International Journal of Medical and Pharmaceutical Research

Online ISSN-2958-3683 | Print ISSN-2958-3675
Frequency: Bi-Monthly
Available online on: https://ijmpr.in/

Original Article

Effectiveness of Early Clinical Exposure in Learning Cardiovascular Physiology in Undergraduate Medical Students

Dr. Shashikant G Somani[1], Dr. S. P. Srinivas[2], Dr Tagaram Ramchandra[3]

[1]Associate Professor, Department of Physiology, Government Medical College, Nalgonda, Telangana
[2]Associate Professor, Department of Physiology, Government Medical College, Yadadri, Telangana
[3]Associate Professor Dept of community medicine Government medical college, Nalgonda Telangana

Corresponding Author:

Dr. Shashikant G Somani
Associate Professor, Department of Physiology, Government Medical College, Nalgonda, Telangana

Received: 05-06-2026
Accepted: 25-06-2026
Available online: 08-07-2026

ABSTRACT

Background: Early Clinical Exposure (ECE) is increasingly recognized as a vital teaching stratergy in medical education. It is to help first year undergraduate students to overcome their initial queries and also motivate them to develop better knowledge and awareness for the same. **Aim:** This study evaluates the effectiveness of ECE in enhancing the understanding of cardiovascular physiology. **Methodology:** It was a cross sectional study among 150 undergraduate medical students who were divided in two groups, Control Group and an interventional group. Data was analysed by appropriate statistical method. **Results:** Mean test scores of pre test and post test in intervention group improved significantly as compared to control group (Paired t-test for within groups & Independent t-test for between groups- p value < 0.05). **Conclusion:** Students exposed to clinical settings showed significantly higher comprehension, retention and application of cardiovascular physiology concepts compared to those taught through traditional lectures. Findings support integrating ECE into the curriculum to foster deeper learning and clinical relevance.

Keywords*: Applied Performance, Early Clinical Exposure, Feedback, Knowledge, OSCE, Multiple choice question, Perception of students.*

INTRODUCTION

A good understanding of Physiology in first year of MBBS is essential for the foundation of Medicine. In didactic lectures, students face difficulty in retention and application of concepts in Physiology. So, students may not perform well in studies.[1,2] This adds to anxiety and difficulty in understanding the subject. Cardiovascular physiology provides the foundation for understanding cardiac function, hemodynamics and systemic regulation. However, undergraduate students often struggle to connect theoretical knowledge with its clinical relevance when taught exclusively through traditional lectures. AND it may lead to passive learning and poor retention. Early Clinical Exposure (ECE) introduces students to clinical environments during the preclinical phase, which expose them to the patients in the first year itself [3]. This helps to reduce stress and also motivate them to increase their confidence level. This gap between theory and practice is bridged by competency based medical education (CBME) and experiential learning strategies[4]. This study investigates the impact of ECE on cardiovascular physiology learning outcomes among undergraduate medical students.

AIM

To evaluate the effectiveness of Early Clinical Exposure in learning cardiovascular physiology among undergraduate medical students .

OBJECTIVES

1. To assess knowledge gain in cardiovascular physiology through ECE compared to traditional teaching.
2. To evaluate student attitudes toward ECE as a learning strategy.
3. To determine whether ECE improves clinical application of cardiovascular physiology concepts.

MATERIAL AND METHOD

Present cross-sectional study was done among 150 first year MBBS students. After approval by Ethical Committee, the details of the study was explained to them and written informed consent was obtained. The150 students were divided in two groups.

In Group A (ECE group, n = 75) : Students exposed to clinical settings (Medicine ward visits, patient case discussions, ECG demonstrations).

In Group B (Control group, n = 75): Students taught using traditional lectures.

In both group Pre-test MCQs on cardiovascular physiology were performed. In the ECE group In the classroom, following a brief lecture and with paper based case scenarios discussions was done whereas in the hospital, students were taken to inpatient wards, where they were demonstrated the signs of cardiovascular diseases along with its social implications.

The outcome was assessed in both groups by MCQs post test was done. Applied performance measures (eg., ECG interpretation OSCEs, BP practicals). Also we have collected student's perceptions by feedback with validated questionnaire (Likert-scale).

Statistical Analysis:

All the parameter were expressed as mean and standard deviation (mean ±SD). They were tabulated in microsoft excel sheet. Statistical analysis was done using SPSS. Data was compared using : Paired t-test within groups, independent t-test between groups. 'p' value less than 0.05 was considered significant.

Questionnaire design. The correct answers were counted and the scores were categorized.

Questionnaire:

Domain	**Sample Item**
Knowledge	Multiple choice question 20
Applied Performance	Objective Structured Clinical Examination. (OSCE) 20
Perceptions	Feedback

Also their perception was taken by feedback form in following aspects
Improved Understanding
Linking Theory to Practice
Motivation & Engagement
Retention of Knowledge
Confidence in Learning
Preference over Lectures
Clinical Relevance

Likert Scale Options- For each statement, please select one option:
1 = Strongly Disagree
2 = Disagree
3 = Neutral
4 = Agree
5 = Strongly Agree

Additional Open-Ended Questions were asked for qualitative feedback:
1 What aspects of the AMI ECE module did you find most useful?
2 What improvements would you suggest for future sessions?
3 Any additional comments?
This design balances both quantitative (Likert scale) and qualitative (open-ended) feedback, also in capturing student perspectives in depth.

RESULTS

Knowledge Assessment (Pre-Test vs Post-Test MCQ) :

Table I : Learning Gain & Intervention Effectiveness (N= 150)

Groups	Average Pre-Test Score	Average Post-Test Score	Average Improvement	p-value
Group A (ECE) n=75	9.3 / 20	12.5 / 20	+3.1	< 0.05
Group B (Control) n=75	10.2 / 20	13.0 / 20	+2.8	< 0.05

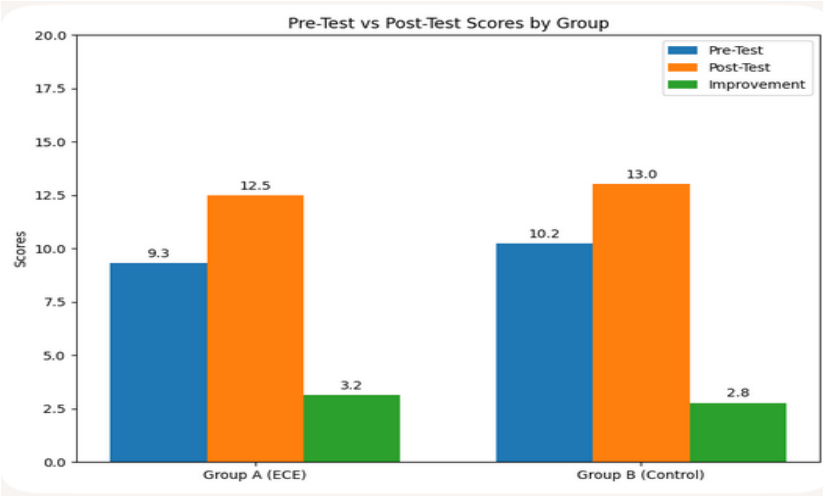

Figure 1 : comparing Group A vs Group B Pre-Test vs Post-Test Learning Gain

Group A (ECE) : Average score improved from 9.3 → 12.5, showing a gain of +3.1.
Group B (Control) : Average score improved from 10.2 → 13.0, showing a gain of +2.8.

• **Paired t-test (within groups):**
Group A (ECE): t = 13.49, p < 0.05 → significant improvement
Group B (Control): t = 11.09, p < 0.05 → significant improvement

• **Independent t-test (between groups**):
t = 2.19, p = 0.030 95% CI [0.04, 0.70])→ Significant difference, favoring Group A (ECE).
Thus both groups improved significantly, but the ECE group showed a slightly **greater improvement**, highlighting the added value of early clinical exposure.

Table II: Comparison of Skill Performance using OSCE Scores

Group(N = 150)	Key Skills Assessed	Average Score (out of 20)	p value
Group A (ECE, n=75)	History taking, risk factor identification, ECG interpretation, clinical reasoning	16.2	< 0.05
Group B (Control, n=75)	Same domains assessed for comparison	14.5	

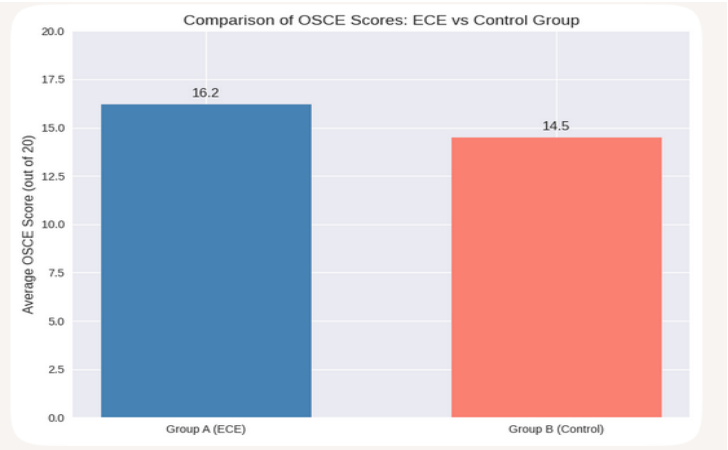

Figure2 : Comparing Group A vs Group B average OSCE scores

• Group A (ECE) : Higher performance, reflecting stronger integration of knowledge into practice.

• Group B (Control) : Lower performance, reflecting less skill application.

Statistical Analysis:

• Independent t-test showed significantly higher OSCE performance in Group A compared to Group B ($t = 3.25$, $p = 0.0015$; 95% CI [0.7, 2.7]). $p = 0.0015$: It indicates strong evidence against the null hypothesis (that there is no difference between the groups).

95% CI [0.7, 2.7]: The 95% confidence interval for the true mean difference between the groups. Since both the lower bound (0.7) and the upper bound (2.7) are positive, it further confirms that true difference is likely positive, meaning Group A's performance was higher

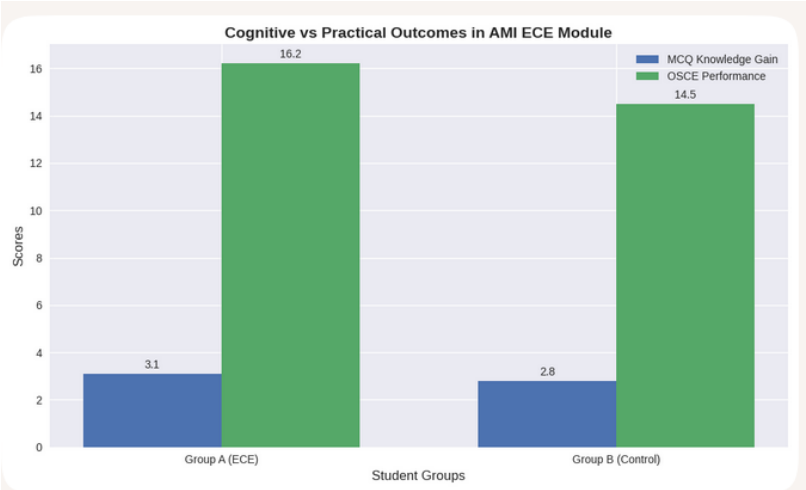

Figure 3 : Combined outcomes of MCQ knowledge gain (Cognitive) and OSCE applied performance (Practical) of both Group.

Observations:

•Group A (ECE):

MCQ knowledge gain = +3.1 points

OSCE applied performance = 16.2 / 20

Shows stronger improvement in both cognitive and practical domains.

•Group B (Control):

MCQ knowledge gain = +2.8 points

OSCE applied performance = 14.5 / 20

Improvement noted, but less pronounced compared to ECE group.

statistically significant, $p<.05$ on appling the Independent t-test .

Table III : Feedback Assessment in Two Groups (N= 150)

Feedback Category	Group A (ECE, n=75)	Group B (Control, n=75)
Positive Feedback (%)	88	68
Neutral Feedback (%)	7	12
Negative Feedback (%)	5	20
Total (%)	100	100

Interpretation:

Majority of students in both groups gave positive feedback but number of positive feedbacks were more in ECE group. The difference in positive feedback (20%) highlights the effectiveness of ECE in improving student satisfaction and engagement in reinforcing & enhancing cardiovascular physiology learning

DISCUSSION

In present study, Both groups demonstrated significant knowledge improvement, confirming the effectiveness of structured teaching. However, the greater learning gain in the ECE group highlights the added value of clinical exposure in reinforcing theoretical knowledge.

The ECE group outperformed the control group in applied skills, particularly in clinical reasoning and ECG interpretation. This demonstrates that early clinical exposure not only improves knowledge but also enhances practical

competencies, bridging the gap between classroom learning and patient care. Thus ECE modules foster into deeper learning and skill acquisition [2].

Usha et al [5] compared ECE with traditional teaching in first-year physiology practicals using blood pressure measurement. ECE led to superior outcomes, supporting early, clinical contact, confidence and skill acquisition .
Singh RA [6]. Studied Phase I MBBS students' perceptions of ECE from North eastern India in 2024 documented high acceptance and perceived benefits in linking theory to practice, motivation and confidence.
The findings align with prior studies [7-10] emphasizing experiential learning as a cornerstone of medical education.

CONCLUSION

From present study it was concluded that Early clinical exposure enhances both cognitive learning , retention, clinical application and applied performance. Also it is perceived as more engaging and clinically relevant. Thus it is an effective pedagogical approach in undergraduate medical students which can foster holistic learning and better prepare students for clinical practice.

Recommendations

1. Faculty Development: Training programs for faculty to facilitate ECE effectively.
2. Infrastructure Support: Collaboration with clinical departments to ensure patient availability and structured exposure.
3. Continuous Evaluation: Regular assessment of ECE outcomes to refine teaching strategies.

Limitations

Challenges such as faculty training, patient availability and time constraints must be addressed for successful implementation.
Short follow-up may not fully capture long-term retention, single-institution settings may limit generalizability and potential instructor effects are frequent constraints.

Acknowledgement : We sincerely thank all participants and all authors we referred in the present study.
Conflict of Interest: Nil
Source of Funding: Self Funding

REFERENCES

1. Basila V1, Purnima Meher 2, Ritarani Sahu3, Shehin M2, Importance of early clinical exposure in understanding physiology,Int J Acad Med Pharm 2023; 5 (1); 784-786
2. Kherde, Piyush,Mishra, Ved, Mishra, Neelam et al, Early Clinical Exposure as A Method to Augment Context Based Learning Among First Year MBBS Students, Indian Journal of Applied Basic Medical Sciences2017; 18(B);2-9.
3. Verma M. Early clinical exposure: New paradigm in Medical and Dental Education. Contemp Clin Dent 2016;7:287 8.
4. Medical Council of India. Early Clinical Exposure for the Undergraduate Medical Education Training Program, 2019: pp 1-43.
5. Usha Sekkizhar, Rashmi Ramanathan, Priyadharshini Ananthi Sakthivel, Jeevithan Shanmugam. Effectiveness of early clinical exposure in competency-based curriculum – A step forward, Natl J Physiol Pharm Pharmacol. 2024; 14(1): 27-32
6. Singh RA. Perception of Early Clinical Exposure (ECE) among Phase I MBBS Students in a Medical College in Northeastern India. J Med Sci Health 2024; 10(2):169-174
7. Warkar AB, Asia AA. Introduction to early clinical exposure as learning tool in physiology. Indian J PhysiolPharmacol 2020;64(Suppl_1):S62-S9.
8. Deepalakshmi K, Ramya A, DarshniK, Vaishali SM, Patricia MJ. Exploring the Benefits of Early Clinical Exposure in Undergraduate Medical Students. Glob J Med Stud. 2025;5:4-7. doi: 10.25259/GJMS_14_2025
9. Avjot K. Miglani , Rajiv Arora. Introduction of Early Clinical Exposure(ECE) in 1st year M.B.B.S Students in the Department of Physiology. Int J Physiol. 2020;8(1):9-15.
10. Kharay SS, Vohra H, Puri S, Bansal P. Phase I Medical Students' Perceptions of Early Clinical Exposure in Classroom and Hospital Setting: A Qualitative and Quantitative Analysis. Future Health 2023;1:8-14