

Research Article

Objective structured practical examination as a formative assessment tool for IInd MBBS microbiology students

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ABSTRACT

Background: Assessment drives learning. It is well known that conventional or Traditional Practical Examination (TPE) has several limitations, especially in terms of subjectivity. In OSPE the procedures are standardized, so objectivity is ensured and also reliability maximized. Objectives of the study were to compare TPE & OSPE examination in formative assessment for IInd MBBS microbiology students on the topic culture media and to obtain feedback from students attending OSPE, and faculty.

Methods: 76 students were taught about culture media and simultaneously were sensitized about OSPE and TPE, which followed the next week. Informed consent was taken. All students were randomly divided into 2 batches (TPE and OSPE) based on roll call. 71 students were tested, 33 for OSPE and 38 for TPE. Eight OSPE stations were set up with 8 culture media, plus a rest station after station 4. TPE students went for viva-voce to one examiner for same eight culture media. Both OSPE and TPE students were evaluated for a score of 20. OSPE students and the faculty were given a pre-validated questionnaire for feedback.

Results: Mean scores, standard deviation (SD) and “p” values were calculated using the T-test from the scores obtained. The mean scores for OSPE and TPE were found to be statistically significant- p-value <0.01. Feedback from OSPE students & faculty was also evaluated.

Conclusions: OSPE is more structured and eliminates examiner bias better, and should be practiced in formative assessments and also be introduced in summative assessments.

Keywords: Faculty, Feedback, Formative assessment, OSPE, TPE

INTRODUCTION

Assessment drives learning. It is well known that conventional or traditional practical examination (TPE) has several limitations, especially in terms of its outcome.

Although grading/marking should depend only on student's competence, yet variability in experiments selected and examiners, both affects grading in conventional 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.¹ The objective structured examination (OSE), with its clinical (OSCE) and practical (OSPE) components, is nowadays used all over the world due to its reliability, validity and practicability.²

In OSPE the procedures are standardized, so objectivity is ensured and also maximizes reliability in assessment.³ This method of assessment is an approach in which competencies are evaluated in a comprehensive,

consistent and structured manner with close attention to the objectivity of the process, and is a widely accepted tool for measuring skills with a high degree of technical fidelity.³ The term OSPE was derived from OSCE in 1975 which was later extended to practical examination and was modified by Harden and Gleeson.⁴

In terms of the Miller’s framework of development of competencies, OSPE assesses the third “shows how” level, focusing on the assessment of performance of specific skills in a controlled setting.⁵ The use of OSPE for formative assessment has great potential, as the learners can gain insights into the elements making up competencies as well as feedback on personal strengths and weaknesses.⁵

The following study was conducted at Apollo Institute of Medical Sciences and Research, Hyderabad (Microbiology Department), during formative assessment for second MBBS Microbiology students to compare the outcomes and student feedback of OSPE over traditional practical examinations (TPE).

Objectives

- To compare TPE & OSPE examination pattern in formative assessment for IInd MBBS Microbiology students on the topic culture media.

- To obtain feedback regarding OSPE as a tool of assessment from the OSPE students and the faculty.

METHODS

The study was a cross sectional comparative study, which was conducted after obtaining clearance from the Institutional Research Committee. The topic chosen was Culture Media.

76 students were taught about culture media- theory and demonstration for 2hour each, in 3 batches spread over 3 days, and simultaneously were sensitized about OSPE and TPE, which followed the next week. Informed consent was taken from the students and the faculty. All the students were divided randomly into two batches (who would appear on three days) for OSPE and TPE based on their roll call.

76 students gave consent and 71 participated in the examination, 5 did not attend. For the practical examination, on day one total 25 students attended, 11 for OSPE and 14 for TPE. Pre-validated checklist of questionnaire with correct responses for eight culture media was prepared for OSPE. Five questions were given at each OSPE station, each question carrying 0.5 marks, thus the evaluation coming to a total of 20 marks (0.5x5x8=20) for each student.

Table 1: Student feedback form for OSPE.

Question	Yes	Some what	No	No idea
Were you prior sensitized about OSPE?				
Was the exam stressful?				
Was OSPE well structured, relevant and uniform?				
Was time given at each station sufficient?				
Did the questions cover the appropriate knowledge area?				
Should OSPE be included in future as a method of assessment in practical’s?				

Table 2: Faculty feedback form for OSPE.

Criteria	Strongly agree	Neither agree nor disagree	Disagree
OSPE is better structured than TPE			
OSPE examines practical skills better			
OSPE eliminates examiner bias better			
OSPE is better timed than TPE			
OSPE can be included as an assessment method (formative) in future also			

Total nine stations were set up for OSPE, with one rest station after station four. All the OSPE students passed on from one station to another in a series and answered the questions. Observers were deployed at each station, and time allotted at each station was 5 minutes. The OSPE students were finally given a pre-validated feedback

questionnaire to be answered, before leaving out. Faculty also were given feedback forms for their opinions and suggestions. The TPE students were also tested for the same eight culture media and were questioned regarding them by one faculty in the traditional viva-voce pattern. TPE students were also evaluated for a total of 20 marks.

On day two 24 students appeared in total, 12 for OSPE and 12 for TPE. On day three 22 students appeared, 10 for OSPE and 12 for TPE.

Thus on all the three days total 71 students appeared, 33 for OSPE and 38 for TPE. All the students were finally evaluated for a score of 20. Total three faculty participated for TPE, one on each of the three days. The scores for OSPE were evaluated by one more faculty for 20 marks.

All the scores were compiled individually for OSPE and TPE for all the three days. Mean scores were calculated for OSPE and TPE separately, and their standard deviations derived. Finally 'p' value was calculated (using T-test) to see for the statistical significance of the mean scores (OSPE & TPE). The feedback forms (OSPE students and faculty) were also evaluated for the responses.

RESULTS

Mean score of OSPE obtained was 11.85 with a standard deviation of ±3.98. The mean score of TPE obtained was 9.58 with a standard deviation of ±3.02. The TPE mean score was found to be lower than that of OSPE. The p-value (using T-test) obtained was 0.00439 (p<0.01) which was found to be statistically significant.

Table 3: Mean scores of OSPE and TPE.

Type of test	Mean score	p-value (<0.01)
TPE	9.58±3.02	0.00439
OSPE	11.85±3.98	

In the feedback questionnaire for students 69.69% opined that they were prior sensitized for OSPE, 63.63% responded that the exam was not stressful, 96.96% said that the exam was well structured, 96.96% said that the time given at each station was well sufficient, 84.84% said that the exam covered the appropriate knowledge area and 78.78% opined that such type of exams should be further included in formative assessments.

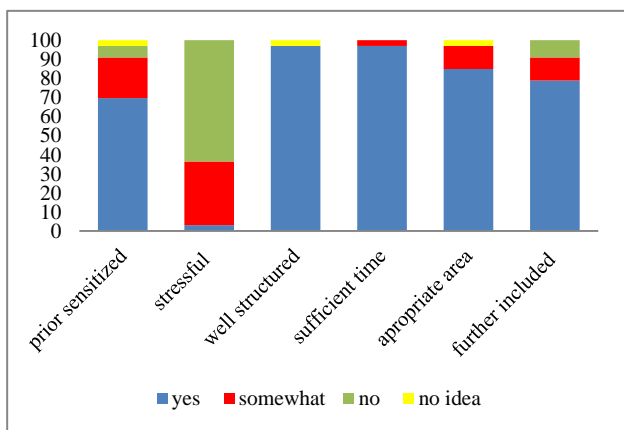


Figure 1: OSPE student feedback.

Faculty gave mixed responses regarding OSPE and TPE. Most of them agreed that OSPE eliminated examiner bias better, only if multiple faculty are involved in assessing and prior preparation of a well drafted answer key was done.

They opined that OSPE was well structured and examined practical skills better than TPE.

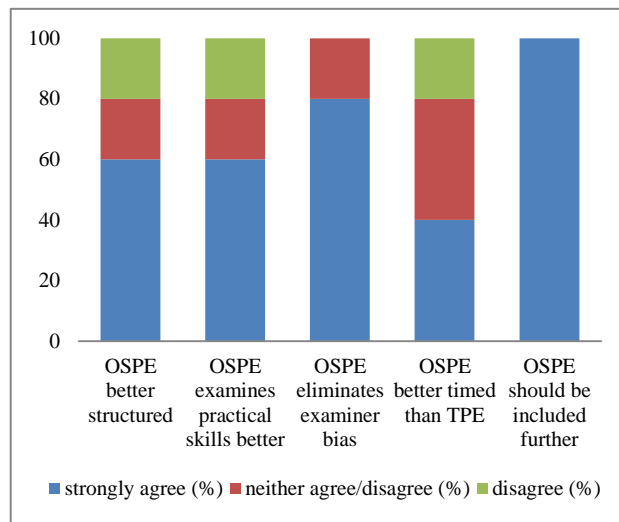


Figure 2: Faculty feedback.

All faculty unanimously said that OSPE should be included further in formative assessments, and if possible in summative assessments also.

One another important fact faculty had expressed were that students' attitude and communication skills cannot be assessed only by OSPE, and hence a combination of assessment methods has to be used, and not sticking to a single method.

DISCUSSION

OSPE is useful for any subject and the main benefit of OSPE is that both the examination process and the examinee are evaluated by giving importance to the individual competencies. There is objectivity in OSPE and the standard to check the competencies are made earlier and agreed check lists are used for marking and evaluation.

This examination removes the variability of experiments and examiner for a group of students or a class studying the same subject and thus it enhances the validity of exam.¹ OSPE provides integration of teaching and evaluation. Students take more interest due to variety, and keep themselves alert during the whole process of examination, which is not found in conventional one.¹

Students have negative perceptions about traditional assessment such as viva in practical exams and it directs the students to explore the knowledge according to the

requirement of the involved teacher. To consider an assessment tool as effective, it should be valid and

reliable and studies had proven the reliability of OSPE tool.⁶

Figure 4: Alia Bashir et al had pointed out some important differences OSPE and TPE.⁷

OSPE assessment system	Conventional methods of viva and practical
Covers 90% topic content studied in whole year	Only 30 to 47% of content covered through this test
Questions are highly structured (same questions for every one)	Questions are not structured (different students get different questions)
Total 15 stations for rotation, each station is of five minute duration, some are static need written answer, some have examiner asking structured questions. The answers are documented and marked according to predesigned checklist	Only two sets of examiner, sometime maximum four, questioning unstructured questions according to their own wish and will, no limitation of time and depending upon their perception fail or pass the candidate, moreover no documentation of candidate answer
In minimum time maximum number of students cover major topics in a transparent way	More time to examine students, without any transparency and only cover topics of examiners choice
The students' needs to prepare the entire subject therefore, become more knowledgeable	The students prepare selected topic of every subject therefore, less knowledgeable
It is students friendly, not making them nervous	It is not student friendly putting them in stress.

The mean score for OSPE obtained in the present study was 11.85 and that for TPE was 9.58, which was found to be statistically significant using the T-test. In a study by Nigam R et al, their mean score for OSPE was 13.75 and that for TPE was 9.13, and their p-value was highly significant <0.0001 .² In another study by Dandannavar Vijaya S, et al, their mean OSPE score was 68.18 and their mean TPE score was 49.28, the p-value obtained was <0.001 .³

In another study by KL Bairy et al their mean OSPE (43.41) and TPE (40.29) scores were statistically significant at $p<0.05$. In a study by Malhotra SD, et al, there was no significant difference in the mean OSPE (13.16) and TPE (12.82) scores obtained in their study.^{7,8}

Students (in the present study) had unanimously expressed that the study was well structured (96.96%) and the questions covered the appropriate knowledge area (84.84%) and also the given time was sufficient (96.96%). Majority of the students felt that the exam was not stressful (63.63%), they were prior sensitized (69.69%) and OSPE should be further included in future formative assessments also (78.78%).

In a study by Manjula A, et al 81% of their students felt OSPE as a fairer tool of examination in practical exercises and 62% of students perceived it as well structured.¹⁰ They also reported that 36% of their students perceived OSPE to be less stressful, 55% felt that it was more useful than conventional examination, 42% opined that OSPE reduced the chances of failing, and 72% felt that it highlighted their areas of weakness. In a similar study by Faldessai N, et al 90% of their student participants opined that OSPE was a better examination pattern than conventional examination and it was better

structured and uniform. 88% students in their study opined that OSPE assessed the relevant practical skills and 80% opined that it covered the appropriate knowledge area consistent with the learning objectives. 50% students in their study said that OSPE was less stressful, and 78% opined that this pattern of examination was helpful in bringing out their areas of weakness.¹¹

In the same study 100% of their faculty opined that the pattern of testing was totally objective and eliminated examiner bias, 75% opined that OSPE examined practical skills better and 50% said that OSPE was aptly structured. All 100% of the faculty in their study unanimously said that OSPE should be introduced in the university examinations for the students.

The main drawback of OSPE seems to be the fact that there is an artificial compartmentalization of tasks which does not truly reflect the real life situation. The other problems are observer fatigue, which can be avoided by getting observers to change stations after some time. Prior discussion with all teachers and meticulous planning is required to conduct OSPE effectively.¹²

The success of OSPE depends a great deal on the checklists which are used. In designing these checklists care should be taken that the task and its components are observable, measurable and can be completed comfortably within the allotted time. Discussions with the faculty and students will ensure that unrealistic and irrelevant tasks are not set.¹²

In a study by Wadde SK et al to know the perceptions of teachers and students regarding OSCE/OSPE as a tool for assessment and to know how it can be made more effective, the participants had pointed out the following

disadvantages of OSPE like- only specific questions are to be asked as in proforma, a pattern of questions may be formed and students will study only concerned topics, more resources (examiners, time) required for preparation, preparation of stations requires expenses and time and it is a continuous process, little difficult to manage time at stations, no direct interaction with examiners, and comprehensive assessment may not be possible as we have to follow proforma.¹³

Some of the suggestions given by the participants in that study were- examiners should get a chance to ask questions related to stations which are not there in proforma, teaching and assessment should go hand in hand, higher level of OSCE should be conducted for student with distinction, some modifications should be done in OSCE and can be implemented (OSCE + Traditional Practical Examination), more emphasis should be given on maintaining confidentiality of the examination and there should be some interaction or conversation with the examiners.

Dandannavar Vijaya S., Alan S et al also reported some limitations of OSPE like resistance from faculty to participate, convincing students to participate as both can become reluctant, resistance from policy makers in committee at college level, availability of adequate number of observers who are keen to evaluate students with patience, expensive and intensive man-power could limit practicality and feasibility.³ Task specific checklists may not exactly replicate an actual clinical encounter which limits the validity.³

Limitations of the present study were that each student was not be examined both for OSPE and TPE, and their performances evaluated, and hence feedback could not be collected from all the 71 students who participated in the study. Another limitation was that the set of media and respective questionnaire were not changed every day which could lead to passing on the information to the students coming the next two days.

CONCLUSION

A total of 71 students were tested, 33 for OSPE & 38 for TPE. The mean scores for OSPE and TPE were 11.85 with a standard deviation of ± 3.98 , and 9.58 with a standard deviation of ± 3.02 respectively, which was statistically significant p-value < 0.01 . Most of the students opined that OSPE was well structured and it covered the appropriate knowledge area, it was less stressful, and it should be continued in future formative assessments.

Most faculty agreed that OSPE eliminated examiner bias better, only if multiple faculty are involved in assessing and prior preparation of a well drafted answer key is done. All faculty unanimously said that OSPE should be definitely included further in formative assessments, and if possible in summative assessments also.

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REFERENCES

1. Azeem MA. A brief overview regarding various aspects of objective structured practical examination (OSPE): Modifications as Per Local Needs. *Pak J Phy.* 2007;3(2):1-3.
2. Nigam R, Mahawar P. Critical analysis of performance of MBBS students using OSPE & TDPE- a comparative study. *Nat J Comm Med.* 2011;2(3):322-4.
3. Vijaya DS, Alan S. A Comparative Study to Evaluate Practical Skills in Physiology Among 1st Phase Medical Under Graduates At Jnmc Belgaum: Traditional Practical Examinations Versus Objective Structure Practical Examinations (TPE V/S OSPE). *Int J Educat Res. Technol.* 2014;5(1):126-134.
4. Chandelkar UK, Rataboli PV, Samuel LJ, Kamat AS, Bandodkar LV. Objective structured practical examination: our experience in pharmacology at Goa Medical College, Bambolim Goa, India. *Int J Sci Rep.* 2015;1(2):113-7.
5. Wani PD, Dalvi VS. Objective structured practical examination vs. traditional clinical examination in Human Physiology: Student's perception. *Int J Med Sci Public Health.* 2013;2:543-7.
6. Nasir N, Asad MR, Sami W, Amir KM. Student's Perception on Objective Structured Practical Examination in College of Applied Medical Sciences. *IJAR.* 2015;3(6):535-40.
7. Bashir A, Tahir S, Khan JS. Objectively structured performance evaluation-a learning tool. *Biomedical.* 2014;2:139-47.
8. Bairy KL, Adiga S, Shenoy S, Magazine BC, Amberkar M, Kumari MK et al. OSPE in Pharmacology: Comparison with the conventional Method and Students' Perspective Towards OSPE. *British Biomedical Bulletin.* 2014;2(1):218-22.
9. Malhotra SD, Shah KN, Patel VJ. Objective Structured Practical Examination as a tool for the formative assessment of practical skills of undergraduate students in pharmacology. *J Edu Health Pro.* 2013;2:53.

10. Manjula A, Shashikala P, Nagaraj P. Student's Perception on Objective Structured Practical Examination in Pathology. *J Med Education & Res.* 2013;1(1):12-4.
11. Faldessai N, Dharwadkar A, Mohanty S. Objective-Structured Practical Examination: A Tool to Gauge Perception and Performance of Students in Biochemistry. *AJMS.* 2014;2(8):32-8.
12. Batmanabane G, Raveendran R, Shashindran C. Objective Structured Practical Examination in Pharmacology for Medical Laboratory Technicians. *Indian J Physiol Pharmacol.* 1999;43(2):242-6.
13. Wadde SK, Deshpande RH, Madole MB, Pathan FJ. Assessment of III MBBS Students using OSPE/OSCE in Community Medicine: Teachers' and students' Perceptions. *Sch. J. App. Med. Sci.* 2013;1(4):348-53.

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