

Impact, impression, and innovations of objective structured practical examination in biochemistry curriculum of medical undergraduates



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ABSTRACT

Background: In the recent years, there is a huge paradigm shift of medical education in India from curriculum-based learning to learner-centered and time independent competency-based medical education. This paradigm shift was to rear and trains medical graduates to function as physician of first contact being globally acceptable. Due to this, the felt need of the hour was to find an assessment tool that is valid, reliable, devoid of subjective bias, and has the capabilities to assess the cognitive, psychomotor, and effective domain.

Aims and Objectives: In this context, this study was done to assess the impression and impact of objective structured practical examination (OSPE) in comparison to conventional practical examination (CPE). Due to the ongoing pandemic of COVID-19, there was some scope of organizing OSPE in virtual mode. **Materials and Methods:** The study involved of 250 Phase I medical undergraduates of Nil Ratan Sircar Medical College. The response stations included charts, clinical problems, graphs, pictures, and critical analysis of reports.

Results: The mean scores in OSPE were higher than CPE. In our study, 51.3% strongly voiced that conducting OSPE was more scientific with uniformity in evaluation. **Conclusion:** OSPE was preferred by the students as an assessment tool. Moreover, OSPE had a scope to be organized in Virtual mode.

Key words: Assessment; Biochemistry; COVID-19; Objective structured practical examination

INTRODUCTION

Evaluation and assessment in any curriculum is a well-organized and systemic process to identify whether the learning objectives have been fulfilled and assimilated by most of the students.¹ Practical examination is a quintessential component of medical education. However, the real challenge is to establish an assessment tool that meets the criteria of uniformity, validity, reliability, and practicability.² Biochemistry practical examination for undergraduate students in most of the medical colleges in India is conducted mainly in the form of conventional test performance and assessment. However, with the paradigm shift of medical education in India from curriculum-

based teaching to learner-centered, time independent “Competency-based medical education” (CBME) focuses on the change of assessment tools too.³ This transition to CBME was to rear and train medical graduates to function as physician of first contact being globally acceptable. Consequently, the felt need of the hour that conventional method of assessment may not assess all the domains.⁴

Although the technique of objective structured practical examination (OSPE) may be in an experimental phase in some institutions, this innovative practical technique has been introduced in 1975 and elaborated by Harden and his colleagues in 1979.^{5,6} However, this 40 years old time tested assessment tool has been recommended by various

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educational experts to have outstanding validity and reliability score. Moreover, the OSPE can be used to assess the student's competence in identification of instruments, reagents, interpretation of reports, and procedural skill and communication skills too by giving patient management problems. Moreover, OSPE is devoid of carry-over effect on examinees scores.⁷ The literature review states that OSPE has constraints of time taken and high faculty versus student's ratio required for evaluation. The conventional practical examination (CPE) is imposed to subjectivity and bias of the examiners regarding particular topic effecting the scores awarded to students.⁸ Some experts on medical education opine that CPE assesses the global performance and scope of assessment of individual competencies has been minimized. Moreover, the scope of feedback pertinent to individual competencies has been narrowed down and thus chance of further improvement for the candidate. Thus, to incorporate OSPE in practical examination has shifted from a moot concern to consensus opinion. In our institution, the practical examination was done in a conventional way mostly. With this background, the present work is aimed to evaluate the impression, acceptance, innovations, and utility of OSPE for the students in learning of clinical biochemistry.

Aims and objectives

This study was done to assess the impression and impact of OSPE in comparison to CPE. The feedback of the students regarding both the examination procedure was assessed.

MATERIALS AND METHODS

This prospective-longitudinal study was conducted in the Department of Biochemistry of Nil RatanSircar Medical College after appropriate institutional ethical approval. (vide Memo.no:NMC/1383 dated 11/03/2020). The study included participants from Phase I MBBS students of 2019–2020 batch. CPE was conducted on detection of abnormal constituents of urine and colorimetric estimation of plasma glucose and serum protein, respectively. The marks were awarded scores post-conventional examination. The students were sensitized toward OSPE and examination was conducted on the similar topic with two performing stations and three response stations. The response stations included charts, clinical problems, graphs, pictures (chromatograph, etc.), and critical analysis of test reports such as jaundice and renal failure. The students had to perform tests such as detection of abnormal constituent of urine in the observed or performance stations. Each OSPE station was allotted a time frame of 5 min and 4 marks each. The stations were designed with maintaining the same difficulty level for both OSPE and traditional practical examination. Each was OSPE station question. The stations/questions were

designed at per with the competencies mentioned in the new curriculum designed by the NMC. The facilitators were sensitized toward the evaluation of OSPE and a checklist was provided. The facilitators were cautious to avoid interaction between the students who attended the OSPE stations and who were about to attend it. The scores of OSPE were also compiled and tabulated. To evaluate student views on comparison between the two categories of assessment, a 10-item questionnaire devised and validated by the principal investigator and co-investigator. All the items were assessed by a Likert-type scale, with the responses “strongly disagree,” “disagree,” “neither agree nor disagree,” “agree,” and “strongly agree” and with values ranging from 1 to 5 points. The questionnaire (Table 1) was validated after assessment of face validity, content validity (using CVR by Lawshe test), and reliability measurement by Cronchbach's alpha (0.775) after giving the questionnaire to a panel of 30 experts.^{9,10} The students of Phase I MBBS students who voluntarily agreed to participate in the study were requested to fill the 10-item questionnaire after receiving appropriate consent from them. The anonymity of the students was maintained and the students were briefed about maintaining the true views while filling the details in given questionnaire. The responses of the

Table 1: Reliability co-efficient of the 10-item questionnaire used as a study tool

S. No.	Item tested	Reliability Coefficient (Cronchbach's Alpha)
1.	Are the objectives outlined in the beginning of Practical examination?	0.775
2.	Do you think OSPE is more interesting than conventional practical examination?	
3.	Do you think OSPE promotes sharp thinking and memory?	
4.	Do you think that OSPE promotes focusing on clinical correlation of topics taught in practical?	
5.	Was there uniformity in assessment or evaluation?	
6.	Do you think OSPE could prepare you to face the conventional exam with confidence?	
7.	Do you think that both OSPE and conventional practical should be there?	
8.	Do you think OSPE should be cancelled from Practical examination and only conventional method should be followed?	
9.	Is the method of conducting OSPE in practical examination is more scientific?	
10.	Possibility of high scoring in OSPE is more as the chance factor is less	

OSPE: Objective structured practical examination

students were recorded, extrapolated, and compiled using Microsoft Excel and appropriate statistical tests were done. The consensus among the Likert scale items was calculated by the formula as described by Tastle and Wierman.¹¹

RESULTS

The questionnaire was distributed among the 250 students enrolled in Phase I MBBS students (2019–2020) of Nil Ratan Sircar Medical College and Hospital. Among the 250 students, 240 students voluntarily agreed to participate in the study. The perception of the students about OSPE vis-à-vis CPE are detailed in Table 2. About 45% students were in agreement with the fact that OSPE is more interesting than conventional examination. Out of the 240 students who voluntarily participated in the study, 131 and 123 accepted the fact that OSPE promotes sharp thinking and memory as well as OSPE promotes focusing on clinical correlation of topics taught in practical, respectively. The majority of the students, about 63.4% denied the fact that OSPE should be cancelled from the examination protocol. The responses were compared using Chi-square test and $P < 0.05$, considered statistically significant. However, the majority of the students gave a consensus opinion that there was a possibility of scoring in OSPE was high. The reasons explicitly detailed by the students for chances of scoring in OSPE was due to same set of questions for all students, less chance of stress, and devoid of personal bias of the examiner. The total score was assigned 20 marks for both CPE. The scores of the students ($n=250$) obtained in the practical examination were compared with the scores of OSPE and detailed in Figure 1. The mean score \pm standard deviation

for conventional practical and OSPE was 13.15 ± 2.17 and 14.69 ± 2.29 respectively. The mean scores for CPE and OSPE were compared using paired t-test. The scores were significantly ($P < 0.01$) higher for the OSPE pattern with the similar set of topics. The most of the students opined that it was more scoring, scientific as well as chances of part marking. However, some of the students had a different opinion regarding the time allotted for each station.

DISCUSSION

Assessment tool is the evaluation of teaching-learning effectively. The CPE focuses mainly on the cognitive domain. The formative assessment is by far the best tool for evaluation as there is a scope of feedback. A study by Rafique et al., clearly points out the role of OSPE in the identification of gap in teaching-learning methodologies and rectifying the problems in a suitable manner.¹² The OSPE was well received by both the facilitators and students. The mean score of the OSPE was significantly higher in our study as compared to the traditional practical examination. Similar observation is detailed by the study of Syeeda et al.,¹³ In our study, 51.3% strongly voiced that conducting OSPE was more scientific with uniformity in evaluation. In the study of Faldessai et al., the findings are concordant with our findings where 90% of the participants agreed OSPE to be a better assessment tool.¹⁴ Moreover, there are less chances of examiners bias and uniformity of assessment makes OSPE a reliable tool of assessment. However, conducting OSPE is a more tedious job considering the key-points such as framing of question and marking pattern. A study by Rao et al., suggested that

Table 2: Students perception about OSPE versus conventional practical examination (n=240)

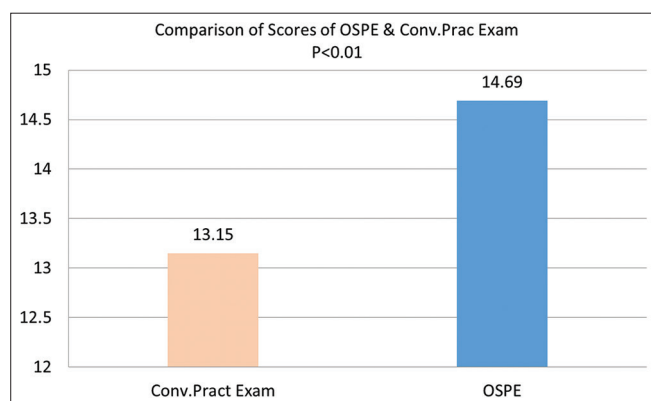
S. No.	Items Testes	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	P-value
1.	Are the objectives outlined in the beginning of Practical examination?	61 (25.4)	121 (50.1)	38 (15.8)	17 (7.1)	3 (1.3)	<0.0001*
2.	Do you think OSPE is more interesting than conventional practical examination?	70 (29.2)	108 (45)	33 (13.8)	16 (6.7)	13 (5.4)	<0.0001*
3.	Do you think OSPE promotes sharp thinking and memory?	65 (27.1)	131 (54.6)	31 (12.9)	12 (5.0)	1 (0.4%)	<0.0001*
4.	Do you think that OSPE promotes focusing on clinical correlation of topics taught in practical?	47 (19.6)	123 (51.3)	46 (19.2)	21 (8.8)	3 (1.3)	<0.0001*
5.	Was there uniformity in assessment or evaluation?	39 (16.3)	117 (49.8)	58 (24.2)	22 (9.2)	4 (1.7)	<0.0001*
6.	Do you think OSPE could prepare you to face the conventional examination with confidence?	45 (18.8)	102 (42.5)	54 (22.5)	31 (12.9)	8 (3.3)	<0.0001*
7.	Do you think that both OSPE and conventional practical should be there?	38 (15.8)	78 (32.5)	49 (20.4)	50 (20.8)	25 (10.4)	<0.0001*
8.	Do you think OSPE should be cancelled from Practical examination and only conventional method should be followed?	18 (7.5)	27 (11.3)	43 (17.9)	101 (42.1)	51 (21.3)	<0.0001*
9.	Is the method of conducting OSPE in practical examination is more scientific?	44 (18.3)	123 (51.3)	55 (22.9)	13 (5.4)	5 (2.1)	<0.0001*
10.	Possibility of high scoring in OSPE is more as the chance factor is less	43 (17.9)	104 (43.3)	61 (25.4)	23 (9.6)	9 (3.8)	<0.0001*

Figure in parenthesis suggest percent distribution. *Statistically significant ($P < 0.05$), OSPE: Objective structured practical examination

Table 3: Students perception about the merits of OSPE vis-a-vis conventional practical examination (n=240)

Indicator	Statement	Strongly Agree and agree (%)	Consensus Score
Merits	OSPE is more interesting than conventional practical examination	74.2	0.62
	OSPE promotes sharp thinking and memory	81.7	0.77
	OSPE promotes focusing on clinical correlation of topics taught in practical	70.8	0.70
	Possibility of high scoring in OSPE is more as the chance factor is less	61.3	0.64

OSPE: Objective structured practical examination

**Figure 1:** Comparison of mean scores in conventional practical examination and OSPE using PAIRED t-test ($P < 0.05$)

a high facilitator/observer versus student's ratio is required for OSPE as compared to CPE.¹⁵ Table 3 summarizes the perception of the students and their consensus opinion regarding the merits of OSPE in comparison to traditional practical examination. Out of 240 students, 81.7% students opine that OSPE promotes sharp thinking and 61.3% (consensus score=0.64) suggested that the chance of scoring in OSPE is high as chance factor being less. The ongoing global pandemic of COVID-19 has jeopardized the medical education globally. However, this has helped to opportunity to train ourselves in virtual teaching learning activities. The facilitators and students have adapted to current need of online education or assessment due to this COVID-19 pandemic. In this COVID 19 struck pandemic where we had to maintain the social distancing as well as observer/student ratio could not be met, the innovation of e-OSPE could be organized in hybrid mode. The stations can be provided as power point presentation with pre-set time of slide transition. The department can allot different rooms for e-OSPE in hybrid mode and each room provided with the sitting arrangement of 5–10 students. This may curtail down the time and observer requirement. A similar study was done by Dutta et al., in virtual form using Google forms and Google class room.¹⁶ There are limited scopes of organizing CPE in virtual mode.

Limitations of the study

A limited number of students in focused group discussion suggested that the fixed time for each OSPE stations results

in stress among students. The students also suggested that facilitators should consult among them regarding the time distribution as per station subtype. Inter-station variability of score according to stations was not analyzed due to limited number of OSPE stations. These statistical analyses would reveal the better designing of them in future examinations.

CONCLUSION

From the experience of OSPE, we have learned that through the continuous process of feedback analysis, it is a reliable and valid assessment tool to assess the competencies. Moreover, planning for OSPE helped us to review the curriculum effectively. This was a supplementary benefit. However, limitations imposed by time intensive and higher faculty/student ratio for OSPE conduction does not preclude its benefit as an assessment tool of psychomotor and affective domain.

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