

## ORIGINAL ARTICLE

# Effectiveness of Small Group Discussion Sessions in Teaching Biochemistry for Undergraduate Medical Students

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## ABSTRACT

**Background and aim:** Teaching is an important part of the medical curriculum. Different teaching methods include small group discussions, demonstrations, inquiry approaches, lectures, problem solving methods, and tutorials. Group discussions are at the core of medical education because they help students learn more effectively. As a result, the current study sought to analyze the efficacy of small group discussions in teaching biochemistry to undergraduate medical students.

**Place and Duration:** Gomal Medical College MTI, Dera Ismail Khan and Department of Biochemistry of Amna Inayat Medical College Lahore for the duration from March 2022 to August 2022.

**Method:** This study included 50 undergraduate medical students of first year registered in international medical program. Prior to study conduction, ethical approval and informed written consent was taken. Student's perception regarding small group discussion sessions were elicited based on unknown questionnaires provided to them. Likert scale was used to show their level of agreement with the questionnaire's claims.

**Results:** Of the 50 undergraduate medical students, 28 (56%) were male and 22 (44%) were females students. About 64.6% (n=32) students believed that their grasp over the study material improved with small group discussion and 52.4% (n=26) agreed to the facilitation of active learning in small group discussion. Communication skills and clinical reasoning improved by small group discussion were claimed by 36% (n=18) medical students. Majority of undergraduate medical students 68% (n=34) strongly agreed to the claims that small group discussion helped them to correlate medical problems with biochemical concepts.

**Conclusion:** The present study concluded that small group discussion in combination with lectures appears to provide the best instruction for the learner or medical students. Mostly students emphasized on importance of small group discussion in terms of topic better comprehension, promoting knowledge, correlation of biochemical ideas with medical issues, and interest. Similarly, they discussed the need of developing effective communication skills, as well as leadership and teamwork abilities.

**Keywords:** Medical students, Undergraduate, Small group discussion, Biochemistry, Effectiveness

## INTRODUCTION

Following a lecture, students have even less chance and space to confirm their issues and reaffirm the principles they have learnt. As a consequence, during clinical training, students frequently struggle to connect a clinical disease to its underlying molecular ideas. Teaching is an essential component of the medical curriculum. Small group discussions, demonstrations, inquiry techniques, lectures, problem solving methods, and tutorials are examples of different teaching methods. Because they help students learn more efficiently, group discussions are at the heart of medical education [1, 2]. Typically, lectures are used to instruct a big number of pupils. Demonstrations/bedside clinics will be favored for teaching small groups of students [3]. One cannot anticipate every student's problems to be handled during a lecture. An intensive small group discussion including questionnaires, possible case, and pertinent biochemistry test results can revisit and reinforce the topics addressed in the lectures [4]. Students will learn to associate the biochemical principles learned in lectures to the case by reviewing a case history with pertinent biochemical and clinical data. Students in a small group can first present their thoughts and then obtain feedback from their classmates. There are several instances of how lecture may be used in conjunction with supporting instructional techniques.

Numerous scholars have also observed lecture drawbacks, such as a low level of student readiness and a deficiency of meta-cognition. Other downsides include limited opportunities for active student involvement with course content and a lack of fast feedback on student comprehension [5-8]. According to cognitive science research, knowledge received via activity is more beneficial than knowledge gained through memorizing [9]. Other research has demonstrated that teaching skills in clinical situations inside fundamental scientific disciplines is important for fostering clinical thinking [10]. Traditional lecturing does not often promote the development of higher order thinking abilities such as analysis,

synthesis, assessment, decision making, and problem solving [11]. Small group interaction sessions were shown to be beneficial in both traditional and problem-based learning curricula [12]. The advantages of educating students using the SGD approach include: increasing knowledge, serving as a review exercise after theory class, strengthening reasoning abilities in the interpretation of biochemical parameters, and the capacity to apply biochemical concepts to clinical scenarios. Students improve their communication and teamwork abilities. Students analyze the topic offered, generate various hypotheses, and every student participates in discussion by providing responses to the tasks given during SGD sessions [13, 14].

## METHODOLOGY

This study included 50 undergraduate medical students of first year registered in international medical program. Prior to study conduction, ethical approval and informed written consent was taken. Student's perception regarding small group discussion sessions were elicited based on unknown questionnaires provided to them. Likert scale was used to show their level of agreement with the questionnaire's claims. Small group discussion on various areas of biochemistry was held. Prepared questionnaire modules were provided to students one week prior to small group discussion. All the participants were categorized into five groups comprised of 10 students each. At the conclusion of the SGD session, the group was provided with an anonymous questionnaire vetted by topic experts to extract their perspectives on SGD. The questionnaire examined topics such as relevance, emotional stimulation, and support in comprehending lecture themes and how they connect to clinical scenarios, as well as learning opportunities and adoption of SGD. The responses were collected on a Likert scale (strongly agree = 5 to strongly disagree = 1) to reflect their level of concurrence with the questionnaire's assertions. It is generated and examined using the percentage

distribution of the Likert answer items acquired from student recordings.

## RESULTS

Of the 50 undergraduate medical students, 28 (56%) were male and 22 (44%) were females students. About 64.6% (n=32) students believed that their grasp over the study material improved with small group discussion and 52.4% (n=26) agreed to the facilitation of active learning in small group discussion. Communication skills and clinical reasoning improved by small group discussion were claimed by 36% (n=18) medical students. Majority of undergraduate medical students 68% (n=34) strongly agreed to the claims that small group discussion helped them to correlate medical problems with biochemical concepts. Table-I represents the gender's distribution. Respondent distribution was depending on the efficacy of SGD as a teaching approach in studying Biochemistry as shown in Table-II. Pre and post Likert test mean scores were compared for various groups (Values presented as mean standard deviation) as represented in Table-III.

Table-1: Gender's distribution

Gender	Frequency N	Percentage %
Male	28	56
Females	22	44
Total	50	100

Table-2: Respondent distribution depending on the efficacy of SGD as a teaching approach in studying Biochemistry.

SGD sessions usefulness	Strongly agree	Agree	No opinion	Disagree	Strongly disagree
Subject understanding	32 (64.6%)	16 (32%)	2 (0.4%)	-	-
Active learning facilitation	26 (52.4%)	24 (47.6%)	-	-	-
Communication skills and clinical reasoning promotion	18 (36%)	26 (52.4%)	6 (11.6%)	-	-
Medical problem correlated with biochemistry concepts	34 (68%)	16 (32%)	-	-	-

Table-3: comparison of pre and post Likert test scores

Groups (n=50)	Likert pre-test score	Likert post-test score	P-value
G1	4.6±1.6	7.1±1.9	0.0029
G2	4.9±1.2	6.5±1.73	0.0326
G3	5.4±2.2	7.9±1.2	0.0041
G4	4.9±2.2	7.4±0.78	0.0102
G5	4.1±2.5	7.9±0.96	0.0007

## DISCUSSION

The present study mainly focused on the effectiveness of small group discussion session in undergraduate medical students and found that 64.6% (n=32) of students stated that small group discussion increased their understanding of the study content, and 52.4% (n=26) agreed that small group discussion facilitated active learning. 36% (n=18) of medical students reported that small group discussions enhanced their communication abilities and clinical reasoning. The majority of undergraduate medical students (68% (n=34) strongly felt that small group discussion assisted them in correlating medical problems with biochemistry concepts. The implementation of tutoring SGD sessions will aid students in meaningful knowledge by overcoming the constraints of merely lectures. Active and participatory small group discussion revises the themes addressed in the lectures. Students emphasized the benefits of good small group teaching, as in previous research on students' perceptions of SGD sessions.

Several essential ethical and cultural concerns can also be explored, which is an extra benefit in SGDs. As a result, SGD sessions must be maintained in the curriculum. When compared to other research authors, it was shown that small group interaction sessions aid students in absorbing information and promote active learning [15, 16]. Another study found that asking short answer

questions followed by small group discussions is an excellent revision exercise for boosting students' grasp of a particular topic [17].

It has been suggested that small group talks would assist pupils enhance their academic achievement [18, 19]. Small group discussions were beneficial because they encourage students to actively participate in the conversation and aid with retention. Students at medical schools will have to study a variety of courses and will be involved in clinics beginning in their second year. As a result, pupils have a tough time correlating symptoms with illnesses. As a result, it would be extremely difficult for students to contact lecturers after lecture lectures to explain their problems. However, small group discussions will enable students to communicate with one another as well as with lecturers [20, 21]. This study backs up previous research since we saw a considerable improvement in performance after small group conversations. However, additional faculty in the department are required for small group discussion [22].

## CONCLUSION

The present study concluded that small group discussion in combination with lectures appears to provide the best instruction for the learner or medical students. Mostly students emphasized on importance of small group discussion in terms of topic better comprehension, promoting knowledge, correlation of biochemical ideas with medical issues, and interest. Similarly, they discussed the need of developing effective communication skills, as well as leadership and teamwork abilities.

## REFERENCES

- Govindarajan S, Rajaragupathy S, Subramanian K, Karthikeyan J. Effectiveness of team teaching in biochemistry lectures for undergraduate students. *Biochemistry and Molecular Biology Education*. 2021 Jul;49(4):583-7.
- Goswami B, Mahajan R, Jain A, Koner BC. Team idea mapping method: A brainstorming session for enhancing problem-solving skills in postgraduate medical biochemistry students as assessed by self-efficacy. *Adesh University Journal of Medical Sciences & Research*. 2021 Dec 29;3(2):74-8.
- Catherine P, Nambi S, Vivekkumar P, Natrajan N, Saravanan PS. Barriers to Effective Utilization of Teaching-Learning Methods: A Qualitative Study Using Focus Group Discussions among First-Year Bachelor of Medicine, Bachelor of Surgery Students in a South Indian Medical College. *Journal of Medical Education*. 2021 Aug 31;20(3).
- Simmons JM, Franklin DS, Dahlman KB, Symes K, Viselli SM, Diaz-Cruz ES, Fong SF, Spicer DB. Teaching Biochemistry to Students of Dentistry, Medicine, and Pharmacy: 8th International Conference of the Association of Biochemistry Educators (ABE) Virtual Conference, May 3–7, 2021.
- Rysavy M, Christine P, Lenocho S, Pizzimenti MA. Student and faculty perspectives on the use of lectures in the medical school curriculum. *Med Sci Educ*. 2015;25(4):431–437.
- D'Souza MJ, Rodrigues P. Engaging millennial students in an engineering classroom using extreme pedagogy. *Indian J Sci Technol*. 2015;8(24):1–6.
- Wiley JM, Lim YS, Kwiatkowski T. Modeling integration: coteaching basic and clinical sciences medicine in the classroom. *Adv Med Educ Pract*. 2018;9:739–751.
- Sullivan GM. Getting off the "gold standard": randomized controlled trials and education research. *J Grad Med Educ*. 2011;3 (3):285–289.
- Ismail NA. Interactive Group-Based Assessment in Medical Biochemistry. In *Alternative Assessments in Malaysian Higher Education 2022* (pp. 49-55). Springer, Singapore.
- Andrews, D. A., Sekyere, E. O., & Bugarcic, A. (2020). Collaborative active learning activities promote deep learning in a chemistry-biochemistry course. *Medical Science Educator*, 30, 801–810. <https://doi.org/10.1007/s40670-020-00952-x>
- Anthony, B., Kamaludin, A., Romli, A., Raffei, A. F. M., Eh Phon, D. N., Abdullah, A. et al. (2019). Exploring the role of blended learning for teaching and learning effectiveness in institutions of higher learning: An empirical investigation. *Education and Information Technologies*, 24, 3433–3466. <https://doi.org/10.1007/s10639-019-09941-z>
- Blaschke, L. M. (2012). Heutagogy and lifelong learning: A review of heutagogical practice and self-determined learning. *International*

- Review of Research in Open and Distributed Learning, 13(1). <https://doi.org/10.19173/irrodl.v13i1.1076>
13. Ghani, I. B. A., Ibrahim, N. H., Yahaya, N. A., & Surif, J. (2017). Enhancing students' HOTS in laboratory educational activity by using concept maps as an alternative assessment tool. *Chemical Education Research and Practice*, 18, 849–874. <https://doi.org/10.1039/C7RP00120G>
  14. Ghanizadeh, A. (2017). The interplay between reflective thinking, critical thinking, self-monitoring, and academic achievement in higher education. *High Education*, 7(1), 101–114. <https://doi.org/10.1007/s10734-016-0031-y>
  15. Ismail, N. A. S. (2016). Effectiveness of team-based learning in teaching medical genetics to medical undergraduates. *Malaysian Journal of Medical Sciences*, 23(2), 73–77.
  16. Ismail, N. A. S., Abdul Sani, N. F., Tan, J. K., Alias, E., Ahmad Damanhuri, M. H., Tajul Arifin, K. et al. (2017). The effectiveness of Objective Structured Performance Evaluation (OSPE)-Based Setting versus conventional practical in enhancing knowledge among medical students. In *EDULEARN17 Proceedings. 9th International Conference on Education and New Learning Technologies*, 3rd–5th July, 2017, Barcelona, Spain. (pp. 4868–4872).
  17. Kanani, D., Mishra, A., Patel, V., Patel, A., & Patel, N. (2020). Learning medical biochemistry by combination of traditional & modern teaching methods: Students perceptions. *International Journal of Clinical Biochemistry and Research*, 7(1), 25–29.
  18. Li, B., Jia, X., Chi, Y., Liu, X., & Jia, B. (2020). Project-based learning in a collaborative group can enhance student skill and ability in the biochemical laboratory: A case study. *Journal of Biological Education*, 54(4), 404–418. <https://doi.org/10.1080/00219266.2019.1600570>
  19. Ma'arop, A. H., & Embi M. A. (2016). Implementation of Blended Learning in Higher Learning Institutions: A Review of the Literature. *International Education Studies*, 9(3). <https://doi.org/10.5539/ies.v9n3p41>
  20. Rheingold, H. (2014). The peeragogy handbook. Retrieved from <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.664.1191&rep=rep1&type=pdf>
  21. Terrell, C. R., Nickodem, K., Bates, A., Kersten, C., & Mernitz, H. (2021). Game-based activities targeting visual literacy skills to increase understanding of biomolecule structure and function concepts in undergraduate biochemistry. *Biochemistry and Molecular Biology Education*, 49(1), 94–107. <https://doi.org/10.1002/bmb.21398>
  22. Kwan CY, Lee MC. Medical Education Pendulum: From Lecture-based Learning to Problem-based Learning and Swing to Large-class Small-group Team-based Learning. *J Med*. 2021 Jul 1;10(2):1-7.