

An effective approach in learning clinical biochemistry - Case Based Learning

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Introduction

The main aim of medical education technology is to increase teaching and learning by introducing various effective teaching learning methods into the medical curriculum. Biochemistry is one of the first year subjects in the undergraduate medical syllabus. It is having a lot of importance in understanding the clinical subjects. Clinical biochemistry basically deals with the methods and interpretation of biochemical test results, performed on body fluids, which help us to support the clinical diagnosis, treatment and also in assessing the prognosis of the disease. But it is usually considered to be a subject of structures, chemical formulae, pathways and reactions which are usually taught by regular monotonous lectures and practical classes. This is considered as a teacher centered teaching when in there won't be any participation from the students. There is a need to change this system, so as to involve the students actively in the learning process.^(1,2) CBL is considered as a method, which can co-relate both the basic and clinical sciences. Case-based learning (CBL) is student-centered and interactive session. It requires students to recall and apply their previous knowledge to solve clinical cases.⁽³⁾ As a result of this, students can have a satisfactory and self directed learning. It increases the enthusiasm among the students and improves their analytical thinking rather than just to listen passively.⁽⁴⁾ Hence with this type of learning, a medical student will understand the importance of the basic science subjects.⁽⁵⁾ Our objective is to assess the impact on the academic performance of the medical students by using traditional and innovative methods(CBL) of teaching, to analyze the perception of students about CBL as teaching learning method and to evaluate student's feedback regarding to case based learning.

Materials and Method

This study was carried out in the Department of Biochemistry, S.V.S Medical College, Mahabubnagar, Telangana state. Institutional ethical approval and informed consent was taken from all the participants. The students were explained about the usefulness of the study. First year medical students were randomly divided in to two groups of A and B. Lipid chemistry and metabolism is the topic selected for these students. 74 participants from group A and 74 participants from group B were evaluated with pretest in the form of multiple choice questions with one best possible answer

related to topic selected. The pre test score for A and B group were noted. Then lectures was taken to group A and group B separately by the same teacher. After a week, group A was evaluated with the same 40 MCQs. The pre and post lecture scores of group A were compared. Simultaneously group B students after the lecture sessions, were given with small clinical cases, related to the topic in the tutorial classes. For this session 100 students participated. Both the lecture and the case discussions were taken by the same teacher. A detailed case history was provided to the students. They were given time to solve the case. Simultaneously, the students were provided with specific learning objectives. During the sessions, the facilitator motivated and guided the students in solving the case. In subsequent sessions, the case was discussed by the facilitator, properly and systematically, and made sure that every student had participated in the session actively. Questions were asked by the facilitator, to avoid any diversions and to achieve the main learning objectives. Students were also encouraged to ask questions to the facilitator during the session. After a week we evaluated these 100 participants with the same questionnaire consisting of 40 MCQs. The pre lecture and post lecture+ CBL scores of group B were analysed and compared. Scores from post lecture of group A was compared with the score from Post lecture + CBL of group B. To evaluate the student's perception towards the CBL for group B, we administered a qualitative questionnaire with Likert scale consisting of ten questions. The questionnaire was validated prior to the use by participants. The response obtained was in the terms of strongly agree, agree, disagree, strongly disagree, neither.

Statistical Analysis: The data was analysed by Graph Pad Prism software 6.0 version. The numerical data of pre and post test was expressed in terms of mean±SD. Student's 't' test was used to compare the continuous variables between the groups. Pre and Post test comparison of group A, paired 't' test and for group B unpaired 't' test was used. Post Lecture score of group A and Post Lecture+ CBL score of group B were compared with unpaired 't' test. The p value of <0.05 was considered to be statistically significant.

Results and Discussion

Table 1 gives the comparison of pre and post evaluation for Didactic Lecture of group A, which

shows an improvement in the scores with post lecture and the change is significant (p=0.00). Table 2 gives the comparison of pre and post evaluation test for (Lecture+CBL) of group B, which shows an improvement in the scores with post and the change is significant(p=0.00). Table 3 gives the comparison of scores obtained after post Lecture (group A) and post Lecture+CBL (group B), which shows a significant improvement with post Lecture+ CBL of batch B and the change is statistically significant. Regarding perception of students in Table 4, majority 54% students opined that CBL session was useful in development of analytical thinking, 62% opined that Clinical case arouse the interest in biochemistry subject, 59% students opined that CBL helped to correlate biochemistry with clinical knowledge and to interpret the laboratory results, 56% of students were willing to have similar sessions in future, 66% of students opined that CBL is helpful in making a diagnosis in clinical practice, 65% opined that CBL is helpful in overall better understanding of the topic, 58% opined that Clinical case was relevant to the topic discussed, 63% opined that, teacher plays a main role in CBL session, 65% opined that Group discussion during CBL session was helpful, 61% opined that CBL must be followed by regular lectures. Case based learning seems to be a very interesting and useful way of learning. Based on the results of our evaluation, it proved that, CBL helped the students to develop the art of self directed learning. It aided for the active participation of the students in the discussion.⁽⁶⁾ CBL session in Biochemistry is a very useful way wherein the students will come across a case scenario, they will have to think, rule out the several differential diagnosis and finally will have to solve it. This process enhances the student’s ability to apply information, promotes self directed learning, improves

decision making and problem solving attitude. On the whole CBL allows the students to undergo a meaningful learning.^(7,8) Our results were almost similar to that of other studies, which showed improved test scores in CBL sessions.⁽⁹⁻¹⁴⁾ Another advantage is, it helps in the training of faculty, which strengthen the quality of teaching in future and helps the faculty to grow as a good academicians.⁽¹⁵⁾

Table 1: Comparison of pre and post evaluation test for Didactic lecture of A batch

MCQ evaluation	Pre test score of batch A	Post test score of batch A	P value
	11.79 ± 5.21	22.29 ± 3.47	0.000

Table 2: Comparison of pre and post evaluation test for Lecture+ CBL of B batch

MCQ evaluation	Pre test score of batch B	Post test score of batch B	P value
	12.75 ± 4.21	29.43 ± 4.35	0.000

Table 3: Comparison of scores obtained after post Lecture (batch A) and post Lecture +CBL of (batch B)

MCQ evaluation	Post Lecture score of batch A	Post SGD score of batch B	P value
	22.29± 3.47	29.47± 4.41	0.000

Table 4: Student’s Feed back form after Case Based learning

Sr. No	Case Based Learning (CBL)	Strongly agree	Agree	Disagree	Strongly disagree	Neither
1.	CBL session was useful in development of analytical thinking	54%	45%	0%	0%	1%
2.	Clinical case arouse the interest in biochemistry subject	62%	36%	0%	0%	2%
3.	CBL helped to correlate biochemistry with clinical knowledge and to interpret the laboratory results	59%	39%	0%	1%	1%
4.	Will like to have similar sessions in future	56%	40%	2%	0%	2%
5.	CBL will help to make a diagnosis in clinical practice	66%	34%	0%	0%	0%
6.	CBL is helpful in overall better understanding of the topic	65%	33%	0%	2%	0%
7.	Clinical case was relevant to the topic discussed	58%	40%	0%	0%	2%
8.	Teacher plays a main role in CBL	63%	35%	0%	0%	2%

	session					
9.	Group discussion during CBL session was helpful	65%	34%	0%	0%	1%
10.	CBL should be followed by regular lectures	61%	36%	0%	1%	2%

Limitations

Limitation of this study is that CBL session was conducted for only one topic, as much of preplanning and faculty training is required for such exercise. Also, first year students are not aware of pathogenesis and treatment aspects of a clinical case. Thus all the entities of a clinical case cannot be discussed at this level. Hence, formulating cases appropriately and stating specific learning objectives are challenging and crucial at first year stage.⁽¹⁶⁾ To summarize, we implemented a newer method of teaching with positive and encouraging results.

Conclusion

We conclude by saying that in understanding clinical biochemistry topic, case based learning along with the regular lecture is more effective than lecture method alone. Students found this method more useful for learning, understanding, developing analytical thinking and skills and interpretation. Therefore CBL must be included as a regular teaching method at specific places, while teaching the subject of Biochemistry.

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References

1. West DC, Pomeroy JR, Park JK, Gerstenberger EA, Sandoval J. Critical thinking in graduate medical education: a role of concept mapping assessment? *JAMA*. 2000;284:1105-10.
2. Michael J. In pursuit of meaningful learning. *Advances in Physiology Education*. 2001;25:145-58.
3. Garvey T, O'Sullivan M, Blake M. Multidisciplinary case-based learning for undergraduate students. *Eur J Dent Educ* 2000;4(4):165-8.
4. Michael J. In pursuit of meaningful learning. *Advances in Physiology Education*. 2001;25:145-58.
5. CF Herreid. Case studies in science- A novel method of science education. *J Coll. Sci. Teach*. 1994;23:221-29.
6. Meyer C, Jones TB. Case studies. In *promoting Active Learning: Strategies for the College Classroom*. San Francisco, CA: Jossey-Bass, 1993;103-19.
7. Sandhya K. Kamat, Padmaja A. Marathe, Tejal C. Patel, Yashashri C. Shetty, and Nirmala N. Rege Introduction of

case based teaching to impart rational pharmacotherapy skills in undergraduate medical students. *Indian Journal of Pharmacology* 2012;44(5):634-638.

8. Jill Elizabeth Thistlthwaite, David Davies, Samilia Ekeocha, Jane M. Kidd, Colin Macdougall, Paul Matthews, Judith Purkis & Diane Clay The effectiveness of case-based learning in health professional education. A BEME systematic review: BEME Guide No. 23 2012;34:e421-e444.
9. Usha Adiga, Sachinanda Adiga Case based learning in biochemistry *International Journal of Pharma and Bio Sciences* vol 2/issue2/Apr – Jun 2011.
10. Surpaneni K M the Effect of Integrated Teaching with Case Based Learning (CBL) In the Biochemistry of Undergraduate Medical Curriculum *Journal of Clinical and Diagnostic Research*. 2010 Oct;(5):3058-3063.
11. Sandhya Pillai Nair *et al.*, Case Based Learning: A Method for Better Understanding of Biochemistry in Medical Students. *Journal of Clinical and Diagnostic Research*. 2013;7(8):1576-1578.
12. PA Burrows. A student-centered approach to teaching general biology that really works: Lord's constructivist model put to a test. *Am Biol.Teach*. 2003;65:491-502.
13. Surapaneni KM. The effect of integrated teaching with Case Based Learning (CBL) in the biochemistry of undergraduate medical curriculum. *Journal of Clinical and Diagnostic Research*. 2010;5:3058-60.
14. M Reicks, T Stoebner, C Hassel. Evaluation of a decision case approach to food biotechnology education at the secondary level. *J Nutr Educ*. 2003;28:33-38.
15. Joel Michael In pursuit of meaningful learning; *Advances in physiology education* 2001;25(3):145-158.
16. Jürgen Abela Adult learning theories and medical education: a review *Malta Medical journal*; 2009;21(01):11-1.