

RESEARCH ARTICLE

Introducing Objective Structured Practical Examination as a formative assessment tool for phase I medical professionals in Physiology

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Received: April 19, 2020; Accepted: May 01, 2020

ABSTRACT

Background: Assessment in medical education has lot of scope for improvement. Objective Structured Practical Examination (OSPE) involves direct observation of students' performance at planned stations. As proposed by the new competency-based medical education curriculum, we introduced OSPE as a formative assessment tool on a pilot basis. **Aims and Objectives:** The aims of the study were to introduce OSPE, study its feasibility and acceptability among students and faculty and assess its impact on learner performance. **Materials and Methods:** Institutional Ethics Committee approved, analytical cross-sectional study conducted in the Department of Physiology Smt. Kashibai Navale Medical College and General Hospital, Pune. A batch of 50 First MBBS students volunteered, of which 44 appeared on the day of the exam ($n = 44$). Informed consent was taken. Students were randomly divided into two groups. Group I went for Traditional Practical Exam in hematology. Group II went for OSPE, consisting of ten stations, of which two were procedure stations having observers with checklists, and eight were response stations. Four minutes time was given at each station. Groups switched over after finishing. Feedback (Likert scale based Questionnaire) was collected from students and faculty. Students were given feedback about their performance in OSPE. Analysis of the questionnaire was done using unpaired *t*-test with SPSS software. **Results:** Students felt that OSPE is a uniform, unbiased tool for practical assessment, less stressful and can be used as a routine form of assessment. Faculty felt that OSPE though, needs a lot of groundwork is feasible to implement and would be more helpful in clinical physiology practical. **Conclusion:** OSPE is an effective assessment tool for precisely measuring practical skills. Giving feedback becomes easier because of checklists.

KEY WORDS: Objective Structured Practical Examination; Formative Assessment; Hematology; Feedback

INTRODUCTION

Assessment is an important part of medical education. The traditional tools for assessment of medical students have included written tests, bedside and theory viva, and clinical case presentations which mainly focus on the base of the "Miller's pyramid of competence."^[1] A good assessment tool

is judged on the basis of reliability, validity, feasibility, as well as acceptability.^[2] It is well known that conventional practical examination has several problems, especially in terms of its outcome.^[3-5] In physiology, students are usually asked to perform a particular clinical or hematology practical which is followed by the viva and scores are mostly based on overall performance rather than the candidate's individual practical/clinical skills. Hence, individual competencies might not be tested. Due to this, students do not bother much about exact procedures while performing a skill. They are vague in answering questions, lacking focus, and objectivity.

Although grading/marketing should depend only on student's competence, yet variability in experiments selected and examiners, both affects grading in the conventional

Access this article online	
Website: www.njppp.com	Quick Response code
DOI: 10.5455/njppp.2020.10.04094202001052020	

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examination, significantly. Further, the subjectivity involved in this examination also affects the correlation negatively between marks awarded by different examiners and performance of the same candidate.^[6]

Assessment drives learning. However, to foster active learning, assessment needs to be informative.^[7] Although many options are available to do this more consistently, the Objective Structured Practical Examination (OSPE) is most preferred.^[8] This method is derived from Objective Structured Clinical Examination (OSCE) by Harden and Gleeson.^[8,9] OSPE is a standardized tool and has proved advantages over the traditional assessment method.^[10] It involves direct observation of the students' performance at planned stations. The OSPE can also reduce the examiners' variability in marking the students.^[11,12]

The new competency-based medical curriculum has specified the roles to be played by an "Indian Medical Graduate" and also described various competencies to be achieved at each level of the undergraduate curriculum. The focus is not only on "Knows" and "Knows how" but also on "Shows" and "Shows how" to achieve the required set of skills. The MCI document also emphasizes on more streamlined and continuous formative and summative assessments. The use of OSPE for formative assessment has great potential as the learners can gain insight into the elements making up their competencies as well as feedback on personal strengths and weaknesses.

At present, we at Smt. Kashibai Navale Medical College and General Hospital (SKNMC) still follow Traditional Practical Examination (TPE) for the evaluation of practical or clinical skills. Developing better assessment tools like OSPE is the need of time which will ultimately improve learning and help achieve the objectives of medical education. With this background, we introduced OSPE as a formative assessment tool for the first time in the Department of Physiology at SKNMC as a pilot project.

Aims and Objectives

The aims of the study were as follows:

- To develop and implement OSPE in the 1st-year MBBS program
- To study its feasibility in terms of time, space, material, and manpower requirements
- To assess its acceptability among students and faculty, and
- To assess its impact on learner performance.

MATERIALS AND METHODS

Study Settings

The study was conducted in the Department of Physiology SKNMC and GH, Pune.

Study Design

It was an analytical cross-sectional study conducted as educational research.

Study Population

The study was conducted on the newly admitted 1st-year MBBS students of competency-based medical education (CBME) curriculum for hematology practical. As OSPE had never been implemented in our department, we conducted it on a small group of students to study its feasibility. All the students were first informed about the kind of assessment and the process of OSPE. A batch of 50 1st-year MBBS students of total 150 volunteered for the study. Of these total, 44 students actually appeared on the day of the examination ($n = 44$). Informed consent was taken. The orientation of the entire faculty involved in the process was taken in advance, to sensitize them about the OSPE process, different stations to be made, marking system, and checklists used at different stations. Blueprint of the checklist was validated by senior faculty members from the department. Participant students were again informed about the details of both the assessment methods, i.e., TPE and OSPE well in advance.

On the day of the assessment, students were randomly divided into 2 groups (Group I & II). The topics chosen were Hemoglobin & RBC. Group I: First appeared for hematology exam by Traditional method. Each student was asked to perform a procedure by picking up a chit and 20 min time was given to complete the procedure. Table viva was taken at the end. Group II: Appeared for OSPE, where two parallel sets of 10 stations each had been created. Of 10, two stations were procedure stations having observers with checklists and remaining eight stations were response stations which included case histories, calculations, and other questions related to the topics. Four minutes time was given at each station. The two groups were kept separate from each other. The groups were switched over after finishing. Feedback in the form of a questionnaire (based on 4 points Likert scale) was collected from the students about their perception for both sets of assessments. Feedback from faculty ($n = 7$) was also collected.

A session on feedback to the students about their performance in OSPE (based on checklists) was organized where individual performances, overall performances, and the lacunae in them were discussed.

RESULTS

Statistical Analysis

The questionnaire was analyzed using unpaired *t*-test with SPSS software. Each response of the questionnaire was assigned a numerical value on a Likert scale and mean/average was calculated [Table 1].

Analysis of the questionnaire showed significant differences in students' perceptions about traditional examination and OSPE. Students felt that the overall exam session in OSPE was better than the traditional exam. The atmosphere was more student-friendly during OSPE. They expressed that OSPE was a well-structured and unbiased method as compared to traditional exam and there was a uniformity of questions to all the students during OSPE. Regarding anxiety levels, students felt more anxious during OSPE as compared to traditional exam because they were actually observed by the examiners while performing the procedure. They felt that relevant practical skills were better assessed during OSPE than TPE, but the difference was statistically non-significant. They also felt that the feedback session on individual performance-based on OSPE checklists was really helpful which was not possible in the traditional exam. According to them, OSPE covered all the important questions related to the topics and is easier to pass and less stressful. However, the time provided at procedure stations should have been more. Overall, students were satisfied with this new kind of assessment. About 47% ($n = 21$) students agreed that OSPE should be used as a routine form of assessment for small topics that would help them to acquire desired set of skills. However, 47% ($n = 21$) also expressed that it should be combined with TPE, like in term-end exams, without completely discarding the assessment. Few students also expressed that TPE is good because it provides an opportunity to interact with the teachers.

For % distribution of students' responses to various questions (based on Likert scale) refer to Table 2 and Figures 1-4. The summary of responses to open-ended questions is given in Table 3.

Feedback from the faculty members is summarized below:

TPE

Easy to conduct, time consuming, chances of bias are there. All of them agreed that practical exams should be structured.

OSPE

A lot of preparation is required beforehand, but the overall exam needs less time. Students need to be well versed with the pattern of examination; it is a better test of practical skills, helps in giving feedback to students, can be better implemented for clinical practical and better for learning if repeatedly done.

Analysis of the scores/marks of both these forms of assessments (TPE and OSPE) did not show any statistically significant difference.

DISCUSSION

According to our study, more than 90% of the students were satisfied with the OSPE method. The majority of the students felt that it is an unbiased and uniform method of assessment as compared to traditional practical exam. They felt that OSPE covered all the important practical questions which were the same for every student, while in TPE, there was considerable variation in the number and difficulty level of the questions asked. Some students felt that TPE method has also got some advantages like it involved direct interaction with the faculty. Hence, either OSPE or OSPE/TPE combined should be used as routine forms of assessment. Faculty felt that extensive groundwork is needed for the preparation and implementation of OSPE as compared to TPE, but it is a structured kind of assessment and is feasible to implement in the future. We could also record the mistakes/lacunae of individual students in the checklists and got aware of the modifications that need to be done in the teaching-learning process to improve their practical skills. By OSPE, we could test the knowledge, practical skills as well as overall comprehension of the topic by the students by keeping a different variety of stations.

Our findings are similar to that of researcher Revathi, who reported that 75% of the students perceived that the OSPE

Table 1: Analysis of feedback questionnaire

Questions	TPE		OSPE		<i>t</i> -value	<i>P</i> -value
	Mean	SD	Mean	SD		
Q 1 (Overall exam session)	2.84	0.64	3.40	0.65	4.08	<0.001*
Q 2 (overall student friendly environment)	2.79	0.73	3.15	0.74	2.30	<0.05*
Q 3 (Satisfaction with the process)	3.02	0.50	3.34	0.52	2.89	<0.01*
Q 4 (Uniformity of questions)	2.38	0.75	3.79	0.4	10.90	<0.001*
Q 5 (Felt anxious/depressed about questions)	2.79	0.73	2.47	0.84	1.8	N.S. at $P < 0.05$
Q 6 (Relevant practical skills assessed)	2.95	0.64	3.13	0.73	1.23	N.S. at $P < 0.05$
Q 7 (OSPE well-structured and unbiased as compared to TPE)	2.95	0.91	3.45	0.54	3.11	<0.01*
Q 8 (Equal time for each student)	2.5	0.79	3.61	0.49	7.91	<0.001*
Q 9 (Opportunity to get feedback about performance)	1.65	0.47	1.09	0.29	6.7	<0.001*
Q 10 (Stimulated for learning more)	3.22	0.64	3.29	0.66	0.4	N.S. at $P < 0.05$

*Significant difference NS: Non-significant. OPSE: Objective structured practical examination, TPE: Traditional practical examination

Table 2: % Distribution of students' responses to various questions

Questions (n=44)	Excellent 5		Very good 4		Good 3		Poor 2		Very poor 1	
	TPE (%)	OSPE (%)	TPE (%)	OSPE (%)	TPE (%)	OSPE (%)	TPE (%)	OSPE (%)	TPE	OSPE
Overall exam session	6 (13.6)	22 (50)	25 (56.8)	18 (40.9)	13 (29.5)	4 (9.1)	0	0	0	0
Satisfaction with the process	Highly satisfied 4		Satisfied		Unsatisfied 2		Highly unsatisfied 1			
	TPE	OSPE	TPE	OSPE	TPE	OSPE	TPE	OSPE		
	6 (13.6)	16 (36.4)	33 (75)	27 (61.4)	5 (11.4)	1 (2.3)	0	0		
Got feedback about performance	Yes 1		No 2							
	TPE	OSPE	TPE	OSPE						
	15 (34.1)	40 (90.9)	29 (65.9)	4 (9.1)						
	Strongly agree 4		Agree 3		Disagree 2		Strongly disagree 1			
	TPE	OSPE	TPE	OSPE	TPE	OSPE	TPE	OSPE		
Overall student friendly environment	5 (11.4)	15 (34.1)	28 (63.6)	22 (15)	8 (18.2)	6 (13.6)	3 (6.8)	1 (2.3)		
Uniformity of questions	3 (6.8)	35 (79.5)	15 (34.1)	9 (20.5)	22 (50)	0	4 (9.1)	0		
Felt anxious/depressed about questions	6 (13.6)	4 (9.1)	25 (56.8)	19 (43.2)	11 (25)	15 (34.1)	2 (4.5)	6 (13.6)		
Relevant practical skills assessed	7 (15.9)	14 (31.8)	29 (65.9)	23 (52.3)	7 (15.9)	6 (13.6)	1 (2.3)	1 (2.3)		
Equal time for each student	6 (13.6)	27 (61.4)	12 (27.3)	17 (38.6)	24 (54.5)	0	2 (4.5)	0		
Stimulated for learning more	15 (34.1)	18 (40.9)	24 (54.5)	21 (47.7)	5 (11.4)	5 (11.4)	0	0		

OPSE: Objective structured practical examination, TPE: Traditional practical examination

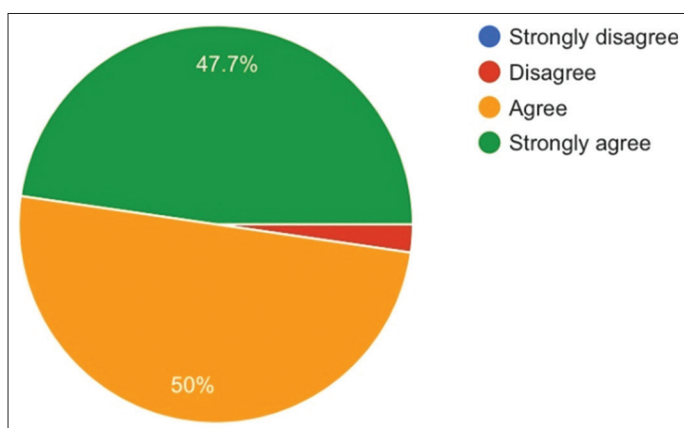


Figure 1: Distribution of students' responses to question 7 (objective structured practical examination well-structured and unbiased as compared to traditional practical examination)

examination was unbiased and easy to score and had better content which was relevant to the topics.^[13] Several studies (e.g., by Hilliard and Tallet) have proved that OSPE is a reliable assessment tool.^[14] In a study conducted by Malik *et al.*, OSPE was rated by students as an effective, useful, interesting, and challenging exam.^[15] Studies have also reported that OSPE is an effective tool in discriminating between good and not so good performers.^[16,17] It has been felt that the traditional examination tends to overlook the demonstration of individual competencies and the scoring system measures mostly the overall performance of the examinees. The new CBME by MCI has given the emphasis on individual competencies to be developed in medical graduates and the continual formative assessments for

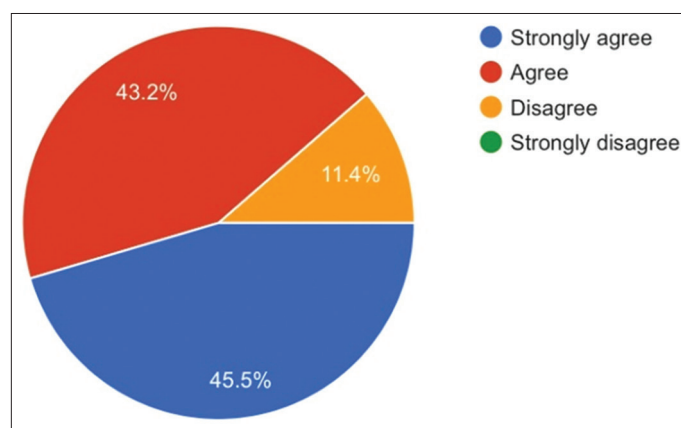


Figure 2: Distribution of students' responses to question 12 (objective structured practical examination is easier to pass as compared to traditional practical examination)

the same. Yet another study reports that OSPE/OSCE is a uniform assessment tool, there is no examiners bias and it could be frequently conducted.^[18] Our faculty also gave a similar kind of feedback. The most important aspect of this method of evaluation is that it has the scope for improving the teaching-learning process in total, through feedback. It provides an opportunity to test a student's ability to integrate knowledge, clinical, and practical skills that are a must for any student aspiring to become a successful clinician. It has been shown that such an assessment method can influence student learning.^[19,20] We observed the same in our study, as giving feedback became easier because of marked checklists and we could discuss with the students about the shortcomings/lacunae in their individual performance. At

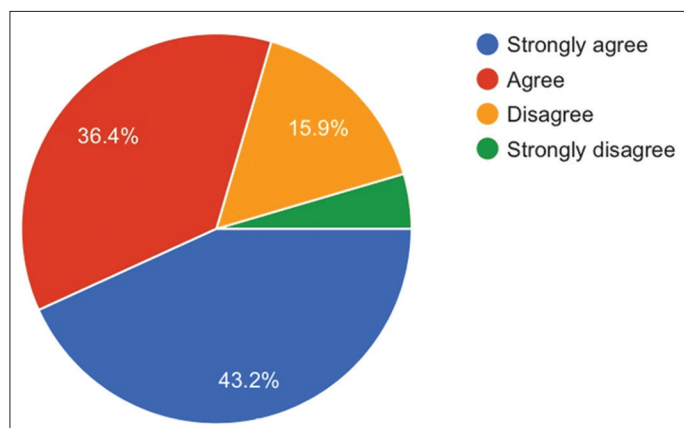


Figure 3: Distribution of students' responses to question 13 (objective structured practical examination is less stressful as compared to traditional practical examination)

Table 3: % Distribution of students' responses to open-ended question

Remarks/feedback of the students about OSPE in open-ended question (n=40)	No. of students of such opinion (%)
OSPE is a precise method where one has to demonstrate exact skills	12.5
Questions gave good coverage of syllabus, exposed to almost all important questions/quick revision of the topic	25
OSPE is unbiased/reduces luck factor	17.5
Felt good because of uniformity of questions and time to all	15
Less stressful as there was no viva/interaction	15
Time at procedure stations should be more	12.5
OSPE is stressful because skills to be demonstrated in stipulated time/more practice will be good	12.5
OSPE is better for learning because of feedback/ was a different kind of learning experience	10
More OSPE sessions should be conducted/ should be used routinely for practice	7.5

(Q. What differences you observed with OPSE as compared to TPE? Give your opinion.). OPSE: Objective structured practical examination. TPE: Traditional practical examination

the same time, faculty also came to know about the areas they need to stress more during practical sessions to improve students' performance. Similar findings were reported by some researchers earlier.^[21,22] We experienced that OSPE needs a lot of groundwork in terms of making checklists, training the faculty as well as making actual arrangements. Halden *et al.* had also mentioned that the main disadvantage of OSPE is the increased preparation required. This effort, however, takes place before the examination, and on the day of the examination, the examiner's time is used more efficiently. Student takes more interest in OSPE due to variety and keeps themselves alert during the whole process of examination, which is not found in the conventional one.^[23] The examination can be modified easily as per

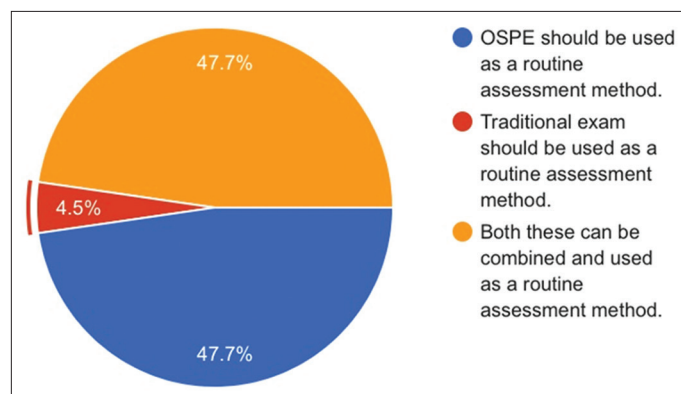


Figure 4: Distribution of students' responses to objective structured practical examination can be used routinely

institutional circumstances and need. In our study, there was no statistically significant difference in the marks obtained by TPE and OSPE. We conducted OSPE mainly with the help of junior teachers using checklists. This suggests that OSPE can be effectively used as an assessment tool with less experienced examiners by incorporating pre-validated checklists.^[24] OSPE, despite being an objective and reliable method, Aarti *et al.* who conducted a study on the performance of students in different methods of examination of physiology at All India Institute of Medical Sciences, opined that OSPE can supplement but not replace conventional methods.^[25] Gitanjali formulated a semi-OSPE, an amalgam of conventional practical examinations and the OSPE, to overcome the burdens of the OSPE, such as time constraints, good human resources, observer fatigue, and logistical problems.^[26]

Our study was one of the first kinds in our department as well as the institute. It was really challenging to conduct OSPE as regards time constraints as the time table for the whole year for the CBME batch was already prepared. Although it was a totally new experiment for us, the faculty put a lot of interest and dedication in planning and successful implementation of OSPE. Our students expressed that repeated practice on small topics with OSPE would help them develop practical skills better and wished that either OSPE or OSPE/TPE combined should be used as a routine form of assessment. Limitations of our study were smaller sample sizes as we could assess only a batch of 50 students because of feasibility issues and time constraints. The reason being this was carried out as a project by the corresponding author for the MCI advanced course by GSMC and KEM Hospital, Mumbai, within the required time frame. It was mainly a reaction level study to get the perceptions of the students about the assessment method and we could not study its impact on learning. In future, we wish to conduct OSPE repeatedly to study its impact on learning. Overall, it was a great learning experience for our department and we can now look forward to implement OSPE as a formative assessment tool for other physiology practicals.

CONCLUSION

OSPE is an effective assessment tool for precisely measuring practical/clinical skills. Giving feedback to students becomes easier because of checklists. As per faculty feedback, OSPE can be better implemented for clinical physiology practical.

ACKNOWLEDGMENT

My gratitude toward the dedicated team of MCI Nodal Centre for ACME at GSMC, Mumbai, for the constant support. The author is grateful to Dr. Priya Mardikar, Professor and Head Department of Physiology for the constant guidance and all the faculty members and teaching support staff from the Department of Physiology at SKNMC and GH without whom implementation of OSPE would not have been possible. My sincere thanks to Dr. Samir Singru Professor, Department of Community Medicine, SKNMC, for his valuable guidance.

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How to cite this article: Shenwai M, Mardikar P, Joshi N, Joshi RN. Introducing Objective Structured Practical Examination as a formative assessment tool for phase I medical professionals in Physiology. *Natl J Physiol Pharm Pharmacol* 2020;10(08):619-624.

Source of Support: Nil, **Conflicts of Interest:** None declared.