OPEN ACCESS
Saudi Journal of Medical and Pharmaceutical Sciences
Abbreviated Key Title: Saudi J Med Pharm Sci
ISSN 2413-4929 (Print) |ISSN 2413-4910 (Online)
Scholars Middle East Publishers, Dubai, United Arab Emirates
Journal homepage: https://saudijournals.com/journal/sjmps/home

Original Research Article

Effect on Student Scores: Objective Structured Practical Examination of Motor System

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| **Received:** 15.01.2019 | **Accepted:** 26.01.2019 | **Published:** 10.02.2019
DOI: 10.36348/sjmps.2019.v05i02.001

Abstract

This complete enumeration, cross-sectional descriptive study was conducted on 62 students (females=29; 46.77%; males=33; 53.23%) at Rajiv Gandhi Medical College, Kalwa, Thane, Maharashtra State, India, to determine the effect of objective structured practical examination on student scores. After the examination procedure and the check-list based marking system was explained to first-year medical students, written informed consent was taken from willing participants. The mean conventional practical examination score (out of 60) was 38.03 ± 8.62 (95% CI: 35.89 – 40.18), while that for objective structured practical examination (out of 60) was 52.19 ± 4.56 (95% CI: 51.06 – 53.33). The difference in overall scores was highly significant (Z=11.433; p<0.00001). But, the gender differences in mean scores were not significant. The results of this study indicate that objective structured practical examination was more objective, measured practical skills better, eliminated examiner bias and significantly enhanced student scores and can be used for formative assessment to improve students' competence (psychomotor component). Students with lower scores may need remedial educational intervention.

Keywords: Motor system, Objective structured practical examination, Student scores.

INTRODUCTION

The Objective Structured Practical Examination (OSPE) is a method of appraisal wherein students are assessed by direct observation of their performance. The examination setting may vary, but it typically it comprises several laboratory stations that ought to be completed synchronously [1, 2]. At each procedure station, which is planned to test a component of competence, an observer uses a pre-validated check list to score the student in the task to be performed at that station. At question stations, students answer questions or record their findings of the previous procedure station. In a pre-determined sequence, the students move to the next station when a signal is given and should rotate through all the laboratory stations. Often, the stations are independent and the students can start at any of the stations and complete the cycle [3]. The evaluation process can be accelerated by computer-assisted OSPE (COSPE) [4].

In 1990, George Miller suggested a framework for evaluating clinical competence and described four levels – "knows", "knows how", "shows how", and "does" [5]. The conventional practical examination (CPE) is subjective; the scores reveal the overall student performance and are not based on demonstration of individual competencies, communication skills, or attitudes [3], and chiefly examines the cognitive (knowledge) component viz. "knows" and "knows how" aspects while the OSPE also evaluates the psychomotor (competence) component - the "shows how" level [5].

For a consistent skill-based evaluation, student performance has to be assessed across a assortment of situations [1]. Each student assessment method has its own importance, based on the circumstances, relevance and the existing resources [6]. Student learning behaviour is propelled by the assessment method [7, 8], has a decisive role the learning process [9] and primarily decides what students learn [8], while a modification in the student assessment method can transform learning behaviour [10].

The OSPE reduces subjectivity [11, 12] and examiner bias, [13, 14] evaluates a group of

competencies [11, 13], appraises practical psychomotor skills, reduces total time for practical examination, facilitates standardized student assessment, reduces stress levels among students [15], has a wider discrimination index and high reliability [16] and helps students to grasp various components of competencies and also obtain feedback [15, 17].

Its labour-intensive nature, difficulties in maintaining identical difficulty levels and observer fatigue are among the impediments in using OSPE [18]. OSPE brings about an improvement in student assessment in spite of these limitations [11]. A single pattern of examination that can evaluate students on the basis of their knowledge, comprehension, psychomotor skills, communication skills and attitudes is not currently available [15].

Examination of the motor system was chosen for this comparative study since it evaluates the psychomotor skills of the student and is in the "must know" category in the curriculum of Physiology for the First MBBS course. The objective of the present study was to determine the effect of OSPE on student scores.

MATERIALS AND METHODS

This complete-enumeration, cross-sectional descriptive study was conducted at Rajiv Gandhi Medical College in Kalwa, Thane, Maharashtra State. This medical college has an intake capacity of 60 students per year for the MBBS course. After obtaining Institutional Ethics Committee (IEC) approval, the study objectives, the OSPE procedure and the check-list based marking system was explained to first-year MBBS students and written informed consent was taken from willing participants.

In the CPE, each student performed motor system examination (eliciting biceps, triceps, knee, ankle and plantar reflexes) which was followed by viva-voce on the same procedure and overall marks (out of 60) were assigned by the examiners.

In OSPE, one mark was awarded for correct performance of each step in eliciting biceps, triceps, knee, ankle and plantar reflexes, as per the checklist-based marking system. At each procedure station, an observer was provided with this check-list. The maximum marks obtainable at the procedure station were 50. At the question station, students had to write answers to 10 short-answer type questions carrying maximum of 10 marks (one mark each). Thus, the total marks obtainable during OSPE were out of 60.

The OSPE and CPE scores were tabulated in Microsoft Excel (Microsoft Corporation, Redmond, WA, USA) and statistically analysed 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). The standard error of difference between two means (Z value) was calculated. 95% Confidence interval (CI) was stated as: [Mean-(1.96)*Standard Error)] - [Mean + (1.96)* Standard Error)]. Statistical significance was determined at $p<0.05$.

RESULTS AND DISCUSSION

A total of 62 students (females=29; 46.77%; males=33; 53.23%) participated in this study. The mean CPE score (out of 60) was 38.03 ± 8.62 (95% CI: 35.89 – 40.18), while that for OSPE was 52.19 ± 4.56 (95% CI: 51.06 – 53.33). The difference in overall CPE and OSPE scores was highly significant (Z=11.433; $p<0.00001$).

Table-1: Gender distribution of mean marks obtained (out of 60) at OSPE and CPE

Assessment type	Females (n=29)	Males (n=33)	Z value #	p value
	Mean (SD)	Mean (SD)		
OSPE	52.97 (4.06)	51.38 (5.16)	1.356	0.175
CPE	39.52 (7.78)	36.21 (9.55)	1.503	0.133

SD = Standard deviation; # Standard error of difference between two means

Examination of the motor system consists of evaluation of strength, muscle tone, muscle bulk, coordination, abnormal movements and various reflexes. The elicitation of various reflexes can be hampered in a weary patient or lack of comprehension of the examination, lack of rapport between the examiner and the subject. The biceps, triceps, knee, ankle and plantar reflexes are commonly tested.

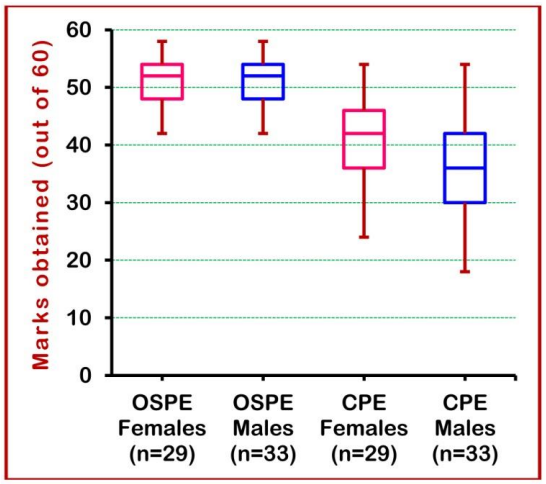

Fig-1: Boxplot depicting gender-wise OSPE and CPE scores

In the present study, the maximum, third quartile, median, first quartile and minimum OSPE scores were nearly identical for females and males. However, for CPE, only the maximum scores were identical for both sexes but the third quartile, median, first quartile and minimum CPE scores for females were much higher than that for males (Fig-1). However, the gender differences in mean scores were not significant in OSPE, as well as CPE (Table-1). Lack of significant gender difference has also been reported by a Karnataka-based study [19]. In contrast, some researchers [20-24] have reported that female students obtained significantly higher scores compared with their male counterparts.

CONCLUSION

The results of this study indicate that OSPE was more objective, measured practical skills better, eliminated examiner bias and significantly enhanced student scores. OSPE can be used for formative assessment to improve students' competence (psychomotor component). The gender differences in average scores were not significant. Feedback was given to the students regarding their OSPE performance so that their errors could be rectified. Students with lower scores may require remedial educational intervention.

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