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Pre and Post examination evaluation of MCQs and SEQs Items in Undergraduate MBBS mock examination.

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ABSTRACT… Objectives: To evaluate the quality of MCQs and SEQs pre and post Mock examination of physiology and biochemistry and correlation between the scores of both at private medical college Lahore. **Study Design:** Descriptive study and convenient sampling was done. **Setting:** Fatima Memorial College of Medicine and Dentistry, Lahore. **Period:** September 2016 to September 2017. **Material & Methods:** 149 students in Physiology and 143 in biochemistry took Mock examination. 45 MCQs and 9 SEQs each in biochemistry and physiology were prepared according to the table of specification provided by University of Health Sciences (UHS) Lahore, Pakistan. Item assessment according to Blooms taxonomy was done and item flaws identified with cover test done for structural validity of the paper before the exam by two medical educationists. Item analysis with difficulty index, discrimination index and distraction efficiency were done post examination. **Results:** 84.4% in physiology and 51.1% in biochemistry were of recall type (C1 level according to Blooms taxonomy), and 58% SEQs in physiology and 50% in biochemistry were C1. 20% and 28% MCQs in physiology and biochemistry respectively pass cover test and were without item writing flaws. Difficulty index shows that 53.3% in physiology and 48.8% in biochemistry needs modifications. 48.8% of MCQs in physiology and 15.5% in biochemistry need modification in discriminatory index. Similarly 59.5% and 64.0 % of MCQs had functional distractors in physiology and biochemistry respectively. **Conclusion:** The study concluded that Mock examination in subjects of physiology and biochemistry had item writing flaws, more MCQs were of C1 level and showed majority items in good difficulty, discriminatory index with two third functional distractors were present

Key words: Cover Test, Difficulty Index, Discriminatory Index, Distractor Effectiveness, Mock Examination.

INTRODUCTION

Assessment is an important part of learning cycle and is used both as formative and summative. Formative assessment helps not only teachers to identify the gap in learning of students but also to modify the teaching strategies.[1] Summative assessment is done either at end of year or at end of semester in most of the medical schools in Pakistan. The tools of assessment are mostly MCQs, SEQs, SAQs, OSPE, OSCE and Viva Voce. However in clinical assessments long and short cases are also used for bed side assessments. The MCQs and SEQs are part of the written examination at University of Health Sciences (UHS) Lahore. Mock examination carried out before the professional examinations are done at pattern of final examinations and students who failed to pass the mock are not allowed to take professional examinations. Due to high stake of this examination, the quality of MCQs and SEQs matters a lot. A number of medical colleges have assessment units which ensure the quality of the items in MCQs and questions in SEQs. Moreover post examination evaluation of assessment i.e. difficulty index, discriminatory index and distraction factor help in improving the quality of assessments in the next examinations.[2] Studies by Patel and Mohajen (2013), Mehta and Mohsin (2014), Baig et al. (2014) and Mahmood (2015) indicate the psychometric analysis of items done in various undergraduate MBBS subjects.[1,2,3,4]

The study was done to evaluate the quality of MCQs and SEQS in physiology and biochemistry and correlation between the scores of them in Mock examination at private medical college of Lahore.

OBJECTIVES
Is to evaluate the quality of MCQs and SEQS pre and post Mock examination of physiology and biochemistry and correlation between scores of two modalities at private medical college of Lahore

MATERIAL & METHODS
Study was conducted at Fatima Memorial College of Medicine and Dentistry, Lahore from 2016 to 2017. It was a descriptive study and convenient sampling was done. Informed consent was obtained from students of second year MBBS and the study was approved by Institutional review board (IRB) of FMH and UHS. Included were second year MBBS students and MCQs and SEQs papers of biochemistry and physiology were analyzed. Students of third, fourth and final years MBBS were excluded from the study and OSPE and Viva were not considered for analysis.

Study Protocol
Out of 150 second year MBBS students, 149 took the written Mock examination of physiology and 143 students in biochemistry comprising of one MCQ and one SEQ paper in each subject.

Each paper consist of 45 MCQs and 9 SEQS according to the table of specification of the University (UHS) Lahore, Pakistan. Final scores of SEQS were the mean of scores of each SEQ by two independent examiners.

Item analysis with difficulty index, discrimination index and distraction factor were done post examination. Standard setting was done at 50% or 45/90 using absolute method. Scores of MCQs and SEQs were correlated using Pearson's method.

Data analysis was done using SPSS 21. Difficulty, discriminatory index and distractors efficacy were calculated by the standard formulas (Gajjar et al., 2014; Mehta and Mokhasi, 2014).

RESULTS
Total of 90 MCQs and 18 SEQs were reviewed in Basic Sciences i.e physiology and biochemistry. Figure-1 shows 84.4% in physiology and 51.1% in biochemistry were of recall of knowledge, while 13.3% and 28.8 % of interpretation level and 2.22% and 20% of problem solving in physiology and biochemistry respectively. Out of 9 SEQs in each subject 58.8% and 50% of SEQs were of recall of knowledge, 17.6% and 27.7 % interpretation level and 23.5 % and 22.2% were of problem solving in physiology and biochemistry respectively.

Figure-2 shows the item writing flaws in MCQs in both subjects and ability to pass cover test. Passing the cover test was rated as 1. 20% and 28% were rated 1 and 80% and 71.2% had one or more item writing flaws in physiology and biochemistry respectively.

Figure-3 shows difficulty, discriminatory index and distractor effectiveness. 62.2 % of MCQs out 45 were in good and acceptable range of difficulty index while 53.3% need review in physiology while 51% of MCQs in biochemistry were good and acceptable while (48.8%) need to be reviewed. Similarly 53.3% of MCQs in physiology and 84.3% in biochemistry were either excellent, good or acceptable of discriminatory index while 4.8% and 15.5% in physiology and biochemistry need to be reviewed.

Distractor effectiveness of options in MCQs >5 were 59.5% in physiology and 64% in biochemistry, while 40.4% of physiology and 36% in biochemistry had distractor effectiveness <5 i.e. were nonfunctional distractors (Figure-3).

Correlation of scores of MCQs and SEQs was determined by Pearson's correlation, which was significant (0.049) in physiology and highly significant i.e. 0.001 in biochemistry (Figure-4).
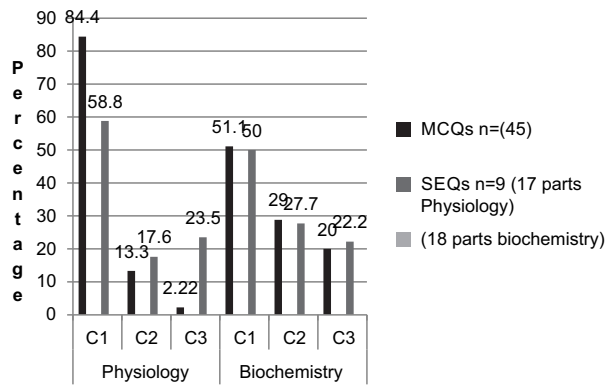
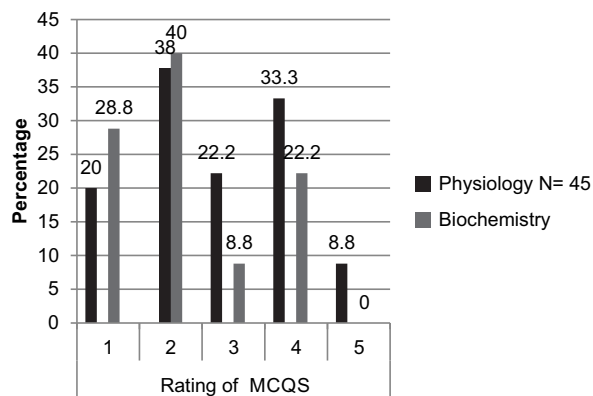Figure-1. Knowledge Level of Items Based on Bloom's Taxonomy

Figure-2. Rating of MCQs in physiology and biochemistry

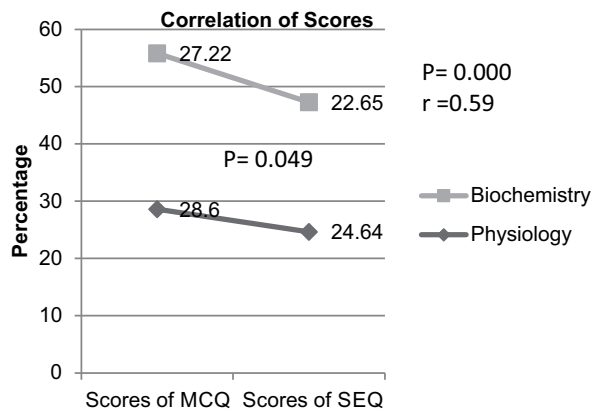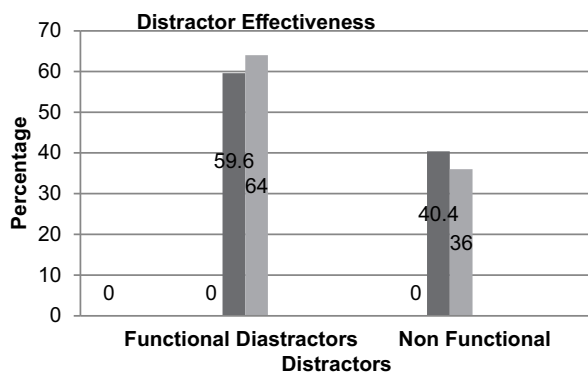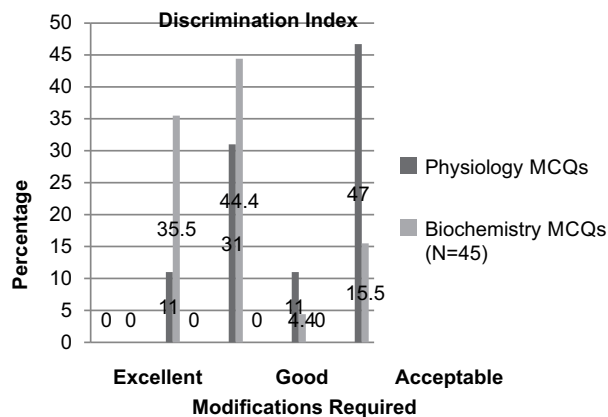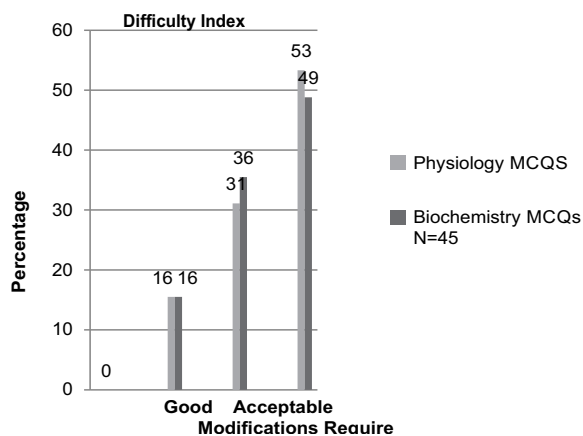| Rating	Specifications
1.	Cover test pass with no item-writing flaws
2.	Cover test pass with 1 to 2 item–writing flaws
3.	Dubious cover test dubious with no item writing flaws
4.	Cover test fail with 1 to 2 item-writing flaws
5.	Cover test fail with more than 2 item-writing flaws
(Palmer and Devitt, 2007; Bloom et al., 1956)	

Figure-3. Difficulty index discriminatory index and distractor effectiveness of MCQS in physiology and biochemistry

Figure-4. Correlation of MCQ and SEQ scores in subjects of physiology and biochemistry

DISCUSSION

Assessment plays key role in learning, whether it is formative or summative. Selection of appropriate tool for assessment is the key to gage the learning of students. Summative assessment is assessed at University of Health Sciences (UHS) by written and viva voce and practical examinations, which each student has to pass separately. Mock examinations are conducted by each medical college affiliated with UHS before professional examinations. Each student has to pass the examination for being eligible to take professional examination.

The written Mock examination of a private medical college was assessed in this study for quality of MCQs and SEQs. One best type MCQs and SEQs were assessed for difficulty index, discriminatory index, distractor effectiveness, ability to pass cover test and correlation between MCQs and SEQs. Most of the MCQs (84.4% in physiology and 51.1 % in biochemistry) were of recall type with few of interpretation and problem solving level with only 20% and 28.8% pass the cover test without any item writing flaws (IWF) respectively. Similarly 58% and 59% SEQs in physiology and biochemistry respectively were of recall type. Though it is difficult to construct C3 level items in basic sciences but little more effort by the faculty may increase such items especially in 21st century when the medical sciences are being taught contextually and with relevance. IWFs can be minimized by proof reading the items by subject specialist and medical educationist before finalizing the examination paper. Difficulty index showed 53.3% MCQs in physiology and 48.8% in biochemistry needs modifications. Similar pattern was seen in discriminatory index with 48% and 15.5% required modifications in both subjects respectively. 40.4% and 36% were nonfunctional distractors respectively. MCQs and SEQs correlated positively and significantly in two subjects.

Several studies support the data in our study. Study done at Qassim University (KSA) to examine the undergraduate students in medicine showed that 40 % MEQS and 60% MCQs were of C3 type, while others assess comprehension and recall.[5]

Another study done in Ophthalmology showed 30% MCQs and 10% SEQs of interpretation level.[4] Another study conducted to examine baccalaureate nursing programs from 2005-6 showed 53.8% of MCQs with no item writing flaws while 46.2% with one or more item writing flaws. C1 type MCQs were 91.1% while only 4.7% were of C2 and C3 type.[6] 35.1 % were nonfunctional distractors. Another study showed 38% nonfunctional distractors out of 477 items.[7]

Similar study showed 76% and 24% of MCQs at C1 and C2 levels respectively. 69 IWFs were found in 150 MCQs with 30.43% implausible distracters.[3] Studies by Downing (2005) and Elisworth et al., (1990) showed similar results for IWF in examinations.[9] Study by Mehta and Mohsin, (2014) showed 62% items within acceptable range and 38%require modifications. Another study showed 61% items in acceptable to excellent range of difficulty index while 24% items were easy and 15% difficult. Similar pattern was shown by study by Patel and Mohajen, (2013). Study by Hingorjo and Jaleel, (2012) showed 78% items were of average difficulty with 81.41 distractor efficiency in physiology examination.[10] Studies done by Mehta and Mokhasi (2014) showed only 30% items of poor discriminatory index, while 35.3% were nonfunctional distractors, while study by Mahjabeen et al., (2017) also showed similar results.[11,12] Study conducted by Mawlood et al at., anlaysed 180 single best questions in Paediatric dentistry department postgraduate examinations and identified 81% as recall and 19% of higher order thinking.[13] Two studies were conducted by Hassan et al., in 2016 and 17 to determine the item anlaysis and reliability of undergraduate examination in Malaysia and it impact.[14,15] Several other studies were carried out in different medical schools in the world and have shown similar results.[16-22]

Vigorous training of basics and clinical faculty is required to construct MCQs and SEQs of interpretation and problem solving level. Although MCQs and SEQs development of C3 level is easy in clinical sciences compared to basic sciences

but clinical relevance in basic sciences create a space for more problem solving type questions. Specified time must be allocated by the faculty in examination department to construct and proof read the papers pre and post examination.

The study helped us to identify the fault in construction of items, easiness and difficulty of the items and whether they were able to discriminate between good and poor students. These factors affect the validity and reliability of the examination. MCQs with negative discriminatory index affect the validity of the examination and should be removed from the bank. The regulation of PMDC for mandatory medical education department in each medical college with full time qualified medical educationist must be appreciated. Although faculty development workshops are being conducted on regular basis in quality medical colleges but hands on training of the faculty in Item construction with more time being spent on it would improve the quality of examinations in near future

CONCLUSION

The study concluded that Mock examination conducted at FMH college of Medicine and Dentistry in subjects of physiology and biochemistry had item writing flaws, more MCQs were of C1 level and showed majority items in good difficulty, discriminatory index with two third functional distractors were present

LIMITATION OF THE STUDY

The study was done only in second year MBBS written examination while quality of other modalities like OSPE and viva was not considered.

CONFLICT OF INTEREST

There is no conflict of interest regarding the study
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