Research Article

World J Curr Med Pharm Res. 2026; 8(2): 32-36

World Journal of Current Medical and Pharmaceutical Research

Content available at www.saap.org.in ISSN: 2582-0222

COMPARATIVE EVALUATION OF HIGH-FIDELITY SIMULATION VERSUS CONVENTIONAL TEACHING IN IMPROVING KNOWLEDGE, CLINICAL SKILLS, AND TEAM DYNAMICS IN MANAGING OBSTETRIC EMERGENCIES AMONG MBBS INTERNS: A PROSPECTIVE RANDOMIZED CONTROLLED STUDY

Sri Vasavi Ch*, Madhukiran SP, Ruba Zareen

Sri Devaraj URS Academy of Higher Education and Research, R L Jalappa Hospital & Research Centre, Tamaka, Kolar, Karnataka, India.

ARTICLE HISTORY

Received on: 04-02-2026
Revised on: 27-03-2026
Accepted on: 19-05-2026

ABSTRACT

Background: Simulation-based medical education has been shown to improve clinical competence, communication, and patient safety. However, evidence comparing simulation with conventional teaching methods among MBBS interns in obstetric emergencies remains limited, especially in Indian settings.

Aim: The aim of the present study was to compare the effectiveness of high-fidelity obstetric simulation training versus conventional teaching methods in improving knowledge, clinical skills, and teamwork among MBBS interns.

Methodology: A Prospective randomized control trail was conducted in a simulation and skills centre, tertiary care teaching hospitals, including 100 MBBS interns with 50 participants in each the groups of simulation and conventional teaching. Assessment of knowledge, clinical skills, teamwork and communication were evaluated over a 3 months of time period. Continuous variables were analyzed using paired t-test and independent t-test and categorical variables were analyzed using chi-square test using SPSS Version28. A p-value of <0.05 was considered statistically significant.

Results: Both the groups demonstrated statistical significance in simulation based training and conventional teaching. Post test knowledge scores were significantly higher in the simulation group compared to conventional group (31.4 ± 3.8 vs 26.9 ± 4.2,p<0.001). Total OSCE scores is significantly higher in simulation group (82.4±6.5 vs 68.7±7.8,p<0.001). CATs scores depicted superior teamwork and communication performance in the simulation group (86±6.2 vs 72.5±7.1,p<0.001). Confidence improvement and knowledge retention at one month showed significantly higher among simulation group. Participant satisfaction was higher in the simulation group.

Conclusion: High-fidelity simulation-based training is significantly more effective than conventional teaching in improving knowledge, clinical skills and teamwork and communication in managing obstetric among MBBS interns. Implementation of simulation -based training into undergraduate medical curriculum improves handling of real-world emergencies and patient safety.

Keywords: *High-fidelity, simulation-based training, obstetric, OSCE, conventional teaching.*

***Corresponding Author**
Dr. Sri Vasavi CH

DOI: https://doi.org/10.37022/wjcmpr.v8i2.397

1. INTRODUCTION

Improved emergency obstetric and neonatal care in healthcare facilities can save a large percentage of maternal and perinatal deaths. By offering a secure and error-tolerant practice environment, simulation-based training guarantees the safety of actual patients. This successfully eliminates the competing goals of patient care and teaching from trainee physicians' clinical encounters [1]. In recent decades, medical education has changed significantly, moving away from traditional didactic lectures and toward more hands-on, immersive learning methods. High-fidelity simulators (HFS), which provide realistic clinical scenarios where students can practise both technical and non-technical skills in a safe, controlled environment, have become an essential part of undergraduate medical education (UME). HFS fosters decision-making, cooperation, and communication skills without compromising patient safety by simulating actual patient care scenarios, allowing students to connect academic knowledge with clinical experience [2].

A popular teaching strategy is simulation-based training (SBT), which gives students a safe, regulated setting in which to hone their clinical abilities. In medical education, simulation takes many forms, from virtual reality platforms and high-fidelity mannequins to low-fidelity task trainers. With the use of these technologies, clinical scenarios of various levels of complexity may be replicated, giving trainees the opportunity to practise purposefully without endangering patient safety. Because SBT is immersive, students can apply their theoretical knowledge to simulated clinical circumstances, get rapid feedback, and evaluate their performance [3].

The "see one, do one, teach one" approach is typically used in clinical skills training in medicine, which means that after witnessing a certain skill or operation once, learners are expected to be able to carry out that process and instruct another trainee in it. Six Many contend that this teaching approach is out of date because students can't confidently and successfully execute a medical operation or skill after only seeing it once [4].

This randomized controlled trial aims to compare the effectiveness of high-fidelity obstetric simulation training versus conventional teaching methods in improving knowledge, clinical skills, and teamwork among MBBS interns.

2. MATERIALS AND METHODS

2.1 Study Design

This prospective, randomized controlled trail was conducted at a simulation and skills centre, tertiary care teaching hospital in a time period of three months to compare the effectiveness of high-fidelity obstetric simulation training versus conventional teaching methods among MBBS interns.

2.2 Study Site: Simulation and skills centre, R L Jalappa hospital & Research centre, Tamaka, Kolar, Karnataka, India

2.3 Study Period: February 2026 to April 2026.

2.4 Ethical

Ethical approval was obtained from the institutional review board of Sri Devaraj Urs Academy of Higher Education and Research institution with approval number IEC/2025/OBG/02 and written informed consent was secured from all participants prior to enrollment.

2.5 Sample size

A total of 100 medical students were recruited and randomly assigned to either the simulation group (n=50) or the control group (n=50). Randomization was performed using computer generated sequence to ensure allocation concealment. The sample size was calculated using Epi info software, considering an expected effect of size of 0.5, a power of 80%< and a significance level of 0.05, resulting in 50 participants per group.

2.6 Inclusion and exclusion criteria

Inclusion criteria encompassed interns posted in OBG department, willing to participate and provide consent and exclusion criteria included prior exposure to obstetric simulation training, and non-consenting participants.

2.7 Educational interventions

Participants in simulation-based training using high-fidelity obstetric simulator such as CAE Lucina. The intervention focused on realistic, scenario-based training, debriefing sessions. Training scenarios included postpartum hemorrhage, Eclampsia, pre-eclampsia, and normal vaginal delivery. The control group (conventional teaching) participated in conventional educational training consisting of didactic lectures, case discussions, and video demonstrations based on obstetric emergencies.

2.8 Outcome evaluation

The effectiveness of the educational interventions was evaluated by using multiple outcome measures. Knowledge assessment was used through pre-test and post- test questionnaire (MCQs) with scores out of 20. Clinical skills assessment was evaluated through case management using standardized checklist and the performance was expressed as percentage scores. Teamwork and communication skills were assessed by using CATs scale which measured coordination, cooperation, situational awareness and communication among participants during clinical scenarios. After one month completion of the training program participants underwent repeat evaluation to determine long term learning retention. Participant's satisfaction was assessed by using likert scale-based feedback questionnaire.

2.9 Statistical analysis

Data entry was done in Microsoft Excel and analysis in SPSS version 28. The average scores obtained by students following the training session is expressed in mean and standard deviation. Paired t-test was used to compare difference within the groups. And independent t-test was used to compare between the groups and chi-square test used for categorical data. A p-value <0.05 was considered statistically significant.

3. RESULTS

Baseline characteristics:

A total of 100 MBBS interns were participated in the study, in which 50 interns each in the groups of simulation and conventional teaching groups.

Table 01: Baseline Characteristics of Participants (n = 100)

Variable	Simulation Group (n=50)	Conventional Group (n=50)	Total (n=100)	P-value
Age (years, Mean ± SD)	23.8 ± 0.9	24.1 ± 1.0	23.9 ± 0.95	0.18
Gender (Male)	24 (48%)	26 (52%)	50 (50%)	0.68
Gender (Female)	26 (52%)	24 (48%)	50 (50%)	
Internship duration ≥6 months	28 (56%)	30 (60%)	58 (58%)	0.69
Prior exposure to emergencies	15 (30%)	17 (34%)	32 (32%)	0.66

There is no statistical significance observed between the groups, indicating successful randomization.

Table 02: Pre-test knowledge scores comparison

Parameter	Simulation (Mean ± SD)	Conventional (Mean ± SD)	P-value

Knowledge Score (/40)	17.6 ± 3.2	18.1 ± 3.5	0.52

Table 03: Post-test knowledge scores comparison

Parameter	Simulation (Mean ± SD)	Conventional (Mean ± SD)	P-value
Knowledge Score (/40)	31.4 ± 3.8	26.9 ± 4.2	<0.001

The simulation group demonstrated significantly higher post-test knowledge scores compared to the conventional teaching group.

Table 04: Improvement in knowledge scores (Within groups)

Group	Pre-test	Post-test	Mean Improvement	P-value
Simulation	17.6 ± 3.2	31.4 ± 3.8	+13.8	<0.001
Conventional	18.1 ± 3.5	26.9 ± 4.2	+8.8	<0.001

Both groups showed statistically significant improvement after training, but improvement was superior in the simulation group.

Table 05: Clinical skills (OSCE Scores)

Parameter	Simulation (Mean ± SD)	Conventional (Mean ± SD)	P-value
PPH Station (/20)	16.8 ± 2.1	13.2 ± 2.5	<0.001
Eclampsia (/20)	17.2 ± 1.9	13.9 ± 2.3	<0.001
Labour (/20)	16.5 ± 2.3	14.1 ± 2.4	<0.001
Decision-making (/20)	15.9 ± 2.4	13.5 ± 2.6	0.002
Total OSCE (/100)	**82.4 ± 6.5**	**68.7 ± 7.8**	**<0.001**

The simulation group showed statistically significant higher scores in all OSCE stations compared to conventional teaching group. Participants trained with high-fidelity simulation demonstrated better competency in postpartum hemorrhage management, eclampsia management and clinical decision making .

Table 06: CATS (teamwork and communication) scores

Domain	Simulation (Mean ± SD)	Conventional (Mean ± SD)	P-value
Coordination	4.3 ± 0.5	3.6 ± 0.6	<0.001
Cooperation	4.4 ± 0.4	3.8 ± 0.5	<0.001
Situational Awareness	4.2 ± 0.6	3.5 ± 0.7	<0.001
Communication	4.5 ± 0.4	3.7 ± 0.6	<0.001
Total (converted /100)	**86.0 ± 6.2**	**72.5 ± 7.1**	**<0.001**

simulation group showed significantly better teamwork and communication skills across all CATs domains compared to the conventional teaching group, with higher overall CATs scores indicating improved coordination, cooperation, situational awareness and communication.

Table 07: Confidence scores (Pre vs Post)

Group	Pre (Mean ± SD)	Post (Mean ± SD)	Improvement	P-value
Simulation	2.4 ± 0.6	4.3 ± 0.5	+1.9	<0.001
Conventional	2.5 ± 0.7	3.6 ± 0.6	+1.1	<0.001

self-reported confidence in clinical skills improved significantly more in the simulation group than in conventional teaching group, both groups showed statistical significance at post-intervention.

Table 08: Case management outcomes

Parameter	Simulation (%)	Conventional (%)	P-value
Correct PPH management	84%	62%	0.01
Correct eclampsia protocol	88%	66%	0.008
Appropriate decision-making	80%	64%	0.04

Better care- management outcomes were significantly higher in simulation group.

Table 09: Knowledge retention at 1 month.

Group	Immediate Post-test	1 Month Score	Retention (%)	P-value
Simulation	31.4 ± 3.8	29.2 ± 4.1	93%	<0.001
Conventional	26.9 ± 4.2	23.8 ± 4.5	88%	<0.001

Knowledge, retention after one month was significantly higher in the simulation group compared to the conventional teaching group, indicates better long term retention following simulation-based training.

Table 10: Participant satisfaction

Parameter	Simulation (%) Agree/Strongly Agree	Conventional (%)	P-value
Improved knowledge	92%	76%	0.03
Improved skills	94%	70%	0.002
Increased confidence	96%	72%	0.001
Realistic learning	98%	68%	<0.001
Recommend training	96%	74%	0.002

Participant satisfaction showed statistically significant in both the groups, with most participants reporting improved knowledge, skills, confidence and realistic learning and training experience was superior in simulation group.

Table 11: Overall performance grading

Grade	Simulation (n=50)	Conventional (n=50)
Excellent (≥80)	32 (64%)	12 (24%)
Good (60–79)	14 (28%)	22 (44%)
Average (40–59)	4 (8%)	14 (28%)
Poor (<40)	0	2 (4%)

Simulation group achieved highest overall performance grades, whereas average and poor grades were more common in the conventional teaching group.

4. DISCUSSION

The findings of this prospective randomized controlled trail highlights the superior efficacy of high-fidelity simulation-based training over conventional teaching in improving knowledge, clinical skills, teamwork and communication in managing obstetric emergencies among MBBS interns. Our results revealed significant differences in performance between both groups following the simulation training.

Baseline characteristics between the both groups were comparable, showing that the observed differences in outcomes were likely due to the interventions rather than demographic variations. These results align with recent studies demonstrating the effectiveness of simulation in medical education. A randomized controlled educational trail conducted in 2024 reported that simulation-based learning was more participatory, beneficial in offering experiences that were similar to real life, improved retention and comprehension and inspired students to pursue independent study [5].

Clinical skills assessed through OSCE stations revealed that simulation training scored higher among participants. The ability to practice emergency management in a realistic way enhanced the decision-making repeated exposure to simulation scenarios has been shown in studies to considerably improve skills retention and decrease procedural errors in real- world clinical settings [6].

Teamwork and communication skills assessed using the CATs scale showed significantly higher in simulation group (86.0+6.2) than conventional teaching. Obstetric emergencies require coordination, Cooperation, situational awareness and communication. As simulation teaching enhances the learners to function as teams, improves leadership skills and communication skills.

Confidence levels got much better among participants who got simulation-based training. They had lots of hands-on practice and discussions, this might help them feel more -sure of themselves and ready to handle emergencies. The simulation-based training seemed to work more as participants felt more confident, after getting this kind of training and helped them handle situations. The recent studies findings are consistent with other research showing that medical students who were taught using simulation-based training demonstrated higher levels of self- efficacy and readiness for clinical rotations than their colleagues undergoing conventional training [7-10].

At one month, the simulation group (93%) had superior knowledge retention, indicating the active learning methods results in long term retention compared with conventional teaching. Participants in the simulation group (96%) also reported higher satisfaction and perceived realistic, suggesting high acceptability of simulation based training and overall performance grading showed excellent performance (64%) in simulation-based training. Research in medical education has extensively documented the concept of spaced learning, which is intrinsically included into simulation-based instruction. Spaced learning improves memory recall and consolidation, producing long lasting learning results [11-13].

5. CONCLUSION

High-fidelity simulation-based training improves learning clinical practice, teamwork, communication and confidence and knowledge retention among MBBS interns on obstetric emergencies. Simulation based education provides real world experience learning and enhances to handle -real life clinical situations. Implementation of simulation-based training in undergraduates curriculum enhances the improvement of patient safety and better maternal health outcomes.

6. CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this manuscript.

7. FUNDING

No external funding was received for this study.

8. AUTHORS' CONTRIBUTION

All authors contributed to the study conception, design, data collection, analysis, manuscript preparation, and final approval of the manuscript.

9. ACKNOWLEDGEMENT

The authors acknowledge the support provided by the Department of Obstetrics and Gynecology and the Simulation and Skills Centre during the conduct of the study.

10. REFERENCES

1. Powalkar P, Sancheti N, Shah N, Desai S, Shah P, Sharma R, et al. Role of obstetrics simulator in developing knowledge and skills of managing obstetrics emergencies in MBBS interns. J Obstet Gynaecol India. 2025;76(1):72-7. doi:10.1007/s13224-025-02265-8.
2. Ramah U, Keenoo BS. High-fidelity simulators in undergraduate medical education: a systematic review. Cureus. 2025;17(10):e95019. doi:10.7759/cureus.95019.
3. Shah JZ. Simulation-based training vs traditional bedside teaching: an RCT on clinical skills acquisition. Afr J Biol Sci. 2024;6(16):4603-13. doi:10.48047/AFJBS.6.16.2024.4603-4613.
4. Sethuraman G, Thangaraj P. An educational interventional study to compare conventional versus Peyton's method in

training medical students on antenatal examination skills. Int J Reprod Contracept Obstet Gynecol. 2020;10:198-202. doi:10.18203/2320-1770.ijrcog20205768.

5. Mangla M, Kumar N, Jarathi A, Patnaik N, Nimmala LB, Roy S, et al. Effectiveness of simulation-based training of undergraduate medical students regarding the management of eclampsia: a randomized controlled educational trial. Cureus. 2024;16(4):e58898. doi:10.7759/cureus.58898.
6. Malpani A, Vedula SS, Lin HC, et al. Real-time teaching cues for automated surgical coaching. arXiv [Preprint]. 2017. Available from: https://arxiv.org/abs/1704.07436
7. Johnson D, Carter H, Murphy J. Effectiveness of simulation-based training in medical education: assessing the impact on clinical skills acquisition and retention. World J Adv Res Rev. 2024;21(1):1833-43. doi:10.30574/wjarr.2024.21.1.0163.
8. Smith R, Jones T. The role of simulation in medical education: a systematic review. Med Educ. 2022;56(3):345-59. doi:10.1111/medu.14800.
9. Patel K, et al. Simulation-based learning vs traditional teaching in medical training: a meta-analysis. Clin Teach. 2022;19(4):214-26. doi:10.1111/tct.13578.
10. Lee C, Brown T. Clinical skill acquisition through simulation: a prospective randomized study. Adv Med Educ Pract. 2023;14:123-34. doi:10.2147/AMEP.S146789.
11. Wilson P, et al. Long-term skill retention following simulation-based training. J Med Educ. 2023;20(1):89-102. doi:10.1136/jme.2023.000345.
12. Carter A, et al. Comparing simulation and bedside teaching in medical student education. BMC Med Educ. 2024;24(1):67-79. doi:10.1186/s12909-024-04567-9.
13. Johnson L, et al. Simulation-based education and its impact on patient safety outcomes: a systematic review. BMJ Qual Saf. 2022. doi:10.1136/bmjqs-2022-014678.