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Original Research Article

Introducing Case Scenario-Based Learning in Obstetrics and Gynaecology: Enhancing Critical Thinking among Undergraduate Medical Students

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Abstract

Background: Critical thinking is a cornerstone of medical education, yet traditional lecture-based methods often limit active engagement and problem-solving. Case scenario-based learning (CSBL) has emerged as an innovative teaching strategy to bridge the gap between theory and practice in clinical disciplines.

Objective: To evaluate the effectiveness of CSBL in enhancing critical thinking, clinical reasoning, and student engagement among undergraduate medical students (MBBS Phase 3 Part 2) in Obstetrics and Gynaecology.

Methods: A prospective interventional study was conducted at Government Medical College, Patiala, over five months. A total of 226 undergraduate students and senior residents participated. Teaching sessions were redesigned using case scenarios, followed by assessments with pre- and post-intervention multiple-choice tests. Feedback from students and faculty was collected using structured Likert scale questionnaires. Data were analyzed using the Chi-square (χ^2) test, and Relative Risk (RR) and Risk Difference (RD) were calculated to assess improvement in performance.

Results: The post-intervention analysis revealed a statistically significant improvement in learning outcomes across all ten CSBL sessions ($p < 0.05$). The proportion of students scoring ≥ 75 % increased by 11 %–40 % (risk difference), with students being 1.2–1.9 times more likely to achieve higher scores after CSBL (relative risk = 1.16–1.87). Student feedback demonstrated marked enhancement in attentiveness (95 %), confidence (98 %), interaction (96 %), and satisfaction (97 %). Faculty responses were similarly positive, with 90 % reporting improved engagement and motivation to innovate their teaching style. Key challenges included time constraints in preparing cases and resistance from some faculty accustomed to traditional methods.

Conclusion: CSBL proved to be a highly effective and statistically significant pedagogical tool in obstetrics and gynaecology, enhancing knowledge application, critical thinking, clinical decision-making, and learner engagement. Its integration into undergraduate curricula can bridge theoretical and practical gaps, fostering interactive, clinically relevant learning experiences for both students and faculty.

Keywords: Case Scenario-Based Learning, Critical Thinking, Obstetrics And Gynaecology Education, Medical Undergraduates, Active Learning, Clinical Reasoning.

Introduction

Critical thinking is a fundamental competency in medical education, equipping future physicians with the ability to analyze, evaluate, and apply knowledge in complex clinical settings. In the context of healthcare, where practitioners must navigate challenges such as disease prevention, rapid technological advances, environmental hazards, and socioeconomic disparities, traditional didactic approaches often fall short in preparing students for real-world decision-making [1]. Conventional lecture-based methods are largely teacher-centered, emphasizing memorization and recall rather than problem-solving or contextual application. This approach limits student engagement, reduces opportunities for active participation, and inadequately fosters the higher-order cognitive skills required in modern healthcare practice [2]. To address this gap, innovative pedagogical models such as problem-based learning (PBL) and case scenario-based learning

(CSBL) have been widely introduced in health professions education. CSBL presents learners with structured clinical cases that mirror real-world situations, requiring them to engage in active reasoning, reflection, and decision-making. This method has been shown to promote deeper understanding, enhance retention, and improve the transferability of knowledge from the classroom to clinical practice [3,4]. By emphasizing contextualized and interactive learning, CSBL bridges the gap between theory and practice, aligning with the educational need to prepare graduates for complex clinical encounters.

Evidence supports the effectiveness of case-based and scenario-driven learning in improving critical thinking, clinical reasoning, and learner satisfaction across medical disciplines. Systematic reviews highlight that students not only enjoy this method but also perceive it as more effective in reinforcing knowledge and developing problem-solving skills compared to traditional lectures [5,6]. In obstetrics and gynaecology, where clinical decisions often involve multifactorial considerations, CSBL has been reported to improve motivation, satisfaction, and confidence among learners [8,9]. Additionally, structured scenario analysis has been shown to enhance clinical reasoning and decision-making in undergraduate students, underscoring the value of CSBL as a transformative teaching strategy [7]. Given this growing evidence base, the present study was conducted to evaluate the impact of case scenario-based learning in undergraduate obstetrics and gynaecology teaching. Specifically, the study aimed to assess student perceptions, critical thinking outcomes, and faculty acceptance of CSBL as an alternative to traditional lecture-based teaching.

Materials and Methods

This prospective interventional study was conducted in the Department of Obstetrics and Gynaecology at Government Medical College (GMC), Patiala, over a duration of five months. Prior approval for the project was obtained from the ACME faculty, followed by clearance from the Institutional Ethical Committee (Reference No. Trg 9(310)2024/28118 dated 13/09/2024).

The study population comprised MBBS Phase 3 Part 2 undergraduate students enrolled in the theory batch for the academic year 2024, along with senior residents from the department who voluntarily participated. A total of 226 students were included. Participation was open to all students willing to be part of the study, while those absent from any session or unwilling to participate were excluded.

Teaching sessions were restructured using CSBL. Instead of conventional lectures, selected topics were taught through clinical case presentations designed to stimulate critical thinking and problem-solving. Each session was followed by a formative assessment using multiple-choice questions (MCQs). During the initial four sessions, assessments were conducted using paper-based MCQ tests, while subsequent sessions employed QUIZZIZ, a digital teaching platform, to enhance interactivity and real-time evaluation.

The effectiveness of CSBL was evaluated through pre-test and post-test assessments. Students first attempted a set of MCQs prior to the case-based lecture (pre-test) and were reassessed with a comparable set of MCQs after the session (post-test). Scores from these tests were analyzed to determine improvement in knowledge acquisition and critical thinking.

In addition to academic performance, student perceptions were evaluated through a structured feedback questionnaire based on a five-point Likert scale (1 = strongly disagree to 5 = strongly agree). The questionnaire assessed domains such as knowledge gain, interaction, attentiveness, confidence, interest, and overall satisfaction with the teaching method.

Faculty members of the department were also sensitized to the CSBL approach, and their perspectives were captured using a similar Likert scale-based feedback form. Items focused on comfort in facilitating case-based sessions, perceived enhancement of teaching, adaptability, and willingness to continue using this method.

Statistical Analysis: Data were compiled and analyzed using Microsoft Excel and IBM SPSS Statistics version 26. Descriptive statistics were applied to calculate frequencies and percentages for categorical variables derived from Likert-scale questionnaires. Pre- and post-intervention test scores were compared to assess the effectiveness of case scenario-based learning (CSBL). For inferential analysis, the proportion of students scoring ≥ 75 % before and after CSBL sessions was compared using the Chi-square (χ^2) test. The magnitude of improvement was further quantified using Risk Difference (RD) and Relative Risk (RR) with corresponding p-values. A p-value < 0.05 was considered statistically significant. Graphical representations were generated to depict trends in pre- and post-test performance and student–faculty feedback.

Results

A total of 226 MBBS Phase 3 Part 2 undergraduate students participated in the study, and all completed the pre- and post-test assessments as well as structured feedback forms. Feedback was also obtained from five faculty members following sensitization to CSBL approach. These results were analyzed both descriptively and inferentially to

evaluate changes in knowledge acquisition, engagement, and perception.

Student feedback: Student responses to the Likert scale questionnaire are summarized in Table 1. Overall, CSBL was highly appreciated by learners. Nearly all participants (98%) reported improvement in their knowledge base, while 96% acknowledged enhanced interaction during lectures. Confidence levels increased in 98% of students, and 95% indicated that they were more attentive during CSBL sessions.

Moreover, 97% expressed greater interest and satisfaction with this method of teaching. The graphical representation of these responses is shown in Figure 1, which illustrates the consistently high ratings across all domains.

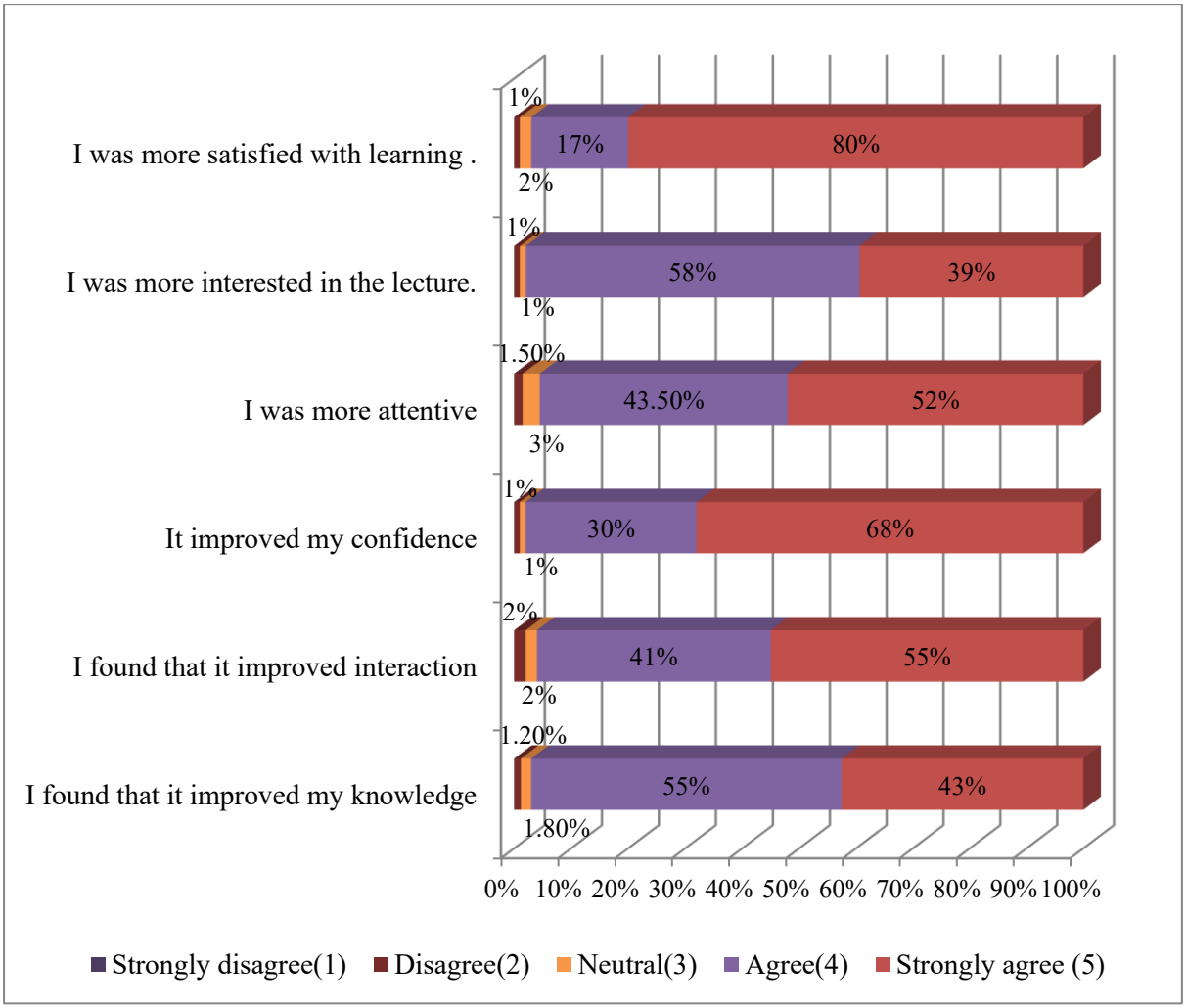

Figure 1: Graphical representation of student feedback on case scenario-based learning using a five-point Likert scale

Table 1: Student feedback on case scenario-based learning (n = 226) using a five-point Likert scale.

S. No	Question	Strongly agree (5)	Agree (4)	Neutral (3)	Disagree (2)	Strongly disagree (1)
1	I found that it improved my knowledge	43%	55%	1.8%	1.2%	0
2	I found that it improved interaction	55%	41%	2%	2%	0%
3	It improved my confidence	68%	30%	1%	1%	0%
4	I was more attentive	52%	43.5%	3%	1.5%	0
5	I was more interested in the lecture	39%	58%	1%	1%	0%
6	I was more satisfied with learning	80%	17%	2%	1%	0%

Faculty feedback: Faculty responses are detailed in Table 2. Most respondents (87%) reported feeling comfortable facilitating case-based sessions, and 91% indicated that the method enhanced their teaching experience and interaction with students. Approximately 90% noted that CSBL helped

maintain clinical relevance, and 87% expressed willingness to conduct further sessions using this approach. Importantly, 90% of faculty members felt motivated to innovate or modify their teaching style after being exposed to CSBL. These findings are further illustrated in Figure 2, which demonstrates the distribution of responses across different domains.

Table 2: Faculty feedback on case scenario-based learning (n = 5) using a five-point Likert scale

S. No.	Question	Strongly Agree (5)	Agree (4)	Neutral (3)	Disagree (2)	Strongly disagree (1)
1	I felt comfortable facilitating case scenario-based teaching.	15%	72%	8%	5%	0%
2	I felt this method enhanced my teaching experience and interaction with students.	63%	28%	5%	4%	0%
3	Case scenarios – based teaching helped me focus on clinical relevance while teaching.	25%	65%	6%	4%	0%
4	The time allocated for conducting and discussing case Scenarios were sufficient.	23%	60%	11%	6%	0%
5	I found it easy to adapt to this teaching method compared to traditional approaches.	56%	33%	6%	5%	0%
6	I am willing to conduct more sessions using case scenario-based teaching in the future.	48%	39%	5%	8%	0%
7	This teaching method motivated me to innovate or modify my approach to teaching.	20%	70%	7%	3%	0%

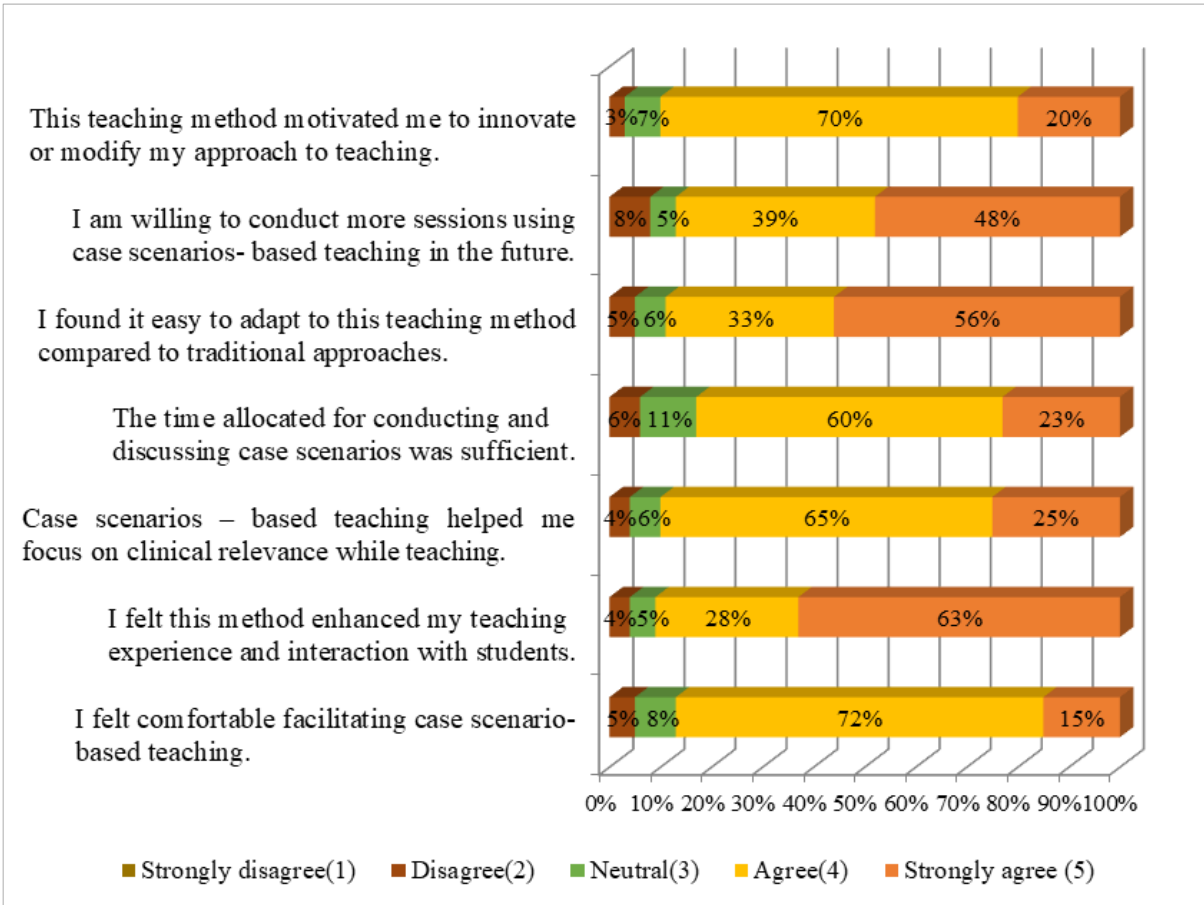

Figure 2: Graphical representation of faculty feedback on case scenario-based learning using a five-point Likert scale.

Pre- and post-test performance: Student performance analysis demonstrated significant gains following the introduction of CSBL. Pre-test scores, obtained prior to case-based lectures, were modest, whereas post-test assessments consistently revealed marked improvement. More than 75% of students achieved scores above 75% in post-tests, compared to substantially lower proportions in pre-tests. The trend of rising scores across ten consecutive sessions is depicted in Figure 3, which shows a consistent upward trajectory in post-test performance, underscoring the effectiveness of CSBL in reinforcing knowledge acquisition and critical thinking.

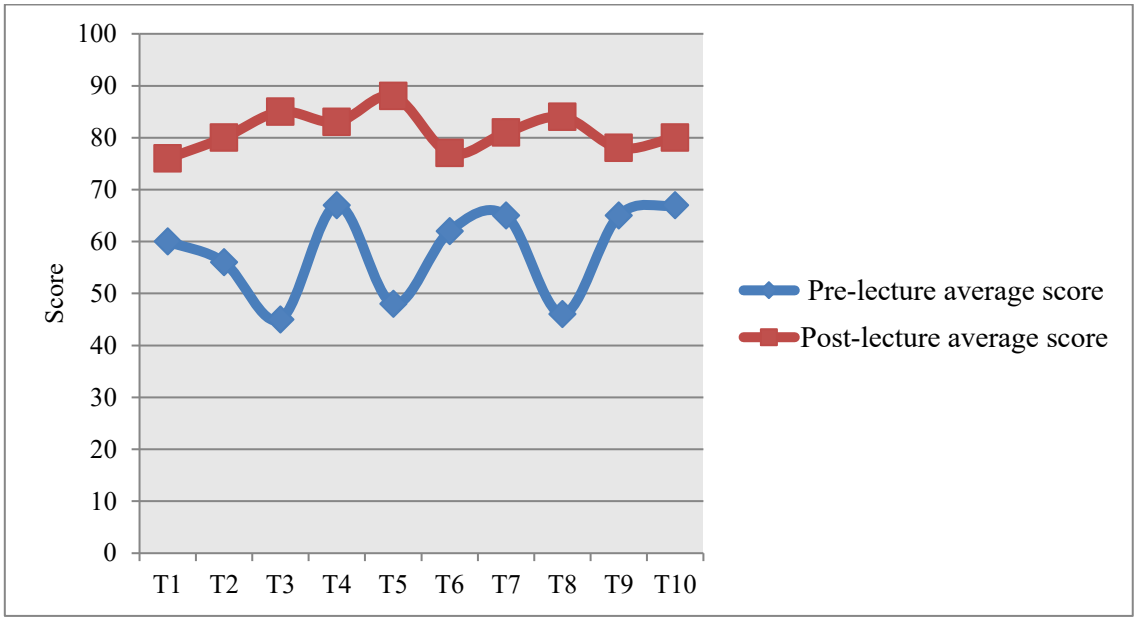

Figure 3: Comparison of pre-test and post-test performance of students (T1–T10) showing significant improvement after implementation of case scenario-based learning.

To objectively assess academic improvement, pre-test and post-test scores were compared across ten consecutive CSBL sessions. The analysis revealed a statistically significant enhancement in performance in all sessions ($p < 0.05$), as shown in Table 3. The relative risk (RR = 1.16–1.87) and risk difference (RD = +11 % to +40 %) confirmed a consistent and meaningful learning gain among students, underscoring the positive impact of CSBL on critical thinking and knowledge application.

Table 3: Comparison of pre-test and post-test performance of students across ten CSBL sessions (N=226)

Test	Pre>=75% (n, %)	Post >= 75% (n, %)	RD (%)	RR	χ^2 value	p value
T1	136 (60%)	174 (77%)	+17	1.28	11.6	<0.001
T2	124 (55%)	181 (80%)	+25	1.45	18.9	<0.001
T3	102 (45%)	192 (85%)	+40	1.87	22.3	<0.001
T4	156 (69%)	188 (83%)	+14	1.20	10.8	<0.001
T5	111 (49%)	199 (88%)	+39	1.80	21.4	<0.001
T6	140 (62%)	176 (78%)	+16	1.26	12.0	<0.001
T7	148 (66%)	176 (78%)	+12	1.18	8.1	<0.001
T8	108 (48%)	190 (84%)	+36	1.75	19.6	<0.001
T9	149 (66%)	179 (79%)	+13	1.20	9.9	0.0016
T10	156 (69%)	181 (80%)	+11	1.16	7.4	0.0069

RD= Risk Difference; RR= Relative Risk; χ^2 = Chi-square statistic

Overall observations: The study findings clearly demonstrate that CSBL enhanced student engagement, attentiveness, confidence, and satisfaction while also being well-received by faculty as a feasible and enriching teaching strategy. While preparation time and resistance from some faculty members were noted as challenges, these were outweighed by the demonstrable improvement in student learning outcomes and the overall positive reception. Qualitative feedback from both students and faculty was organized into a SWOC analysis, summarizing the perceived strengths, weaknesses, opportunities, and challenges of case scenario-based learning (Table 4).

Table 4: SWOC analysis of case scenario-based learning in obstetrics and gynaecology

Strengths	Weaknesses	Opportunities	Challenges
Enhances critical thinking and problem-solving	Time-consuming for instructors	Integration with technology	Resistance to change from traditional methods
Bridges theory and practice	Dependent on faculty expertise	Scalability for large groups	Assessment challenges due to subjectivity
Increases student engagement	Limited resources in some settings	Cross-disciplinary application	Inadequate student preparation
Promotes patient safety	Uneven participation in groups	Encourages student collaboration	Technological barriers in low-resource settings
Flexible and versatile for different topics	Requires careful preparation	–	–

Discussion

The present study demonstrated that CSBL is an effective pedagogical tool for enhancing critical thinking and clinical reasoning among undergraduate medical students in obstetrics and gynaecology. Feedback from students and faculty, coupled with improved performance on post-test assessments, supports the conclusion that CSBL fosters active learning, engagement, and knowledge retention.

Student feedback (Table 1; Figure 1) highlighted that nearly all participants found CSBL to improve knowledge acquisition, confidence, attentiveness, and satisfaction. These findings are consistent with prior research in health professions education, where case-based learning has been shown to bridge the gap between theoretical knowledge and practical application [2,6]. The observed improvements in attentiveness and confidence suggest that students were more motivated to participate in learning when exposed to real-world clinical contexts, a trend similarly reported in previous studies [8,9].

Faculty feedback (Table 2; Figure 2) further emphasized the utility of CSBL. The majority of faculty agreed that the approach improved teaching quality, reinforced clinical relevance, and motivated them to innovate their methods. These results resonate with findings by Keegan (2017), who highlighted that problem- and case-based approaches stimulate not only student engagement but also faculty adaptability. However, some faculty noted time constraints and preparation challenges, issues previously acknowledged in the literature as common barriers to the widespread adoption of active learning strategies [5].

The most objective measure of CSBL's effectiveness in this study was the significant improvement in student performance on post-tests (Figure 3). The upward trajectory of scores across ten sessions demonstrates that contextualized, case-driven teaching promotes better knowledge retention and critical thinking than conventional lecture formats. The quantitative analysis further substantiated these findings. Across all ten CSBL sessions, there was a statistically significant increase in the proportion of students achieving scores ≥ 75 % ($p < 0.05$ for each session, Table 3). The relative risk values (1.16 – 1.87) indicated that students were 1.2 – 1.9 times more likely to attain higher scores following CSBL compared to pre-test performance, while the absolute gain (risk difference) ranged from +11 % to +40 %. These results highlight a consistent and meaningful improvement in cognitive performance after exposure to scenario-driven teaching. This finding aligns with previous research showing that structured scenario-based analysis improves decision-making skills among undergraduates [7]. Similarly, other studies have reported that incremental case exposure enhances problem-solving capacity, mirroring the progressive improvement observed in our cohort [3].

Overall, these results confirm that CSBL not only supports immediate academic gains but also promotes deeper cognitive engagement, preparing students to manage complex obstetric and gynaecological cases more effectively. Importantly, the adoption of CSBL required minimal infrastructural change, underscoring its feasibility as a cost-effective and sustainable teaching method in resource-limited settings.

The SWOC analysis (Table 4) highlighted that while CSBL was strongly valued for enhancing critical thinking, bridging theory with practice, and improving engagement, its implementation was limited by preparation time and reliance on faculty expertise. Similar barriers have been noted in previous studies [5,6]. The present study was conducted at a single institution with a limited duration of observation, which restricted the ability to assess long-term retention of knowledge and transfer of critical thinking skills to clinical practice. In addition, the analysis relied primarily on multiple-choice assessments, which may not fully capture the depth of clinical reasoning achieved through CSBL approach. The variability in faculty expertise and time constraints for case preparation was also recognized as minor limiting factors. Despite these limitations, the overwhelmingly positive reception from both

students and faculty underscores the transformative potential of CSBL in medical education. Future research should include multicentric trials with larger cohorts and longitudinal follow-up to evaluate sustained learning outcomes and their translation into clinical performance.

Conclusion

The present study demonstrated that case scenario-based learning (CSBL) is a highly effective and feasible pedagogical strategy for undergraduate obstetrics and gynaecology teaching. In comparison with traditional lecture-based methods, CSBL produced a statistically significant improvement in student performance across all sessions ($p < 0.05$), with learners being up to 1.9 times more likely to achieve scores ≥ 75 %. The absolute gain in high achievers ranged from 11 % to 40 %, confirming its consistent positive impact on learning outcomes.

Beyond measurable academic gains, CSBL enhanced attentiveness, confidence, interaction, and overall satisfaction among students, while also motivating faculty to adopt more interactive and clinically relevant teaching practices.

By embedding theoretical concepts within real-world clinical scenarios, CSBL bridged the gap between rote learning and critical thinking, equipping students with essential skills for addressing complex healthcare challenges. Given its demonstrated efficacy, minimal infrastructural adjustments, ease of implementation, and strong acceptance by both the students and faculty, the integration of CSBL into routine undergraduate teaching is strongly recommended to promote deeper understanding, problem-solving ability, and clinical decision-making skills in future doctors.

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Ethical approval: Obtained from the Institutional Ethics Committee, Government Medical College, Patiala (Ref. No. Trg 9(310)2024/28118 dated 13/09/2024).

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