

COMPARATIVE ASSESSMENT OF STUDENTS' ACADEMIC PERFORMANCE IN MULTIPLE CHOICE QUESTIONS VERSUS SHORT ESSAY QUESTIONS IN PHARMACOLOGY EXAMINATIONS OF A MEDICAL COLLEGE OF PAKISTAN

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ABSTRACT

Introduction: The method chosen for important examinations strongly influences the nature of student learning. Multiple choice questions (MCQs) and short essay questions (SEQs) are the commonly used tools for assessing cognitive domain of medical students; the choice of question type for better assessment is debated. The present study is designed to compare the academic performance of year 3 MBBS students of Rehman Medical College Peshawar, in MCQs and SEQs of Pharmacology examinations for the sessions 2013-14.

Material and Methods: Results of MCQs and SEQs of 100 3rd year MBBS students were evaluated and compared on the basis of previous records of end of module, midterm and end of session examinations of Pharmacology. Comparisons between different methods of assessment were done by Independent Samples T-test and the Chi Square test.

Results: Students' academic performance was significantly higher in MCQs as compared to SEQs ($p=0.001$). When further comparison was made by gender, female students scored significantly higher in SEQs as compared to males ($p<0.001$); female students also showed significantly better overall performance ($p<0.001$). Failing students (Grade E: $<50\%$ scores) showed a significantly poor performance in SEQs ($p=0.003$).

Conclusion: Academic performance of students was better in MCQs as compared to SEQs. However, the academic performance of the more competent students and female students was better due to higher scores in SEQ examinations.

Key words: Educational assessment; Cognition; Academic training; Learning; Pharmacology.

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INTRODUCTION

Assessment is an important tool of the learning process in education.¹ Assessment is one of the key components of medical course curriculum. In a medical profession accurate and responsible assessment is of high importance. It is basically the assessment which drives the learning process. Scientific studies confirmed that the most profound impact on what the students ultimately learn is the evaluation system rather than the educational objectives or curriculum or instructional techniques.²

Assessment can be in two forms; formative or summative. Formative assessments are usually done during instruction to monitor student learning to provide ongoing feedback that can be used by instructors to improve their teaching and by students to improve their learning. Formative assessment also improves the learning of students by providing immediate feedbacks to them. While the summative assessment is a test which is usually given at the end of a unit, the end of a course, or the end of the year, in order to summarize student learning and the effectiveness of the instructional program.³

A well-designed system of assessment and evaluation is a powerful educational device.⁴ Evaluating the competence of undergraduate medical students is a very critical task, as in the future, these 'to be physicians' have to deal with human lives.⁵ It is essential to evaluate both the teacher and the student for how much they have succeeded in the achievement of the objectives of teaching and learning during and at the end of a course of study. While developing the curriculum it is necessary to design assessment and evaluation

simultaneously. In all the teaching institutes evaluation of students on the basis of internal formative assessment is in trend.⁶ Evaluation of the students is done by various methods but multiple choice questions (MCQs) and short essay questions (SEQs) are the mostly used tools for assessing the academic performance of undergraduate medical students.⁷

MCQs are good tool for measuring comprehension, knowledge and could be designed to measure application and analysis.⁸ MCQs due to their higher validity, reliability and ease of scoring are being used increasingly.⁹ Essay-type assessment is a sensitive test requiring students not only to recall facts but also to use higher-order cognitive skills.¹⁰ Essay questions though time consuming provides a unique evaluation tool particularly suited for the undergraduate settings.¹

Mujeeb and his colleagues in 2010 performed a comparative study in India.⁶ They found that students performed better in MCQs than SEQs. The findings of another study in 2012 revealed that maximum scoring was done in SEQs followed by MCQs.² Junaid along with his coworkers in 2010 conducted a study in Pakistan which shows that no statistically significant difference was found in the mean marks obtained by the students when MCQs and SEQs were compared.¹¹

The results of the present study will suggest whether the additional effort used to prepare examinations in both formats may or may not be necessary.

MATERIALS & METHODS

A comparative study was carried out at Rehman Medical College, Peshawar, after approval from the Institutional Ethics Committee. Student confidentiality was maintained as the names of the students were not disclosed. All 99 Professional MBBS year three students of the session 2013-14 were included in the study by universal sampling technique. The course contents included general

pharmacology, chemotherapeutic agents, autacoids, drugs acting on blood and autonomic nervous, central nervous, cardiovascular, renal, gastrointestinal, respiratory and endocrine system. All the pharmacology examinations of year 03 MBBS were evaluated and compared on the basis of previous records of End of Module (EOME), Mid-Term (MTE) and End of Session (EOSE) examinations. The written theory paper consisted of two components: part-I MCQs; single best answer type and part-2; SEQs. The keys for SEQs were designed in such a way that each part of question has a clear point for scoring in order to minimize the examiner's bias.

The grading of the academic performance of students was done for MCQs, SEQs and overall scores as; Grade E (Failed students): who got < 50% marks in exams; Grade D: who scored between 51 - 59% marks; Grade C: who scored between 60 - 69% marks; Grade B: who scored between 70-79% marks and Grade A: who got ≥ 80% marks.

Statistical Analysis: After collection data were entered and analyzed by using SPSS 15.0 software. The Independent T-test was used to compare mean scores of MCQs and SEQs, while the Chi-Square test was used to compare frequencies across different groups; $p \leq 0.05$ was considered statistically significant.

RESULTS

Of 99 students of Professional MBBS year three students, 60 were males and 39 females. Table 1 depicts the academic performance of the students in three internal examinations (06 EOME; 01 MTE; 01 EOSE) and overall performance of all internal examinations, based on their mean scores of MCQs and SEQs. Further categorization by gender is also included. Students scored significantly higher in MCQs as compared to SEQs; however the females scored significantly better in almost all SEQs as well as in overall performance.

Table 1: Mean scores of MCQs and SEQs in internal examinations by question type and gender.

#	Examinations	Question Types	Genders	Percentages (Mean ± SD)	p value
1.	All EOME (06) Percentages	MCQ	Male (60) Female (39) Total (99)	48.15 ± 13.39 50.77 ± 13.26 49.18 ± 13.33*	0.343
		SEQ	Male (60) Female (39) Total (99)	35.64 ± 16.53 55.83 ± 15.26 43.59 ± 18.79*	<0.001
		Total	Male (120) Female (78) Total (198)	41.89 ± 16.26 53.30 ± 14.43 46.39 ± 16.49	<0.001
2.	MTE (01) Percentages	MCQ	Male (49) Female (39) Total (88)	58.67 ± 13.37 58.65 ± 10.68 58.66 ± 12.18	0.994
		SEQ	Male (49) Female (39) Total (88)	46.46 ± 21.37 70.64 ± 12.61 57.18 ± 21.62	<0.001
		Total	Male (88) Female (88) Total (176)	52.57 ± 18.76 64.64 ± 13.08 57.92 ± 17.51	<0.001
3.	EOSE (01) Percentages	MCQ	Male (59) Female (38) Total (97)	55.93 ± 11.84 59.60 ± 11.96 57.37 ± 11.96†	0.141
		SEQ	Male (51) Female (33) Total (84)	29.85 ± 17.13 43.64 ± 13.95 35.27 ± 17.25†	<0.001
		Total	Male (110) Female (71) Total (181)	43.84 ± 19.49 52.18 ± 15.13 47.11 ± 18.32	0.001
4.	All Exams Percentages	MCQ	Male (60) Female (39) Total (99)	48.03 ± 12.98 53.82 ± 11.71 50.31 ± 12.76†	0.027
		SEQ	Male (60) Female (39) Total (99)	34.73 ± 17.00 56.27 ± 13.78 43.22 ± 18.96†	<0.001
		Total	Male (120) Female (78) Total (198)	41.38 ± 16.47 55.05 ± 12.76 46.76 ± 16.51	<0.001

*p=0.017 for the differences in All EOME MCQ & SEQ total percentages; †p<0.001 for the differences in EOSE and All Exams MCQ & SEQ percentages.

Figure 1 gives the graphic representation of student grades based on their percentage scores of MCQs and SEQs. It can be seen that grade E had the highest number of students (total 116; MCQ 44, SEQ 72) followed by grade D (total 48; MCQ 30, SEQ 18), grade C (total 30; MCQ 21, SEQ 09), grade B (total 13; MCQ 03, SEQ 10) and grade A (total 01; MCQ 01, SEQ 0). These differences were significant (p=0.004) and also

indicated relatively poor performance of students in SEQ compared to MCQ.

Figure 2 depicts the better performance of female students in overall grades as compared to males; grade E had 81 males and 25 females, grade D had 24 males and 24 females, grade C had 21 males and 09 females, grade B had 03 males and 10 females, while grade A had only 01 female. This difference was significant (p<0.001).

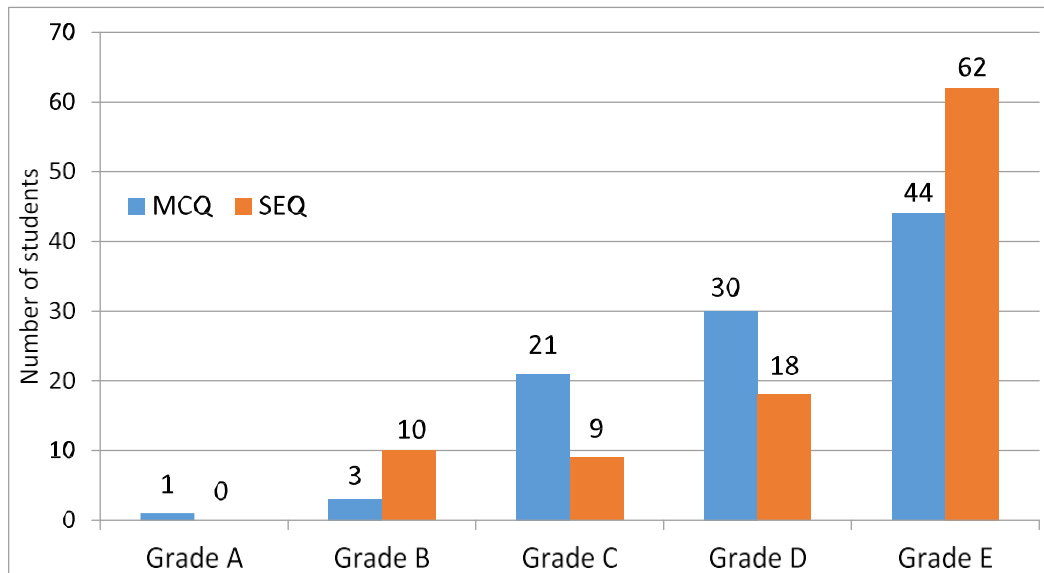


Figure 1: Grade wise comparison of the academic performance of students in MCQs & SEQs; for Grade E (Failed students), $p=0.003$

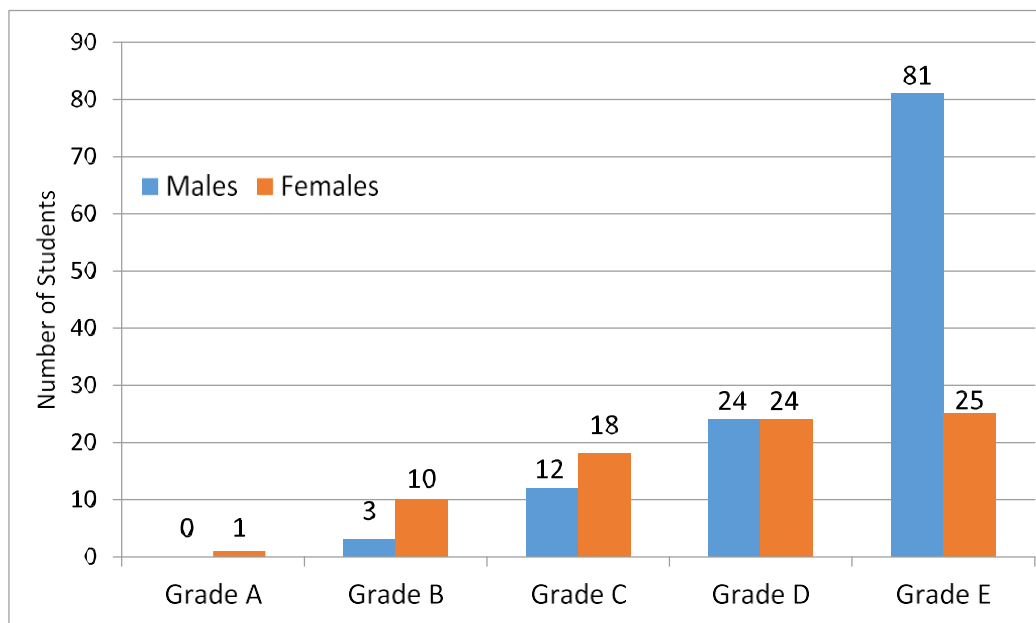


Figure 2: Grade wise comparison of academic performance of students by gender

DISCUSSION

The selection of a proper assessment method for measuring students' performance remains a scary task for many medical institutions in Pakistan. Many attempts have been made to change existing assessment methods but were hindered by financial constraints, lack of expertise in

psychometric analysis of the examination and institutional policies. The concepts of medical teaching are changing very rapidly as nowadays the limits of knowledge is no longer restricted to lectures and text books. Access to internet, educational videos, electronic journals and online

conferences are shifting the concept of traditional lecture based teaching.¹²

The findings of the present study showed a significant difference between the scores obtained by medical students in MCQs and SEQs, as well as for gender and grades. The students performed much better in MCQs overall, while female students performed better in SEQs.

Sharma and Mutalik conducted a study at Sir Seewoosagur Ramgoolam Medical College, India. The study period was from June 2006 to April 2011. They compared the scores of MCQs and SEQs. Students were examined in both types of questions related to same course content at the same sitting. Students were found to perform better in MCQs as compared to SEQs.⁷ The same results were found by Kazeem and his colleagues when he compared the students' academic performance in MCQs and SEQs.¹³ A study was designed by Oyebola to compare the academic performance of medical students in the subject of Physiology by comparing their scores in MCQs and SEQs. The results showed better performance of the students in MCQs in comparison with SEQs.¹⁴ A similar study was carried out at B.J. Medical College, India, where MCQs and SEQs scores of Pharmacology examination were compared. The performance of the students was much better in MCQs.⁶ Same results were found by Pepple in West Indies, by Nahla in Qatar and by Delaram in Iran.^{10,15,16}

A study was carried out in Nigeria to assess the performance of students in academics. The examination record of all the students that had sat for the first professional MBBS examination in

Physiology between 2008-2009 sessions and 2011-2012 sessions was used. Results of the 244 students who appeared in examination revealed that the performance in SEQs was good by securing 51.5% in SEQs while 44.1% in MCQs (Adeniyi, 2013).¹⁷ The findings of another study by Bodka revealed that the performance of students in SEQs was 73.6% and in MCQs was 62.6%.² Another study was designed at Sultan Qabool university of Oman to analyze the performance of students in SEQs and MCQs. The results clearly indicated the higher performance of students in SEQs.¹⁸

Khan et al., performed a study to compare the results of MCQs and SEQs in all professional annual 2008 and 2009 Bachelor of Medicine and Bachelor of Surgery (MBBS) and Bachelor of Dental Surgery (BDS) examinations. They analyzed the data of fifteen different medical and dental colleges of Punjab, Pakistan. Students scored almost equally in both MCQs and SEQs when the results of all the examinations were compared.¹¹

Conclusions

Overall student performance is better in MCQs while females performed better in SEQs as well as in overall performance; thus it appears that SEQ is a better assessment of student academic performance.

Recommendations

Further research studies should be conducted at a wide level in Pakistan, so that the results become valid for the whole country.

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