

Evaluation of Small Group Discussion as a Teaching-Learning Method in Biochemistry for First Year MBBS Students: A Pilot Study

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Abstract

Background: Significance of Small Group Discussion as a teaching learning method is yet to be explored in teaching Biochemistry for medical students in India. Hence, this experimental pilot study was undertaken to assess the effectiveness of small group discussion for first year MBBS students in learning Biochemistry.

Materials and Methods: A voluntary group of 40 first year MBBS students were chosen randomly for the study comprising of both high achievers and low achievers. Study was conducted on a particular day for five consecutive weeks. In each session, small group discussion study pattern included a pre-test followed by group discussion then by a post-test. Participants' feedback was obtained after completion of the study. Statistical comparisons were done on each PAIR (pre-test and post-test) of Mean scores obtained and Pearson's correlation co-efficient were calculated for each pair. Statistical significance was obtained at $p < 0.05$.

Results: Mean post-test scores were increased compared to mean pre-test scores in each PAIR and the increase was statistically significant. Significant positive correlations were observed between pre-test scores and post-test scores in all PAIRS. Majority of the study group felt that small group discussion method will enhance their learning and memory.

Conclusion: This pilot study emphasizes that small group teaching is an effective teaching learning method to develop the student's critical thinking and problem-solving skills. However, larger studies at several medical colleges for a longer duration have to be undertaken before arriving at a conclusion.

Key words: Medical teaching; student learning; teaching skills; teaching learning method

Introduction

Medical Biochemistry is included in the first year MBBS curriculum in India.

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Biochemical studies have illuminated many aspects of health and disease and medical treatment is firmly grounded in the knowledge of biochemistry and other basic sciences that can be adapted to accommodate new knowledge.

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The goal in medical education to generate effective qualified professionals depends on the impact of teaching. There are various modes of teaching Medical Biochemistry such as lectures, tutorials, demonstrations, seminars, text book method, project method, small group discussions, study tours, problem solving method, team teaching, inquiry approach, videotapes, case studies etc. (Aziz

et al., 2008). Lecture method is the most widely used method for large group teaching in medical colleges and Tutorial / Demonstrations/ Bed-side clinics are the usual modes of teaching small group of students. There are very limited studies to establish the small group discussion as an effective teaching learning method to teach medical Biochemistry in India (Rathnakar *et al.*, 2010). Hence, this experimental pilot study was undertaken to assess the effectiveness of small group discussion on the first year MBBS students in learning Medical Biochemistry.

Methods

This experimental pilot study was conducted on first year MBBS Students (n=40) who were enrolled into the study voluntarily after obtaining informed consent in the Department of Biochemistry. Study group (20 males and 20 females, aged 18-20 years) comprised of low achievers and high achievers chosen based on mean marks obtained in the previous two internal assessments (Maximum marks = 60) who were selected by purposive sampling method. This study was conducted on a particular day for five consecutive weeks.

During each study session, a topic in Medical Biochemistry was chosen for discussion.

Study Variables:

A description of study variables is presented as follows:

1. Independent Variable: Test given and feedback provided by the study groups through self-assessment.
2. Dependent Variables: The achievement of students at the end of our study format.
3. Control Variables: Parameters which were held constant for the duration of the study format were: Pre-test session, length of discussion period (45 minutes), post-test session, classroom, content and its sequence, lighting and ventilation.
4. Uncontrolled Variables: Parameters which were not controlled under the study were: Age of students, intelligent quotient of students, miscellaneous (study habits / socio-economic factors affecting student's academics etc).

Conduct of the study

The study group was stratified into five sub-groups, each comprised of eight students. Study pattern was explained in clear language

to the students. Topic of discussion was announced on the previous day itself to mentally prepare the students for the study. The small group discussion method included a pre-test, followed by group discussion (for about 45 minutes) moderated by the teacher and later a post-test on the same topic discussed. Pre-test and post-test each included ten short answer questions and one mark was awarded for each correct answer. Identical pre- tests and post-tests were used in the study.

After conducting the pre-test, small group discussion activity was initiated under the following 3 phases:

- Introductory phase comprised of: Introducing the purpose of the study activity to the participating students, describing the key topic of Medical Biochemistry chosen for discussion. General guidelines for the students included the following: Students were encouraged to think critically and participate in the small group discussion, be patient and tolerant with other classmates and not to respond hurriedly to the questions.
- Discussion phase comprised of: Encouraging the students to be actively involved in the activity by listening, interacting, asking questions and to comprehensively test their knowledge. Organize and understand the topic in a sequential manner with a coherent thinking.
- Conclusion phase comprised of: Organizing, synthesizing and summarizing the topic discussed by group representatives facilitated by the teacher. Discuss and evaluate the opinions, facts to arrive at a sequential conclusion of the topic. Encourage students to be prepared for the post-test.

Duration of activity, Pre-test session was conducted for 5 minutes. Small-group-discussion was conducted for 45 minutes which was again subdivided into: Introductory phase: 5 minutes, discussion phase: 30 minutes, conclusion phase: 10 minutes including summarization from both group representatives and by the faculty. Post-test session was conducted for 5 minutes.

Our study duration and pattern was based on few modifications of patterns adopted by

various researchers (Hofer *et al.*, 2000; Worrall, 1999; Kumar, 2003). After completion of the teaching learning method, a structured questionnaire was used to obtain written feedback. Mean marks obtained during pre-test and post-test by the study group (marks scored by all the five sub-groups compiled) were evaluated separately.

Statistical Analysis

The Student 't' test was employed to compare the mean marks of study group during the pre-test and the post-test. The data was analysed by using online statistical tools. P values which were <0.05 were considered to be statistically significant. Statistical correlations were done

using Pearson's correlation co-efficients at 5% level of significance.

Results and Discussion

Each session with a pre-test and a post-test after small group discussion was considered as a PAIR. Accordingly, in all five PAIRS, it was evident that post-test scores were increased compared to pre-test scores and the increase was statistically significant ($p < 0.05$, Table 1). Statistically significant positive correlations were observed between pre-test scores and post-test scores in PAIR 1, PAIR 2 and PAIR 3. Statistically non-significant positive correlations were observed in PAIR 4 and PAIR 5 (Table 2).

Table 1: Comparison of Measured parameters among the study group (n = 40)

PAIRS	PARAMETERS	MEAN ± SD SCORES (Maximum marks – 10)	P value
PAIR 1	PRE-TEST 1	5.30±1.652	<0.05
	POST-TEST 1	7.88±2.015	
PAIR 2	PRE-TEST 2	5.78±1.732	<0.05
	POST-TEST 2	8.60±1.429	
PAIR 3	PRE-TEST 3	4.93±1.289	<0.05
	POST-TEST 3	7.85±1.350	
PAIR 4	PRE-TEST 4	4.62±1.407	<0.05
	POST-TEST 4	8.38±1.248	
PAIR 5	PRE-TEST 5	4.65±1.703	<0.05
	POST-TEST 5	8.65±1.122	

Table 2: Correlations of pre-tests and post-tests among the study group (n = 40)

PAIRS	PARAMETERS COMPARED	r value	P value
PAIR 1	PRE-TEST 1 and POST-TEST 1	0.451	0.004
PAIR 2	PRE-TEST 2 and POST-TEST 2	0.564	0.000
PAIR 3	PRE-TEST 3 and POST-TEST 3	0.362	0.022
PAIR 4	PRE-TEST 4 and POST-TEST 4	0.131	0.425
PAIR 5	PRE-TEST 5 and POST-TEST 5	0.001	0.993

Discussion is a process whereby two or more people express, clarify and pool their knowledge, experiences, opinions and feelings. Greater student engagement in class is a strong predictor of success and such students are more likely to earn higher grades (Goodenow, 1993). Various studies emphasize on the small group discussion as teaching learning method compared to the large group lectures in terms of student's academic performance and high quality results (Voelkl, 1995; Roche *et al.*, 1997).

It is very important to pre-sensitize the students by appropriate thought provoking questions to achieve the learning objectives of the study which will be an essence for the small group discussion (Steinert, 1996). Pre-test conducted in this study was based on the same ideology.

The objectives of holding the discussion and how it fits into the overall course has to be very clear. Rearranging the seating to allow students to face one another and formation of peer-to-peer relationships between students enables the small group discussion to be more effective. Small group discussion is an opportunity for the students to apply abstract ideas and think critically about what they are learning (MacMillan & McLean 2005). The objectives, conduct and general guidelines narrated by the faculty during introductory phase of this study highlighted the above facts.

To achieve the specific learning objectives, the teacher must act as moderator/facilitator and remain focused on the students' interactions, encourage students to contribute to discussions, respect the views of all students, invoke inquisitiveness, elicit student interpretations and opinions (Steinert, 1996; Costa *et al.*, 2007). Participants use the time to communicate with each other. Each group member has the right to speak. A group member communicates with other members in the group by speech and by facial expressions, gestures and body movement. Other members receive his / her message by listening and by seeing the non-verbal signs. These processes of listening, speaking, and observing are the basis of discussion method. In general the teacher's role in a small group discussion is not to dominate, but rather to get the discussion started, set goals, summarize, mediate, clarify and allow all to be heard (MacPherson *et al.*, 2001). The Discussion

phase in this study was conducted in accordance with the above pattern.

At the end of discussion, the teacher should list out the correct comments and emphasize on the sequential presentation of the topic under discussion based on the student's interactions in a clear and concise manner and connect them to the original questions posed at the beginning of the class. It allows students to come to their own conclusions, and to help structure and analyse them (Xakeliis *et al.*, 2005). The conclusion phase in this study was meant to organize, summarize and synthesize on the essence of small group discussion.

Research has shown that small group discussion increases attention and motivation that ultimately enhances memory. Increased arousal and motivation are the essential ingredients for learning and are often more important for retention than intelligence (Dunnington *et al.*, 1987; Springer *et al.*, 1999). Post-test was conducted to check the impact of the small group discussion on the study group in understanding the topic. The results of this study has showed significant improvement in the post-test mean scores compared to the pre-test mean scores (Table 1 and Table 2).

Based on the study group feedback obtained, 31 out of 40 students (77.5%) preferred small group discussion because small group discussion created interest in the topic, and excellent interaction. They also perceived that it helped them to understand the topic and the concepts clearly and better method compared to lectures for reinforcing the topic, revision, for long term memory and build up confidence to face viva voce in the examination.

Conclusion

The results of this study and the feedback obtained from this study indicate that small group teaching is preferred and effective and that it facilitates a better recollection of the material which is taught, in the undergraduate teaching of medical biochemistry among the first year MBBS students. Overall, small-group learning provides opportunities for students and the teachers to discuss key topics, concepts and ideas. They are an ideal forum to develop the students' critical thinking and problem-solving skills. However, a larger study involving many medical colleges is required, before this finding can be generalized in teaching medical biochemistry in India.

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Conflict of interest

The authors have no conflict of interest to report.

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