RESEARCH

USE OF JIGSAW TECHNIQUE AS A TEACHING LEARNING METHOD FOR UNDERGRADUATE MBBS STUDENTS IN DEPARTMENT OF COMMUNITY MEDICINE

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Abstract

Background: Medical institutes follow different types of teaching methodologies to deliver knowledge to students. Traditional didactic teaching methodology is the most widely used in many educational institutions. There are many innovations and trends in medical education that have been undertaken globally which include self-directed learning, integrated teaching and small group teaching, with active learning methods (ALM). The objective is to Comparing the effectiveness of jigsaw learning method with didactic method and to assess the student perception regarding jigsaw learning method. **Materials and Methods:** An institution-based interventional study was carried out in the Department of Community Medicine among 5th semester undergraduate MBBS students of Katihar Medical College, Katihar. Students and faculty members were sensitized with the Jigsaw technique using power point presentation. Total 84 students of 5th semester were participated. And they were randomly divided by using random table into two equal groups, 'I' and 'II'. Two topics, Acute Diarrhoeal Diseases and Acute Respiratory infections were selected for both group covered in two sessions. **Result:** Statistically significant results were obtained using pre and post-test questionnaire for both groups during both sessions. Intergroup comparison of mean scores obtained in the post-test were higher in jigsaw study group than the didactic method study in both sessions and differences were found to be statistically significant ($P<0.05$). The students showed a positive attitude about jigsaw and a majority of students believed that other topic should also taught by using jigsaw. **Conclusion:** This present study revealed jigsaw method is a powerful method of learning. Statistically significant results suggested that jigsaw method helps in the enhancement of students' performance.

INTRODUCTION

Medical institutes follow different types of teaching methodologies to deliver knowledge to students. Traditional teaching methodology, the most widely used in many educational institutions is a teacher-dominated and teacher-centric interaction, where teachers are the source of the knowledge, while learners are passive receivers who should memorize things.[1,2] Traditional teaching takes place mainly through didactic lectures.[3] It is mostly monotonous with little or negligible involvement of students.[4] There are many innovations and trends in medical education that have been undertaken globally which include self-directed learning, integrated teaching and small group teaching, with active learning methods. Active learning has attracted strong advocates among faculty, there remain questions about what active learning is and how it differs from traditional education.[5] Active engagements of learners has shown to improve long-term retention of acquired knowledge.[6,7] Incorporation of active learning strategies into conventional passive learning approaches has resulted in improved student performance.[8,9] Various active learning methods (ALMs) have been proposed that ensure

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the active participation of students.[10] One of the ALMs is jigsaw method. Jigsaw method not only helps to understand the subject in a better way, but also creates a friendly atmosphere among students as well as improves communication skills.[11] Jigsaw method has already been successfully incorporated in other education systems and shows better results. Literature search reveals that a very limited work on jigsaw has been done in the department of Community Medicine.

MATERIALS AND METHODS

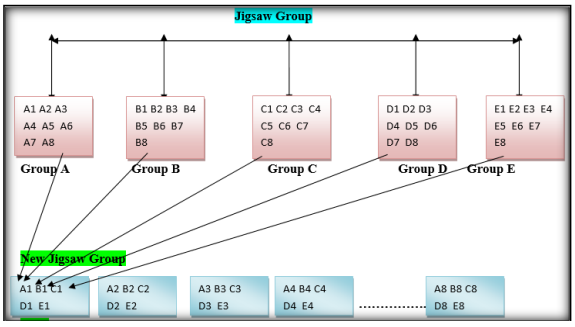
An institution-based interventional study was carried out in the Department of Community Medicine among 5th semester undergraduate MBBS students of Katihar Medical College, Katihar. Due approval was taken from Institutional Ethics Committee before undertaking the study. The students and the teaching faculty were informed that the active learning strategy will be introduced in learning a particular topic. Students and faculty members were sensitized with the Jigsaw technique using PowerPoint presentation. Total 84 students of 5th semester were targeted towards participating in the study. The study participants were randomly divided by using random table into two equal groups, 'I' and 'II'. Written informed consent was taken from each participant with explanation that the internal assessment marks would not be affected with this pre- and post-test marks. A Core group consisting of faculty members of Community Medicine was constituted for the selection of topics to be used for conducting this study. As per the suggestion of the core group it was decided that the topics to be taken up would beAcute Diarrheal Diseases (ADD) for First session and Acute Respiratory infections (ARI) for the second session. In the first session, group 'I' would be taught the topic ADD by didactic lecture and group 'II' would be required to engage in the same topic through Jigsaw technique. In second session, a cross-over of group would be done, and the students of group 'I' would learn through Jigsaw method on the topic ARI while group 'II' would be taught the same topic through didactic lecture. Both didactic sessions were taken by the same faculty of community medicine. To assess the effectiveness of the Jigsaw method and traditional teaching method, a predesigned pretested structured self-administered questionnaire containing close ended questions was prepared. A self-administered questionnaire consisting of 15 single best response type MCQ would be prepared for both sessions as pre-& post-test.

The MCQs were prepared by a senior faculty member of Community Medicine, who was not involved in the study and it was pretested upon 20 students from senior batch (7th Semester) and necessary corrections were done. The pre & post-test questionnaire were same for both the topics.

At the end of both sessions the effectiveness of this learning experience was evaluated through Feedback of the students which was obtained on a predesigned 5-point Likert scale.

Intervention Phase

After making them familiar with Jigsaw method, consent of all students was taken. Students were allocated randomly into two groups 'I' and 'II' comprising of 42 students each. Students of both groups I & II were further divided into 5Jigsaw groups and this groups were designated as a Jigsaw A, B, C, D &E group. And each Jigsaw group (A, B, C, D, E) had 8 students from serial number 1 to 8 who were numbered A1, A2, A3, A4,……A8, B1, B2……B8, C1, C2…...C8, and so on. The remaining 2 student were attached with Jigsaw group D and E. Identification of leader for each Jigsaw group was done for smooth functioning of all groups.



Session -1

Didactic Teaching Method was introduced to group 'I' and Jigsaw method was introduced in group 'II' on ADD. For group 'II', each Jigsaw group (A,B,C, D, E) was assigned to one specific segment of ADD. Jigsaw group-A was given problem statement, Jigsaw group B was given Epidemiological determinants, group C was given classification of dehydration, Jigsaw group D was given treatment plan and group E was given prevention and control of ADD (Annexure-1). Teaching material was distributed to each Jigsaw group according to topic segment. Sufficient time (30 minutes) was given to each group to study the subject matter. One faculty member each was assigned to each Jigsawgroup to ensure that the conversation was going on right direction or not, and to intervene, if required. Reallocations of new groups like A1, B1, C1,D1, E1; A2, B2, C2, D2,E2 and so on was done [Figure 1]. Now this new group had one student from each Jigsaw group (A,B,C,D,E) that was formed earlier. Over the next 30 min A1 taught problem statement to new group (A1,B1,C1,D1,E1), and B1 taught epidemiological determinants and so on. Finally, at the end of 30 minutes, there was an overall complete discussion of the topic by each new group11,12. Before the start of the session, students from both groups were given a pre-test questionnaire containing 15 MCQs and at the end of session a

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post-test questionnaire with same set of questions were introduced to them. Each question carried one mark, with no negative marking for wrong responses.

Session 2

Session 2 was basically a repetition of Session 1, except that a cross-over of groups was done for the second topic (ARD), wherein the students of group 'I' learned through Jigsaw method while group II was taught through didactic. Pretest and post-test were taken, as described in Session 1.

Again, for the benefit of the students, a crossover was made so that those who learned by didactic teaching got the benefit of exposure to Jigsaw technique and vice versa for the topics.

Annexure -1 Topic segment of Jigsaw method during the two allocated sessions

Topic Segment for Jigsaw during 1st session	Topic Segment for Jigsaw during 2nd session
Acute Diarrheal Diseases	Acute Respiratory Diseases
Jigsaw Group A: Problem Statement	Jigsaw Group A: Problem Statement
Jigsaw Group B: Epidemiological Determinants	Jigsaw Group B: Epidemiological Determinants
Jigsaw GroupC: Classification of illness	Jigsaw Group C: Classification of illness
Jigsaw Group D: Treatment	Jigsaw Group D: Treatment
Jigsaw Group E: Prevention & Control	Jigsaw Group E: Prevention & Control

Statistical Analysis

The data were analyzed using statistical tests. Comparison of marks of pre- and post-test scoresof Jigsaw group and didactic group (of both sessions) was done by using paired t-test and unpaired t-test. Descriptive statistics was done in the form of mean, standard deviation, Standard error, mean difference. P value 0.05 was considered to be statistically significant. All the data was entered in Microsoft Excel Sheet, and then transferred & analyzed by using statistical software SPSS20.

RESULTS

Out of 100 students, 84 students participated in this study.

[Table 1] depictscomparison between pre- andpost-test meanscores of both didactic and Jigsaw (group-I &II) methods of first session. It shows mean value, standard deviation, standard errorof scores obtained in the pre- and post-testof both groupsusing Student's paired t-test.It was observed that the mean score for both pre- andpost-testwere slightly higher in Jigsaw group than compared to didactic group. However, the average scores obtained in the post-test were significantly higher in didactic study group (Group I) than pretest marks of the same group (Group I). This difference was found to be statistically significant (P<0.000).

This table also depictsthat the average score obtained in the post-testwas significantly higher(P<0.000) in Jigsaw group (Group -II) than pretest scores of the same group.

[Table 2] depicts comparison between pre- andpost-test scores of both Jigsaw and didactic methods of second session. It shows the mean value, standard deviation, and standard error of average scores obtained in the pre- andpost-testof both groups by using Student's paired t-test. The average scores obtained in the post-test was significantly higher in Jigsaw group (Group I) than pretest scores of the same group (Group I). And the differences of scores were found statistically significant (P<0.000).

This table also depicts that the average scores obtained in the post-test was significantly higher in didactic group (Group -II) than pretest marks of the same group (Group-II) and differences were found statistically highly significant(P<0.000).

[Table 3 & 4] showedinter group comparison of both pre-&post-testscores between Jigsaw and Didactic method of both sessions. It depictsmean scores, standard deviation, standard error of scores obtained in pre- andpost-testof both study groups (Group I and II) in both sessions and the inter-group comparison of significance using unpaired t-test. Mean scores obtained in the pre-test were higher in Jigsaw study group than the didactic method study in both sessions and differences were found not to be statistically significant (P>0.05).

Mean scores obtained in the post-test were higher in Jigsaw study group than the didactic method study in both sessions and differences were found to be statistically significant (P<0.05).

Table 1: Comparison between Pre- and Post-test scores of both Didactic and Jigsaw Methods (1st Session Acute Diarrheal Diseases)

Paired Samples Statistics									
		Mean	N	Std. Deviation	Std. Error Mean	Mean difference	t	df	Sig (2 tailed)
Group-I (Didactic)	Pretest	6.7857	42	1.88104	0.29025	3.64286	-27.765	41	0.000
	Post-test	10.4286	42	1.41668	0.21860				
Group–II (Jigsaw)	Pretest	7.1429	42	1.50724	0.23257	4.02381	-15.057	41	0.000
	Post-test	11.1667	42	1.05730	0.16315				

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Table 2: Comparison between Pre- and Post-test scores of both Jigsaw and Didactic Methods (2nd Session Acute Respiratory Infections)

Paired Samples Statistics									
		Mean	N	Std. Deviation	Std. Error Mean	Mean difference	t	df	Sig (2 tailed)
Group-I (Jigsaw)	Pretest	6.8571	42	1.1597	0.1789	-4.5952	-22.454	41	0.000
	Post-test	11.4523	42	0.9423	0.1454				
Group–II (Didactic)	Pretest	6.4048	42	1.1274	0.1739	-3.7381	-31.585	41	0.000
	Post-test	10.1429	42	0.9258	0.1428				

Table 3: Intergroup Comparison of scores between Didactic and Jigsaw Method during first session (Acute Diarrheal Diseases)

Unpaired t test								
		Mean	N	Std. Deviation	Std. Error Mean	t	df	Sig (2 tailed)
Pretest	Didactic(Gr*-I)	6.7857	42	1.88104	0.29025	-0.96	82	0.34
	Jigsaw(Gr*-II)	7.1429	42	1.50724	0.23257			
Post-test	Didactic (Gr*-I)	10.4286	42	1.41668	0.21860	-2.70	82	0.008
	Jigsaw(Gr*-II)	11.1667	42	1.05730	0.16315			

Gr* =Group

Table 4: Intergroup Comparison of scores between Jigsaw and Didactic Method during second session (Acute Respiratory Diseases)

Unpaired t test								
		Mean	N	Std. Deviation	Std. Error Mean	t	df	Sig(2 tailed)
Pretest	Jigsaw(Gr*-I)	6.8571	42	1.1597	0.1789	1.813	82	0.74
	Didactic(Gr*-II)	6.4048	42	1.1274	0.1739			
Post-test	Jigsaw(Gr*-I)	11.4523	42	0.9422	0.1454	6.424	82	0.000
	Didactic(Gr*-II)	10.1429	42	0.9258	0.1428			

Gr* =Group

Feedback response of students on various aspects of Jigsaw method on 5 point Likert scale

Items	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Q1.The objectives of the session were well explained	--	--	3	40	41
Q2.The methodology of the session were well explained	--	--	2	43	39
Q3.Jigsaw is a powerful method of Active learning	--	6	6	41	31
Q4.The Jigsaw method guided me to take responsibility of my learning	--	5	9	38	32
Q5.Jigsaw learning method helped in overcoming hesitation in class	--	4	4	47	29
Q6.Active learning methodology encouraged active student participation and discussions	2	8	10	28	36
Q7.Good understanding of topic is achieved by using Jigsaw teaching method	4	7	7	33	33
Q8.Other topics should also taught by using Jigsaw method	3	4	5	39	33

5: Strongly agree; 4: Agree; 3: Neutral 2: Disagree; 1: Strongly disagree.

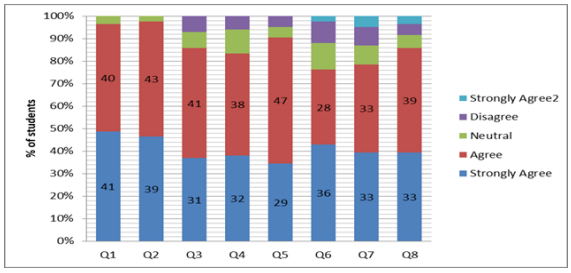

Figure 1: Feedback response of students on various aspects of Jigsaw method

Feedback from Students

84 students gave their feedback. About 85.7% students either agreed or strongly agreed that Jigsaw is a powerful method of learning and almost 90.5% student answered that it helped in overcoming hesitation in class. 78.6% believed that Jigsaw method is good for understanding the topic. About 76.1% students agreed that ALM encouraged active student participation. A majority of students believed that other topics should also be taught by using Jigsaw.

DISCUSSION

This present study was conducted to compare the Jigsaw learning method with didactic teaching methods. The study revealed that during both sessions & in both groups, the average scores obtained in post-test were significantly higher than the pre-test, and the difference of scores were found to be statistically significant (P<0.00) [Table 1 & 2] using student's paired t- test.

[Table 3 & 4] showed the intergroup comparison of pre-test and post-test scores of both sessions using

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unpaired t-test. The average scores were higher in pretest Jigsaw groups in both sessions and difference was not statistically significant. These statistically non-significant differences observed in pretest mean scores in both sessions is an indication that randomization was proper. Post-test Jigsaw scores were significantly higher ($P<0.05$) in both sessions. It indicates that the Jigsaw method is an effective method of learning.[12]

Azmin NH mentioned in his study that there is a significant improvement in students' performance after the Jigsaw method was implemented.[13] Bogam RR also mentioned in his study that Jigsaw technique helped in enhancing the knowledge of participants and difference was found to be statistically significant ($t = 9.36$, $p<0.001$).[14]

Other studies also suggested that a significant improvement in the students' performance has been found after exposure to Jigsaw.[15,16] It is suggested that the improvement of student's performance may be due to the active involvement of students for learning. It promotes interdependence with collaborative learning.[13] Jigsaw is an effective method of learning because it allows the students to have individual accountability and to actively interact with their colleagues.

Feedback from students showed a preference towards Jigsaw methodology, and they definitely liked this teaching methodology. Majority of students answered it is a powerful method of learning which not only gives responsibilities to students to actively learn, but also enhances the communication skills and reduce hesitation among students. Majority of students opined that more topics should be taught by using Jigsaw method because it gave a better understanding of topics.

CONCLUSION

This present study revealed Jigsaw method is a powerful method of learning. Statistically significant results suggested that Jigsaw method helps in the enhancement of students' performance. It reduces hesitation to interact, while promoting involving themselves in learning, whereby making the class atmosphere more student friendly and effective.

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