]. Moderate preference for Gynaecology, Orthopaedics, Dermatology, and Paediatrics, together with a gradual rise in Psychiatry, reflects sustained engagement with core clinical specialties and growing recognition of mental health relevance in medical practice. Conversely, Ophthalmology and ENT were less frequently selected, possibly due to

comparatively limited early clinical exposure. Year-wise comparisons revealed no significant differences across cohorts, and the small-to-moderate effect sizes indicate largely stable elective selection patterns. Together, these findings highlight a structured progression from diagnostic and research-oriented interests in the initial elective phase to clinically focused electives providing greater hands-on patient care and procedural experience in the subsequent phase, underscoring the role of electives in facilitating progressive career exploration and skill development within the CBME framework.

Motivational factors analysis revealed that interest in a specific specialty and the desire for better subject understanding were the predominant factors influencing elective selection across both blocks, followed by research opportunities and career prospects. The statistically significant variation in motivational factors indicates that elective choice is driven by multiple academic and professional considerations. Similar findings have been reported in previous studies where specialty interest, academic enrichment, and perceived career relevance were major determinants of elective selection [9,18]. These observations underscore the importance of aligning elective offerings with student interests while ensuring balanced exposure across disciplines. Elective preference fulfilment analysis showed that although nearly half of the students obtained preferred electives in both blocks, a considerable proportion experienced partial or complete mismatch. This likely reflects constraints such as seat availability, institutional resources, and merit-based allocation. The variation in fulfilment may also explain the strong student support for structured pre-elective counselling, which could help align student preferences with available opportunities. Nevertheless, participation in alternative electives still provided academic enrichment and broader professional exposure, highlighting the educational value of elective postings beyond preference fulfilment and

supporting previous reports on the role of diverse clinical exposure in shaping professional perspectives [18]. Students' perception findings further reinforced the educational significance of electives. A majority of students reported an improved understanding of medical career options following elective postings, consistent with previous studies demonstrating that electives enhance career awareness and professional identity formation. However, fewer students reported a direct influence on specialty choice, suggesting that career decisions evolve through multiple educational experiences. Moderate satisfaction with the allocation process, largely due to the limited availability of preferred electives, together with strong support for structured pre-elective counselling and greater autonomy in elective selection, underscores the need for transparent allocation systems, mentorship, and student-centred planning to optimize elective experiences. Notably, career interest score analysis demonstrated statistically significant improvements across all evaluated professional domains following elective exposure. Although clinical practice remained the most preferred career pathway both before and after electives, interest in research, academic medicine, public health, and healthcare administration increased significantly. Even when students were not allotted their preferred electives, participation in alternative modules contributed meaningfully to academic enrichment and enhanced career awareness, highlighting the intrinsic educational value of the elective programme. The greatest gains were observed in research and academic medicine, indicating that elective exposure effectively fosters scholarly orientation and broadens awareness of diverse professional pathways. These findings suggest that electives expand career perspectives and encourage exploration of both clinical and non-clinical roles within healthcare systems.

Overall, the present findings are consistent with the objectives of Competency-Based Medical Education, which emphasize

reflective learning, research engagement, and holistic professional development. Although this study is limited by its single-centre, cross-sectional design and reliance on self-reported data, it included multiple student cohorts and utilized a validated questionnaire with good internal consistency (Cronbach's $\alpha = 0.81$). Consequently, it provides one of the few quantitative evaluations of medical students' elective preferences and their perceived influence on career development within the Competency-Based Medical Education framework in India.

CONCLUSION

Elective postings under the Competency-Based Medical Education framework provide meaningful opportunities for career exploration, experiential learning, and professional development. While students consistently preferred clinically relevant, diagnostic, and research-oriented disciplines, their elective choices were primarily driven by specialty interest and the desire to enhance subject understanding. Eventually, elective participation resulted in improved awareness of diverse medical career pathways and increased interest across multiple professional domains, particularly research and academic medicine, even when preferred electives were not allotted. These findings underscore that the educational value of electives extends beyond preference fulfilment. Strengthening elective programs through structured pre-elective counselling, transparent and equitable allocation processes, effective mentorship, and greater flexibility in elective design may further enhance student satisfaction, optimize learning experiences, and support informed career decision-making within undergraduate medical education.

Declaration by Authors

Ethical Approval: Approved by the Institutional Ethics Committee of ESIPGIMS & ESIC Medical College, Joka (IEC No. ESIC/217/IEC (JOKA)/2025).

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