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### Students' performance in Objective Structured Practical Examination and Traditional Practical Examination in Clinical Physiology

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**Abstract:** This complete enumeration, cross-sectional comparative study was conducted on 62 (29 females; 46.77% and 33 males; 53.23%) first-year MBBS students of a municipal medical college. After explaining the purpose of the study and orienting students about the OSPE procedure and its marking system, written informed consent was obtained from those willing to participate in the study. In the traditional practical examination (TPE), each student tested near and distant vision, which was followed by viva voce on the same procedure and overall marks (out of 20) were allotted by the examiners. During the OSPE, the examiners were provided with a pre-validated checklist containing 10 steps each for examining near vision and distant vision. These examinations were to be carried out within an allotted time of 5 minutes each. One mark was given for correct performance of each step mentioned in the checklist. The maximum marks obtainable were 20 marks - 10 marks each for testing near vision and distant vision. The difference in the overall mean TPE and OSPE scores was highly significant ( $Z=11.79$ ;  $p<0.00001$ ). However, the gender difference in mean scores in both TPE and OSPE was not significant. While testing near vision, 69.35% students ensured adequate lighting in the room while 79.03% students tested visual acuity both with and without glasses for subjects who wear glasses. While testing for distant vision, only 24.19% students enquired whether the subject had been prescribed glasses earlier. Thus, for these three OSPE steps, the difference in scores while testing for near and distant vision was statistically significant. Students obtaining relatively lower scores would require remedial training. A larger study would be necessary in order to generalize the results.

**Keywords:** Clinical physiology, OSPE, Traditional practical examination, Visual acuity.

#### INTRODUCTION

The Objective Structured Practical Examination (OSPE) involves assessment of the student by direct observation of the student's performance in a flexible examination setting that consists of laboratory stations [1,2]. The OSPE was first described by Harden *et al.* [3] from the University of Dundee, Scotland in 1975 and improved in 1979 [1,2]. In 1990, George Miller, a psychologist, proposed a framework for assessing levels of clinical competence and described four levels - "knows", "knows how", "shows how", and "does" [4]. Student performance has to be assessed across a range of situations to ensure a reliable skill-based evaluation [1].

Each method of student evaluation has its own importance, based on the situation, relevance and the available resources [5]. More often than not, introduction of an idea, such as, OSPE, in a

conventional framework is greeted with disbelief [6]. Currently, there is no "gold standard" [7] or single pattern of examination that can assess students on the basis of their knowledge, comprehension, psychomotor skills, communication skills and attitudes [8]. The mode of assessment influences the learning style of student [9] and has a crucial role the learning process. [10] The method of assessment largely determines the learning pattern of the students [11] while an alteration in the student evaluation method can transform learning behaviour [12].

The OSPE appraises a assortment of competencies [13,14], measures practical psychomotor skills, enables uniformity in student assessment, decreases stress levels among students [15], eliminates subjectivity [14] and examiner bias [16], reduces total time for practical examination, has a broader discrimination index and high reliability [17] and helps

students to understand several elements of competencies and also to take feedback [8].

The impediments in using OSPE include its labour-intensive nature, difficulties in maintaining identical difficulty levels, and observer fatigue. [18] Despite these limitations, OSPE brings about a change for the better in student assessment. [14] OSPE was first introduced in India as a teaching and evaluation tool and standardized in 1986 by Nayar *et al.* to assess the practical skills of students in Physiology [19,20]. OSPE is currently conducted as a formative examination in select Indian medical colleges [18] and has been introduced as summative assessment in a small number of Indian universities [14,15]. Till date, OSPE has not yet been used as a routine evaluation tool during MBBS practical examinations in Maharashtra State since it is not yet mandated by the Maharashtra University of Health Sciences.

Visual acuity examination was selected for this comparative study since it is classified in the “must know” category in Clinical Physiology and moreover, the technique of visual acuity examination simultaneously assesses the psychomotor and communication skills of the student. The objective of the present study was to compare the scores obtained by students in Objective Structured Practical Examination (OSPE) with that obtained in Traditional Practical Examination (TPE) in Clinical Physiology.

## MATERIALS AND METHODS

This complete enumeration, cross-sectional comparative study was conducted at Rajiv Gandhi Medical College, a municipal medical college located at Kalwa, Thane, about 30 kms from Mumbai in Maharashtra state, India. After obtaining permissions from the Institutional Ethics Committee (IEC) and institutional authorities for conducting the study, the purpose of the study and the OSPE procedure was explained to first-year MBBS students and written informed consent was obtained from those willing to participate in the study. TPE on visual acuity was first conducted, wherein, each student performed tested near and distant vision, which was followed by viva voce on the same procedure and overall marks (out of 20) were allotted by the examiners. Before conducting OSPE, students were oriented regarding OSPE and the marking system based on a checklist. During the OSPE, the examiners were provided with a pre-validated checklist containing 10 steps for examining near vision (allotted time = 5 minutes) and 10 steps for examining distant vision (allotted time = 5 minutes). One mark was given for correct performance of each step mentioned in the checklist. The maximum marks obtainable were 20

marks - 10 marks for near vision testing and 10 marks for distant vision testing.

The data were statistically analyzed using EpiInfo Version 7.0 (public domain software package from the Centers for Disease Control and Prevention, Atlanta, GA, USA). Continuous data were presented as Mean and Standard Deviation (SD). 95% Confidence interval (CI) was stated as: [Mean-(1.96)\* Standard Error] - [Mean+(1.96)\* Standard Error]. Karl Pearson’s Chi-square test with Mantel-Haenszel correction (where required) was used. The standard error of difference between two means (Z) was calculated. Statistical significance was determined at  $p < 0.05$ .

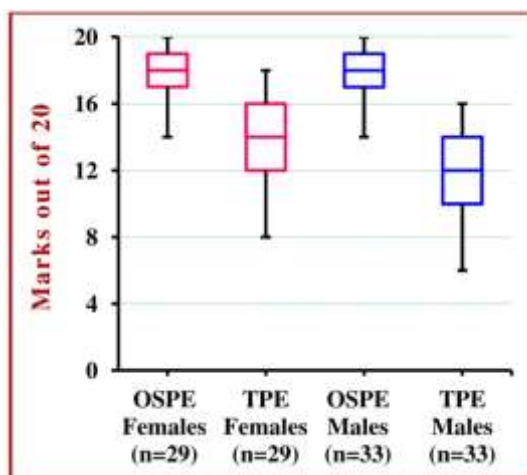
## RESULTS AND DISCUSSION

A total of 62 students (29 females; 46.77% and 33 males; 53.23%) participated in the study.

Overall mean scores: The mean OSPE score was 17.58 +/- 1.57 (95% CI: 17.18 – 17.98) while that for TPE was 12.68 +/- 2.87 (95% CI: 11.95 – 13.40) and the difference in the mean TPE and OSPE scores was highly significant ( $Z=11.79$ ;  $p < 0.00001$ ).

### Gender-wise mean scores

The mean score obtained by female students ( $n=29$ ) in TPE was 13.17 +/- 2.59 (95% CI: 12.23 – 14.11) while that for male students ( $n=33$ ) was 12.24 +/- 3.07 (95% CI: 11.19 – 13.29) and the gender difference in mean scores was not significant ( $Z=1.294$ ;  $p=0.197$ ). The mean score obtained by female students ( $n=29$ ) in OSPE was 17.72 +/- 1.49 (95% CI: 17.18 – 18.26) while that for their male counterparts ( $n=33$ ) was 17.45 +/- 1.66 (95% CI: 16.88 – 18.02) and the gender difference was not significant ( $Z=0.675$ ;  $p=0.497$ ). A study [21] from Belgaum, Karnataka, has also reported that there was no significant ( $p=0.115$ ) gender difference in OSPE scores. The maximum, third quartile, median, first quartile and minimum scores in OSPE was nearly identical for both males and females (Fig. 1). However, in TPE, the same set of female students outperformed their male counterparts with higher maximum, third quartile, median, first quartile and minimum scores. In a TPE, the examiners may have their own personal preferences, prejudices and their own sets of non-standardized questions, [22] which may explain the higher scores of female students in TPE in the present study. The TPE is subjective and for the most part, evaluates the cognitive (knowledge) component viz. “knows” and “knows how” aspects whereas the OSPE focuses on assessment of performance of specific skills in a controlled setting. [17]



**Fig-1: Boxplot of scores obtained in OSPE and TPE**  
 OSPE = Objective Structured Practical Examination  
 TPE = Traditional Practical Examination

**Table-2: OSPE steps performed by students (n=62)**

Procedure	Near vision	Distant vision	Chi Square #	p value
1. Ascertaining that the subject knows the language in which the letters are written on the chart	54	46	3.307	0.069
2. Ensuring adequate lighting in the room	43	61	19.159	<0.0001 **
3. Ensuring appropriate distance between the subject and the vision chart	57	61	2.779	0.095
4. Asking the subject to read letters of the different sizes with both eyes open	62	61	1.000	0.317
5. Recording the smallest lettering that the subject can read comfortably with both eyes open	62	60	2.016	0.155
6. Asking the subject to close eye and read the chart with the other eye	59	58	0.150	0.698
7. Repeating step-6 separately for each eye (with one eye closed)	59	60	0.207	0.649
8. Recording the smallest lettering that the subject can read comfortably with each eye	60	58	0.695	0.404
9. Enquiring whether the subject has been prescribed glasses earlier	48	15	35.138	<0.0001**
10. Testing visual acuity both with and without glasses for subjects who wear glasses	49	57	4.126	0.042 *

# Karl Pearson's Chi Square test \*Significant; \*\*Highly significant

**Procedure-related scores**

While testing near vision, only 43 out of 62 (69.35%) students ensured adequate lighting in the room while only 49 out of 62 (79.03%) students tested visual acuity both with and without glasses for subjects who wear glasses. While testing for distant vision, only 15 out of 62 (24.19%) students enquired whether the subject had been prescribed glasses earlier. Thus, for step Nos. 2, 9, and 10, the difference while testing for near and distant vision was statistically significant (Table-2).

**CONCLUSION**

In the present study, the difference in the overall mean TPE and OSPE scores was highly significant, while the gender differences in mean TPE and OSPE scores were not significant. For three procedural steps, the difference while testing for near and distant vision was statistically significant. Students obtaining relatively lower scores would require remedial training. A larger study would be necessary in order to generalize the results.

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