

Original Research Article

OBJECTIVE STRUCTURED PRACTICAL EXAMINATION (OSPE): AN OBJECTIVE APPROACH TO ASSESSING LABORATORY PRACTICAL SKILLS IN MBBS STUDENTS OF FORENSIC MEDICINE AND TOXICOLOGY

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ABSTRACT

Background: Subjectivity and examiner bias often influence traditional practical evaluations in medical examinations. The purpose of this study was introduction and evaluation of Objective Structured Practical Examination (OSPE) in the curriculum of MBBS students as a teaching and assessment tool in Forensic Medicine & Toxicology.

Materials and Methods: The study was conducted at a tertiary care teaching institute involving MBBS students. The OSPE consisted of 8 question stations and 4 procedure stations, with each station to be completed within 3 minutes. Major topics included in the study were forensic identification, injury, asphyxia, and toxicology. The solidity of the question items was analyzed using Cronbach's alpha, calculated through IBM SPSS software, and feedback was taken via a structured questionnaire.

Results: A significant variation was observed in the performance of students, with more than 75% marks scored by 56 students and only 21 students scored under 50%. A Cronbach's alpha of 0.596 indicated reliable result. Feedback was helpful and highly acceptable: almost every student accepted that OSPE helped them in improvement, and 82% said OSPE can be a valuable learning tool. Students highly liked the objectivity (38%) and uniformity (28%) of the examination. Faculties also agreed that OSPE ensures objectivity and reduces examiner bias.

Conclusion: OSPE removes examiner bias, measures practical skills more accurately, and is more objective. According to student feedback, this kind of assessment aids in the development of practical skills and is a useful tool for teaching and evaluating MBBS students studying Forensic Medicine & Toxicology.

Keywords: OSPE (objective structured practical examination); OSCE (objective structured clinical examination); medical education, assessment tools; forensic medicine and toxicology; competency-based medical education (CBME).

INTRODUCTION

Examinations in medical teaching have always been influenced by biases, such as subjectivity, examiner

bias, and differences in assessment methods, which resulted in a significant lack of objectivity in practical exam evaluations.^[1] Ideally, assessment

should focus only on the student's skill variability rather than their general performance.^[2]

To address this, researchers have developed objective evaluation methods, such as the Objective Structured Clinical/Practical Examination (OSCE/OSPE). It can test skills in laboratory procedures, simulation, and applied medical aspects. Designing it involves defining objectives, breaking tasks into scored subtasks, using checklists, and equipping stations with resources like photomicrographs, specimens, or X-rays.^[3,4]

Aims & Objectives

1. To introduce OSPE to third-year MBBS students as a teaching technique and an evaluation tool for practical skills in the subject of forensic medicine and toxicology.
2. To investigate instructors' and students' perspectives about OSPE as a teaching and evaluation tool.
3. To address different biases in traditional practical exams in the subject of Forensic Medicine & Toxicology by the introduction of OSPE as a teaching and assessment tool.

MATERIALS AND METHODS

The study was conducted on MBBS students studying in the 2020–21 and 2021–22 batches. A notification about the OSPE was sent out ten days before the successful completion of the course, covering the theoretical and practical parts of forensic identification, injury, asphyxia, and toxicology. All participants involved in the creation and implementation of the OSPE received training in the institute before its administration as an evaluation instrument. Assessment at the procedure stations was based on a pre-validated, peer-reviewed checklist. To guarantee consistency in evaluation, structured questions and matching key answers were created for the question stations.

Students were given an orientation in advance to acquaint them with the format and expectations because this was the first time the OSPE was being

used as an assessment instrument. The list of practical competencies that each student must complete as part of the curriculum for each subject has been established under the new competency-based medical education (CBME) curriculum.^[5] Twenty-three of the 176 students who were eligible for evaluation did not show up. Over the course of six days, a maximum of fifty students were assessed each day. 8 question stations and 4 procedure stations were used to evaluate each student. Each station was designed such that every task could be completed comfortably within three minutes.

Inclusion criteria

All the MBBS students from 2020-21 and 2021-22 batch

Exclusion criteria-

1. Students from other batches of MBBS where forensic medicine and toxicology is not part of their syllabus
2. Students who failed to consent.

The reliability of the question items was analyzed using Cronbach's alpha, calculated through IBM SPSS software version 28.0.1.0(142), and a structured questionnaire was provided to get feedback on different components of OSPE.^[6,7]

RESULTS

21 of the 176 students who took part in this OSPE exercise did not receive an average score of 50% or above. On average, 56 students scored higher than 75%, 60 students scored between 65 and 75%, and 39 students scored between 50 and 65%. The mean scores for each station are shown in [Table 1 and 2], along with the score determined by calculating Cronbach's alpha to assess the internal consistency of the given questions. If the Item number (question 11) were deleted, then Cronbach's alpha of the questions should have increased internal consistency as shown in [Table 3 & 4]. As seen in [Table 5], student feedback was helpful and showed high acceptability. [Table 6] shows feedback from teachers on the evaluation system based on OSPE.

Table 1: Mean scores & Cronbach's alpha of objective structured practical examination (OSPE) station

Type of station	Station Number	Mean Scores
Procedure	1	4.27
	2	4.22
	3	4.25
	4	4.09
Question	5	3.86
	6	4.1
	7	4.36
	8	4.25
	9	4.36
	10	4.25
	11	4.24
	12	4.22
Cronbach's alpha = 0.596		

Table 2: Reliability Statistics

Cronbach's alpha	Cronbach's alpha based on standardized items	No. of items
0.596	0.605	12

Table 3: Showing the different questions Item Statistics

Question Number	Mean	Std. Deviation	N
Q1	4.27	0.67	176
Q2	4.22	0.724	176
Q3	4.25	0.705	176
Q4	4.09	0.773	176
Q5	3.86	0.831	176
Q6	4.1	0.707	176
Q7	4.36	0.703	176
Q8	4.25	0.721	176
Q9	4.36	0.703	176
Q10	4.25	0.721	176
Q11	4.24	0.717	176
Q12	4.22	0.724	176

Table 4: Representing the Summary Item Statistics

Parameters	Mean	Minimum	Maximum	Range	Maximum/ Minimum	Variance	No. of Item
Item Means	4.205	3.864	4.358	0.494	1.128	0.018	12
Inter- Item Correlations	0.113	-0.242	1	1.242	-4.124	0.062	12

Table 5: Feedback analysis: On various aspects of OSPE and on response to questionnaires of 176 students.

Criteria	Choice 1	Choice 2	Choice 3	Choice 4
Orientation to OSPE	Very Helpful 27(22%)	Helpful 80(66%)	Somewhat Helpful 15(12%)	-
Relevance to syllabus	Yes 119(98%)	No	Somewhat 3(2%)	-
Environment of OSPE	Very Comfortable 15(12%)	Comfortable 79(65%)	Somewhat 18(15%)	Uncomfortable 10(8%)
Questions in Response Station	Relevant 121(99%)	Irrelevant 1(1%)	-	-
Time for Procedure Station	Adequate 63(52%)	Somewhat adequate 48(39%)	Inadequate 11(9%)	-
Effect of OSPE	Help to improve 121(99%)	Does not help 1(1%)	-	-
Assessment system	Only Evaluation 5(4%)	Only Learning 17(14%)	Learning & Evaluation 100 (82%)	-
Introduction in final Exams	Completely 29(24%)	Partially 83(68%)	Not at all 10(8%)	-

Table 6: Feedback from Faculty on OSPE as an evaluation system

Criteria	Choice 1	Choice 2	Choice 3	Choice 4
Tested Objectivity	Strongly Agree 5 (62.5%)	Agree 3 (37.5%)	Somewhat Agree Nil	Disagree Nil
Measured Practical Skills better	Yes 7 (87.5%)	Somewhat 1 (12.5%)	Not at all Nil	-
Eliminated Examiner Bias	To a large extent 5(62.5%)	Somewhat 3 (37.5%)	Not at all Nil	-
Intervals to conduct OSPE	More frequently 8 (75%)	Less frequently 2 (25%)	Not at all Nil	-
Introduction of OSPE for evaluation	Only formative 8 (100%)	Only summative Nil	Both Nil	-

DISCUSSION

In the Forensic Medicine & Toxicology laboratory practical, medical undergraduates' cognitive, psychomotor, and affective domains were assessed using the multi-station, multi-task (OSPE). Students had more opportunities to demonstrate their knowledge and skill competency when using the OSPE assessment approach. OSPE is a valid, objective, and trustworthy assessment tool that reduces examiner bias, according to several studies.^[8-10] Additionally, the present study demonstrated a favorable opinion about OSPE as an impartial, fair, valid, and trustworthy evaluation technique. During the COVID-19 pandemic, Dutta et al. devised the Electronic Objective Structured

Practical Examination (eOSPE) to help with formative evaluation.^[11]

80 of the 176 students performed really well, with an average score of more than 65%. However, 15 students performed equally poorly in both the performance and question stations, failing to even reach 50% of the average marks. [Table 1 and 2] show the average scores for each process and question station. Cronbach's alpha was used to evaluate the administered questions' reliability. With a Cronbach's alpha value of 0.596, the assessment procedure showed strong internal consistency and reliable efficacy. The students were given access to the evaluated scores from the procedure station checklist and the inquiry station, allowing them to identify areas for development and acknowledge their accomplishments. Comparable studies in the

other domains of undergraduate medical curriculum have indicated that OSPE serves as a dependable tool for educational purposes and assessment.^[12,13] If the Item number (question 11) were deleted, then Cronbach's alpha of the questions should show increased internal consistency, as demonstrated in [Table 3 and 4].

As seen in [Table 5], comments from students were constructive and showed a high degree of acceptance. Positive feedback was also reported by Feroze et al.^[14] Most of the students liked the curriculum, the exposure to OSPE, and the pertinence of the questions posed. The evaluation procedure was deemed comfortable by many. Interestingly, 82% of students saw OSPE as a learning and assessment tool, and 99% of students thought it helped them better. Nonetheless, 68% of the students recommended a partial introduction of OSPE in the final exams. The aspects of OSPE that were highly appreciated by students were its objectivity (38%), time-efficiency (31%), and uniformity (28%).

Comments of faculties on the OSPE-based evaluation system are shown in Table No. 6. Interestingly, all faculty members either agreed or strongly agreed that this assessment method was an appropriate way to test objectivity. Furthermore, 75% of faculty respondents thought OSPE greatly decreased examiner bias, and 87.5% thought it rated practical skills more accurately. The majority stated that more regular conduct of these evaluations was necessary. Importantly, every faculty member agreed that OSPE should only be utilized for formative evaluation. These results align with the findings of other researchers in the field, including Krishna Murthy N et al. and Mohan et al.^[15,16]

Our findings are consistent with other research showing that measuring student performance completely requires more than one method of assessment. This increases the relevance of forensic medicine and toxicology by motivating educators to investigate cutting-edge teaching and assessment strategies. It also encourages a reassessment of question styles to improve comprehension in subsequent tests. We believe that by training the students in a variety of learning skills, this method will help them become more efficient and practical. OSPE is practical and has significant benefits, such as facilitating formative assessments. It assesses students' clinical approach by generating objective scores for these assessments and has been efficiently used as a tool to evaluate practical skills among MBBS students in the subject of Forensic Medicine and Toxicology. This method has been widely applauded by both students and faculty in terms of application and results. Thus, it is being recognized as an important learning and assessment resource by all nowadays.

Prospects For Further Research

1. This study, supported by substantial evidence, indicates that OSPE may enhance learning abilities, practical skills, problem-solving skills,

numeracy, and communication skills among students. By further exploring OSPE, we can regularly assess the learning of MBBS students and equip them with cutting-edge knowledge, skills, and abilities necessary for their future careers.

2. Additionally, new research can be done which will focus on long-term retention rates and tracking of the competencies gained by newer OSPE methods. This assessment can be done during the student's internships and residency to determine whether they are performing well or not after learning through these OSPE methods and this will lead to further standardisation of teaching methods.
3. A comparative study between traditional evaluation and newer OSPE methods could help in refining the medical curriculum even further and developing a standard method that would be applicable worldwide, even in different socio-economic scenarios.

CONCLUSION

OSPE has numerous advantages: it is more objective, measures practical skills better, and removes examiner bias. Both evaluators' and students' feedback reflections appreciated it. Some students even stated that this system should be the only component in their final assessment. Faculties involved in organizing OSPE accepted that such exercises should be conducted frequently for formative evaluation before being integrated into summative assessment. The study proves that OSPE has a dual role, both in the development of clinical competency and in facilitating comprehensive curriculum review within the MBBS program.

REFERENCES

1. N. Ananthkrishnan, K.R. Sethuraman, Santosh kumar. Medical education principles and practice. 2nd edn. Pondicherry: Alumi Association of National teacher centre, JIPMER; 2000.
2. Ananthkrishnan N. Objective structured clinical/practical examination (OSCE/OSPE). J Postgrad Med 1993; 39:82.
3. Medical Education technology Workshop. Participants workbook. Regional training centre, St. John's Medical College, Bangalore; April 2011.
4. www.idealmed.org/workshop/OSPEJWare.ppt
5. Medical Council of India. Competency based undergraduate curriculum for the Indian medical graduate. Available at www.nmc.org.in/wp-content/uploads/2020/01/UG-Curriculum-Vol-I.pdf (accessed on 10 Apr 2022).
6. Bland JM, Altman DG. Statistics notes: Cronbach's alpha. BMJ 1997; 314:572.
7. Cronbach LJ. Coefficient alpha and the internal structure of tests. Psychometrika 1951; 16(3):297-334. <http://dx.doi.org/10.1080/02602930050031289>
8. Sehgal R, Dhir BV, Sawhney A. Teaching technologies in Gross Anatomy. J Anatomic Soc India 1998; 48:36.
9. Smees S; Skill based assessment. British Medical Journal 2003; 326(7391): 703-06. <http://dx.doi.org/10.1136/bmj.326.7391.703> PMID:12663410 PMCid:PMC112560

10. Tekian A. Have newly graduated physician mastered essential clinical skills? *Med Educ.* 2002; 36: 406-407. <http://dx.doi.org/10.1046/j.1365-2923.2002.01214.x>
11. Dutta AK, Goswami K, Murugaiyan S, Sahoo S, Pal A, Paul C, et al. The transition from objectively structured practical examination (OSPE) to electronic OSPE in the era of COVID-19. *Biochem Mol BiolEduc*2020;48:488–9.
12. Kundu D, Das HN, Sen G, Osta et al. Objective structured practical examination in Biochemistry: An experience in Medical College, Kolkata. *J Nat Sci Biol Med.* 2013 Jan;4(1): 103-7.
13. Nayar U, Malik SL, Bijlani R.L. Objective structured practical examination: a new concept in assessment of laboratory exercises in preclinical sciences. *Med Educ.*1986 May;20(3):204
14. Feroze M, Jacob AJ. OSPE in pathology. *Indian Journal of Pathology & Microbiology.*2002.45:53-57.
15. Krishna Murthy N, Ashakiran S et al. OSPE as a learning and evaluation tool for Biochemistry: First experience. *J Clin Biomed Sc* 2011;1(2):64-69.
16. Mohan M Sagdeo, Shubhada Ghade, Anaga Sahasrabuddhe, Suresh Chari, A Trial of OSPE as a Formative Assessment Tool in Physiology, *Journal of Education Technology in Health Sciences* Jan - Apr 2017; 4(1): 18 - 21