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Original Article

IMPACT OF STRUCTURED PEER-ASSISTED LEARNING ON ANATOMY TOPICS: A JIGSAW METHOD APPROACH

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ABSTRACT

Objective: To evaluate the effectiveness of structured peer-assisted learning using the Jigsaw method in improving understanding, retention, teamwork, communication skills, and overall academic performance among Phase-I MBBS students in anatomy.

Methods: A pre-test and post-test interventional study was conducted among 150 Phase-I MBBS students in the Department of Anatomy, Government Medical College, Mahabubnagar. Students participated in a structured Jigsaw learning session covering selected anatomy topics. A 15-item multiple-choice questionnaire was administered before and after the intervention. Scores were analyzed using paired statistical methods.

Results: The mean pre-test score was 7.0±2.1, which improved significantly to 14.0±1.3 in the post-test. The improvement was statistically significant ($p<0.0001$) with a very large effect size (Cohen's $d = 1.85$). There was a marked reduction in low scorers and a substantial increase in high achievers.

Conclusion: Structured peer-assisted learning using the Jigsaw method significantly enhanced comprehension, retention, communication skills, teamwork, confidence, and overall academic performance among MBBS Phase-I students. The method aligns well with CBME objectives and represents an effective student-centered teaching strategy in anatomy education.

Keywords: Jigsaw Method, Anatomy education, Knowledge retention

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INTRODUCTION

Contemporary medical education increasingly emphasizes learner-centered approaches that promote active participation, collaboration, and shared responsibility for learning, Cooperative learning strategies have emerged as effective tools for improving engagement and academic outcomes, particularly in content-heavy subjects such as anatomy.

The Jigsaw teaching technique, developed by Aronson [1], is a structured cooperative learning method in which students become "experts" on subtopics and subsequently teach their peers. This approach promotes positive interdependence, individual accountability, and enhanced communication skills. By requiring students to reorganize and verbalize information, peer teaching strengthens conceptual clarity and long-term retention [2-4].

In medical education, jigsaw learning has been shown to improve understanding of complex concepts, reduce learner anxiety, and foster teamwork and professional communication skills [5, 6]. Despite concerns regarding variability in peer teaching quality, structured facilitation and clear objectives can mitigate these limitations. This study was undertaken to assess the effectiveness of the Jigsaw method in anatomy teaching under the CBME framework.

MATERIALS AND METHODS

Study design and participants

A pre-test and post-test interventional study was conducted in the Department of Anatomy, Government Medical College, Mahabubnagar. The study included 150 Phase-I MBBS students after obtaining institutional approval.

Study procedure

A structured Jigsaw learning session was conducted as follows:

a) A 15-item multiple-choice pre-test was administered to assess baseline knowledge.

b) Students were divided into small home groups, each containing 5–6 students.

c) Each home group member was assigned a specific subtopic.

d) Students with the same subtopic formed expert groups and studied their assigned content (bones, joints, muscles, nerves, vessels, and organ systems) for 30 min under faculty supervision.

e) Students returned to their respective home groups and taught their subtopics to peers.

f) After completion of peer teaching, the same 15-item questionnaire was administered as a post-test using Google Forms.

g) Total duration: 2 h and 10 min.

DISCUSSION

The present study demonstrates that structured peer-assisted learning using the Jigsaw method leads to significant improvement in anatomy learning outcomes among Phase-I MBBS students. The substantial increase in post-test scores, large effect size, and reduction in low performers indicate strong educational effectiveness.

These findings are consistent with previous studies that reported improved conceptual clarity, enhanced student engagement, reduced failure rates, and better retention through cooperative learning strategies [7-9]. The present study further supports the role of Jigsaw learning in developing communication skills, teamwork, and learner confidence, which are essential competencies under CBME.

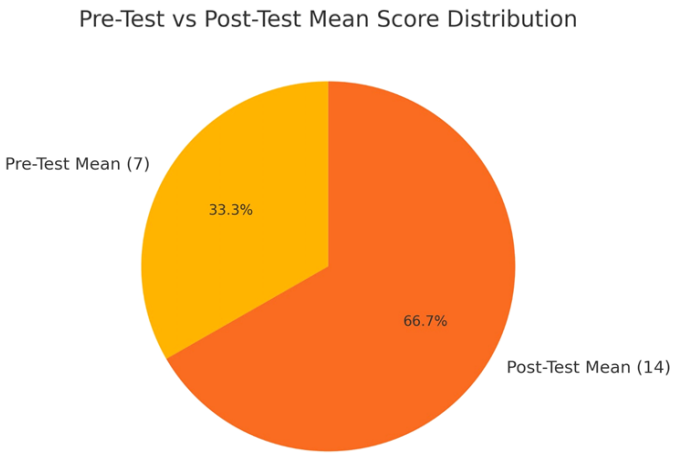

Fig. 1: Comparison of pre-test and post-test mean scores among phase-I MBBS students

Table 1: Comparison of pre-test and post-test scores

Parameter	Pre-test	Post-test
Mean score	7.0	14.0
Standard deviation	±2.1	±1.3
Median	7	12
Minimum score	3	9
Maximum score	12	15

Table 2: Distribution of student performance before and after jigsaw learning

Performance category	Pre-test observation	Post-test observation
Low scorers (<5 marks)	Many students	Very few students
Average scorers (5–9 marks)	Majority of students	Few students
High scorers (>10 marks)	Very few students	Majority of students

Table 3: Detailed comparison of learning outcomes

S. No.	Parameter assessed	Pre-test observation	Post-test observation	Interpretation
1	Score distribution	4–8 marks	10–14 marks	Significant improvement
2	Mode	6–7	12–14	Shift toward higher scores
3	Low scorers	High proportion	Minimal	Weak learners improved
4	High scorers	Few	Majority	Strong achievers increased
5	Score skewness	Left-skewed	Right-skewed	Positive shift
6	Median score	7	12	Improved central tendency
7	Overall performance	Below average	High performing	Clear academic gain

Table 4: Statistical analysis of scores

Statistical parameter	Value
Pre-test mean±SD	7.0±2.1
Post-test mean±SD	14.0±1.3
mean improvement	100%
Median (Pre → Post)	7 → 12
Paired t-test	p<0.0001
Effect size (Cohen's d)	1.85 (Very large)

Table 5: Comparison with previous studies

S. No.	Authors	Key findings	Comparison with present study
1	Sengupta P, Sharma A, Das N(7)	35% improvement with Jigsaw method	Higher improvement (46.6%) observed
2	Bhutia Tenzing Norbu, Tamang Sonam (8)	Improved clarity and engagement	Similar findings
3	Freeman Scott, Eddy Sarah L, McDonough Miles, Smith Michelle K, Okoroafor Nnadozie, Jordt Hannah, Wenderoth Mary Pat (9)	Reduced failure rates with active learning	Low scorers reduced significantly
4	Haq Imran, Rose Jenny, Miller Andy (6)	Improved retention and understanding	Strong post-test scores
5	Johnson David W, Johnson Roger T	Improved teamwork and communication	Comparable improvement

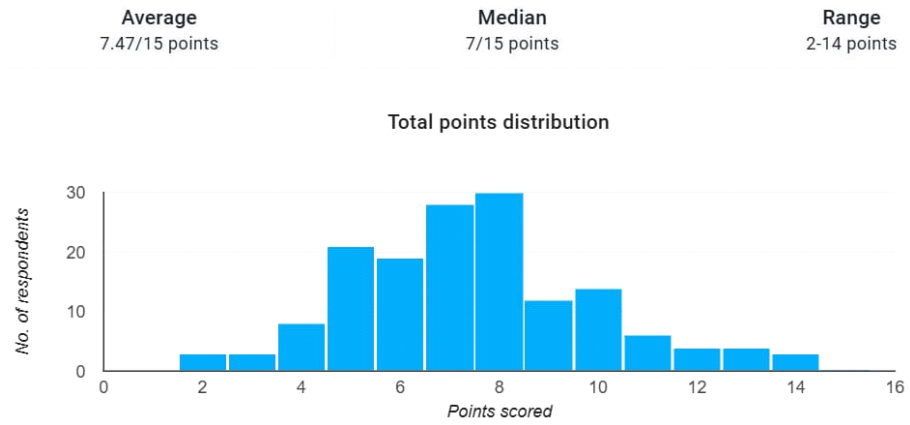

Fig. 2: Distribution of pre-test scores showing baseline knowledge levels

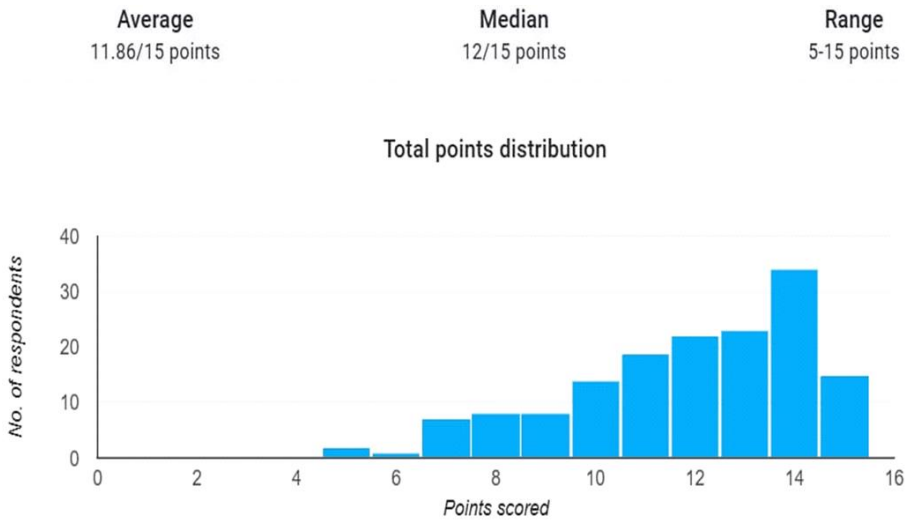

Fig. 3: Distribution of post-test scores demonstrating learning gain after jigsaw intervention

Table 6: Interpretation of learning gains

Parameter	Pre-test status	Post-test status	Interpretation
Confidence	Low	High	Improved communication
Teamwork	Minimal	Strong	Enhanced collaboration
Understanding	Fragmented	Clear	Better mastery
Engagement	Passive	Active	Increased involvement
Retention	Weak	Strong	Sustained learning

CONCLUSION

The structured peer-assisted Jigsaw learning method significantly improved understanding, retention, communication skills, teamwork, and academic performance among Phase-I MBBS students in anatomy. The method effectively supports CBME objectives and provides an inclusive, student-centered learning environment beneficial to learners of all performance levels.

LIMITATIONS

1. Single-institution study

2. Selected anatomy topics only

3. Absence of a control group

4. No long-term follow-up assessment

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AUTHORS CONTRIBUTIONS

All authors have contributed equally

CONFLICT OF INTERESTS

Declared none

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