

## To Study the Efficacy of Quiz as Teaching Learning Method in First Phase MBBS Students in Biochemistry

Shivkar Rajni Rajendra<sup>1</sup>, Gulajkar Supriya Ramesh Rao<sup>2</sup>, Panchbudhe Sanjyoti Ankur<sup>3</sup>, Naphade Manoj<sup>4</sup>

<sup>1</sup>Associate Professor, Department of Biochemistry, SKNMC & GH, Pune

<sup>2</sup>Assistant Professor, Department of Biochemistry, SKNMC & GH, Pune

<sup>3</sup>Professor & Head, Department of Biochemistry, SKNMC & GH, Pune

<sup>4</sup>Assistant Professor, Department of Biochemistry, NAMO, MERI & VBCH, Silvassa (DNH)

Received: 02-06-2022 / Revised: 20-06-2022 / Accepted: 23-07-2022

Corresponding author: Dr Naphade Manoj

Conflict of interest: Nil

### Abstract

**Background:** Focus of medical education is to prepare students for lifetime patient care. It has been progressively recognized that didactic lectures are considered by students as an inefficient mode of learning due to one way flow of content. Learning could be shifted from teacher centric to student centric where learner would take active part in the learning process. Quiz could be one of such tool, which not only assesses what one knows, but also enhances later retention, a phenomenon known as the testing effect. So, objectives of our study were to study the utility of quiz in Biochemistry as a teaching learning method and to get perception of quiz by students through feedback.

**Methods:** Present comparative cross sectional study was carried out on First phase MBBS students of batch 2020-2021. Quiz participants and students who attended the quiz were considered as Group A (n=120). While Students who were absent for the quiz were considered as Group B (n=30). Statistical analysis was done using unpaired 't' test using GraphPad Prism 5 software.

**Results:** We have seen improved performance of Group A as compared to Group B. Average scores of Group A and Group B students were  $12.00 \pm 1.60$  (mean  $\pm$  SD) and  $7.03 \pm 2.30$  respectively. The p value for comparison was  $<0.001$  which is highly significant.

**Interpretation and conclusions:** Quiz can be used as a learning tool for students in Biochemistry to enhance their active participation and increase their interest in the subject which would motivate them to acquire knowledge about core and applied aspects of subject.

**Keywords:** Biochemistry, Didactic lecture, Quiz, Student centric, Teaching-learning method

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### Background

Competency-based undergraduate medical education (CBME) program is designed with a goal to create an "Indian Medical Graduate" (IMG) possessing

requisite knowledge, skills, attitudes, values, and responsiveness so that she or he may function appropriately and effectively as a physician of first contact of

the community. Focus of medical education is to prepare students for lifetime patient care [1,2]. The construct for CBME relies on the foundations of focusing education on patient outcomes, emphasizing learner abilities, de-emphasizing time based learning and increasing individualized trainee plans for the learner. In this greater emphasis has been laid on hands on training, small group teaching and self-directed learning (SDL) [3].

Over the last few decades, teacher-driven didactic lectures have been the traditional teaching mode in medical education across the world. It has been progressively recognized that didactic lectures are a poor method for exchanging information. It is generally considered by students as an inefficient mode of learning due to one way flow of content [4-6].

This often leads to trapping of disinterested students in a non-participatory relationship, embarking on disinterest in the subject, poor retention of knowledge and inefficient use of time and resources. So there is a need to implement teaching-learning methods which are innovative, context oriented, would create interest in the learner, will encourage them to read the subject further in detail at the same time imparting them with subject knowledge [4-7]. Lectures also do not promote any reasoning, logical or analytical skills as students are being passive listeners [8].

With such kind of teaching-learning methods, learning could be shifted from teacher centric to student centric methods where learner would take active part in the learning process. First phase MBBS subject Biochemistry which is taught over two terms, is considered by the students as volatile subject which needs repetitive revisions due to many metabolic pathways into the curriculum.

But at the same time it has got tremendous importance as diagnostic tool in clinical application and patient

care. This should be imprinted on the mind of students in their first year only so it will create learning ability and interest into them towards the subject.

Quiz could be one of such teaching-learning tool, which is now defined as a "Test of knowledge" [4]. Cognitive psychology research have shown testing of knowledge not only assesses what one knows, but also enhances later retention, a phenomenon known as the testing effect. Testing is a powerful means of improving learning, not just assessing it [9]. In the present study, we evaluated the efficacy of quiz as a tool of teaching and learning in medical education.

It is done by evaluating each student by MCQ test. We also had obtained feedback on the conduct of quiz to assess the format of the quiz, its role in improving the understanding of information among the students and their acceptability among the learners.

### Material and Methods

This is a comparative cross sectional study conducted in the Biochemistry department of Smt. Kashibai Navale Medical College and General Hospitals, Pune. The efficacy of quiz as a tool to increase interest and understanding of knowledge was conducted on (I/II term) first phase MBBS students in the month of October 2021. Syllabus, format and schedule of the quiz were announced one month in advance. Students were asked and encouraged to participate in the activity.

Institutional Ethical Committee approval was obtained for this study and informed written consent was obtained from all the participants of study. Four teams were selected from volunteer entries for the quiz as Adenine, Guanine, Cytosine and Thymine which are nitrogenous bases in DNA to make it more interesting. Three participants formed one team, so total 12 students participated in the quiz. Total students including participants who attended the quiz were 120 in number

forming Group A giving 75% of attendance for the quiz. Quiz was conducted in six rounds as details given in Table I. We tried to cover

knowledge, comprehension and application part of subject while formulating questions of quiz.

**Table 1: Details of Quiz round, Time given and marks allotted**

Round	Time given	Marks Allotted
Multiple Choice Questions (MCQs)	30 sec for each question (Non-Transferable)	10
Justify or Give reason	30 sec for each question (Non-Transferable)	10
Match the column	30 sec for each question (Non-Transferable)	10
Identify the clinical case or condition	1 Min for each question (Transferable)	10
Fill in the blanks of metabolic pathway	1 Min for each question (Transferable)	10
Rapid fire	1 Min for all questions (Non-Transferable)	20

The questions were also framed for students sitting as audience so that they should also get actively involved in between each round.

Winners were felicitated with certificates and prizes while all participants were encouraged with certificate of participation.

Students who were absent for the quiz were considered as control group B (n=30). MCQ questionnaire was given to all students next day to get information about understanding of the syllabus and to check the efficacy of quiz over conventional teaching method. Students who were absent for the quiz but attended didactic lectures also answered the

questions as control group. The obtained data was fed and analyzed in GraphPad Prism 5. The p value of <0.05 was considered as statistically significant.

The assessment of the format and conduct of the quiz along with perception of students towards quiz as learning method was done using pre-validated feedback questionnaire for the students (n=120). Feedback also involved the questions to check perception of students towards quiz as learning tool by creating interest into the subject. Feedback taken was anonymous so that students could give real opinions regarding the activity. Questionnaire has been given in Table 2.

**Table 2: Feedback questionnaire about Quiz for the students**

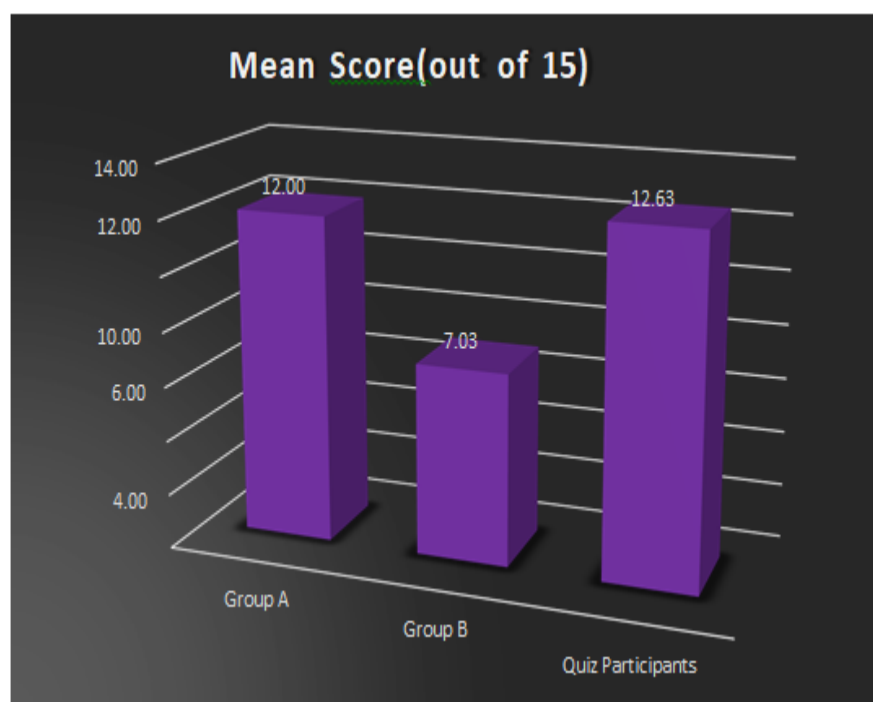
1. Did you like this type of Teaching-Learning Method over didactic lectures? YES/NO
2. What drives you to study the most? Class Test/Quiz/Lecture
3. What factors facilitated learning in Quiz? Interesting/Innovative/Informative/None (Can answer more than one option)
4. Which round you liked the most and why?
5. What are the disadvantages you think of this teaching and learning method if any?
6. Did you find this activity student centric/ Active Learning method? YES/NO

7. Do you think such type of teaching and learning method should be included regularly?

8. What are your suggestions for improvement?

**Table 3: Comparison between Mean scores of MCQ Tests**

	Group A	Group B	Quiz Participants
Mean Score (out of 15)	12.00	7.03	12.63
SD	1.60	2.30	1.32



**Figure 1: Comparison between Mean scores of MCQ Tests**

## Results

The MCQ test data was presented in terms of mean  $\pm$  SD. For MCQ test score performance of students between Group A and B was compared using unpaired t test. The p value of  $<0.05$  was considered to be statistically significant. Average score of group A students was  $12.00 \pm 1.60$  (mean  $\pm$  SD) while that of Group B  $7.03 \pm 2.30$  (mean  $\pm$  SD). When we calculated p value for comparison of scores between group A and B, it was  $<0.001$  which is highly significant.

From group A, 96% of students scored marks between 10-15 while 4% students scored 9 marks. None of the student scored marks below 9 in group A. Highest score was 15 out of 15 which was scored

by two students. In group A average score of quiz participants was  $12.63 \pm 1.32$  (mean  $\pm$  SD).

From Group B 76.66% students scored marks between 1 to 7 while 23.33% students scored marks between 8 to 11. None of the student scored marks above 11 in group B out of 15 while lowest score scored was 1 in group B.

Analysis of perception of students towards quiz was done by eight open and closed ended questionnaire which was filled by the students who participated and attended the quiz. In first question 98 % students agreed that they like quiz as learning method over conventional method of teaching. In second question 50%

students said class test drives them to study more, 40 % students agreed that quiz is driving force while 10 % agreed that lectures drive them to study more. 66% students found quiz interesting, 61% as innovative way of learning while 57% students found quiz activity interesting too. Many students responded as they liked rapid fire round as lot of questions and information was covered. This was followed by identify the clinical cases round as knowledge application part in patient care was covered into that round.

Few students liked justify the statement due to involved reasoning, followed by fill in the blanks and MCQ round. About 95 % students agreed that there is no disadvantage of this learning method while remaining 5% students wrote about less audience participation as disadvantage of quiz. For sixth question 98% students agreed that quiz is active or student centric learning method. In seventh question 97% students responded positively for regular involvement of quiz as teaching learning method. In suggestions students wrote quiz is innovative and interesting activity and should be conducted frequently so that many students could participate into it. Questions related to clinical cases should be increased; audience questions should also be increased.

### Discussion

Medical education is evolved from teacher centric to student centric and competency based, as active participation of students in learning process will help them to retain the knowledge and it will also motivate them to read the subject by increasing their interest into it [1,2]. It is recommended that every effort should be made by the medical teachers to generate subject interest, to encourage students to read subject to gain more knowledge and develop attitude of learning which would help them throughout their medical career and patient care [10]. Many alternative teaching learning methods like

small group teaching, self-directed learning, quiz, flipped classroom teaching, tutorials are being practiced in the world but among them quiz has advantage of both student centered and problem oriented learning tool which stimulates active learning process by covering all three domains of learning [4].

In our study as shown in table III and figure 1, we have seen better performance in MCQ test of students who attended the quiz than those who did not attend the quiz and this difference was statistically highly significant ( $p$  value  $<0.001$ ). Our findings are consistent with K. Devi who conducted a quiz as innovative approach in teaching community medicine to medical students and concluded that quiz method was successfully used to teach International Health to under graduate medical students [10]. In one cross sectional and interventional study conducted on community medicine students concluded that there was an exceptional improvement in students performance in post-test analysis of swine flu quiz, as compared to the didactic lecture on mother and child health which are similar to our findings [8].

One literature review have enumerated the various formats of the Quiz conducted on medical, dental and nursing students, their role in improving the understanding and retention of knowledge among the students and assess their acceptability among the stakeholders [4]. But to our knowledge very few literatures is available on the efficacy of quiz as learning tool in first phase basic science biochemistry subject which has got immense importance in laboratory medicine and patient care. Our study is an attempt to imprint importance of subject on the minds of students through quiz as learning tool, in first year of MBBS only so that they would read the subject with more interest to gain deep knowledge of the subject.

Another study to find out whether Quiz competitions are effective teaching learning methodologies also showed similar results of statistically significant improvement in the performance of students who had participated in the competition [11].

In their study they also found that after comparing the performance of students who participated in the competition with non quiz participants there was statistically significant improvement in the performance of students who participated in the quiz competition with non quiz participants [11]. Our finding is in contrast to their finding as we did not find much difference in the performance of quiz and non-quiz participants. Table III and figure 1. This also supports the finding of attentiveness of students towards quiz activity in our scenario.

To check perception of students towards quiz as an active learning method we had also obtained summary of feedback by the students which was positive. They enjoyed quiz as learning tool over conventional method of teaching and asked for the more frequent sessions. They found quiz as innovative, interesting and informative way of learning.

It also helped participants to work as team in peer group and face a healthy competitive spirit along with friendly way of educating the subject. Clinical cases rounds enhanced their capacity to apply their subject knowledge in case scenarios creating interest to read topic further.

Many studies had also got the positive feedback from students that quiz based learning are more interesting, innovative, student engaging, build healthy competitive spirit, should be used frequently as teaching-learning tool like in our study [4,8,10,11].

### Conclusion

Learning in medical field is a lifelong phenomenon and student should always

have curious mind to earn knowledge and develop skills. Learning is complex phenomenon involving deep insight of subject, ability to solve problems and application of knowledge for patient and health care.

Quiz can be used as a learning tool for students in Biochemistry to enhance their active participation and increase their interest in the subject which would motivate them to read it further. It could also help them to acquire knowledge in the core and applied aspects of subject as quiz question drives them for self and peer learning through team work and healthy competitive spirit.

### Limitation

All students cannot participate in the quiz as quizzers. It is always challenging for teachers to frame innovative and interesting questions for the quiz which could overcome by proper planning and keeping the competencies in the mind. We did not perform pre-test to avoid any bias toward quiz topics during preparation. Instead of dividing students in two groups, we used absent students as control group as we did not want any student to left out from quiz experience from our study

### Acknowledgement

We would like to acknowledge all the faculty members of Department of Biochemistry from SKNMC&GH, Pune for their valuable support and involvement during organization and conduct of Quiz.

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