

# Objective Structured Practical Examination in Haematology for First-Year MBBS Students

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## Abstract

This complete enumeration, cross-sectional comparative study was conducted in the Physiology Department of a municipal medical college in Maharashtra, India to determine the gender differences in scores obtained by students in objective structured practical examination. After explaining the purpose of the study and the procedure of the Objective Structured Practical Examination to first-year MBBS students (n=60; 30 females and 30 males), written informed consent was obtained. The examiners were provided with a pre-validated checklist for assessing the students' performance at the procedure station. After the procedure station, the students shifted to the question station for writing answers to ten short-answer type questions. The overall mean score (out of 20) in the procedure station was  $18.57 \pm 1.88$  (95% CI: 18.09–19.04) while the mean score in the question station (out of 20) was  $10.98 \pm 4.05$  (95% CI: 9.96–12.01). The gender differences in mean scores were not significant (p=0.499) at the procedure station that primarily assessed the psychomotor domain at the “shows how” level of the Miller's Pyramid. However, male students obtained significantly (p=0.015) lower mean scores at the question station that chiefly evaluated the cognitive domain at the “knows” and “knows how” levels. This implied that while both male and female students were equally proficient at performing the procedure (psychomotor domain) component of the practical, the male students were deficient in the knowledge (cognitive domain) component of the practical, when compared with their female counterparts.

**Keywords:** Bleeding time, Clotting time, Haematology, OSPE.

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## INTRODUCTION

The Objective Structured Practical Examination (OSPE) entails student assessment by direct observation of the student's performance in a flexible examination setting that comprises several laboratory stations that ought to be completed within the same time duration (about 4-5 minutes each) [1, 2]. The students move to the next station when a signal is given and should rotate through all stations in a pre-determined sequence. Frequently, the stations are independent and the students can start at any of the stations and complete the cycle. Each station is designed to test a component of competence. Each procedure station is assigned an observer with a pre-validated check list for scoring the student's performance in the task to be performed at that station. At question stations, students answer questions or record their findings of the previous procedure station [3].

In 1990, George Miller proposed a framework for assessing levels of clinical competence and described four levels – “knows”, “knows how”, “shows

how”, and “does” [4]. The traditional practical examination is subjective and principally examines the cognitive (knowledge) component viz. “knows” and “knows how” aspects while the OSPE also evaluates the psychomotor (competence) component - the “shows how” level [4].

Student performance has to be assessed across a range of situations to ensure a reliable skill-based evaluation [1]. The OSPE evaluates a constellation of competencies [5, 6], measures practical psychomotor skills, eliminates subjectivity [5, 7] and examiner bias [6, 8], reduces total time for practical examination, enables uniformity in student assessment, decreases stress levels among students [9], has a wider discrimination index and high reliability [10] and helps students to grasp various components of competencies and also obtain feedback [9, 11]. Use of computer-assisted OSPE (COSPE) that expedites the evaluation process has been described [12].

The snags in using OSPE include its labour-intensive nature, difficulties in maintaining identical

difficulty levels, and observer fatigue [13]. Despite these shortcomings, OSPE brings about an improvement in student assessment. [5] OSPE has been introduced in select Indian universities [5, 9]. Currently, OSPE is not used during the summative MBBS practical examinations in Maharashtra State since it is not yet authorized by the Maharashtra University of Health Sciences.

Each method of student evaluation has its own importance, based on the situation, relevance and the available resources [14]. The mode of assessment influences the learning style of student [15], has a crucial role the learning process [16], and chiefly determines what students learn [17] while an alteration in the method of student evaluation can transform learning behaviour [18].

Bleeding time and clotting time was chosen for this comparative study since it is in the “must know” category in Haematology in the curriculum of Physiology for the First MBBS course. In addition, this practical assesses the psychomotor skills of the student. The objective of the present study was to determine the gender differences in the OSPE scores obtained by students so that remedial measures can be taken.

## MATERIALS AND METHODS

This complete enumeration, cross-sectional comparative study was conducted in October 2018 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 and institutional authorities for conducting the study, first-year MBBS students (n=60; 30 females and 30 males) were oriented about the purpose of the study, the OSPE procedure and the check-list based marking system and their written informed consent was obtained.

During the OSPE, the examiners were provided with a pre-validated checklist containing the following 5 steps (two marks for each correct step) for assessing the students' performance of practical on Bleeding Time –

- Cleaned finger with alcohol swab
- Pricked the finger with lancet & noted the time the prick is made and wiped away the first drop of blood with cotton swab
- At every 30 seconds' interval, the flowing blood was dried on the edge of the filter paper
- When bleeding ceased, calculated each blot on filter paper
- Disposed off the cotton swab, lancet and filter paper in the dustbin & cleaned the table

Likewise, the pre-validated checklist comprised the following 5 steps (two marks for each correct step) for evaluating the students' performance of practical on Clotting Time –

- Cleaned finger with alcohol swab.
- Pricked the finger with lancet & noted the time the prick is made and wiped away the first drop of blood.
- Placed one end of a capillary tube horizontally, when blood started flowing freely and let the tube fill by capillary action.
- At the end of one minute, broke off one cm of the capillary tube from one end and noticed that a thread of fibrin connected the broken ends of the tube.
- Discarded the cotton swab, lancet and broken capillary tube in the dustbin & cleaned the table.

The maximum marks obtainable in the procedure station were 20 marks (10 marks each for bleeding time and clotting time). After the procedure station, the students shifted to the question station wherein they had to write answers to ten short-answer type questions (two marks each; maximum marks = 20) pertaining to the same topics.

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]. The standard error of difference between two means (Z) was calculated. Statistical significance was determined at  $p < 0.05$ .

## RESULTS AND DISCUSSION

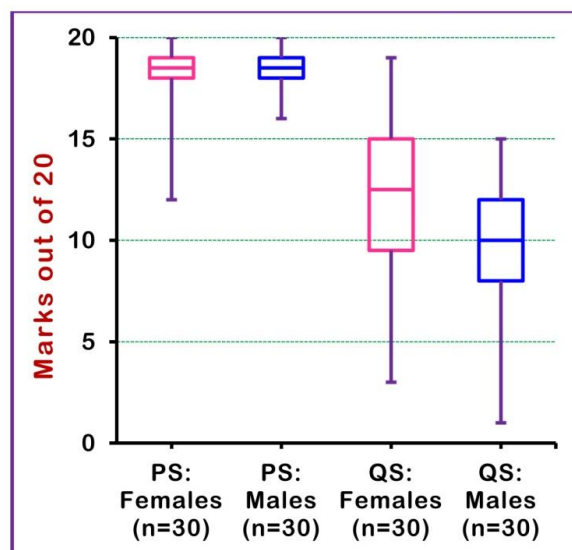
A total of 60 first-year MBBS students (30 females & 30 males) participated in the study. The overall mean score (out of 20) in the procedure station was  $18.57 \pm 1.88$  (95% CI: 18.09–19.04) while that in the question station (out of 20) was  $10.98 \pm 4.05$  (95% CI: 9.96–12.01).

### Gender-Wise Mean Scores

For female students, the mean score (out of 20) at the procedure station was  $18.40 \pm 2.19$  (95% CI: 17.62–19.18) while that at the question station was  $10.64 \pm 4.36$  (95% CI: 10.64–13.76). For male students, the mean scores (out of 20) at the procedure station and question station were  $18.57 \pm 2.19$  (95% CI: 17.62–19.18) and  $10.64 \pm 4.36$  (95% CI: 10.64–13.76), respectively. The gender difference in marks obtained at the procedure station was not statistically significant ( $Z=0.676$ ;  $p=0.499$ ) but that obtained at the question station was statistically significant ( $Z=2.417$ ;  $p=0.015$ ).

At the procedure station, the maximum score, third quartile, median and first quartile are nearly identical for male and female students but the minimum score was much lower for females, as compared to their

male counterparts. At the question station, the maximum score, third quartile, median and first quartile and minimum score for males was much lower than that for females (Fig-1).



**Fig-1: Box plot of gender differences in scores**  
PS = Procedure Station; QS = Question Station

The gender differences in mean scores were not significant ( $Z=0.676$ ;  $p=0.499$ ) at the procedure station that primarily assessed the psychomotor domain at the “shows how” level of Miller’s Pyramid [7]. However, male students obtained significantly ( $Z=2.417$ ;  $p=0.015$ ) lower mean scores at the question station that chiefly evaluated the cognitive domain at the “knows” and “knows how” levels. This implied that while both male and female students were equally adept at performing the procedure (psychomotor domain) component of the practical, the male students were deficient in the knowledge (cognitive domain) component of the practical, when compared with their female counterparts.

Researchers [19-23] from varied geographical locations have found that female students performed significantly better, as compared to their male counterparts, which corroborates the findings in this study. However, one research paper from Belgaum, Karnataka, has reported lack of significant gender difference in OSPE scores [24].

The limitation of the present study was that it was conducted on only one batch of 60 first-year MBBS students. A larger study would be necessary in order to generalize the results.

## CONCLUSION

Since the errors committed by most students were comparable, these errors were recorded and feedback was given to the students regarding their performance. Remedial teaching may be required for students with lower scores. This study also drew

attention to the need to develop a pre-validated OSPE question bank.

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