ISSN: 0975-8585

Research Journal of Pharmaceutical, Biological and Chemical Sciences

Evaluating the Effectiveness of Small Group Discussions in Enhancing Learning Outcomes in Biochemistry for First-Year Medical Students.

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ABSTRACT

Small Group Discussion (SGD) is an effective pedagogical tool that facilitates active learning and knowledge retention among medical students. This study evaluates the impact of SGD on the topic of enzyme inhibition for Phase-1 MBBS students, focusing on improvements in communication skills, memory retention, and conceptual understanding. Pre- and post-tests were conducted, and student feedback was collected. Results showed a statistically significant improvement in post-test scores, supported by overwhelmingly positive feedback.

Keywords: Competency-Based Medical Education, Small group discussion and Enzyme inhibition.

https://doi.org/10.33887/rjpbcs/2025.16.4.6

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ISSN: 0975-8585

INTRODUCTION

Medical education is evolving towards more interactive and learner-centered methodologies, with Small Group Discussion (SGD) emerging as a prominent strategy. SGD allows for increased student engagement, better knowledge assimilation, and enhanced communication skills [1, 2]. Particularly in subjects like Biochemistry, which involve complex molecular mechanisms, SGD has demonstrated a capacity to foster deeper understanding and long-term retention [3].

With the implementation of Competency-Based Medical Education (CBME) by the National Medical Council (NMC) in India, methods like SGD are being increasingly incorporated into curricula [4, 5]. This study investigates the effectiveness of SGD in teaching enzyme inhibition—a crucial topic in Biochemistry—among first-year MBBS students.

MATERIALS AND METHODS

The study was conducted over a six-month period at MVJ Medical College and Research Hospital. Out of 150 enrolled Phase-1 MBBS students, 120 attended the session and were included in the analysis.

Five days before the SGD session, students received a handout covering enzyme inhibition, including definitions, types, graphical interpretations, and clinical examples. On the session day, students were divided into 12 groups of 10, each assigned to a Biochemistry faculty member. A 10-mark pre-test using multiple-choice questions was administered to assess baseline knowledge[6].

This was followed by a 30-minute lecture by each facilitator. Students then participated in 30 minutes of peer group discussion, guided by faculty. A 10-mark post-test (identical to the pre-test) was administered afterwards. Feedback was collected using a five-point Likert scale on aspects such as clarity, engagement, communication, and overall satisfaction [7]. The SGD focused on the following subtopics:

- Introduction to Enzyme Inhibition
- Types of Enzyme Inhibition (Competitive, Noncompetitive, Uncompetitive, Suicide)
- Saturation Curves and Michaelis-Menten Kinetics
- Clinically Relevant Inhibitors
- Comparative Analysis of Inhibition Types

Preparation for the session began five days prior, when a detailed handout was distributed to students to aid in pre-session reading.On the scheduled day, 120 students were divided into 12 groups, each mentored by a Biochemistry expert.

The session began with a pre-test consisting of 10 multiple-choice questions based on the handout. Faculty members then delivered a focused 30-minute lecture on enzyme inhibition, utilizing clinical examples and visual aids to facilitate comprehension.

Subsequently, students engaged in a 30-minute interactive group discussion. Facilitators encouraged students to explain concepts to peers, clarify doubts, and apply their knowledge to hypothetical clinical scenarios. A post-test identical to the pre-test was then administered to measure immediate learning outcomes.

Questions	Strongly disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly agree(5)
1.Given handout for the preparation before group discussion was helpful	1% (1)	1% (1)	3% (3)	15% (18)	80% (97)
2.Small group discussion was interactive	1% (2)	3% (3)	4% (4)	11% (13)	81% (98)
3.Small group discussion took up less time to understand difficult topics	4% (5)	6% (7)	12% (14)	7% (9)	71% (85)

4.Small group discussion helped each and every student to increase active participation in discussion	1%(1)	1% (1)	3% (3)	5% (6)	90%(109)
5. Small group discussion method made everyone to develop interest on the topic	2%(2)	2% (2)	3% (3)	11% (14)	82%(99)
6.Small group discussion enhanced communication skill	1%(1)	1% (1)	1% (1)	10% (12)	87%(105)
7. I would like to participate in small group discussion at the end of every important topics	1% (1)	1% (1)	1% (1)	9% (11)	88%(106)
8. Writing pre test before discussion helped me to analyse myself	1% (1)	3% (3)	1% (1)	5% (6)	90%(109)
9.Small group discussion was conducted in a systematic manner	1% (1)	1% (1)	3% (3)	5% (6)	90%(109)

Finally, structured feedback was collected through a nine-item Likert scale questionnaire to evaluate student perceptions of SGD's effectiveness.

Statistical Analysis

Pre- and post-test scores were compared using a paired t-test. The improvement in scores was statistically significant:

Groups	N	Mean	p-value
Pre	120	7.4±1.17	
post	120	8.7±0.99	>0.001

*Statistical significance set at $p < 0.05$
(Total number of students assigned are120)

- 80% strongly agreed that preparatory handouts were helpful.
- 81% found the discussion interactive.
- 71% stated it simplified complex concepts.
- 90% believed it increased participation.
- 82% felt more interested in Biochemistry.
- 87% noted improved communication skills.
- 88% expressed willingness to participate in future SGD sessions.
- 90% found the pre-test beneficial for self-assessment.

90% confirmed that the session was conducted systematically.These findings are consistent with prior research showing that SGD fosters a supportive environment conducive to deep learning and better concept application.

DISCUSSION

The present study reinforces the educational value of SGD in undergraduate medical training. The significant improvement in post-test scores aligns with previous studies affirming that active learning methods like SGD outperform traditional lectures in terms of knowledge retention and student satisfaction[8]. Enzyme inhibition, a topic often perceived as difficult due to its abstract nature, was more easily understood when students were engaged in collaborative discussions. This pedagogical shift enhances not only cognitive performance but also soft skills like communication, teamwork, and critical thinking [9].

The high level of satisfaction indicated by student feedback further supports the notion that learners are more engaged and perform better when they are active participants in the educational process [10].

CONCLUSION

This study demonstrates that Small Group Discussion is a highly effective educational strategy for teaching complex Biochemistry concepts such as enzyme inhibition. The statistically significant improvement in test scores, coupled with highly positive student feedback, underscores its utility within a CBME framework. Medical educators are encouraged to incorporate SGD into their teaching methodology to foster deeper learning, critical thinking, and communication skills among students.

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