

Comparison of Traditional lecture and Interactive Teaching Methods in Large Group Teaching of Non Communicable Diseases: A Quasi Experimental Study

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Abstract:

Introduction: Lectures as a method of teaching are very common and also under increasing criticism due to passive recipients of information with no development of thinking skills or change in attitude.

Objective: To Compare traditional lecture method with interactive teaching methods in large groups and to assess the perceptions of students towards these methods. **Method:** A Quasi-Experimental Study was taken up at the Department of Community Medicine among 7th semester students of MBBS course of Medical College located at Hyderabad for a period of 4 months. Four different teaching-learning methods such as traditional, case-based, Jigsaw, and Quiz were conducted for 4 topics of Non-communicable diseases which were evaluated through objective structured questions and subjective by perceptions rated on a Likert scale (1-5).


Results: Out of 100 students, 92 students regularly attended all the teaching methods of 4 topics- Hypertension, Diabetes Mellitus, Stroke, and Coronary artery disease. The highest objective structured mean score of 6.34 ± 2.367 was obtained for case based teaching in hypertension topic, whereas for rest of the topics like Diabetes Mellitus (6.63 ± 1.827), Coronary artery disease (6.95 ± 1.561) and stroke (6.11 ± 1.941), jigsaw method showed highest mean score. Subjective rating was excellent for jigsaw method in context with the topic related to Hypertension and stroke. Quiz was rated as excellent for the topics related to Diabetes mellitus and Coronary artery disease. For the overall perceptions consisting of positive and negative questions, highest score was rated for the jigsaw method of teaching. **Conclusion:** Objective evaluation has revealed higher scores with interactive teaching methods compared to traditional method and the jigsaw method was most preferable method and scored the highest as per feedback given by students.

Keywords: Competency based medical education, Interactive learning, Non Communicable diseases, Teaching- Learning Methods

Introduction:

Lectures as a method of teaching is very common and also under increasing criticism due to multiple reasons such as passive recipients of information with no development of thinking skills or change in attitude.^[1] Thereby, Interactive teaching

facilitates higher level of thinking and improves the affective domain as well as cognitive and psychomotor domains. Therefore, Interaction is always important in promoting application of knowledge with active involvement and increased attention and motivation at both ends.^[2] This is

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particularly important in medical education as retention and recall of events play a crucial role in clinical practice of mere future.

Strategies for interactivity can be either technology based or can be implemented in shared real time social settings where social dynamics can be used for learning efficiently and find easy solutions to entangle the complex ones. Various methods that can be used in a large group for interactive teaching are Question Asking and inviting questions, think pair and share, brainstorming, case based examples, role playing, demonstrating, problem solving, directed listening, quiz, etc.^[3,4] There are various studies supporting internationally that higher order thinking skills development through interactive teaching had delivered the significant improvement in learning.^[5-7] In India, national medical council had recommended a new curriculum moving towards competency based medical education, wherein didactic lectures have been reduced to one third and rest have to be implemented in an interactive way. This has been accentuated by many studies in Indian scenario also where multiple choice questions, confusion techniques, brainstorming etc. have been the preferred methods.^[8-10]

Kolbs learning theory emphasized this learning on a cycle of four stages of having a concrete experience, observation of and reflection on that experience, the formation of abstract concepts (analysis) and to test a hypothesis in future situations.^[11]

This study was conducted with an objectives to compare between traditional and interactive teaching methods in large group and to assess the perceptions of students towards the 4 different teaching methods (Traditional, Quiz, Jigsaw and Case based).

Method:

Quasi-experimental study, one-group post-test design without a control group was conducted at Department of Community Medicine, Medical College, Hyderabad for the duration of four months. Study participants were MBBS students of 7th semester. All the students were included and

convenience sampling was adopted. The students who were absent for any of the classes and have not given consent were excluded from the study.

Study Method:

Topics included in the study were hypertension, diabetes mellitus, coronary artery diseases and stroke. Faculties involved in this were trained prior to conduct the sessions in a similar way. All the students were assessed in two ways- one is the objective assessment by marks scored using various teaching methods and second by subjective method assessing their perceptions and rating.

Objective assessment: Each topic was taken by 4 different methods so that all students were exposed to all the methods adopted in total of two and half hour duration. An extra class was adjusted from the other departments and replaced later. To conduct these methods, was required 1 trained faculty to conduct quiz, 3 trained faculty required to conduct case based scenario and jigsaw method.

Traditional Lecture: A 45-minute lecture followed by a 10 multiple-choice questions on post-test using Google Forms as multiple choice questions was conducted in the lecture hall. One mark was allotted for each question, so total was 10 marks followed by discussion of questions. This took 15 min and a total duration of one hour.

Quiz: Administration of a 10-question quiz using the Kahoot! app (game-based learning platform) through individual logins with real-time feedback. Questions included multiple choice, true/false, trick questions, and visuals. Ranking and the marks were awarded automatically by the app scoring one mark for each question, along with time taken to answer. So total marks allotted were 10. All the questions were explained with answers and the total time taken was 30 minutes.

Case-Based Scenario: A case scenario was presented in the hard copy format in large group which consisted of short answer questions related to diagnosis, treatment, to identify risk factors, assess levels of prevention failures and treatment. Total marks allotted was 10 and total time taken was 30 minutes to complete.

Jigsaw: Five students formed a group, in stage 1- each group (Parent group) were assigned one of five subtopics such as epidemiology, risk factors, clinical features, complications, prevention, and national health programs. In the second stage "Expert" groups were formed by taking each student from the parent groups, Here they are learning other subtopics allotted to other groups. In the third stage, students returned to their parent groups (parent group reformation) to present their subtopics by peer teaching and write individual essay questions (10 marks each). By this method students are learning by teaching twice. Faculty here were only providing guidance to each group.

Subjective Assessment by student feedback: Questionnaire related to perceptions of students towards various interactive teaching methods was prepared after taking valuable suggestions from medical education experts and from review of literature. This consisted 16 items of positive(14) and negative(2) questions on a Likert scale scored as strongly agree =5; agree=4; undecided=3; disagree=2; strongly disagree=1. So the maximum score was 60 and minimum score was 14. The questions were related to their understanding of topic, knowledge gained, learning environment, encouragement, doubt clarification, emphasis on key points, interesting, interactive, active learning and retention.

Along with this, the rating of each topic taught by different methods was depicted as Excellent, Good, Fair, Poor and Very Poor separately by each student in order to label the most preferred method.

Ethical Considerations: Institutional ethical committee clearance with number ESICMC/SNR/IEC-F0387/09-2021, V01 was obtained prior to the study and informed consent was also taken after explaining the purpose of the study.

Data Analysis: Data was analysed using Microsoft Excel 2019. One-sample t-tests were used to compare mean scores for objective marks obtained using different methods. Subjective perception of students was assessed by the validated questionnaire where the Cronbach's alpha value of 0.787 was obtained

after pilot study. Mean \pm Standard deviation was calculated for their perceptions. Rating for each topic and each method was depicted in percentages.

Results:

The study has included 96(96%) students who were present for the two topics included under non communicable diseases and 4(4%) were absent for the classes. The topics were taught by traditional lectures and were compared with interactive teaching methods in large group teaching. Interactive teaching methods included quiz, jigsaw method and case based scenario.

Objective assessment:

The objective marks were calculated as mean scores for the four topics by different methods tabulated in Table 1. Compared to other methods, the case-based scenario method had the highest mean score for the topic of hypertension; on the other hand, the jigsaw method had the highest mean score for the topics of diabetes mellitus, coronary artery disease, and stroke.

Subjective assessment:

The jigsaw method showed the highest mean scores of students' responses as compared to other teaching methods. (Table 2) As per the students perception, the most preferred method of teaching was jigsaw method followed by quiz.

On the analysis of open ended questions related to the reasons for their preference to a particular teaching learning methods, most of the students favoured for interactive teaching methods. Their reasons for preference of quiz included fun way of learning and rewarding, increases enthusiasm to learn, motivating, interactive and interesting, healthy competitive spirit was inculcated, gain more knowledge and easy to remember. Reasons for preference to jigsaw method narrated by students were; one can concentrate on slow learning areas(their weak areas) and learn easily, increases understanding, retention was increased, more interactive, creative, active learning and all concepts were covered in lesser time. Case based scenarios were also preferred for the reasons such as practical

Table 1: Objective Mean Score for all topics covered by Various Teaching Learning Methods (N=96)

Method of teaching	Hypertension(n=96) (Mean±SD)	Diabetes mellitus(n=96) (Mean±SD)	Coronary Artery disease(n=96) (Mean±SD)	Stroke(n=96) (Mean±SD)
Traditional	4.89±1.94	4.58±1.46	5.12±1.84	5.73±2.23
Quiz	6.23±1.93	5.76±2.16	5.51±1.93	5.45±2.24
Jigsaw	5.74±1.39	6.63±1.82	6.95±1.56	6.11±1.94
Case based scenario	6.34±2.36	5.14±1.94	6.20±1.72	5.27±1.97

p value =0.00001, Significant

Table 2: Topic wise Mean Score of students Distribution of Mean Score of perceptions towards various teaching methods (N=96)

Topics	Subjective Mean Scores for Teaching Learning Methods			
	Traditional	Quiz	Jigsaw	Case based scenario
Hypertension	45.33±10.48	50.27±8.76	53.12±12.71	52.2± 9.68
Diabetes Mellitus	43.93±11.27	47.7±11.81	52.20±9.68	47.78±11.18
Coronary artery disease	43.94±11.27	47.85±9.52	54.85±10.33	49.74±9.78
Stroke	42.73±11.66	48.08±12.22	53.86±11.43	49.73±10.91

application, stimulates critical thinking, improvement of clinical knowledge, easy to understand, correlation of concepts with clinical cases, more gain in knowledge and more attentive. Whereas on the other end traditional lectures had mixed results reasoning as monotonous, depends on the faculty as there is amalgamation of slow and fast learners, passive learning and stresses on important points marking as exam driven. The greatest advantage with traditional teaching is its ability to cover the topic in its entirety whereas for other methods we need time and trained faculty to conduct it effectively.

Discussion:

This study compared four teaching methods - traditional lecture, quiz, jigsaw, and case-based scenario - for non-communicable disease (NCD) education in large groups. The findings provide compelling evidence for the effectiveness of interactive methods in enhancing both objective knowledge acquisition and subjective student perceptions.

Higher Knowledge Gain:

For both hypertension and diabetes mellitus, interactive methods generally outperformed traditional lectures. Case-based scenarios yielded

the highest objective scores for hypertension, while the jigsaw method proved most effective for diabetes. These results align with Kirkpatrick’s model of learning evaluation, demonstrating improvements in both cognitive domain (Level 1) and student perceptions (Level 2) with interactive approaches. Similar positive outcomes have been documented in previous research. Carpenter found significant knowledge gains with the jigsaw method compared to other methods like case studies and team projects.^[12] Gupta et al^[13] also observed a preference for interactive methods among students, with quizzes being the most favored followed by role-playing, case-based scenarios, and think-pair-share. Bhutani^[14] documented a 20% increase in student performance with case-based learning compared to traditional lectures, highlighting the potential of interactive methods to improve learning outcomes.

Student Preferences and Reasons:

Subjective ratings and open-ended responses further confirmed students’ preference for interactive methods. The jigsaw method received the highest mean scores for student perceptions of both NCDs. Students favored quizzes for their fun, competitive, and motivating aspects, while the jigsaw

method resonated for its focused learning, increased understanding, and active engagement. Case-based scenarios were appreciated for their practical application, critical thinking stimulation, and enhanced clinical knowledge relevance. Adaptive testing in the form of online quizzes can allow for more frequent practice and can be used for distributed or spaced practice which has been shown to have positive learning benefits by Dunlosky and Van der Kleij.^[15,16] Quizzes can be used to reinforce learning at regularly spaced intervals providing the opportunity and prompting for distributed practice. Students are generally satisfied with adaptive quizzing by Becker-Blease and House.^[17,18]

In contrast, traditional lectures received mixed reviews, often criticized for being monotonous, passive, and exam-focused. While traditional teaching methods often rely on passive information transfer, the Jigsaw method takes a different approach. By placing students in small groups with assigned roles and tasks, it emphasizes active participation and collaboration. This shift in focus has a measurable impact on student experience, as evidenced by research from Aydin and Biyikli.^[19] In their study, over 30% of students reported finding assignments easier to understand and complete when using the Jigsaw method compared to other methods.

Beyond improved task perception, the Jigsaw method also appears to foster a deeper understanding of learning objectives. Qualitative research by Tarhan et al.^[20] explored student perceptions of the method and found that nearly 80% felt a strong sense of accomplishment in meeting lesson goals within the Jigsaw's collaborative environment. This suggests that the method not only simplifies learning but also empowers students to take ownership of their educational journey, leading to more profound and self-directed learning. The study conducted by Vives^[21] showed that the Jigsaw method had benefits in terms of academic performance only for students with low self-esteem and low working memory capacity. Thus, the fit

between the complexity of the content to be taught and student ability appears to be important for avoiding problems when using the Jigsaw method and preventing negative consequences on students' achievement and relationships by O'Leary et al.^[22,23] For several outcomes, the duration of implementation did not appear to be a factor that could explain the significant heterogeneity observed by Drouet et al.^[24]

Implications for Medical Education:

These findings emphasize the potential of interactive methods to transform NCD education. Tailoring specific methods to different NCDs and fostering active student engagement can foster deeper knowledge acquisition, stronger retention, and clinically relevant learning. The diverse student preferences highlighted the importance of offering a variety of interactive approaches to cater to individual learning styles and enhance overall engagement.

Strengths and Limitations:

Current study employed a variety of interactive methods tailored to specific topics, showcasing the adaptability of these approaches to different NCD areas. Additionally, we actively facilitated the learning process, shifting the instructor role from traditional knowledge delivery to guiding student engagement and exploration. While this approach demands more time and resources for preparation and training, the observed improvements in knowledge retention and clinical application potential suggest significant long-term benefits. However, the single-institute design limits generalizability. Future research involving larger populations and diverse institutions is needed to validate these findings on a wider scale. Additionally, long-term studies investigating the impact of interactive methods on clinical practice and student satisfaction would further strengthen the case for their widespread adoption in medical education.

Conclusion:

Objective measurement of the students has revealed higher scores with interactive teaching

methods compared to traditional method. On rating their perceptions, highest positive scoring was found for jigsaw method for the topics. Newer teaching and learning methods are essential to sustain their interest on a longer run. There is also an Urgent need for uniformity with regards to teaching specific and most important topics in different methods to improve the quality of education.

Declaration

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Conflicts of interest: Nil

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