

## Effectiveness Of Jigsaw Technique Of Interactive Learning In Physiology For I MBBS Students

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**Abstract:** Background: Jigsaw technique is method of collaborative and cooperative learning where students learn and teach to each other. Aim and objective was to introduce Jigsaw technique in teaching Physiology and to assess its effectiveness and perception of students. Method: Pretest was conducted. Students were divided in two groups T and J. First group T was taught by traditional lecture and Group J learned by Jigsaw technique followed by posttest. Next day crossover of groups was done and same procedure was repeated for another topic. Feedback was collected. Result: On comparing means of Pretest and Posttest scores (n=77) statistically significant (p=0.00) increase in score in both Traditional and Jigsaw method was observed. On comparing difference between two groups (T and J) increase in score of Jigsaw method was statistically significant (p=0.000) than that for Traditional method. Students and Faculty enjoyed the learning and recommended this technique. Conclusion: : Jigsaw technique is effective and enjoyable method of interactive learning. It shall be implemented for teaching. [Pande S, Natl J Integr Res Med, 2019; 10(6):41-45]

**Key Words:** Interactive learning, Jigsaw technique, Traditional teaching

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**Introduction:** Medical council of India is implementing new curriculum named Competency Based Medical Education (CBME). This undergraduate medical curriculum is created to ensure that the medical doctor emerging out of the MBBS training program is capable of assisting the nation to achieve its goal of health for all. Goal of Medical Education is to develop Indian Medical Graduate (IMG) who is competent in five identified roles as Clinician, Leader and Team member, Communicator, Lifelong learner and Professional<sup>1</sup>. To achieve this goal interactive methods of teaching are gaining more importance in medical education. Need of hour is towards shift to active learning methods rather than the dependent traditional passive learning methods. Various active learning methods (ALMs) have been proposed that ensure the active participation of students. Several simple collaborative teaching techniques like reader's theatre, think-pair-share, roundtable, jigsaw, in-class quizzes and minute papers that can be used to promote student centered active learning are proposed<sup>2</sup>.

Jigsaw technique, introduced by Aronson et al in 1978, is one of the interactive, collaborative, cooperative methods of teaching. The basic goal of Jigsaw technique is to make students help each other learn actively in groups and then teach to their colleagues. It is a classroom technique where students act as blocks of jigsaw puzzle and learn cooperatively with all the participating students acting as teachers as well

as learners<sup>3</sup>. Teaching is the best way of learning. In jigsaw technique a particular topic is divided into subtopics. The students are divided into primary groups with each group member responsible for learning one subtopic. In this method the students learn the topic in parts and then they teach it to fellow colleagues in groups. This will help to improve communication and team work nurturing to develop 3 roles ie Leader and Team member, Communicator and Lifelong learner of IMG.

Research over various education fields like school students<sup>4</sup>, Biology science<sup>5</sup>, Nursing<sup>6</sup>, Dental<sup>7</sup>, Pharmacy<sup>8-10</sup>, Medicine<sup>11-13</sup> has proved this technique to be useful. Most of the researchers have published perceptions after intervention. They have reported this technique to be effective with mixed perceptions of students. But it is not compared with traditional teaching. We have attempted to compare the effectiveness of this technique to traditional method by using control group for teaching Physiology. The aim of this study was to introduce Jigsaw technique in teaching physiology to first year MBBS students and to assess its effectiveness and to study the perception of students and faculty to this methodology through a properly designed feedback questionnaire.

**Material and Methods:** An experimental study was conducted at Dept. of Physiology at Dr. PDMMC, Amravati (MS). The study was approved by Institutional Ethical committee. All the I MBBS

2018 batch students who were willing to participate in the study were included after obtaining Informed consent. Data collection tools were feedback forms, Pretest and posttest questionnaire. Pretest containing 10 MCQs was prepared and validated by experts for the chosen topics Growth hormone and Parathormone in Physiology. Scores obtained were used to test knowledge. Feedback forms were prepared for students and faculty to know their perception about the Jigsaw technique. Study was conducted in regular schedule 2 hr. slot of didactic lecture.

In first session for Topic Growth Hormone, Pretest consisting of 10 MCQs was conducted for 5 mins. before the technique to test their basic knowledge. The students were divided in two groups T and J. Then Group T was taught the topic by traditional didactic lecture and Group J was taught using Jigsaw technique. In this technique the topic was divided in 5 sub topics. Students were divided in 5 groups. Each every group every student was allotted with one subtopic. Then students having same subtopic were regrouped together. This new group having same subtopic prepared it for 30 minutes by discussing among themselves. Required resources were provided and facilitators monitored their discussions helping them to prepare.

After preparation, students returned back to original group. Now in this group there was one expert for every subtopic. Each student then taught to other 4 colleagues the topic which he has prepared, in sequence of subtopics for 40-45 min. This is how whole topic was completed. The faculty guided and acted as a facilitator during the session. After completion of teaching and discussion both the groups were subjected to Post test on same MCQs. During second session conducted next week, the groups were crossed over for another topic of Parathormone repeating the procedure. Students and faculty were asked to fill up the feedback questionnaire having close and open ended questions. Five point Likert scale was used to know their perceptions. Open ended question was used to know their suggestions/recommendations.

Statistical Analysis: Data was entered using MS Excel Worksheet. Mean Pretest and posttest scores were compared in both the groups. Mean Post test scores were compared in Traditional and Jigsaw Technique group. Wilcoxon Signed

Ranks Test was used to compare significance of difference in means of Pretest and Posttest. For comparing difference between two groups (T and J) Mann Whitney U test was used. Qualitative response like feedback was measured on 5 point Likert scale. Responses to open ended question were reported according to common themes. SPSS software Version 16 was used for analysis of data.

**Result:** Mean score for Pretest for the topic Growth hormone in Group T was (2.85± 1.54) and that for Posttest was (6.54± 1.62). The difference was 3.69 for Group T. In Group J mean score for Pretest was (2.32±1.19), Posttest (6.78± 1.21) and difference was 4.46. For the topic Parathormone mean score for Pretest was (2.89±1.13), for Posttest (5.8±1.92) and difference was 2.91 in Group T. Mean score in Group J for Pretest (2.1±1.18), Posttest (6.94±1.37) and difference was 4.84. As shown in Table 1 on comparing means of Pretest and Posttest scores (n=77) there was statistically significant (p=0.000) increase in the score in both Traditional and Jigsaw method for both the topics, using Wilcoxon Signed Ranks Test. When the increase in the scores of Traditional and Jigsaw methods were compared difference was not found to be statistically significant (p=0.58, Mann Whitney U test) for the topic Growth Hormone. On the contrary comparing difference between two groups (T and J) increase in scores of Jigsaw method was statistically significant (p=0.00, Mann Whitney U test) than that for Traditional method for Parathyroid.

**Table 1: Mean scores of Pretest and posttest in both groups (T and J) for Topics Growth hormone and Parathormone and significance of difference. (n=77)**

	Growth Hormone			Parathormone		
	T	J	Sig ** P Value	T	J	Sig **
Pretest	2.85	2.32		2.89	2.1	
Posttest	6.54	6.78		5.8	6.94	
Difference	3.69	4.46	P= 0.058	2.91	4.84	P= 0.000
Sig * P Value	<0.01	<0.01		<0.01	<0.01	

\*significance of difference between Pre and Post test scores (Wilcoxon Signed Ranks Test), \*\*significance of difference between T and J group scores (Mann Whitney U test).

As seen in Table 2, on evaluation of the feedback responses collected on five point Likert scale 58 (75%) respondents said that Jigsaw technique is more effective as compared to the traditional lecture method and commented that student involvement encourages active learning. More than 61 (79%) respondents enjoyed the learning by Jigsaw technique and 54 (70%) recommended that more topics should be taught by this technique. Faculty also gave positive feedback to interactive technique.

**Table 2: Evaluation of student Feedback on 5 point Likert scale n=77**

		SD	D	N	A	SA
1	Aims and objectives of the teaching methodology were explained beforehand	1	5	10	41	16
2	Jigsaw technique is more effective as compared to the traditional lecture method	5	3	9	24	34
3	Active learning methodology encouraged active student participation and discussions	1	1	8	32	32
4	Involvement of students in active learning in Jigsaw technique is more.	2	3	11	29	29
5	The presence of teacher as moderator helped in discussions	2	6	8	30	28
6	Learning by Jigsaw technique was overall an interesting exercise	0	6	7	34	27
7	Many more topics shall be taught by using active learning methods	7	6	7	33	21

When responses to open ended question were analysed, some of the comments from students were,

"Jigsaw technique is wonderful initiative. Absolutely loved it. I would encourage it for small and easy topics."

"This technique helped to develop our own self learning ability and helped to get more confidence for teaching to others."

"I want to learn maximum topics by this interactive technique because it takes less time."

"Preparation time should be increased."

"Topics should be given one day prior."

"This technique should be used frequently as it eliminates boringness of lectures."

From these responses, as seen in Table 3, eight themes were identified. About 40% of students wrote that they enjoyed and wanted more such sessions. While 10% of students commented that topics should be given prior to the session so that more time can be devoted for reading. They also wanted more traditional method better as compared to Jigsaw.

**Table 3: Analysis of responses to open ended question (n=77)**

No	Themes	Responses (%)
1	Enjoyed, liked, want more Jigsaw sessions	40
2	More time for reading / topic on prior day	10
3	More involvement of moderators	10
4	Use for small and easy topics	10
5	Increased confidence and self learning	5
6	Self read topics clear/taught topics difficult	4
7	More learning in less time	4
8	Traditional better than Jigsaw	4

**Discussion:** The present study attempted to assess effectiveness of interactive Jigsaw technique to teach physiology. Comparing the difference between pretest and posttest scores it was obvious that there was gain in knowledge in both the methods (T and J). Jigsaw method was more effective for Parathormone than for Growth hormone. The reason could be that they knew about Growth hormone during pre medical education. When the increase in the scores of traditional and Jigsaw methods were compared, increase in scores of Jigsaw method was statistically more significant than increase in the score of traditional method. This difference may be attributed to active participation and active learning. This means that both the methods showed significant improvement and Jigsaw was more effective than Traditional method. However long term retention of knowledge could not be studied. Similar results were reported by J Phillips et al, in their study on Pharmacy students, by Azmin N.H for Psychology students<sup>14</sup> and Kumar VCS et al<sup>15</sup> in their study among Medical students. However Persky et al<sup>9</sup> in their study on Pharmacy students reported that there was no difference in performance compared to years when the technique was not used.

Learning experiences reported by students were positive and encouraging in this study like those reported by most of the studies with majority preferring to see more of it in the curriculum Buhr<sup>12</sup>, J Philip<sup>8</sup>, Gilkar<sup>11</sup>, Verma<sup>17</sup> and Bhandari<sup>16</sup> in their studies.

Gilkar et al<sup>11</sup> opined that group size should be smaller, more time should be given, which was suggested by our participants as well. Very few (1–2%) did not see a benefit to their learning and felt that it detracted from traditional lecture time. The method was not highly valued by students especially by older age group as reported by JN Leyva et al<sup>6</sup>. In a study conducted by Verma et al 13% students were not satisfied by this technique<sup>17</sup>.

In suggestions and recommendations, few students opined that more time should have been given for preparation. They also felt if topic is allotted prior to activity it will be more useful. Few wanted more involvement of facilitators.

Overall impact of the study was that even if enjoyable, it can definitely be used in modified way for selective topics to learn them in depth. If

the topic is small and given prior it can be more helpful.

**Limitation:** In this study control group was used to compare difference but effect on long term retention of knowledge was not studied.

**Conclusion:** The study proves that the Jigsaw technique is effective and enjoyable method of interactive learning. It is well accepted by the students and faculty.

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