



**STUDENT'S PERCEPTIONS IN LEARNING MEDICAL BIOCHEMISTRY
USING COMBINATION OF TRADITIONAL AND MODERN TEACHING
METHODS**

Dr. Manish Kumar Misra

**Associate Professor (Biochemistry), Rajarshi Dasharath Autonomous State Medical
College, Ayodhya, U.P.**

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1. Introduction:

In medical education the basic teaching starts with Anatomy, Physiology and Biochemistry as these are fundamental subjects in our medical curriculum. In Indian scenario most institutional teaching i.e. traditional teaching is based on lectures, practical and tutorials. Students acts as passive learner as teaching is one way. Biochemistry is always assumed to be tough subjects and difficult to understand due to different types of pathways laden disciplines. Students had to struggle to understand it and reproduce.

To overcome this struggle, we need to apply knowledge of the subject with it's practical applications and to understand the co-relation of this knowledge with different disease processes. Biochemistry is a complex subject with mostly lecture based one sided teaching making it boring and students lack interest from the subject.

The traditional education method is teacher-centric learning and modern education is learner-centric learning. To make subject easy to understand teachers should have a positive attitude with full devotion and dedication towards teaching. (1) Modern teaching methods include case base



learning, seminars, demonstrations, video-based learning and group-based learning. The combination of these methods make students understand medical biochemistry so that they can use or apply this knowledge in clinical medicine. (2) Detailed information of clinical biochemistry is essential for proper diagnosis of clinical cases and its effective management. (3) Combination of traditional and modern teaching methods involve both teacher and students in learning the subject. This combination of learning is flexible and self-directed where teacher is facilitator and mentor while students play role of mentees. Education place important role in human civilization since ancient times as country's development is dependent upon education of society. Traditional teaching is teacher entered which delivers the bookish knowledge to students. In due course of time due to development in science and technology students not only want a bookish or textbook knowledge but are more inclined towards innovative knowledge. Modern teaching method is an answer to improve the teaching quality and better education to students. With multiple teaching methods students find themselves in relax and comfortable environment and are more receptive. These methodologies assist well in teaching and the classrooms have now become student centred instead of teacher centred. Both methods of teaching have its advantages as well as disadvantages. The aim of this study is to compare between the effects of traditional and modern teaching methods. On the basis of the above study one can pick and choose different methods for students to improve efficacy and quality of teaching medical biochemistry in a medical institute. The most important necessities of our education system is to explore the effective and useful teaching learning methods.

2. Aims and Objective:

The aim of our present study is:

1. To formulate and implement different modules using combination of multiple teaching tools;



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2. To evaluate the students' perception towards effectiveness of combination of traditional & modern teaching methods.
3. Stimulate different thinking processes to first understand the concepts and then connect concepts to construct knowledge structures,
4. Teach students to apply their knowledge to new situations and solve new problems. This way of teaching promotes lifelong learning, open inquiry, and critical thinking ability that physicians should have.

3. Materials and Methods:

This study was carried out in the Biochemistry department at Rajarshi Dasharath Autonomous State Medical College, Ayodhya, Uttar Pradesh, India. A total of 100 students from phase 1 MBBS were included in our study group. The study was a quasi-experimental study. Informed oral consent was taken from the phase 1 MBBS students and approval from institutional ethical committee was obtained.

3.1 Combination of traditional & modern teaching methods:

A particular topic is selected. After selection of topic, we perform dietetic lecture (DL). For better understanding and easy learning a group-based learning (GBL) was conducted on the same topic. In group-based learning (GBL) students interact with teachers and feel free to ask questions and solve their queries. After completing the session students are asked to perform practical on the same topic. e.g. carbohydrate chemistry and metabolism followed by quantitative estimation of blood glucose levels (fasting and post prandial) and glycosylated haemoglobin levels. This was followed by case-based learning (CBL) on the same topic. e.g. myocardial infarction. Here demonstrators selected a group of 10-15 students. In this small group facilitator give case history, patients report and photos to the students. This session was followed by discussion of case-based



question answer with reasoning of the case regarding biochemical basis of the disorder, biochemical basis of clinical features and lab tests of diabetes mellitus. Other clinical features, lab tests in support of the diagnosis, complications, and treatment in short wherever required. After completion of the topic, a unit test was conducted with one liner questions, reasonings, case history and short notes. This was followed by paper solving and discussions among students about how to write answer. Simultaneously formative assessment was conducted with feedback from students. By a self-administered questionnaire student's perception was collected regarding the effectiveness and usefulness of different teaching methods.

3.2 Statistical analysis:

The data was compiled in Microsoft excel, presented as tables and analysed in terms of proportion and represented in percentages. Toward the end of the session, feedback was taken from the students using a self-administered questionnaire.

4. Results:

In this study majority (86%) of students felt that the basic information given in Didactic lecture (DL) was appropriate. It was also observed that there was only 54% of the students clarify doubts easily with peers and teacher. Most of the participating students suggested that video-based learning (VBL) was informative (75%) and 79% understand complex steps in a simple way . Video-based learning (VBL) helped them to retain (66%) & recall (66%) content and increase concentration when there included in DLs (74%). It was also observed that 77% students express that case-based learning (CBL) stimulate their capability of thinking, analysis and reasoning the subject medical biochemistry. It also helped them to match the level of prior knowledge (74%) place themselves as a future doctor (78%), increase interest in the subject (91%), help them to interpret patients reports & diagnose the patient's diseases (83%), benefits to solve patients problem (79%) and clinical applicability in medicine (84%). Interestingly, students enjoy group-



based learning (GBL); participating students suggested that they learn useful addition information (79%), plan their study (86%), actively participate in their discussion (82%) clarify doubts easily with peers & teachers (80%) solving problems in a group is an effective way to practice what they have learned and helped them to know how to answer in exam (81%). Regarding coordinated approach with multiple teaching tools like DLS, GBL, VBL, CBL most students felt that it was useful toward understand biochemistry better (76%), learn biochemistry better (81%), find out importance of biochemistry in future medicine (83%), prepare for university examination (81%).

5. Discussion:

The National Medical Commission (NMC) proposed three volumes of the curricular framework for medical students which is Competency-based Undergraduate Medical Education curriculum. (4) Effective teaching and learning methods are one of the most important necessities of educational system. Attention to this task in higher education is considered as a major one, so in their instruction, educators must pay attention to learners and learning approach; along with these two factors, the educators should move forward to attain new teaching approaches.

Combination of traditional and modern teaching methods help teacher and students to work together in order to gain knowledge, understand the topic, analyse, synthesize and evaluate skill. [5] The present study was undertaken to evaluate different teaching methods in biochemistry including DLs with PPT, VBL, GBL, CBL, practical and unit test. The present study revealed that the majority of the students feel that to understand the topic better combination of different teaching method is essential.

Didactic lecture (DLs) is one way teaching method which gives information and knowledge to the students with minimal interaction. According to students this method gives appropriate information but it is difficult to clarify doubts easily with peers and teachers and they also fail to retain the subject. [6] To overcome this limitation combination methods is beneficial which



includes DLs along with GBL, CBL and VBL. In GBL students work together in group and encourage each other to participate in learning the subject. In CBL students get opportunity to behave as future doctor which improve their clinical reasoning, interpretation of lab report and improve ability to think logically. [7,8]

6. Conclusion:

With the above study combination of the teaching methods is beneficial to improve the understanding and retaining of the subjects better as perceived by the students. As per the study the pros and cons of single method is overcome by combination of different teaching methods. In combination teaching methods students get actively involved and learn more. Finally we can say, if teaching methods are used judiciously with active student participation the academic performance is likely to improve a lot.

Table 3: Student's perception toward utility of multiple teaching tools in learning biochemistry

(Numbers in percentage)

	Questionnaire for Didactic Lecture (DL)	
	Partial	Agree disagree
1) Basic information was given properly	86	10
2) DL helped me to clarify doubts easily with peers and teachers	54	43
3) DL helped me to understand and retain subject better	47	44
4) DL helped me to understand complex process in simple way	48	44
Questionnaire for Video based learning (VBL)		
1) Video based learning very clear and informative	75	24
2) Video based learning helped me to understand	79	15



complex process in simple way

3) Video based learning after DL helped me to retain content easily 66 27

4) Video based learning after DL helped me to recall content easily in exam 66 26

5) Video based learning helped me to concentrate more in traditional lecture 74 21

Questionnaire for case base learning (CBL)

1) Case based learning helped me to stimulate thinking, analysis and reasoning 77 14

2) Case based learning helped me to match the level of prior knowledge 74 17

3) Case based learning helped me to place ourselves as future doctors 78 16

4) Case based learning helped me to interpret patient's reports and diagnose the patient's diseases 83 9

5) Case based learning ultimately benefits to solve patients problem 79 14

6) Case based learning showed clinical applicability of biochemistry in medicine 84 11



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7) Case based learning creates interest in subject 91 6

Questionnaire for Group Based Learning (GBL)

1) I learn useful additional information during 79 13

GBL sessions

2) GBL helped me to plan my study 86 13

3) Solving problem in a group is an effective way 82 14

to practice what I have learned and also helped me
to know how to answer in exam

4) GBL helped me to actively participate in the discussion 82 13

5) GBL helped me to clarify doubts easily with peers
and teachers 80 14

Questionnaire for Combination of all method

1) It was helped me to understand biochemistry better 76 15

2) It was helped me to learn biochemistry better 81 12

3) It was helped me to find out important of 83 11

biochemistry in future medicine

4) It was helpful to prepare for university examinations 81 12

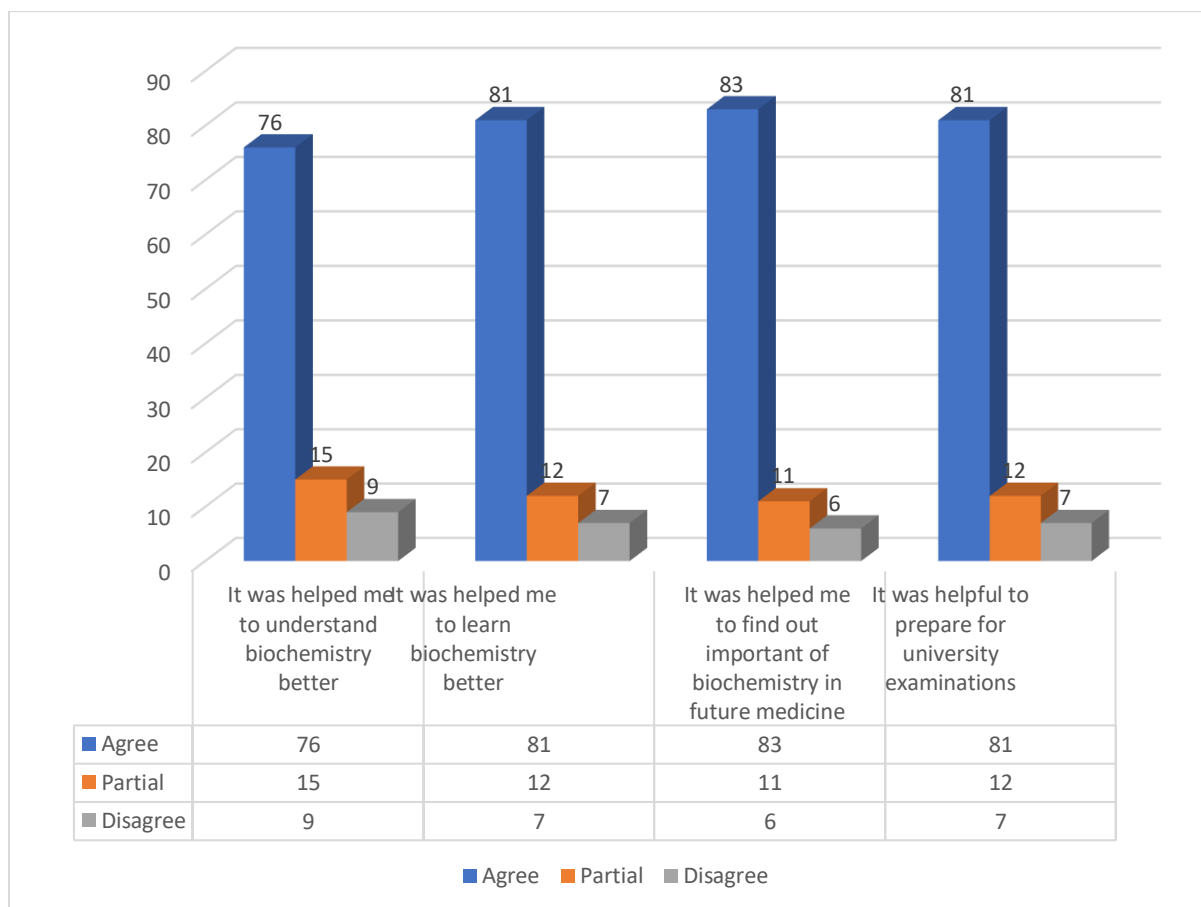


Table 1: Teaching methodology designed for mechanism of action of Enzymes

Topic: Mechanism of action of Enzymes

Main objective: Student able to learn mechanism of action of different enzymes and how they act

Number of teaching hours required: Two hour for didactic lecture. Three hours for group base learning,

To cover the topic/subtopic: 15 min for video-based learning



Teaching/learning methods: Didactic lecture, group based learning , Video based learning

Assessment: Long and short question and answer, one liner questions, case, justification

Table 2: Teaching methodology designed for Carbohydrate chemistry and metabolism

Topic: Carbohydrate chemistry and metabolism

Main objective:

- Students able to learn about carbohydrate chemistry and Metabolism
Students able to learn about biochemical tests which comes under Diabetic profile.
- Students able to learn about how to diagnose and categories categories patients of Diabetes Mellitus.

Number of teaching hours: 13 hours for didactic lecture,

Required to cover the: 12 hours for group base learning,

Topic/subtopic:

- 15 min for video-based learning after each didactic lecture
- 4 hours for case-based learning,
- 9-hour practical for estimation of Diabetic profile

Teaching/learning methods: Didactic lecture, group-based learning, video-based learning, practical, case-based learning

Assessment: Long and short question and answer, one liner questions, case, Justification

Perception: Feedback from students

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