



Original Research Article

Learning medical biochemistry by combination of traditional & modern teaching methods: students perceptions

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ABSTRACT

Introduction: Biochemistry is the key subjects for a clinical diagnosis because that's depends on laboratory analysis of body fluids. Detailed information of clinical biochemistry is essential for proper diagnosis of clinical and its effective management. Very little is known about the students' perceptions towards improving the teaching of biochemistry.

Materials and Methods : Data was analysed from feedback forms of a questionnaire study from the first year students of a medical college in India. The self administered questionnaire which were related to liking the subject of biochemistry, rating of the different topics and the effectiveness of teaching methods.

Results: Regarding coordinated approach with multiple teaching tools like Didactic lecture (DL), Group Based Learning (GBL), Video Based Learning (VBL), Case Based Learning (CBL) most students felt that it was useful toward understand biochemistry better (79%), learn biochemistry better (83%), find out importance of biochemistry in future medicine (84%), prepare for university examination (81%). Practical exercises, lectures, exams, and other methods have been found by majority of the students to be the excellent or very good methods, for effectively teaching biochemistry.

Conclusions: Through the study, depending on the topic to be covered the combination of the teaching methods is beneficial to improve the understanding and retaining of the subjects better as perceived by the students.

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1. Introduction

Biochemistry is the language of biology. Learning biochemistry is crucial to comprehend the basic functions of the body.¹ Biochemistry is the key subjects for a clinical diagnosis because that depends on the laboratory analysis of body fluids. Detailed information of clinical biochemistry is essential for proper diagnosis of clinical and its effective management.²

Biochemistry subject is a part of first-year MBBS curriculum in India. Current scenario for teaching method for learning biochemistry is traditional lectures, tutorial and practical.

The traditional teaching method gives full play of the teacher's leading role and enables the student to obtain more

knowledge.⁽³⁾ But the traditional teaching methods makes the students lose the learning initiative and creativity.³ Modern teaching method like case based learning, video-based learning, seminars, demonstrations play a pivotal role for overall understanding of medical biochemistry subject and application in clinical medicine.⁴

The combination learning is learning through the flexible combination of two or more learning components. Combination allows teachers and students to work together. The result of combination learning is a flexible, self-directed learning environment where the teacher acts as facilitator and mentor, and the student is at a center of and entirely accountable for their own progress and performance.

Combination learning may vary like technology based, based on in person, human interaction, project based, quiz based. Pick and choose one or more of the following "Pieces" to use and /or combined to create a

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learning experience that's meaningful to you and results in something interesting, playful and unique.

Research and exploration to figure out useful and effective teaching and learning methods are one of the most important necessities of the education system.

2. Aims and Objective

1. Stimulate different thinking processes to first understand the concepts and then connect concepts to construct knowledge structures,
2. 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. To evaluate the student perception toward combination of traditional & modern teaching methods.

3. Materials and Method

This study was carried out in the biochemistry department, GMERS medical college, Valsad, Gujarat, India. A total 150 students of the first MBBS course were included. It was a quasi-experimental study. Informed oral consent was taken from the participants and institutional ethical committee approval was obtained.

4. Combination of teaching methods

After completion of dietetic lecture (DL) on a particular topic, a group based learning (GBL) was conducted on the same topic for better understanding and deep learning. This gives a platform to students for interact with teachers and openly ask the queries. This was followed by a practical on the same topic eg. Lipid chemistry and metabolism followed by quantitative estimation of serum total cholesterol. This was followed by case based learning (CBL) on the same topic. Eg. myocardial infarction after lipid metabolism. Here tutors guided a batch of 10-15 students. In this small group facilitator give case history, patients reports, photos to the students. This was followed by discussion of case based question answer with reasoning of the case. Clarifications and explanations were given regarding Biochemical basis of the disorder, Biochemical basis of clinical features, Biochemical basis of abnormal lab tests, Other clinical features, lab tests in support of the diagnosis, Complications and treatment in short wherever required.

At the end of each topic, a unit test was conducted with one liner questions, justification, case and short notes. This was followed by paper solving and how to write answer in paper. Formative assessment was conducted simultaneously with feedback to students. Student's perception was collected regarding the effectiveness and usefulness of multiple teaching tools by a self administered questionnaire.

4.1. Statistical analysis

The data was compiled in Microsoft excel, presented as tables and analyzed 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.

5. Results

Majority (87%) of students felt that the basic information given in DLs was appropriate. They also opined there was only 51% clarify doubts easily with peers and teacher. Most of the participating students suggested that VBL was informative (73%) understand complex steps in a simple way (79%) VBL helped them to retain (66%) & recall (66%) content and increase concentration when there included in DLs (73%).

The response of student for CBL was that 77% students express that CBL was stimulate thinking, analysis and reasoning capability. It also helped them to match the level of prior knowledge (73%), place themselves as a future doctor (77%), increase interest in the subject (90%), help them to interpret patients reports & diagnose the patients diseases (83%), benefits to solve patients problem (77%) and CBL session showed clinical applicability in medicine(83%).

Interestingly, students enjoy GBL; participating students suggested that they learn useful addition information (77%), plan their study(85%), actively participate in their discussion (79%) clarify doubts easily with peers & teachers (78%) 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 co ordinated approach with multiple teaching tools like DLS, GBL, VBL, CBL most

students felt that it was useful toward understand biochemistry better (79%), learn biochemistry better (83%) , find out importance of biochemistry in future medicine (84%) , prepare for university examination (81%).

6. Discussion

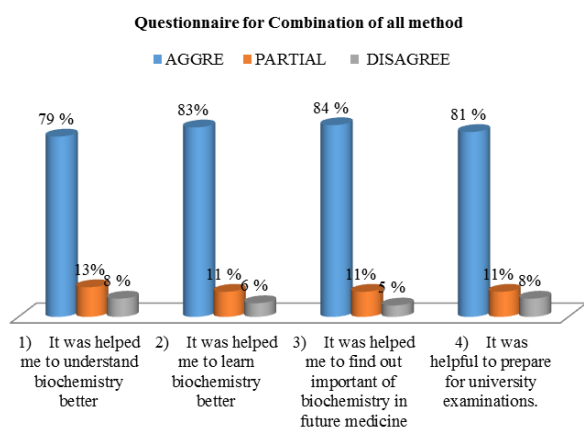
The Medical Council of India (superseded by the Board of Governors) released three volumes of the curricular framework for the proposed Competency-based Undergraduate Medical Education few months ago.⁵ Rapid changes of modern world have caused the Higher Education System to face a great variety of challenges. Effective teaching and learning methods are one of the most important necessities of educational systems. 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.⁶

Table 1: Teaching methodology designed for hormone action

Topic	Hormone action
Main objective	Student able to learn mechanism of action of different hormone and how the act
Number of teaching hours required to cover the topic/subtopic	Two hour for didactic lecture. Three hour for group base learning, 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 lipid chemistry and metabolism.

Topic	Lipid chemistry and metabolism
Main objective	student able to learn about chemistry of lipid student able to learn about metabolism of lipids students able to learn about biochemical tests which comes under lipid profile. Students able to learn about how to diagnose and categories patients of dyslipidemia.
Number of teaching hours required to cover the topic/subtopic	13 hour for didactic lecture. 12 hour for group base learning, 15 min for video based learning after each didactic lecture. 4 hour for case based learning, 9 hour practical for estimation of serum cholesterols.
Teaching/learning methods	Didactic lecture, group based learning, video based learning, practical, case based learning (dyslipidemias , myocardial infarction, etc).
Assessment	Long and short question and answer, one liner questions, case, justification
Perception	Feedback from students


Chart 1: Questionnaire for Combination of all method

A teaching method is the system of operations and activities of the teacher and students, which help them to gain knowledge, understand the topic, analyze, synthesize and evaluate skill and establish habits and develop attitude.⁷

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 according to the topic different combination of the teaching methods is essential for lecture delivery, as far as inherent pros and cons of each method students preferred combination of teaching methods.

Here we elicited the student's opinion about a single method of teaching is on more attractive and informative, in DLs students opinion that basic information gives

appropriate but difficult to clarify doubts easily with peers and teachers they also fail to retain subject, this limitation of DLs covered by GBL and VBL that in GBL students learn from one another and encourage students to work in a group and this events goes a long way to retain subject.⁸ And GBL also created a fearless environment for students to learn and express their doubts.

Learning is transferred to the extent the learning sees possibilities for transfer and has opportunities to apply his knowledge⁹ so usefulness of biochemistry concepts actually come in pharmacology and medicine in later stage, CBL which helped students to place themselves as future doctors and reasoning also prescribe effective treatment. The CBL in biochemistry made the learning more enjoyable and encourage the students ask a question in class and CBL which improve clinical reasoning, interpretation of lab report and improve ability to think logically.^{10,11}

7. Conclusion

Through the study, depending on the topic to be covered the 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 bonding of traditional and modern teaching methods better than a single method because inherent cons of each teaching method is compensated by the other.

Combination of teaching is the most satisfied teaching method because the students actively involved and more learning happen. Judicious use of different method's reproducibility and thus the academic performance of the students.

Table 3: Student's perception toward utility of multiple teaching tools in learning biochemistry (numbers in percentage).

Questionnaire for Didactic Lecture(DL)	Aggre	Partial	disagree
1) Basic information was give properly	87	9	4
2) DL helped me to clarify doubts easily with peers and teachers.	51	45	4
3) DL helped me to understand and retain subject better.	48	43	9
4) DL helped me to understand complex process in simple way	45	45	10
Questionnaire for Video based learning(VBL)			
1) Video based learning very clear and informative.	73	26	1
2) Video based learning helped me to understand complex process in simple way	79	14	7
3) Video based learning after DL helped me to retain content easily	66	29	5
4) Video based learning after DL helped me to recall content easily in exam.	66	25	9
5) Video based learning helped me to concentrate more in traditional lecture.	73	22	5
Questionnaire for case base learning(CBL)			
1) Case based learning helped me to stimulate thinking, analysis and reasoning	77	13	10
2) Case based learning helped me to match the level of prior knowledge.	73	19	8
3) Case based learning helped me to place ourselves as future doctors.	77	17	6
4) Case based learning helped me to interpret patient's reports and diagnose the patient's diseases.	83	10	7
5) Case based learning ultimately benefits to solve patients problem.	77	16	7
6) Case based learning showed clinical applicability of biochemistry in medicine.	83	12	5
7) Case based learning creates interest in subject.	90	7	3
Questionnaire for Group Based Learning (GBL)			
1) I learn useful additional information during GBL sessions.	77	15	8
2) GBL helped me to plan my study	85	14	1
3) Solving problem in a group is an effective way to practice what I have learned and also helped me to know how to answer in exam.	81	16	3
4) GBL helped me to actively participate in the discussion.	79	14	7
5) GBL helped me to clarify doubts easily with peers and teachers.	78	16	6
Questionnaire for Combination of all method			
1) It was helped me to understand biochemistry better	79	13	8
2) It was helped me to learn biochemistry better	83	11	6
3) It was helped me to find out important of biochemistry in future medicine	84	11	5
4) It was helpful to prepare for university examinations.	81	11	8

Therefore, it is recommended that combined teaching method's may be apply for the process of knowledge formation of future MBBS students.

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7.2. Source of funding

None.

8. Conflict of interest

None.

9. Ethical approval

The study was approved by the Institutional Ethics Committee

References

- Supraneni KM. The effect of integrated teaching with case based learning (CBL) in the biochemistry of undergraduate medical curriculum. *J Clin Diagn Res.* 2010;5:3058–3063.
- Badyal DK, Singh T. Teaching of the basic sciences in medicine: changing trends. *Natl Med J India.* 2015;28(3):137–140.

3. Feng-Pei L. Seminar teaching model based on the theory of social interaction effects on the quality of post-graduate education. *J Chengdu Coll Educ*. 2006;4(20):45–47.
4. Alexandre B, Passos RM, Ono AH, Hermes-Lima M. The use of multiple tools for teaching medical biochemistry. *Adv Physiol Educ*. 2008;32(1):38–46. doi:10.1152/advan.00028.2007.
5. India. Medical Council of India. Competency Based Undergraduate Curriculum. Medical Council of India 2018 ; 2019,. Available from: <https://old.mciindia.org/InformationDesk/ForColleges/UGCCurriculum.aspx>.
6. Bidabadi NS, Isfahani ARN, Rouhollahi A, Khalili R. Effective teaching methods in higher education: requirements and barriers. *J Adv Med Educ Prof*. 2016;4(4):170–178.
7. Sheikh ST. Teaching learning aids in medical education. The students perspective. *Int J Clin Surg Adv*. 2015;3:32–37.
8. Joshi KB, Nilawar AN, Thorat AP. Effect of case based learning in understanding clinical biochemistry. *Int J Biomed Adv Res*. 2014;5(10):516–516. doi:10.7439/ijbar.v5i10.920.
9. Gbamanja SPT. Essentials of curriculum and instruction: theory and practice. Port-Harcourt: Pam Unique Publishers ; 1991, . .
10. Setia S, Bobby Z, Anantanarayan P, Radhika M, Kavitha M, et al. Case based learning versus problem based learning: A direct comparison from first year medical students perspective. *Med Educ*. 2011;2(6).
11. Kassebaum D, Averbach R, Fryer G. Student preference for a case-based vs. lecture instructional format. *J Dent Educ*. 1991;55(12):781–

784.

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