



Effectiveness of Objective Structured Practical Examination as an Assessment Method for Indian Medical Graduates: A Pilot Project Carried Out in Pathology at a Medical College in Western India

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Abstract

Background

Practical assessment plays a vital role in medical education. Traditional Practical Examination (TPE) assesses only the knowledge of students without providing constructive feedback. The Objective Structured Practical Examination (OSPE) is a structured, objective, and unbiased tool for assessment. It evaluates all domains of Miller's pyramid with a few limitations. This study assesses the effectiveness of OSPE compared to TPE for second-year MBBS students in Pathology practical exams as an assessment tool in our hospital settings. It also aims to analyze the perceptions of students and faculty regarding OSPE.

Material and Methods

A hospital-based prospective study was conducted during internal practical exams of second-year MBBS students in the Pathology department of a tertiary care hospital, Ahmedabad, Gujarat, India. A total of 115 students and 13 faculty members were enrolled. After a sensitization session, OSPE was conducted alongside traditional exams with the same set of faculty at the same time in the same lab. Feedback was collected from both students and faculty. Marks obtained and perceptions of both methods were compared.

Results

The marks obtained by students using TPE and OSPE had a median of 12.5 with an IQR of 3 and a median of 15 with an IQR of 2, respectively. The p-value was highly significant, suggesting better marks scored by students in OSPE. According to students' perceptions, the majority felt that OSPE is better, well-structured, unbiased, and less stressful compared to TPE. Most faculty members also gave positive feedback for OSPE.

Conclusion

Both students and faculty have a positive approach towards OSPE as it assesses almost all types of practical skills with the ability to provide feedback. It reduced stress and allowed students to achieve higher marks. They recommended OSPE in the formative assessment of medical students.

Keywords:

OSPE, traditional practical examination, internal assessment, validity

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Introduction

As per CBME in medical education, assessment is a continuous process that has equal importance as education to medical students. Students' learning is evaluated by theory and practical tests periodically. Traditional practical examination (TPE) includes practical lab exercises and viva voce, all of which have many challenges like subjectivity, standardization, examiner bias, reliability, practical utility, and poor inter-rater reliability. In addition to it, TPE focuses on cognitive domains (knows and knows how level) and lacks structure and standardization [1,2]. In TPE, the examiner assesses only the knowledge level of students on exercises; he or she cannot assess the students by seeing them in action. Further, the subjectivity in traditional methods also affects the correlation between marks awarded by different examiners, leading to bias and negatively affecting students' skill acquisition [2,3]. Traditional methods have limited learning outcomes with no scope to give feedback to students. So, there is a need for implementing a novel tool in formative assessments and, if found feasible, to include it in summative assessment at the university level to make examinations more effective [2-4].

Objective Structured Practical Examination (OSPE) is an innovative evaluation tool that helps overcome these difficulties. OSPE was described in 1975 by Harden et al. [5]. It is derived from the objective structured clinical examination (OSCE) and used for evaluating basic sciences, preclinical, and para-clinical subjects [5]. It can be used for student assessment in which competencies are evaluated in a comprehensive, consistent, and structured manner. It is a promising tool for appropriate practical assessment of IMGs as all relevant practical skills can be assessed. It is objective and structured, so examiner bias can be avoided. It also helps to align methods of assessment with learning objectives, which is a main part of any practical assessment method in medical education. It can be organized in a standardized manner, so it can assess all teaching goals. Thus, it improves the quality of practical skills acquisition of medical students like performing practical exercises, interpretation of clinical data, or problem-solving skills in a precise, standard, and valid manner [1].

OSPE can assess all learning domains (cognitive, affective, and psychomotor), particularly the “shows how” level of Miller’s pyramid, in a reliable and valid manner. In OSPE, students can give their perceptions, and they are given constructive feedback on their practical skills with strengths and weaknesses to work upon to improve their clinical abilities [1,6]. Faculties' perceptions can also be taken, and their suggestions can be incorporated to enhance the structure, feasibility, and implementation of OSPE. However, it has many drawbacks like it is a complex method, difficult to plan, resource-intensive, and time-consuming assessment method [2,7].

This study is to assess the effectiveness of OSPE as an innovative assessment method for IMGs at the pathology department of the hospital, along with an analysis of the perceptions of faculties and students regarding OSPE.

Aims and Objectives: To assess the effectiveness of OSPE as an innovative assessment tool compared to TPE for IMGs in the Pathology department of the Hospital. To analyze the perceptions of faculties and students regarding OSPE.

Materials and Methods

Study type: Prospective hospital-based. Study period: August to December 2023. Study place: Department of Pathology, tertiary care hospital, Ahmedabad, Gujarat, India. Study subjects: 2nd-year MBBS students (n=115) and faculty (n=13)

Inclusion criteria: All 2nd-year MBBS students who appeared for the OSPE in this study were included.

Exclusion criteria: Those students who didn't appear for the OSPE or were absent and not willing to participate in the study were

excluded.

All participating students and faculty were sensitized about preparation, structure, marking scheme with a checklist of scoring OSPE stations, time allotted, topics, and competency covered, along with the feedback system of OSPE by taking an interactive lecture using PowerPoint. They were also informed that both types of assessments would be taken during the 2nd internal examination of the Pathology specialty at the same location, with the same course, at the same time. Approval was taken from the Institutional Ethics Committee for research (GCSMC/SRC/projects/APPROVE/2023 dated on 29/09/2023).

Competency (PA16.6) selected for OSPE: Prepare a peripheral blood smear and identify anemia from it. Materials provided were EDTA vacuette, glass slides, spreader, Field stain A and B, and a chart having a microphotograph of a peripheral blood smear of megaloblastic anemia.

OSPE (total marks = 20), consisting of 3 stations (2 observed procedural - 5 marks each and 1 non-observed 10 marks - case-based), was framed and conducted. Each station was allotted 5 minutes. The 1st observed station was to prepare a peripheral blood smear from the given sample. The 2nd observed station was to stain the given peripheral blood smear with Field stain. The 3rd non-observed station was a chart having a photograph of a peripheral blood smear of megaloblastic anemia, and students had to identify the type of anemia from it. A checklist for scoring of every step was prepared with the full participation of the faculty, and it was validated by 2 senior faculty members [Tables 1, 2, 3].

Table 1: OSPE Assessment (checklist for scoring) Sheet -Observed Station 1 (Max Marks 5)

Sr. No	Check list	Division of marks	Roll Numbers of students												
1.	Takes a clean, grease-free dry glass slide.	1													
2.	Mixes sample thoroughly without frothing.	1													
3.	Uses a dropper & places a small drop of blood 1cm away from the end of slide, supports the one end of slide with thumb & middle finger.	1													
4.	Places spreader in front of the blood drop at an angle of 40-45 ^o , draws spreader back, allows blood to spread along its width.	1													
5.	Maintains light, even pressure, 40-45 ^o angle, moves spreader forward with a fairly fast, gliding motion, pulling blood behind it in form of thin smear.	1													
	Total Marks	5													

Table 2: OSPE Assessment (checklist for scoring) Sheet -Observed Station 2 (Max Marks 5)

Sr. No	Check list	Division of marks	Roll Numbers of students												
1.	Treats the dried blood film with methanol for 3 minutes.	01													
2.	Dips smear in Field stain B for 2 minutes.	01													
3.	Washes in tap water, remove excess stain & allow it to dry.	01													
4.	Dips smear in Field stain A for 40-45 times.	01													
5.	Washes in tap water, remove excess stain & allow it to dry.	01													
	Total Marks	5													

For the OSPE station, the checklist was scored using yes/no for each point by the faculty, and appropriate marks were given as needed [Tables 1, 2, 3]. After finishing both assessments, feedback from students and faculty members was collected using a separate set of pre-validated questionnaires regarding the comparison of TPE and OSPE, the challenges they confronted, and their

feelings about the incorporation of OSPE as an assessment strategy in their practicals.

Table 3: OSPE Assessment (checklist for scoring) Sheet - - Non observed Station 3 (Max Marks10)

Sr. No	Check list	Division of marks	Roll Numbers of students																		
1.	Megaloblastic anemia	04																			
2.	Presence of Macroovalocytes, hypersegmented neutrophils, normoblasts with megaloblastic change.	02																			
3.	Vit B12 deficiency, folic acid deficiency, drugs, MDS, acute leukemia	02																			
4.	Bone marrow: Hypercellular with maturation arrest showing megaloblastic changes in erythroid series, giant metamyelocytes.	02																			
OSPE: Objective Structured Practical Examination, MDS: Myelodysplastic syndrome																					

Statistical analysis: Feedback was taken as a Google Form with a 5-point Likert scale. Faculty were also asked about the feasibility of OSPE in terms of feasibility, execution, resources needed, and their roles in the feedback questions. For ease of analysis, responses of disagree and fully disagree were merged into the “Disagree” category, and those of agree and fully agree were merged into the “Agree” category. There were also neutral responses, making a total of 3 categories: agree, neutral, and disagree. All three categories were expressed as percentages. Most of the observations were skewed data, so I have used a non-parametric test with the median in the study. The total number of marks obtained in TPE and OSPE was expressed as median with Interquartile Range (IQR) and compared using the Mann-Whitney U test. Results and data were prepared on Microsoft Excel sheets.

Results

A total of 115 second-year medical students enrolled in the current research. It was held during the second internal practical exams at the pathology department as a pilot project. Students' performance was measured by both evaluative modalities. During the examination, the marks obtained by students with assessment by the TPE had a median of 12.5 with an IQR of 3, whereas it was a median of 15 with an IQR of 2 in the OSPE method [Table 4]. The p-value was highly significant ($p < 0.0001$). This shows that medical students received better marks in OSPE compared to TPE.

Table 4: Comparison of marks obtained by students in TPE and OSPE (n = 115)

Group	Median	IQR	Mann Whitney U test value (P value)
TPE	12.5	3	1738 (P<0.0001)
OSPE	15	2	
TPE: traditional practical examination, OSPE: Objective Structured Practical Examination, IQR: inter quartile range			

Students' perceptions about both methods were also analyzed and summarized in Figure 1. It shows that 93% of students agreed on OSPE as a better assessment method to judge all three levels of skills. Additionally, 85% of students agreed that OSPE was well-structured and planned with the inclusion of all relevant practical skills assessments. Moreover, 77% of students reflected that OSPE made them think about clinical situations in more than one way, agreeing that OSPE is a more accurate reflection of their knowledge in all areas. Furthermore, 83% of students agreed that it can be used in formative assessment. A majority of students (70%) said it reduces the chances of failing in practical exams. Only 20% of students said OSPE was more stressful than TPE and concluded that OSPE is more demanding.

Faculty responses were also recorded on a 5-point Likert scale and were analyzed (Figure 2). More than 75% of faculty agreed

that OSPE is an unbiased, objective, structured, comprehensive, and better assessment method covering almost all practical skills of students. They also agreed that it aligns the assessment method with specific learning objectives. A few faculty members reflected on the drawbacks of OSPE, such as it being difficult to plan, less convenient, and more time-consuming. It needs more resources and faculty with continuous motivation.

Student's perception regarding OSPE(n= 115)

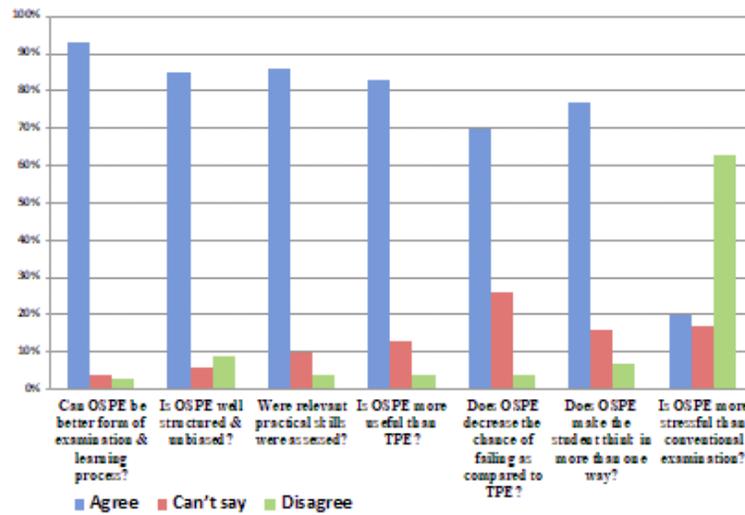


Figure 1: Students' perception regarding OSPE (n=115)

Faculties' perception regarding OSPE(n=13)

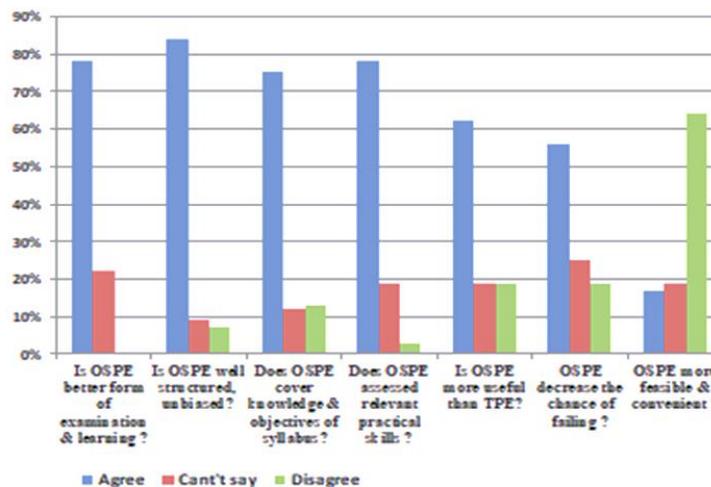


Figure 2: Faculties perception regarding OSPE (n=13)

Discussion

Assessment methods should effectively evaluate the knowledge and practical skills of medical students to create competent International Medical Graduates (IMGs). Continuous mentoring and constructive feedback are essential for effective assessment.

Currently, assessments are conducted through theory exams and traditional practical exams (TPE). However, TPE cannot comprehensively assess all aspects of student competence, highlighting the need for innovative assessment strategies in medical education.

The Objective Structured Practical Examination (OSPE) is a well-adopted novel tool for practical examinations in pre-clinical and para-clinical specialties [4-6]. This study aimed to measure the effectiveness of OSPE compared to TPE by comparing student grades on practical lab exercises. Feedback from students and faculty on both methods was also collected.

OSPE was evaluated using a five-point Likert scale to determine its usefulness and effectiveness as an assessment method. Students agreed that OSPE encouraged critical thinking by requiring them to consider various clinical situations, helping them recognize their strengths and weaknesses. Students assessed with OSPE scored higher and had increased chances of passing exams. Feedback indicated that OSPE produced less stress due to its structured, unbiased, and fair nature, providing equal opportunities for all students to answer the same questions. This structure helped students gain confidence and perform better. OSPE was well-received as it included a broader range of questions and skills compared to TPE. Examiners could directly observe students during lab exercises, allowing for actual assessment.

The OSPE was found to be simple, standardized, fair, unbiased, stress-free, and objective, reducing the chances of failing. Both students and faculty advocated for its continuation as an assessment strategy for formative practical examinations. The majority of students preferred OSPE over TPE, noting its ability to eliminate examiner bias and its relevance to competencies. Similar observations were noted in other studies [1-3, 6-10], demonstrating the effectiveness of OSPE as an assessment method.

Most faculty members gave positive remarks for OSPE over traditional methods. Studies by Lakum NR et al. [1], Khan et al. [3], Kanasagara et al. [6], and Singh G et al. [7] reported similar positive faculty opinions. The positive aspects of OSPE include its comprehensive and well-structured nature, objective assessment, and reduced stress for students. Faculty appreciated the opportunity to provide constructive feedback on students' strengths and weaknesses, recommending its implementation in formative assessment. Similar findings were noted in other studies [1-4, 6, 10, 11].

Faculty also highlighted some drawbacks of OSPE, such as the time and resources required for preparation, conduction, and implementation, and the need for more faculty members to reduce fatigue. This study supports the findings of earlier studies, with favorable responses from both students and faculty regarding OSPE. They favored its implementation as a novel assessment strategy in the formative assessment of medical students [1, 6, 7, 10, 11].

In competency-based medical education, assessment should be a continuous, ongoing process that provides many opportunities for constructive feedback. These goals can be achieved by incorporating novel assessment strategies like OSPE in both formative and summative exams.

Limitations of the Study: The study was conducted only once during the second internal practical exams as a pilot project.

It was the students' first exposure to OSPE. Item analysis with difficulty and discrimination indices was not done to compare TPE and OSPE questions. The feasibility challenges faced by faculty were not analyzed in detail. The possibility of students discussing the OSPE with peers awaiting assessment could have affected scores. The study had a small sample size with limited resources.

Possible Challenges and Solutions in Implementation: Examiner Fatigue: Allocate sufficient time for each OSPE station and conduct frequent OSPEs to train students. Involve senior residents and postgraduate students as examiners. Faculty Training: Provide repeated training and briefings to prevent subjectivity and bias. Continuous motivation of faculty is essential. Curriculum

Coverage: Conduct frequent internal audits and continuous program monitoring. Stick to the curriculum to assess a wide range of skills. Passing Due to Few Stations: Use item analysis with difficulty and discrimination indices to ensure comprehensive assessment.

Conclusion

This study concluded that OSPE is more effective, comprehensive, and better suited for assessing practical skills of IMGs compared to TPE. It is objective, well-structured, and eliminates inter-examiner variation and bias. Students scored higher in OSPE, reducing the chances of failing practical exams. Constructive feedback can be provided to help students improve. Both students and faculty have a positive view of OSPE as a novel assessment method.

Future Research Implications: Although OSPE is time and resource-consuming, it is feasible with more effort. It is recommended for inclusion as a formative assessment strategy in various educational settings and possibly in summative examinations at the university level. More studies with larger sample sizes are needed to test the reliability and validity of OSPE, identify potential barriers, and find ways to address them.

Abbreviations:

TPE: traditional practical examination

OSPE: Objective Structured Practical Examination

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