ORIGINAL ARTICLE

Comparative Effects of Tutor-Led and Peer-Assisted Mock Objective Structured Practical Examinations on Academic Performance and Perceptions of Undergraduate Physiology Students: A Mixed-Methods Quasi-Experimental Study

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ABSTRACT

Objective: To compare the effects of tutor-led and peer-assisted mock OSPE sessions on academic performance and student perceptions among undergraduate physiology students.

Study Design: A mixed-method quasi-experimental study.

Place and Duration of Study: The study was carried out in two study blocks (I & II) of the undergraduate MBBS physiology course at CMH Multan Institute of Medical Sciences, Multan, Pakistan from January 2024 to June 2024.

Methods: The experimental group (N=137) participated in weekly mock Objectively Structured Practical Examinations in Block II, while the control group (N=137) followed the conventional laboratory practical routine. Students in the experimental group were further divided into tutor-led (N=67) and peer-assisted (N=70) mock OSPE sub-groups. Summative OSPE scores of Blocks I and II were compared within and between groups via Student's t-test. Perceptions of performing students and peer assessors regarding feedback quality were assessed through questionnaires with Likert-scale items and open-ended questions, with the qualitative data analyzed thematically.

Results: The introduction of mock OSPE significantly improved the academic performance of the experimental group in Block II compared to Block I (*P*<0.001). Also, the experimental group performed significantly better than the control group in Block II (*P*<0.001). There was no significant difference in OSPE scores between the tutor-led and peer-assisted subgroups within the experimental group (*P*=0.54). Students in the experimental group reported improved exam preparedness, skill development, and self-reliance with both feedback types, although tutor-led feedback was associated with higher satisfaction (*P*=0.02). Peer assessors highlighted the collaborative learning benefit, though concerns about feedback quality were expressed.

Conclusion: Mock OSPE with formative feedback enhanced academic performance. Peer feedback additionally promoted collaborative learning and personal growth. Concerns about peer feedback quality highlighted the need for quality assurance in peer-assisted assessments.

Keywords: *Academic Performance, Feedback, Formative Feedback, Physiology, Learning.*

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Introduction

Formative assessment is integral to teaching and learning, as it engages students in a reciprocal relationship with their learning process.[1] This approach contributes to students' motivation and self-assessment by fostering a sense of autonomy, competence, and relatedness.[1,2]

In recent years, technological advancements have led to the development of digital self-assessment

tools that support knowledge-based learning.[3] However, formative assessment options for skills and psychomotor domains remain limited in medical education.[4] Despite the recognized importance of hands-on competence in preparing students for clinical practice, many undergraduate programs continue to rely on summative practical exams with limited feedback. This gap leaves students underprepared for real-world clinical application. This underscores the need for methods such as mock Objective Structured Practical Examinations (OSPEs) that can combine feedback with deliberate skill practice.

Mock OSPEs, as a form of formative assessment, have emerged as an effective strategy for assessing students' practical skills, clinical competence, and application of theoretical knowledge.[5] This method provides students with an opportunity to practice in a realistic examination environment, receive timely feedback, and reflect on their performance. However, the conduct and quality of feedback from OSPEs largely determine their educational value.[6]

Traditionally, tutor-led OSPEs have been the standard approach in medical education, with experienced faculty members supervising and guiding students through the examination process.[7] While this method provides a structured and practical learning experience, it demands considerable time and effort from faculty, making it resource-intensive.[8]

Given these challenges, exploring alternative approaches to formative assessment is essential. To achieve the full potential of formative assessments, integrating feedback from tutors, peers, and self-assessment is essential.[8] Self- and peer assessment engage students in a metacognitive process that encourages reflection and critique of their own or others' learning.[8] In response to the evolving needs of medical education, peer-assisted mock OSPEs are gaining traction as a solution to increasing medical student populations and limited teaching resources.[5,9]

Peer-assisted mock OSPEs distribute the assessment workload more evenly while maintaining assessment quality.[10] Peer-assisted OSPE not only addresses assessment needs but also fosters a collaborative learning environment.[11] Collaborative learning, including peer feedback and interaction, has been shown to enhance students' learning outcomes.[10] Unlike tutor-led sessions, where feedback is expert-driven and one-directional, peer-assisted OSPEs encourage mutual reflection and dialogue, helping both assessors and performers develop more profound insight into learning processes. Moreover, assuming roles such as examiner, patient, or student enhances participants' professional and teaching skills.[12]

Because both mock OSPEs and peer-assisted approaches are rarely used in undergraduate medical education in Pakistan, there is a clear need to assess their feasibility and effectiveness in this context. Considering the usefulness of a peer-assisted collaborative approach, we implemented a nine-week series of parallel tutor-led and peer-assisted mock OSPEs in undergraduate Physiology at a private medical college.

This study aimed to assess student perceptions and compare the impact of tutor-led and peer-assisted mock OSPEs on summative exam performance of undergraduate Physiology students. By addressing the local evidence gap, this study provides educators and administrators with insights to design best practices that promote desired competencies within available resources.

Methods

This quasi-experimental study was conducted during academic Block I & II of the 2nd year MBBS, 2024 session at CMH Multan Institute of Medical Sciences, Multan, Pakistan from January 2024 to June 2024. Ethical approval was obtained from the Institutional Review Board and Ethical Committee (IRB&EC) on 9th January 2024, vide letter no: TW/51/CIMS.

A total of 274 2nd year MBBS students were included in the study, consisting of N=137 from session 2023 (control group) and N=137 students from session 2024 (experimental group). The sample size was chosen based on logistical constraints and the fixed number of students enrolled in the module. All students of the 2024 session who gave written informed consent were included, while those with less than 50% attendance or absent from summative OSPEs were excluded.

The control group had a traditional laboratory practical setting for both Block I and II. Each practical

session included faculty demonstrations, student practice, and brief, informal feedback. The same routine was followed by the experimental group during Block I, which served as the baseline phase for comparison.

In Block II, the experimental group received the active intervention in the form of weekly mock OSPE practice sessions conducted alongside regular laboratory practical. Before the intervention, an interactive orientation was held to explain the objectives, structure, and feedback process. A standardized feedback rubric was introduced, and both faculty and students were trained to use it for consistent evaluation.

Two to four mock OSPE stations were arranged weekly throughout Block II. Each station required students to perform a skill-based task under time constraints similar to the final summative OSPE. Students in the experimental group were further divided into the following subgroups by a random sampling technique; Tutor-led Mock OSPE batch (N=67): Performing students obtained feedback from the tutor based on a provided rubric; Peer-assisted Mock OSPE batch (N=70): Performing students obtained feedback from peers, based on a provided rubric.

The weekly session facilitator randomly assigned these roles to the students, ensuring that the majority of students in the experimental group either performed or peer-reviewed during Block II. Students performed mock OSPE and received verbal feedback in front of the entire subgroup and facilitators to enhance the learning experience for all.

After each session, both performers and peer assessors completed an anonymous questionnaire assessing the perceived quality of feedback. The pre-validated tool comprised six Likert-scale items (scored 1–5) and two open-ended questions to capture qualitative feedback on the learning experience (Annexure 1).[13]

For performance comparison, summative OSPE scores of the experimental group were compared between Block I (pre-intervention) and Block II (post-intervention) to assess the effect of the intervention. To compare the two feedback modalities, Block II OSPE scores of tutor-led and peer-assisted subgroups were also analyzed. To minimize the impact of block or cohort differences, Block II scores of the control and experimental groups were compared. Block I scores were compared to ensure baseline equivalence.

All the analysis were carried out using SPSS version 26. Continuous data were summarized as mean and standard deviation, while categorical data were presented as frequencies and percentages. Graphical representation was done via bar charts.

Summative OSPE scores of control and experimental groups were compared by an independent sample t-test. Within-group comparisons of Block I and II summative scores were made by paired sample t-test. The Mann-Whitney U test was applied for comparison of perceived quality of feedback among groups on the Likert scale, subjected to the assumption of independence. Qualitative data from open-ended responses were analyzed through thematic analysis to identify and describe emerging patterns.[14]

Results

The Block II OSPE scores of the tutor-led subgroup (81.41 ± 10.32) did not differ significantly from those of the peer-assisted subgroup (80.31 ± 10.77) within the experimental group ($P = 0.54$). However, the experimental group scored significantly higher ($P<0.001$) in Block II (80.84 ± 10.53) after the introduction of the mock OSPE, compared with Block I (60.02 ± 8.37). The experimental group also scored significantly higher ($P<0.001$) in Block II (80.84 ± 10.53) than the control group (60.32 ± 11.62). No significant difference was found between the control (57.62 ± 12.42) and experimental (60.02 ± 8.37) mean OSPE scores in Block I ($P = 0.28$) (Figure. 1).
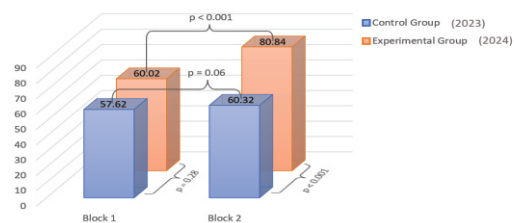

Fig.1: Comparison of summative OSPE scores between control and experimental groups
Control group: No intervention, Experimental group: Mock OSPE intervention during Block II
P-value significant at <0.05, computed for the t-test

The perception of peer assessors regarding peer feedback practice in the experimental group showed that most students strongly agreed that providing peer feedback helps improve OSPE skills (60%) and understanding of the OSPE procedure (58.2%). Also,
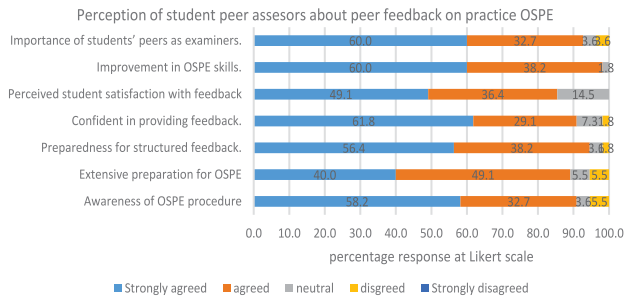
Perception of student peer assesors about peer feedback on practice OSPE

Importance of students' peers as examiners.	60.0	32.7	3.6 3.6
Improvement in OSPE skills.	60.0	38.2	1.8
Perceived student satisfaction with feedback	49.1	36.4	14.5
Confident in providing feedback.	61.8	29.1	7.3 1.8
Preparedness for structured feedback.	56.4	38.2	3.6 1.8
Extensive preparation for OSPE	40.0	49.1	5.5 5.5
Awareness of OSPE procedure	58.2	32.7	3.6 5.5

0.0　10.0　20.0　30.0　40.0　50.0　60.0　70.0　80.0　90.0　100.0
percentage response at Likert scale

■ Strongly agreed　■ agreed　■ neutral　■ disgreed　■ Strongly disagreed

Fig.2: Perception of peer assessors about peer feedback on mock OSPE in the experimental group (N=55)

more than half of the students strongly admitted that they felt prepared and confident while giving feedback. (Figure. 2).

The second part of this study searched for the answer regarding the effectiveness of tutor vs. peer feedback. The perception of students in the experimental group towards tutor vs peer feedback on mock OSPE showed that both subgroups strongly agreed on improvement in their knowledge and OSPE skills, stating that feedback on mock OSPE helped improve their communication skills too. However, students in the tutor-led mock OSPE group were significantly more satisfied (P=0.02) and strongly agreed with the importance of feedback (P=0.02) than those in the peer-assisted batch. (Table 1).

Table 1: Comparison of perception about tutor vs peer feedback on mock OSPE in experimental group

Feedback	Tutor Feedback Mean± SD (N=58)	Peer Feedback Mean± SD (N=55)	Man Whitney test statistic	*P*-value
The feedback after the OSPE station was helpful	1.22± 0.42	1.42± 0.6	1853	0.06
I think it is important to use feedback from tutors/peers	1.43± 0.53	1.8± 0.85	1951.5	0.02*
I believe that getting feedback improves communication skills	1.5± 0.73	1.5± 0.63	1633.5	0.80
I was satisfied with the feedback from OSPE examiners (tutor/peers)	1.45± 0.57	1.78± 0.76	1968	0.02*
The knowledge gained after OSPE feedback was high	1.38± 0.52	1.35± 0.48	1559	0.80
Examiner feedback on OSPE has helped to improve my skills	1.33± 0.47	1.49± 0.6	1797	0.17

The qualitative analysis revealed positive outcomes for both tutor-led and peer-assisted feedback. Participants highlighted improved collaboration, confidence, and interaction with peer feedback. They found it valuable for enhancing self-assessment. However, concerns emerged about the professionalism, bias, and reliability of peer evaluations. Some learners also reported emotional strain and time-related difficulties during feedback sessions. (Table 2).

Discussion

This study investigated the impact of tutor-led versus peer-assisted mock OSPEs on the academic performance and perceptions of undergraduate

Physiology students. Results highlighted the potential benefits and challenges of incorporating peer-assisted learning strategies into undergraduate medical education.

Our results revealed a significant improvement in the experimental group's academic performance following the introduction of mock OSPEs. This finding underscores the educational value of OSPEs as a formative assessment tool. The practical and clinical competencies assessed through OSPEs can bridge the gap between theoretical knowledge and its practical application, a critical aspect of medical education. Our results align with previous research highlighting the positive impact of practice OSPEs on

Table 2: Perception of peer assessors and performing students about tutor vs peer feedback on mock OSPE in the experimental group

Overarching Theme	Subtheme	Peer Assessors	Representative Descriptions Tutor-Assessed Learners	Peer-Assessed Learners
Learning Experience and Skill Development	Comfort and Interaction	"Helps to relax the performing candidate" "Provides a better understanding and comfortable environment."	"Interactive and can ask queries." "Better communication."	"More comfortable environment." "Less hesitation with peers."
	Confidence and Self-awareness	"Helps to gain confidence." "Self-assessment of mistakes."	"Self-awareness of areas of deficiency." "Boosts confidence."	"Decreases exam anxiety." "Self-awareness of mistakes and weaknesses."
	Performance and Skill Enhancement	"A better understanding of the procedure, as per protocol." "Practice OSPE beforehand, makes exam preparation easier."	"Better preparation and performance in exams." "Improved OSPE skills."	"A better understanding of marks distribution improves confidence."
	Collaboration	"Peers can discuss with each other and learn by themselves."	-	"Learning from others mistakes", "Improved OSPE skills for both the performer and assessor"
Challenges in Feedback	Professionalism issues	"May show casual behaviour." "Lack of serious attitude."	-	"Casual behavior and undue favoritism". "Peers may be biased."
	Reliability Concerns	"The peer may lack knowledge." "Less experienced, so that scores may be biased by poor judgment."	-	"Peers might not be able to grade perfectly being less experienced than faculty."
	Emotional Management	-	"Time-consuming." "Embarrassment."	-

Categories used to code the content of qualitative data (Tutor Feedback in control group N = 67, Peer-feedback in experimental group N = 70)

student learning outcomes.[5,15]

Comparing tutor-led and peer-assisted mock OSPEs, we found no significant difference in academic performance between these two groups. This suggests that both tutor and peer feedback can effectively contribute to student learning and improvement. However, it's noteworthy that students who received tutor feedback reported higher satisfaction and a stronger belief in the importance of feedback. This outcome is consistent with previous studies that emphasize the role of expert guidance in providing structured, valuable feedback.[16,17]

Our study highlighted the collaborative learning environment fostered by peer-assisted mock OSPEs. Students in this group reported a more comfortable atmosphere, reduced hesitation when interacting with peers, and improved communication. This aligns with the literature on the advantages of collaborative learning, emphasizing the role of peer interaction in enhancing critical thinking and problem-solving skills.[8,13,15]

Furthermore, peer-assisted and tutor-led mock OSPEs positively impacted skill development. Students reported increased confidence, enhanced skills, and greater self-awareness of their strengths and weaknesses. This finding underscores the holistic benefits of peer-assisted learning, not only for academic performance but also for professional skill development.[18,19]

It's crucial to acknowledge the concerns raised in our study, particularly regarding the quality of peer feedback. Students expressed apprehensions about the accuracy and effectiveness of peer assessments. This is a valid concern, as peer feedback must be carefully monitored and guided to ensure its reliability.[20] Implementing quality assurance mechanisms and training for peer assessors are essential to ensuring the success of peer-assisted learning initiatives.[10,17]

This study has several limitations. Firstly, the short duration of the study may not capture long-term effects. Future research should explore the sustainability of the observed benefits. Additionally, the study was conducted at a single institution, limiting generalizability. A multicenter study could provide more comprehensive insights. Despite its limitations, the mixed-methods approach in this study has highlighted in depth the potential benefits and challenges of integrating peer-assisted learning strategies into medical curricula, ultimately enriching medical students' educational experiences.

Conclusion

This mixed-method study demonstrated that mock OSPEs followed by feedback provide valuable opportunities for mutual learning. Such sessions enhance students' confidence, skill development, and self-reliance. While tutor-led and peer-assisted approaches were equally effective in improving academic performance, tutor feedback was perceived as more reliable. Peer-assisted OSPEs also fostered collaboration and active engagement. However, concerns about the quality of peer feedback highlight the need for proper training and quality assurance mechanisms.

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Author Contributions

FI: Conception and design of the work

AS: Writing the original draft, proofreading, and approval for final submission

SA: Revising, editing, and supervising for intellectual content

IA: Data acquisition, curation, and statistical analysis

II: Manuscript writing for methodology design and investigation

MAR: Validation of data, interpretation, and write-up of results

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