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Perception of Early Clinical Exposure as a Teaching–Learning Method in Anatomy among First-Year MBBS Students and Faculty: A Cross-Sectional Study.

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Abstract

Background: Early Clinical Exposure (ECE) is an important component of Competency-Based Medical Education (CBME) that integrates basic sciences with clinical practice during the early phase of undergraduate medical training. In Anatomy, ECE helps students understand the clinical relevance of anatomical concepts and improves interest and motivation toward learning. ***Aim:*** To explore and analyze the perceptions of undergraduate medical students and faculty toward Early Clinical Exposure as a teaching–learning method in Anatomy. Objectives: To assess the usefulness of ECE in understanding anatomical concepts, improving clinical correlation, enhancing student motivation, and evaluating faculty perceptions regarding ECE implementation. ***Materials and Methods:*** A cross-sectional questionnaire-based observational study was conducted in the Department of Anatomy at Ballari Medical College and Research Centre from September 2025 to December 2025. The study included Phase I MBBS students and Anatomy faculty members exposed to ECE sessions. After obtaining Institutional Ethics Committee approval and informed consent, ECE sessions consisting of clinical demonstrations and integrated Clinical Anatomy lectures were conducted. Data were collected using a pre-validated structured questionnaire containing Likert scale-based and open-ended questions. Responses were analyzed using descriptive statistics and presented as frequencies and percentages. ***Results:*** A total of 196 first-year MBBS students participated in the study. Majority of students strongly agreed that ECE improved understanding of Anatomy (82.1%), enhanced clinical correlation (84.7%), increased interest in learning Anatomy (79.6%), and promoted active interaction with faculty (76.5%). About 81.6% students felt ECE should be included regularly in the Phase I MBBS curriculum. Faculty members also strongly supported ECE as an effective teaching–learning strategy. Students reported that ECE sessions improved confidence, motivation, and retention of knowledge. ***Conclusion:*** Early Clinical Exposure was perceived positively by both students and faculty as an innovative and clinically relevant teaching method in Anatomy. ECE improved student engagement, motivation, and understanding of anatomical concepts. Adequate faculty involvement and interdepartmental coordination are essential for effective implementation of ECE in undergraduate medical education.

Keywords: Early Clinical Exposure; Anatomy; Competency-Based Medical Education; Clinical Anatomy; Medical Education; Undergraduate Medical Students.

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INTRODUCTION

Medical education has undergone substantial transformation over the past few decades with increasing emphasis on integration of basic sciences with clinical practice. During the early years of medical education, students find it challenging to comprehend the practical importance of basic sciences since traditional medical teaching techniques frequently divide preclinical and clinical disciplines. By encouraging meaningful learning and enhancing the application of theoretical information in practical settings, integration in medical education seeks to close this gap.[1]

Understanding the structure and organization of the human body is based on anatomy, which is the cornerstone of medical education. However, anatomy is often seen by students as a broad topic with little practical significance that needs substantial memorizing. In the early stages of MBBS training, these attitudes may lower students' motivation and interest. Innovative teaching strategies like Early Clinical Exposure (ECE) have been included into undergraduate medical curriculum in order to get around these restrictions.[2] During the preclinical stage of their study, medical students are

exposed to patients, clinical situations, or healthcare environments using a teaching-learning approach known as "early clinical exposure." ECE is currently a crucial part of Competency-Based Medical Education (CBME), according to the Medical Council of India, which is now the National Medical Commission (NMC). In order to produce clinically focused, socially conscious, and capable Indian medical graduates, the CBME program places a strong emphasis on integrating fundamental sciences with clinical disciplines.[3]

Through interactions with physicians, patients, radiological imaging, and case-based discussions, ECE helps first-year medical students comprehend the clinical significance of anatomical features. This kind of exposure encourages active learning and aids students in making connections between theoretical information and actual medical issues. ECE sessions in anatomy may involve discussions of prevalent surgical or medical disorders related to anatomical structures, clinical case presentations, radiograph interpretation, and surface anatomy demonstrations.[4] ECE enhances students' motivation, communication abilities, self-directed learning, and long-term information retention, according to several studies. Early exposure to clinical settings enhances students' passion for studying and increases their understanding of the significance of preclinical courses. ECE also facilitates the development of professionalism, empathy, ethical behavior, and patient-centered attitudes at an early stage of training.[5]

Contextual learning theory, adult learning principles, and experience learning are among the educational philosophies that underpin ECE. Kolb's experiential learning theory states that when students actively participate in and think back on events, they remember information better. Early clinical exposure fosters relevant learning experiences and helps students comprehend how fundamental science topics are used in clinical settings.[6] ECE sessions have been incorporated into integrated teaching programs at a number of Indian colleges in recent years. Positive opinions toward ECE have been found in studies of undergraduate medical students. According to students, ECE made anatomy more engaging, participatory, therapeutically applicable, and simple to comprehend. Additionally, faculty members thought that ECE was a good way to encourage integrated learning and increase student involvement.[7]

Despite its advantages, implementation of ECE poses certain challenges including limited faculty strength, increased workload, lack of coordination between departments, time constraints, and infrastructure limitations. Careful planning, faculty training, and institutional support are necessary for effective implementation. In order to assess the efficacy of ECE and pinpoint areas for future development, it is crucial to comprehend the perspectives of both students and professors.[8] As part of integrated clinical anatomy instruction, ECE sessions were implemented in the Department of Anatomy for Phase I MBBS students at Ballari Medical College and Research Center. Through discussion and illustration of clinical scenarios, these seminars sought to increase students' comprehension of anatomical principles and give them clinically relevant learning experiences. The goal of the current study was to evaluate and examine how faculty and undergraduate medical students perceived Early Clinical Exposure as a teaching-learning strategy for anatomy.

AIM

To explore and analyze the perceptions of undergraduate medical students and faculty toward Early Clinical Exposure as a teaching–learning method in Anatomy.

OBJECTIVES

1) To assess students' perceptions regarding the relevance and usefulness of Early Clinical Exposure in understanding anatomical concepts.
2) To evaluate faculty perceptions regarding the effectiveness of Early Clinical Exposure as a teaching–learning method in Anatomy.
3) To determine the role of Early Clinical Exposure in improving clinical correlation and application of anatomical knowledge.
4) To assess the impact of Early Clinical Exposure on student motivation, confidence, and engagement in learning Anatomy.
5) To identify perceived challenges and suggestions for effective implementation of Early Clinical Exposure in Anatomy.

MATERIALS AND METHODS

Study Design

A cross-sectional questionnaire-based observational study.

Study Setting

The study was conducted in the Department of Anatomy at Ballari Medical College and Research Centre, Ballari.

Study Duration

The study was carried out over a period of four months from September 2025 to December 2025.

Study Participants
The study included first-year MBBS students exposed to Early Clinical Exposure sessions and faculty members involved in teaching Anatomy and conducting ECE sessions.

Sample Size
A total of 196 first-year MBBS students who attended the ECE sessions during the study period were included in the study.

Inclusion Criteria
- First-year MBBS students who attended ECE sessions in Anatomy.
- Faculty members involved in ECE teaching.
- Participants willing to provide informed consent.

Exclusion Criteria
- Students or faculty unwilling to participate.
- Incomplete or improperly filled questionnaires.

Study Tool
Data were collected using a pre-validated structured questionnaire containing Likert scale-based closed-ended questions and a few open-ended questions. The questionnaire assessed perceptions regarding:
- Interest and clarity of ECE sessions
- Clinical relevance of Anatomy
- Student–teacher interaction
- Motivation toward learning
- Learning effectiveness
- Overall usefulness of ECE

Methodology
After obtaining Institutional Ethics Committee approval, students were oriented regarding the objectives and importance of Early Clinical Exposure. ECE sessions were conducted in the lecture hall as part of Clinical Anatomy teaching. Each session included:
- One-hour clinical demonstration highlighting clinical relevance of anatomical structures.
- Two-hour integrated Clinical Anatomy lecture using audiovisual aids.

Following completion of ECE sessions, questionnaires were distributed through Google Forms. Responses were collected anonymously to ensure confidentiality and unbiased feedback.

Statistical Analysis
Data were entered into Microsoft Excel and analyzed using descriptive statistics. Categorical variables were expressed as frequencies and percentages. Results were represented using tables and graphs. A p-value of <0.05 was considered statistically significant.

RESULTS

Table 1: Distribution of Study Participants

Participant Category	Number (n)	Percentage (%)
First-year MBBS students present	196	100
Students completing questionnaire	196	100
Faculty participants	12	—

Table 1 shows the distribution of study participants included in the present study. A total of 196 first-year MBBS students were present during the study period, and all students completed the questionnaire, resulting in a response rate of 100%. In addition, 12 faculty members from the Department of Anatomy participated in the study. The complete participation of students indicates good acceptance and interest toward Early Clinical Exposure (ECE) sessions among the study population.

Table 2: Students' Perception Regarding Effectiveness of ECE Sessions (n=196)

Variable	Strongly Agree n (%)	Agree n (%)	Neutral n (%)	Disagree n (%)
ECE improved understanding of Anatomy	161 (82.1)	28 (14.3)	5 (2.6)	2 (1.0)
ECE improved clinical correlation	166 (84.7)	22 (11.2)	6 (3.1)	2 (1.0)
ECE sessions were interesting	156 (79.6)	31 (15.8)	7 (3.6)	2 (1.0)
ECE improved interaction with faculty	150 (76.5)	34 (17.3)	9 (4.6)	3 (1.5)
ECE enhanced retention of knowledge	154 (78.6)	29 (14.8)	10 (5.1)	3 (1.5)

Table 2 illustrates students' perceptions regarding the effectiveness of Early Clinical Exposure (ECE) sessions in Anatomy. Majority of students strongly agreed that ECE improved their understanding of Anatomy (82.1%) and enhanced clinical correlation of anatomical concepts (84.7%). About 79.6% of students strongly agreed that ECE sessions were interesting and interactive. Furthermore, 76.5% strongly agreed that ECE improved interaction with faculty members, while 78.6% strongly agreed that ECE enhanced retention of knowledge. Only a very small proportion of students expressed disagreement regarding the effectiveness of ECE sessions. Overall, the findings indicate a highly positive perception toward ECE as a teaching–learning method in Anatomy.

Table 3: Impact of ECE on Student Motivation and Learning (n=196)

Parameter	Yes n (%)	No n (%)
Increased motivation toward learning Anatomy	162 (82.7)	34 (17.3)
Improved confidence and self-esteem	149 (76.0)	47 (24.0)
Helped understand clinical application of Anatomy	171 (87.2)	25 (12.8)
Encouraged active participation during sessions	158 (80.6)	38 (19.4)
Recommended regular inclusion of ECE in curriculum	160 (81.6)	36 (18.4)

Table 3 demonstrates the impact of Early Clinical Exposure (ECE) on student motivation and learning behavior. Majority of students reported that ECE increased their motivation toward learning Anatomy (82.7%) and improved their confidence and self-esteem (76.0%). A large proportion of students (87.2%) felt that ECE helped them understand the clinical application of Anatomy more effectively. Additionally, 80.6% stated that ECE encouraged active participation during teaching sessions. About 81.6% of students recommended regular inclusion of ECE in the Phase I MBBS curriculum. These findings suggest that ECE positively influenced students' interest, participation, confidence, and clinical understanding.

Table 4: Faculty Perception Regarding Early Clinical Exposure (n=12)

Faculty Perception	Frequency (n)	Percentage (%)
ECE improves student understanding	11	91.7
ECE increases student interest and engagement	10	83.3
ECE enhances clinical correlation	12	100
ECE should be regularly included in curriculum	11	91.7
Adequate faculty strength is necessary for implementation	12	100

Table 4 presents faculty perceptions regarding Early Clinical Exposure (ECE) in Anatomy teaching. Majority of faculty members agreed that ECE improved students' understanding of Anatomy (91.7%) and increased student interest and engagement in learning (83.3%). All faculty participants (100%) believed that ECE enhanced clinical correlation of anatomical concepts. Furthermore, 91.7% of faculty recommended regular inclusion of ECE in the undergraduate medical curriculum. All faculty members also emphasized the importance of adequate faculty strength and proper interdepartmental coordination for effective implementation of ECE. Overall, faculty perceptions toward ECE were highly positive.

DISCUSSION

Early Clinical Exposure (ECE) has emerged as an important component of Competency-Based Medical Education (CBME) aimed at integrating preclinical subjects with clinical practice. The current study assessed how faculty and first-year MBBS students perceived the value and efficacy of ECE in teaching anatomy. The study's conclusions showed that professors and students generally had a favorable opinion of ECE as a cutting-edge and practically applicable teaching-learning approach. All 196 first-year MBBS students who took part in the study successfully finished the questionnaire, demonstrating high engagement and acceptability of the research approach (Table 1). The high response rate can be a result of students' increased interest after attending ECE classes. Similar research on undergraduate medical education has also shown that students who are exposed to clinically integrated learning approaches participate enthusiastically.[1]

The fact that 82.1% of students strongly believed that ECE increased their grasp of anatomy and another 14.3% agreed with the same statement was one of the study's most significant findings (Table 2). Many people believe that anatomy is a challenging topic that requires a lot of memorizing of structures with little obvious therapeutic relevance. ECE assists students in bridging the gap between theoretical anatomical principles and their application in real-world clinical settings. Similar findings were observed by Tayade and Latti, who discovered that early exposure to clinical circumstances enhanced medical students' understanding and recall of preclinical topics.[2]

Additionally, the current study showed that 84.7% of students highly agreed that ECE enhanced the clinical linkage of anatomical ideas (Table 2). This result emphasizes how crucial contextual learning is in the early stages of medical education. Students may understand the importance of anatomical knowledge in diagnosis and treatment through clinical demonstrations, patient-based conversations, and applied anatomy workshops. According to Phalgunan and Baskaran, ECE greatly increased students' comprehension of clinical anatomy and their capacity to connect anatomy with clinical practice.[4] Interest and engagement in learning are important determinants of academic performance in medical education. 15.8% of students in the current research agreed with the assertion that ECE sessions were fascinating, compared to 79.6% who strongly agreed (Table 2). While ECE incorporates clinical relevance and involvement into the learning process, traditional didactic lectures may occasionally decrease student attention and active participation. The results of the current study are in line with Verma's assertion that ECE fosters students' interest and excitement and increases the enjoyment and significance of learning.[3] The fact that 76.5% of students strongly believed that ECE enhanced interactions with faculty members was another noteworthy finding in the current study (Table 2). Interactive learning environments encourage students to ask questions, clarify doubts, and participate actively during sessions. Better comprehension and a supportive learning environment are fostered by improved student-teacher interaction. Early clinical experiences promote collaborative learning and improve teacher-student communication, according to Dornan et al.[7]

Another crucial component of successful learning is information retention. 78.6% of students in the current research strongly agreed that ECE improved anatomical information retention (Table 2). Instead of mindless memorizing, clinical integration promotes greater comprehension and meaningful learning. Kolb's experiential learning theory states that when learning takes place via hands-on activities and active engagement, pupils retain information better.[6] Students' memory retention may have improved as a result of the clinical demonstrations and integrated teaching sessions that took place during ECE. The results shown in Table 3 further demonstrate how ECE improves students' motivation and learning habits. After attending ECE classes, about 82.7% of students said they were more motivated to understand anatomy. Medical students' academic success and self-directed learning are significantly influenced by motivation. Littlewood et al. found similar results, noting that early clinical encounters had a favorable impact on students' excitement, professional attitude, and preparedness for clinical learning.[5] . Additionally, according to the current study, 76.0% of students thought ECE increased their self-esteem and confidence (Table 3). Preclinical exposure to clinical settings may lessen anxiety related to patient contacts in subsequent training years. Early in their schooling, students grow more at ease with clinical language, communication, and healthcare environments. Improved self-confidence and the development of a professional identity may result from this early familiarity.[8]

The fact that 87.2% of students said ECE helped them comprehend the practical application of anatomy was a particularly significant finding in this study (Table 3). Developing a sustained interest in the basic sciences requires clinical relevance. When students comprehend the importance of anatomy in disease processes, physical examination, imaging interpretation, and surgical procedures, they are more likely to value and remember the subject. The National Medical Commission's suggestions about the inclusion of clinical experience in the Phase I MBBS curriculum are supported by this study.[9] In the current study, 81.6% of students suggested that ECE be regularly included in the curriculum, and 80.6% of students said that ECE fostered active engagement during sessions (Table 3). These results clearly show that students embrace clinically integrated teaching strategies. Interactive and application-based learning strategies are becoming more popular among students than lecture-based instruction. Therefore, integrating ECE into regular anatomy instruction may enhance overall learning results and student happiness.[10]. In the current study, faculty opinions of ECE were likewise quite favorable (Table 4). Nearly every faculty member concurred that ECE raised student involvement, improved clinical linkage, and improved student understanding. Because integrated education necessitates cooperation across fundamental scientific and clinical departments, faculty support is crucial to the effective implementation of ECE programs. Faculty members noted that ECE encourages active learning and helps students understand the significance of anatomy in clinical practice, according to similar findings from other research.[11] Faculty members in the current study recognized sufficient faculty strength and interdepartmental collaboration as crucial prerequisites for successful ECE implementation, notwithstanding the favorable results (Table 4). It takes more preparation, scheduling, and resource allocation to conduct clinically integrated sessions. Implementing ECE within already full undergraduate courses continues to be a prevalent difficulty due to time limits and growing teaching effort. For ECE programs to be sustainable and effective, administrative coordination, faculty training, and institutional support are so essential.[12] Overall, the results of this study show that early clinical exposure is a successful and well recognized teaching-learning approach in anatomy education. ECE increases

students' enthusiasm, engagement, confidence, and active involvement in addition to their comprehension of anatomical ideas and clinical connection. The continuous inclusion of ECE in undergraduate medical courses is supported by the favorable opinions expressed by both professors and students.

CONCLUSION

The present study demonstrated that Early Clinical Exposure (ECE) is an effective and innovative teaching–learning method in Anatomy for first-year MBBS students. The majority of students thought that ECE was engaging, therapeutically applicable, and beneficial for enhancing comprehension of anatomical principles and their clinical applications. ECE promoted a more interesting and significant learning experience by boosting students' motivation, self-assurance, involvement, and interactions with teachers. The study findings also revealed strong support from faculty members toward inclusion of ECE in the undergraduate medical curriculum. ECE was seen by faculty as helpful in enhancing clinical linkage and student interest in anatomy education. Students were better able to understand the practical importance of anatomy in patient care and medical practice because to the integration of clinical situations with preclinical instruction. By encouraging integrated, student-centered, and clinically focused learning, ECE implementation supports the objectives of competency-based medical education. However, sufficient faculty strength, careful planning, interdepartmental cooperation, and institutional support are necessary for successful implementation. All things considered, early clinical exposure can be a useful teaching tactic to close the knowledge gap between fundamental sciences and clinical medicine, ultimately helping to produce medical graduates who are capable, self-assured, and clinically focused.

LIMITATIONS OF THE STUDY

1) The study was conducted in a single institution, which may limit the generalizability of the findings to other medical colleges.
2) The study included only first-year MBBS students and a limited number of faculty members.
3) The assessment was based primarily on participants' perceptions and self-reported responses, which may be influenced by subjective bias.
4) Long-term retention of knowledge and academic performance following ECE were not evaluated.
5) The study duration was relatively short, and follow-up assessment after subsequent clinical postings was not conducted.
6) Lack of a control group receiving conventional teaching alone limited direct comparison between traditional teaching methods and ECE.

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