

## Impact of Assessment Modules on Academic Performance of First Year Medical Students in Physiology Subject

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### Abstract

**Background:** Assessment is an integral part of the learning process in medical education and the way how assessment is being conducted is essential factor influencing the learner's approach. It was suggested that the assessment and evaluation must be on the foundational science concepts that led them to clinical decision-making.

**Methodology:** This analytical study was carried out on medical students (both male and female) enrolled for the 1st year medical curriculum. The subjects were divided in three groups assessed by subjective, objective and mixed type questions.

**Results:** Our data reveal that the performance of students, assessed by objective type question, in various examinations was significantly high in comparison to subjective type assessment. Performance in theory exams assessed by long answer questions was significantly lower than objective type assessment, while there were no differences observed in practical examination.

**Conclusion:** The objective type questions may be preferred over short essay questions as there are choices in answers, while they may perform poor in clinical exam. The objectivity of question may increase the capacity to solve one word answer questions but conceptual ability to understand the subject is doubtful.

**Keywords:** Long answer Questions, MCQs, Performance, Medical curriculum.

### 1. Introduction

Teaching and evaluation of Physiology subject in the medical curriculum has undergone major changes. In recent years, Medical Council of India (MCI) reorganized its curriculum including assessment and evaluation pattern in various subjects of medical specialties. [1] This is a similar situation which has observed globally in many medical institutions.[2] Assessment is an integral part of the learning process in medical education because students perceive it as an effective stimulator to direct and drive their learning. It has also been stated by various authors that the way how assessment is being conducted is one of the most important factor influencing the learner's approach.[3-5]

The most challenging aspect of medical curriculum of Bachelor of Medicine, Bachelor of Surgery degree (MBBS) is conducting written exams and validation of questions with appropriate scientific content, correct

marking schemes, optimum allocation of time and clarity. [6]

It was suggested that the assessment and evaluation must be on the foundational science concepts that led them to clinical decision-making. Goldman and Schroth [7] argued that involvement of specific multiple choice questions (MCQs) either before or after class sessions can enhance students' reflective abilities. Bierer and others described an approach in assessment of learner that combines multiple-choice questions with essay questions will provide a narrative interpretation of the mechanisms behind or reasons for the findings in a clinical scenario.[8,9]

In contrast to MCQ type of evaluation, Wood and colleagues advocated for clinical reasoning exercises in which learners are asked to write a single paragraph explaining the mechanisms behind a particular clinical problem [10], but in basic medical subjects, its utility in

Indian scenario is questionable. MCQs are being frequently used due to ease of checking and to avoid examiner's biasness .while essay-type assessment is a well proven, unique type of evaluation requiring not only to recall facts but also to use higher cognitive skills but this type of evaluations are time consuming and fair chances of biasness. [11-13]

The effectiveness of objective and subjective type of evaluation needs regular scrutiny for its improvement. It has been observed commonly in the literature on assessment of learner is the scarcity of published long-term effectiveness of assessment modules. Various retrospective reviews are available but are often limited to opinions based or surveys. The present study was undertaken to evaluate the performance of students using various type of assessment module (MCQs, SEQs, OSPE and traditional type of subjective assessment) in Physiology subject taught in first year of medical curriculum.

## 2. Material and Methods

This analytical study was carried out in the department of Physiology, King George's Medical University Lucknow, India. A total of 675 subjects were taken out of 750 students (both male and female) enrolled for the 1st year medical curriculum in year 2013, 2015 and 2017. The evaluator, investigator and the students were blinded for the study. The subjects were divided in three groups : Group-I (n=225), subjects of this study group were assessed with two theory paper consist of short and long essay type questions, short notes and some diagram/ flow chart making questions.

The practical assessment of this group was carried out by traditional type of practical examination consist of hematological, clinical and experimental type practical exercises. The subjects of group-II (n=225) were assessed their theory part only by objective type questions (MCQs) and maximum part of practical exam by objective structured practical examination (OSPE).

The subjects of group III (n=225) were assessed by using mix type assessment module consisting long answer, short answer, short notes and objective type questions in theory examination. The practical exam of this group was also evaluated by OSPE (objective type) as well as traditional type of practical examination. The inclusion criteria for group-I , II and III were that: the subjects must

be enrolled for study of Physiology subjects and regularly attending lectures (delivered by physiology teachers) 6 hours per week and tutorials/ seminars 2 hrs a week. They should also attend practical sessions including demonstration of 6 hrs a week. The students fail to obtain 75 percent and 80 percent attendance in theory and practical classes respectively were excluded from the study. In group- I, II and III, the theory papers were 50% of total assessment while practical exam shared 40 % and oral and viva consist of 20 % of total assessment. The total theory and practical exam was examined by internal and external examiners. Utmost effort was made to avoid unethical act of students and to examiners bias during theory and practical examination.

## 3. Observation and Results

A total of 750 medical students were analyzed in the study. It showed that the average age (in years) of students in group-I, II and III was  $20.92 \pm 3.22$ ,  $22.03 \pm 2.40$  and  $21.82 \pm 2.50$  respectively without any significant difference. All the students were selected in medical curriculum by all India/ state level entrance exam conducted by competent authorities. The entrance performance (percentages of marks obtained in entrance exam) of group-I, group-II and group-III was  $79.50 \pm 6.32$ ,  $74.82 \pm 7.40$  and  $80.55 \pm 11.92$  respectively (Table-1).

The students of all three groups were from different socioeconomic status and pattern of schooling (state board, CBSE and ISC board). The students of all groups were exposed to same type of theory and practical teaching during the year of study. The performance (marks obtained in %) was  $56.48 \pm 7.09$ ,  $62.14 \pm 10.80$ ,  $53.37 \pm 9.86$  and  $56.92 \pm 9.87$  in four system tests (SAQ based), day to day practical exam, terminal exam and overall performance respectively in group-I. Our data reveal that the performance of group II in various examinations was significantly high in comparison to previous group.

The marks obtained (in percent) by this group were  $67.20 \pm 7.09$ ,  $63.65 \pm 8.20$ ,  $66.80 \pm 10.20$  and  $65.28 \pm 9.80$  in day to day practical exam, system tests, terminal exam and overall performance respectively. In group- III in which mix type of assessment was performed the percentage of marks were less than objective type of exam (group-II) in theory exams while there were no differences in practical examination (Table-2).

**Table 1: Baseline parameters in various groups**

	Group-I	Group-II	Group-III
Number of participant	225	225	225
Average age in years	$20.92 \pm 3.22$	$22.03 \pm 2.40$	$21.82 \pm 2.50$
Average marks (in %) obtained in entrance exam	$79.50 \pm 6.32$	$74.82 \pm 7.40$	$80.55 \pm 11.92$

**Table 2: Performance in various type of assessment module**

Performance (% of marks obtained)	Group-I	Group-II	Group-III	P value*
Day to day practical exam	56.48 ± 7.09	67.20±7.09	66.82±8.20	0.5993
System tests	62.14± 10.80	63.65±8.20	56.74±7.60	0.0001
Terminal exam	53.37± 9.86	66.80±10.20	62.24±10.80	0.0001
Overall performance	56.92± 9.87	65.28±9.80	62.83±9.22	0.0066

\*Group-II vs Group-III

## 4. Discussion

Assessment of performance of medical students without subjective and methodological biasness is a difficult task of the learning and evaluation process in medical colleges and educational institutions. [14] Different types of assessment methodology including multiple choice question (MCQs), short essay questions (SEQs), long answer questions and combination of these were adopted to assess the competency of medical students.[15,16]

In recent years, MCQs type of assessment method is preferred over other traditional methods due to easy, computerized and bias less scoring. In present study, we analyses the effectiveness of various type of assessment module including objective type, subjective type and mixed of objective and subjective type of assessment in first year medical students . Our data showed that in objective type of assessment students are able to score better in theory examinations than other type of assessment.

Various studies reported that [17, 18] the student's score in MCQs was similar to the score of subjective type of assessment and advocated that the students who performed well in the long answer questions were also likely to perform well in the MCQs.

In contrast, the observations of our study are in close agreement with the study [19] in which it was observed that scores in objective type assessment was higher as compared with long and short essay questions. Higher scoring in objective type of assessment is may be due to deficiency in MCQ framing and irrational distribution of difficulty index. On the basis of our data, along with other authors we also believe that long essay questions and clinical problem based assessment is a sensitive test that evaluates higher cognitive skill including analysis, interpretation and application of skills. [20-22]

## 5. Conclusion

The MCQ type of questions may be preferred of students over short essay questions as they scores well in theory exams, while they may perform poor in clinical exam (the assessment of higher cognitive functions).

The objectivity of question may increase the capacity to solve one word answer questions but conceptual ability to understand the subject is doubtful.

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