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### **Jigsaw Technique in Medical Education- Experience in a Medical College**

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#### **ABSTRACT**

Modern teaching methodologies emphasizes on shift from passive teaching to an active cooperative learning approach as a supplementary teaching technique. Jigsaw methodology employs a fellow learner group-based teaching strategy fostering team work based cooperative learning. In the present study , effectiveness of jigsaw teaching method on first year medical students is evaluated on lipid chemistry class of Biochemistry of first year medical students by a pretest and post-test in the form of multiple-choice questions to assess their knowledge with only lecture vis a vis lecture supplemented by jigsaw activity session. As part of a feedback/reflection exercise, which included both qualitative open-ended remarks and quantitative Likert scale questions, the students' perceptions of the jigsaw teaching approach are also assessed. Overall, the jigsaw approach of teaching works well for enhancing both student-student and student-teacher interaction.

**KEYWORDS:** Jigsaw Learning, Indian medical students, teaching methodology

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## **INTRODUCTION:**

Medical education has undergone a tremendous change in the past decade with the introduction of competency based undergraduate curriculum introduction in 2019, it has become imperative to use medical education technologies to comply with CBME guidelines. Traditional teaching methods centered on passive learning, such as lectures, are typically unilateral in orientation and provide few opportunities for students to collaborate, leading to restricted engagement with peers and teachers. The traditional chalk and board teaching to Overhead Projector based and PowerPoint based lecturing methodology are technological extensions of the passive approach. One of its limitations is student's low accountability for their learning outcomes. Since the Internet's invention a decade ago, medical education researchers have started probing into student interaction-oriented approaches in medical education to improve student learning. The majority of it was imposed on teachers as a result of COVID-19, which made online teaching and learning the only option. Active learning including interaction-based approaches has seen an explosive interest in medical faculty in the past decades for this millennial generation, with access to internet all the time. This will help in changing teacher centered (passive) learning approach to student centric (active learning) approach just like in fields of science and technology.

The jigsaw classroom is a research-based cooperative learning technique invented and developed in the early 1970s by Elliot Aronson and his students at the University of Texas and the University of California<sup>1</sup>. The jigsaw technique is a method of organizing classroom activity that makes students dependent on each other to succeed. It breaks classes into groups that each assemble a piece of an assignment and synthesize their work when finished. A study by John Hattie found that the jigsaw method benefits students' learning<sup>2</sup>.

The jigsaw technique is a cooperative learning method that brings about both individual accountability and achievement of the team goals. The process derives its name from the jigsaw puzzle because it involves putting the parts of the assignment together to form a whole picture.

## **MATERIALS AND METHODS**

Three lectures were taken as scheduled for a topic "Lipid Chemistry" for MBBS batch 2021-22 in VMMC (150 students) as traditional method routinely followed. They all attended 3 didactic lectures on topic of Lipid Chemistry, (CBME competency BI4.1) as traditional method routinely followed. After

this students were given access to reading material (Power point presentation and notes by the faculty taking class.For the present study This was followed by Jigsaw activity for this topic in next SGD session ( 1 hour each for half batch(75) – two sessions). A Google form, was prepared and shared with students for a pretest containing multiple-choice question which was to be filled before the start of activity but after the lecture had been conducted. Same test was to be submitted after completion of jigsaw technique in two sessions and students were given a questionnaire also to evaluate their perception of the Jigsaw method.

### **Jigsaw method**

The students were first divided into 10main groups of 7 students, for5 main group 1facilitator (faculty) was moderating andit took around 5 minutes for them to arrange students in group.Further by lottery system they were allotted into 14 (seven with eachfacilitators) expert Jigsaw group. After this each student was given a topic to study on their own (sub topics divided) for 15 minutes followed by going to expert Jigsaw group consisting of all students who studied same subtopic. A 15 minute time was allowed for each expert jigsaw group to discussion where doubt clearing and any other additional preparation for the subtopic could be done as shown in fig 1 and 2. After half an hour students returned to their original allotted Main group, were each students have given different subtopics of the main topic. Now each student taught his/her subtopic to rest of the group since he is expert in that subtopic, thereby completing total topic which was earlier divided into smaller subtopics. Entire jigsaw session was completed in about 40-50 min. This discussion was followed by a post-test in the form of multiple-choice questions and students were given a questionnaire to evaluate their perception of the Jigsaw method.

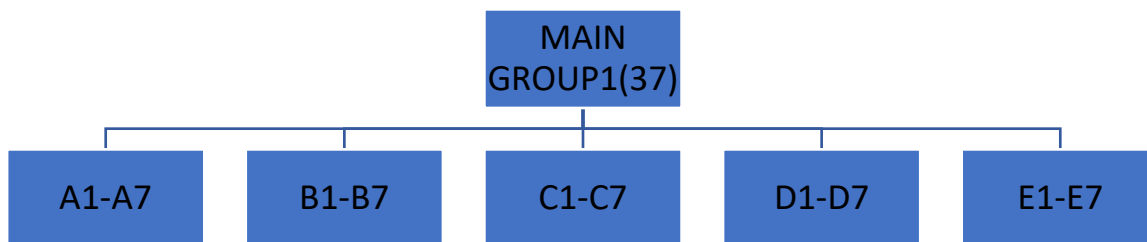


Fig 1:The distribution of the class in to main group 1 where jigsaw technique is applied

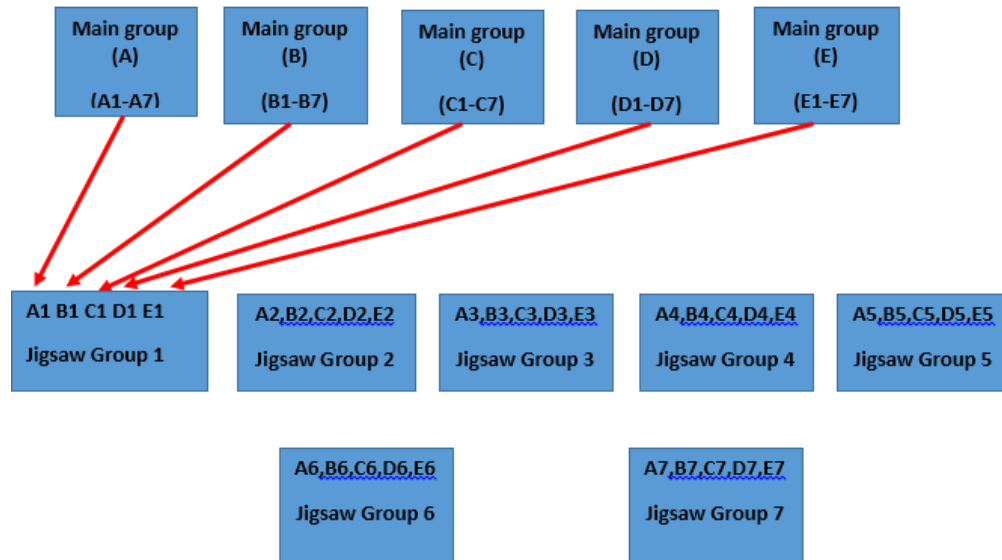


Fig 2: Formation of the jigsaw group from the main group 1 of class where jigsaw method has been applied.

## RESULTS

The present study was designed to ascertain the effectiveness of jigsaw teaching method on first year medical students. All 150 first year MBBS students enrolled for the study were within same age bracket of (17-18 years) and with no prior experience of Jigsaw method. For comparison of mean score of pretest and posttest we have used paired T Test. There was a significant improvement in scores of posttest as compare to pretest ( $p < 0.001$ ) after jigsaw activity as shown in table 1 and fig 3. Feedback was very good students felt that the Jigsaw teaching method was interesting. Some students had significant improvement to the extent of doubling of scores.

Table 1: Descriptive statistics of scores of students

	Lecture	Lecture + jigsaw activity
Mean	8.4	9.5
SD	1.44	0.74
N	140	140
SE	0.12	0.06
95%CI	8.67 to 9.16	9.34 to 9.59
P value		<0.001

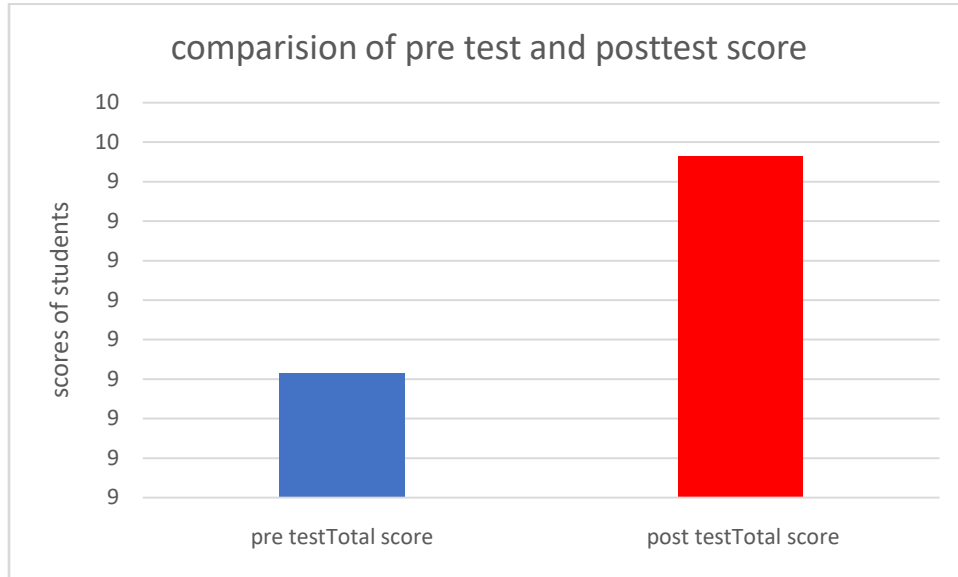


Fig 3 : Bar graph showing score of Pre test vs Post test .

## DISCUSSION:

Students were first given a Google form for pretest before start of activity then they were divided into 10 main groups by roll numbers. After this activity they were asked to attempt the same test again on Google form. That score of pre and posttest was analyzed statistically by paired t test (pretest and posttest score). There was a significant improvement in pre and post test scores ( $p < 0.001$ ) after jigsaw activity as shown in (table 1) and (Fig 1) and students feedback was good.

Following are few points of feedback received especially from 9 students who improved their scores from 50% to > 80%.

1. Comfortable and makes easier to completely cover one topic.
2. Prevents exhaustive discussions which generally end up nonproductive.
3. Less time and energy consuming as each student prepares one portion of bigger topic
4. Established long term concept building
5. Teamwork spirit established
6. Communication and inclusivity with batch mates.

Around 95% students reported that they were overall satisfied by the Jigsaw teaching-learning method and around 84% students felt that jigsaw method was better than the traditional teaching-learning method. In the study done by Doymus et al<sup>3</sup> and Dr. Pradeep M et al<sup>4</sup> on first year MBBS students, they have also found that the students had better understanding of the topic with the jigsaw method. It gave

them an opportunity to teach fellow students and by doing this helped them to understand the topic even better. They also felt that the faculty members present were co-operative and facilitated their learning by solving their doubts. Carpenter et al <sup>5</sup> show that the scores obtained by the students by jigsaw method were significantly higher than those obtained by various other teaching-learning methods <sup>6</sup>. In the study done by Kılıç et al <sup>7</sup> they claim that we should use Jigsaw method of teaching in all phases of education and has more favorable finding on academic performance than tradition methods of teaching. C.S, Vinodkuma et al <sup>8</sup> have also achieved better result by using jigsaw method of cooperative teaching technique than the competitive and individualistic structures found intraditional teaching methods because students construct their own concepts and then reinforce them with one another. Though according to them this method are time consuming in terms of planning and execution but are very effective in bringing out operational outcome for students and faculty so would be desirable to implement this strategy for few selected topics. Leyva-Moral JM et al <sup>9</sup> and Mohammadi AS et al <sup>10</sup> believe that the jigsaw learning technique is an effective way of transforming the medical students from passive to active learners. Knowledge, communication skills and team work are some essential components for being a successful medical practitioner.

## **CONCLUSION:**

We hereby conclude that in our study, jigsaw technique use resulted in better academic performance and hence it should be regularly used. It can also be helpful in overcoming faculty shortage barrier in certain institutions/conditions since facilitators can manage multiple groups compared to conventional tutorial where teacher is required for each group, since students are taking active part in both learning and teaching.

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