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Original Research Article

Introduction of structured oral examination in formative assessment of pharmacology for 2nd professional MBBS students

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ABSTRACT

Background: Conventional Oral Examination (COE) is criticized for being too subjective and being influenced by academic and non-academic factors. Another pitfall of COE is unequal distribution of time. Different examiners use a different set of questions with varying difficulty levels. Student related factors include gender, accent, vocabulary used and ability to pick nonverbal cues. These factors make COE less reliable and valid assessment tool. To overcome the limitations of this useful tool, SOE can be implement instead of COE.
Methods: It is a prospective and non-randomized study comprising 79 students of pharmacology appeared for two forms of viva i.e. COE and SOE. Three sets of questionnaires - Must know, should know and nice to know were prepared, each having 15 items with increasing difficulty levels and were validated by subject experts and pretested. Ten minutes were allotted for each student for each form of viva. Feedback of students about the novel method was obtained by using semi-structured questionnaire comprising of 19 closed ended questions and one open-ended question.
Results: Structured oral examination (SOE) yielded significantly higher marks as compared to COE. There were significant inter-examiner variations in marks awarded in SOE and COE. Other factors influencing implementation were difficulty in structuring viva, rigid time limits, lack of flexibility in knowledge content, monotony and fatigue. The students perceived this format not different from COE but felt that it required in depth preparation of topic.
Conclusions: Conducting SOE is a resource-intensive exercise. Despite structuring, inter-examiner variability was not completely eliminated. The student's performance was depended on factors related to examiners such as teaching experience, vernacular language used, and lack of training. Orientation and training of examiners in assessment strategies is necessary. Standardization of questionnaire is necessary before the implementation of SOE for summative assessment.

Keywords: Conventional oral examination, Formative assessment, Structured oral examination

INTRODUCTION

The conventional oral examination (COE) or viva voce is an important format of assessment that allows probing of depth of the subject knowledge. Carefully constructed questions can test students in all cognitive domains. COE is criticized for being too subjective and being influenced by academic and non-academic factors related to teachers and students.[1] It may largely depend on the knowledge, attitude and mood of examiners. Another pitfall of viva voce is that unequal distribution of time i.e. initially appearing students may be asked greater number of questions but as time passes, an element of fatigue ensues in examiners and thus students giving viva in last get much less time. This is because different examiners use a different set of questions with varying difficulty levels. Student related factors include gender, accent, vocabulary used and ability to pick nonverbal cues. These factors

make COE less reliable and valid assessment tool to determined level of knowledge.

To overcome the limitations of this useful tool, SOE can be implement instead of COE. SOE is relatively a new phenomenon and a number of studies conducted on small groups have shown it to be reasonably reliable and valid, and both faculty and students show positive perception toward this examination tool.[2,3] Because SOE is a resource-intensive and time-consuming exercise, it is of utmost importance to understand the feasibility and process of implementation and factors which determine its implementation in large groups of students for pharmacology examination on regular basis.

Objectives

Primary objective

To introduce structured oral examination during formative assessment of pharmacology subject for 2nd professional MBBS students.

Secondary objective

- To compare structured oral examination with conventional oral examination in terms of students' performance.
- To obtain feedback from students by using semi-structured questionnaire.

METHODS

It was a prospective and non-randomized study. The study was conducted at the Department of Pharmacology, Govt. Shyam Shah Medical College, Rewa (M.P.), India on 79 second professional MBBS students during formative assessment examination in June 2016. The students were informed about the examination schedule one month prior to the examination. The topics of oral examination were General Pharmacology, Drugs Acting on Autonomic Nervous system, Skeletal Muscle Relaxants, Hormones and related drugs. Approval from Institutional Ethics Committee was obtained. All the students were made aware about the pattern of structured oral examination before commencement of formative assessment examination. A written informed consent was obtained from the students prior to participation in the study.

A set of questions from "must know", "should know" and "nice to know" area were prepared by two examiners and validated by two subject experts for comments. On the basis of comments received, set of questions were finalized.

On the day of examination students appeared at two stations for oral examination. At 1st station, question were asked by conventional method and marking done accordingly. Then after 15-20minutes of gap interval, each student went to 2nd station where objectively structured questions were asked. A set of 15 questions comprising 10 (70%) from "must know" set, 3 (20%) from "should know" set and 2 (10%) from "nice to know" set were asked from each student over a period of 10-15minutes. Marking for response against each question asked was 0/0.25/0.5/.075/1 according to correctness of the answer. At both the stations two assessors evaluated each student during viva-voce.

At the end of examination, each student was asked to fill a semi-structured feedback questionnaire comprising of 19 closed ended questions and one open-ended question, without disclosing their identity.

Statistical analysis

Quantitative data was analyzed by using unpaired t-test and qualitative data by chi-square test.

RESULTS

Marks obtained by students in COE and SOE were compared using unpaired t-test.

Table 1: Comparison of marks obtained (out of 15) by students in SOE and COE.

Statistical parameter	SOE	COE
Mean	7.1044	3.7215
SD	2.6583	2.5617
SEM	0.2991	0.2882
N	79	79

Table 1 shows that the average marks obtained by the students in SOE were significantly greater than COE ($p < 0.0001$).

Table 2: Distributions of students according to obtained marks criteria (≥8 or <8) in COE and SOE.

Method	No. of students with ≥8 marks out of 15	No. of students with <8 marks out of 15
SOE	30 (37.97%)	49 (62.03%)
COE	7 (8.86%)	72 (91.14%)

Table 3: Relationship between marks obtained by students according to difficulty level of questions in structured oral examination.

Statistics	Must know (out of 10 marks)	Should know (out of 3 marks)	Nice to know (out of 2 marks)
Mean	5.5	1.1	0.49
95% Confidence Interval	5 - 5.9	0.93 - 1.27	0.37 - 0.6
N	79	79	79

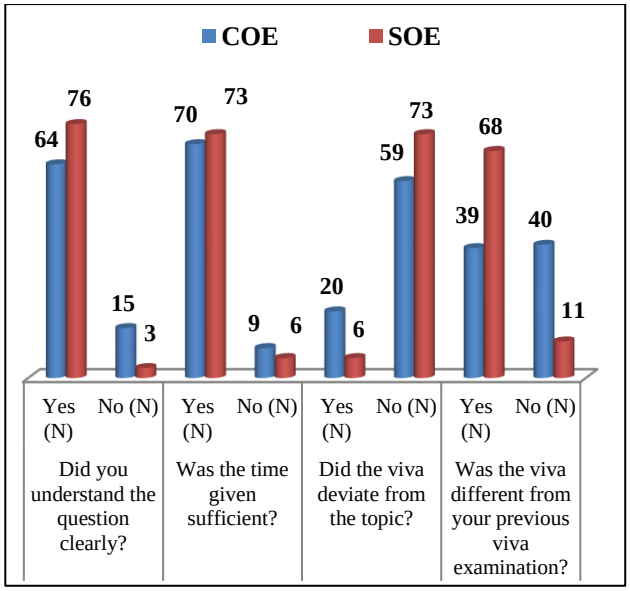

Figure 1: Student's feedback (close ended) on SOE and COE.

Table 2 shows that number of students obtained marks at set criteria (≥8 marks) were more in SOE than COE. Chi-square test was used to analyze 2X2 contingency table. Student's performance in SOE at the set criteria was significantly better than COE ($p < 0.0001$).

Table 3 shows that, mean marks obtained by the students were 5.5 out of 10 in the question of "must know" area, 1.1 out of 3 in the question of "should know" area and 0.49 out of 2 in the questions of "nice to know" area during SOE.

Figure 1 shows that four close ended feedback on dichotomous scale (yes/no) were obtained by students on COE and SOE. Data were analyzed by Chi square test. It is observed that, significant favorable feedback regarding understanding of questions ($p < 0.05$), non-deviation from the topic ($p < 0.05$) and different experience from previous viva examination ($p < 0.005$) for SOE. There was no significant difference found regarding time allotted for responding the questions in both COE and SOE ($p > 0.05$).

Table 4: Student's feedback on various questions (based on Likert scale) in the questionnaire

Items	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
SOE is fair method of assessment compared with Conventional Oral Exam (COE)	25 (31.65%)	35 (44.30%)	11 (13.92%)	6 (7.59%)	2 (2.53%)
SOE cover a wide range of knowledge compared with COE	23 (29.11%)	38 (48.10%)	10 (12.66%)	7 (8.86%)	1 (1.27%)
SOE is easier to pass out compared with COE	16 (20.25%)	23 (29.11%)	20 (25.32%)	14 (17.72%)	6 (7.59%)
SOE is more stressful compared with conventional oral exam	8 (10.13%)	13 (16.46%)	27 (34.18%)	22 (27.85%)	9 (11.39%)
Attitude of teacher during SOE was better compared with COE	20 (25.32%)	24 (30.38%)	27 (34.18%)	6 (7.59%)	2 (2.53%)
SOE is more exhausting compared with COE	5 (6.33%)	12 (15.19%)	19 (24.05%)	33 (41.77%)	10 (12.66%)
SOE is better way to assess different aspect of knowledge	22 (27.85%)	39 (49.37%)	10 (12.66%)	7 (8.86%)	1 (1.27%)
SOE may influence the learning pattern	27 (34.18%)	36 (45.57%)	6 (7.59%)	8 (10.13%)	2 (2.53%)
SOE should be used as an assessment method in future examination	24 (30.38%)	33 (41.77%)	10 (12.66%)	10 (12.66%)	2 (2.53%)

Table 4 is regarding students' feedback on various closed ended questions on Likert scale shows that SOE is better method for assessment in terms of fairness, depth of knowledge and easiness. Most of the students responded that SOE is less stressful, better attitude of the teacher during viva and it may influence their learning pattern. Also, most of the students agreed that SOE should be used as an assessment method in future examination. Table 5 is regarding students' feedback on various closed ended questions on Likert scale with head-on comparison between COE and SOE shows that, most of the students felt SOE was more student friendly, comfortable and covered most of "must know" aspect of the topic as compared to COE. Most of the students felt that there was no gender bias and language barrier in expressing their answers during both COE and SOE. Figure 2 regarding open ended feedback of students shows that 21 students were in favor of SOE and 6 students in favor of COE, 14 students felt that SOE covered most of the topic in the viva and 6 students felt that short and to the point questions were asked in SOE.

Table 5: Student's feedback on various questions (based on Likert scale) in the questionnaire.

Item	Conventional Oral Examination (COE)					Structured Oral Examination (SOE)				
	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
Overall environment was student friendly	11 (13.92%)	40 (50.63%)	11 (13.92%)	10 (12.66%)	7 (8.86%)	25 (31.65%)	38 (48.10%)	12 (15.19%)	3 (3.80%)	1 (1.27%)
Felt anxious /depressed about the questions	13 (16.46%)	32 (40.51%)	17 (21.52%)	15 (18.99%)	2 (2.53%)	6 (7.59%)	24 (30.38%)	23 (29.11%)	17 (21.52%)	9 (11.39%)
Viva Que. covered all the must know aspects of the curriculum	14 (17.72%)	31 (39.24%)	15 (18.99%)	18 (22.78%)	1 (1.27%)	25 (31.65%)	35 (44.30%)	17 (21.52%)	2 (2.53%)	0 (0.00%)
'Carry over effect' affected the viva performance	8 (10.13%)	25 (31.65%)	33 (41.77%)	12 (15.19%)	1 (1.27%)	5 (6.33%)	22 (27.85%)	32 (40.51%)	13 (16.46%)	7 (8.86%)
You felt that there was a gender bias	2 (2.53%)	9 (11.39%)	15 (18.99%)	33 (41.77%)	20 (25.32%)	2 (2.53%)	2 (2.53%)	16 (20.25%)	37 (46.84%)	22 (27.85%)
There was a language barrier in expressing their answers	6 (7.59%)	10 (12.66%)	18 (22.78%)	35 (44.30%)	10 (12.66%)	4 (5.06%)	9 (11.39%)	19 (24.05%)	33 (41.77%)	14 (17.72%)

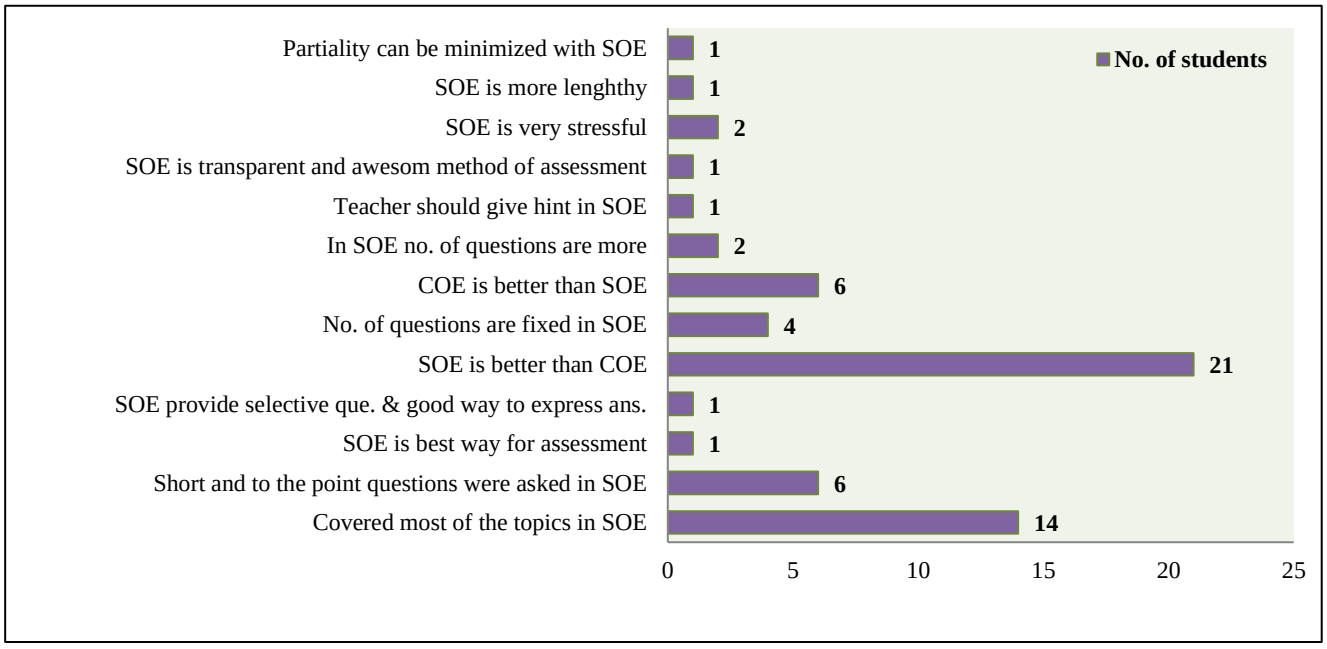

Figure 2: Feedback (open ended).

DISCUSSION

An assessment tool must be valid, reliable, and objective.[4] Most authors agree that structuring and preplanning viva voce leads to a better validity and reliability of viva as an assessment tool for under graduates and postgraduates.[5-7] The results of this study show that SOE format is acceptable to students and has internal consistency. Structured questionnaire allows allotment of marks according to a predetermined scale. Thus, marks awarded are objective, evidence-based as against overall subjective assessment-based award of marks in COE. There was a significant difference in mean marks obtained by the students in SOE as compared to COE. The increase in marks by structuring the content is not surprising because this exposes students to questions of various difficulty levels as against the traditional viva in which examiners preferences and chance plays role. This is corroborated by the perception of teachers who have clearly stated that SOE covers a wider breadth of syllabus as compared to conventional format.

Authors found that structuring in the present form does not eliminate inter-rater variability as is reported elsewhere also.[2]

Conversely, another study found perfect agreement between the marks given by two examiners in objective structured viva voce (OSVV) while the fair agreement was found between the marks given in OSVV and conventional viva.[8] There can be explanation for this discrepancy as the examiners of the both groups had a varied teaching experience (from 5 years to 26 years) which determined the depth and experience in evaluating students' performance. However, a realistic and practical situation prevailing in most of the Departments of Pharmacology is that no examiner was properly trained in this method of assessment. Training by organizing workshops and developing orientation manuals is important for increasing effectiveness of examination.[9,10]

Development of ability in examiners to ask relevant questions in unambiguous words so that almost similar answer comes from all students that increases validity further. This aspect of faculty development is being realized to be important nowadays.[11] Increasing number of examiners may not be a practical proposition because of professional time needed, although it reduces inter-rater variability and improves reliability (agreement in allotted marks between two examiners). Inter-rater reliability can further be enhanced by the use of grading or scoring system.[12,13]

The perception of the students to this form of viva is found to be encouraging.[6,14] In this study, students did not perceive any threat of a new format of examination and perceived structured format similar to conventional viva with respect to understanding and responding to the questions.

Availability of time and human resources are important determinants of the feasibility of an effective evaluation tool. At least four examiners are needed to conduct university practical examination and viva voce for 100 undergraduates and one more for every increase in 50 students. It is customary in conventional format to divide total subject into two parts according to theory paper I and II. One of the examiners takes viva from part I and the other from part II. However, often, time becomes a big constraint. What should be the appropriate time duration for structured viva voce in pharmacology? This is important because ultimately 150-250 students would be required to be examined. In one study, 8 min were assigned for 8-item structured questionnaire during formative assessment in biochemistry.[8] In a targeted viva, examiner engaged each student for about 25 min and thus only 5–6 students were examined in a day.[3] Authors found that arbitrary limit of 10 min is not sufficient because students would not reach till question 14 and 15. One remedy is to reduce the number of questions to 10 and other is to increase the time allotted to the student. Conversely, increasing the number of questions increases inter-examiner reliability.[12] Authors felt that assessment of students' competence for certification (pass/fail) would require the development of questionnaire, which includes items from various systems. Therefore, reducing the number of items in the questionnaire may become counterproductive. The entire exercise could be tiring for examiner and stressful to the examinees. At present, little is known about the impact of these modifications on the scores obtained.

Limitations of the study involved a single batch of students (small sample size) who were examined. More work is required to be done on several batches of students to ascertain a number of questions from the entire syllabus and exact time duration to successfully implement the structured oral viva format for final university examinations. "Carry over" effect need to be re-examined by conducting the study of different design. Both methods under study i.e. COE and SOE were conducted by two pairs of assessors which lead to inter-observer bias.

CONCLUSION

Present work suggested that structured oral examination is a feasible method of assessment and students feel no difficulty to this format. However, its conduction is a resource-intensive exercise and requires preplanning. There are factors, which influence the performance of students and introduce an element of inter-rater variability. These factors are the length of teaching experience, vernacular used and lack of training of teachers. There is a need of training of examiners, development of scoring system, and ascertaining time duration of viva voce examination before SOE can be implemented as a part of fulfilment of university requirement for the summative assessment of student's performance.

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