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Introduction of case based learning in undergraduate anatomy teaching

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Abstract: *Background:* According to Bloom's cognitive taxonomy, higher orders of learning are crucial for clinical training in health science but conventional method of teaching is based on fact transfer and information recall. Cased Based Learning (CBL) is focused on application, problem solving and communication. It is an active learning strategy in small groups in which the group focused on solving presented problem. Thus this structured method may prepare younger learners in becoming better self-learner. *Aim and Objectives:* To improve the learning of Anatomy by the way of case based learning and to promote critical thinking & self-directed learning of the students. *Methodology:* A Descriptive, observational study was conducted in the Department of Anatomy, Maharaja Jitendra Narayan Medical College, Coochbehar, West Bengal, during a study period of six months. After sensitization of departmental faculties & students hundred Phase-I students were divided into five groups and the selected topics were delivered in CBL method. Then the students & the faculty were asked to provide their feedback. *Results:* More than ninety percent students felt that it helped in better understanding of the subject, assisted in memorizing facts easily, gave confidence in subject learning, could be used as a Teaching-Learning Method (TLM) for future batches, increased group interaction, motivated to read more and improved clinical thinking and increased sensitivity towards case. Hundred percent faculties felt that it was feasible to conduct CBL session and the students were confident to apply the theoretical knowledge of anatomy to solve clinical cases but preparation CBL classes took a lot of efforts. *Conclusions:* CBL is not only an innovative teaching-learning method but also it promotes problem solving abilities, analytical, communication skills and self-learning among the students.

Keywords: Cased based learning, Self –directed learning, Teaching-learning methods.

Introduction

Anatomy is one of the foundation sciences in the medical curriculum, which has immense importance in understanding of clinical sciences. In the traditional system of medical education, it was mainly taught by means of didactic lectures, tutorials and practical classes in the first year of the medical curriculum. Hence, it was teacher centered with minimal active participation from the students the students lacked critical thinking. But in recent years, the education system is changing to a student centered teaching-learning process with the use of various innovative teaching methods. This makes the students actively involved in the process of learning as well as improvises the whole academic system and teaching skills. As a result of this, students can have a meaningful learning, wherein the learner is motivated for effective learning rather than just the dispensing the information [1]. It is also helpful to prepare them for the lifelong self-directed learning process [2].

Integrated teaching is an important strategy for promoting meaningful learning and for making it easily retainable by the learner. Many approaches are available for integrating the basic and clinical sciences. Case Based Learning (CBL) is one such approach which can make learning more effective and interesting where the students are provided with a clinical problem and gradually learn a specific topic by solving that [3]. In fact, it is now an established active learning tool which aims at developing reasoning skills, based on the clinical scenarios and hence, a medical student understands the importance of the basic medical science subjects. The clinical

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case which is given, acts as a stimulus for the learner. As the facilitator plays a minimal role in this learning process, it can guide and motivate them to gain knowledge [4].

Several medical education researches stated that CBL could help in developing an effective learning environment with the use of specific learning objects. Previously this method was applied in different subjects by various workers but no comprehensive study was conducted so far in Anatomy in West Bengal [5-8]. So, the aim of the present study was to estimate the impact of CBL in the form of self-directed learning & critical thinking among the Phase-1 students and to estimate the effects of CBL to improve the overall learning of Anatomy in undergraduate medical curriculum.

Material and Methods

Descriptive, observational study was conducted in the Department of Anatomy, Maharaja Jitendra Narayan Medical College& Hospital, West Bengal during a study period of six months. Permission from the Institutional Ethics Committee was taken and the departmental faculties were sensitized regarding CBL. They were shown how to conduct CBL, emphasizing the role of teacher as facilitator. The students were also sensitized regarding this method. In the next one month the case based modules were prepared for two topics with the help of the senior faculties of the departments and also with the guidance of faculties of clinical subjects. Pre-validated feedback questionnaires were also prepared during the same period of time. Thereafter the hundred Phase-I students were divided into five groups (twenty students in each group) and the selected topics were delivered in CBL method for the period of three months. Then the students & the faculties were asked to provide their feedback. The collected data was tabulated in Microsoft Excel Spread Sheet and analyzed by Epi-info 7.0 and SPSS 20. Finally, the report was framed within a period of one-month.

Results

Eighty-eight percent students felt that the method was interesting and it helped in increasing the sensitivity towards case. Ninety-six percent students felt that it helped in better understanding. Ninety-five percent students felt that it helped in memorizing facts easily and gave confidence in subject learning. Ninety-four percent students felt that CBL could be used as a teaching-learning method for future batches. Ninety-three percent students felt that it increased group interaction. Ninety-two percent students felt that it motivated to read more. Ninety-one percent students felt that it motivated clinical thinking. Ninety-one percent students felt that the method was interesting and increased sensitivity towards case (Table-1, Fig-1).

Table-1: Analysis of feedback of the Students (n=100)

Sl. No.	Statement	Response				
		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1.	Method is interesting	0 (0%)	0 (0%)	0 (0%)	12 (12%)	88 (88%)
2.	Motivate to read more	0 (0%)	0 (0%)	0 (0%)	8 (8%)	92 (92%)
3.	Better understanding	0 (0%)	0 (0%)	0 (0%)	4 (4%)	96 (96%)
4.	Motivate clinical thinking	0 (0%)	0 (0%)	0 (0%)	9 (9%)	91 (91%)
5.	Helps in memorizing facts easily	0 (0%)	0 (0%)	0 (0%)	5 (5%)	95 (95%)
6.	Helps facts finding	0 (0%)	0 (0%)	2 (2%)	13 (13%)	85 (85%)
7	Increase group interaction	0 (0%)	0 (0%)	0 (0%)	7 (7%)	93 (93%)
8.	Increase sensitivity towards case	0 (0%)	0 (0%)	3 (3%)	9 (9%)	88 (88%)
9.	Give confidence in subject learning	0 (0%)	0 (0%)	0 (0%)	5 (5%)	95 (95%)
10.	To be continued (CBL be used as a TLM for future batches)	0 (0%)	0 (0%)	0 (0%)	6 (6%)	94 (94%)

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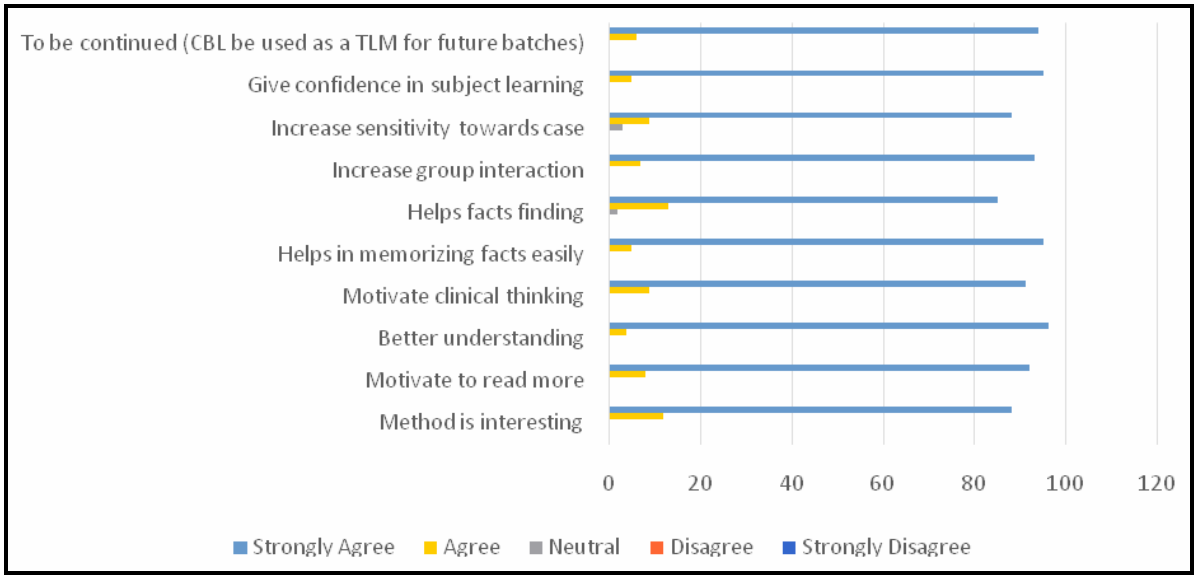
Fig-1: Students' feedback after CBL (n=100)



Hundred percent faculties felt that it was feasible to conduct CBL session, students felt confident to apply the theoretical knowledge of anatomy to solve clinical cases, CBL preparation requires a lot of efforts, faculties were satisfied with CBL approach of teaching, other topics of anatomy should be taught by CBL and CBL be used as a teaching-learning method for future batches (Table-2, Fig-2).

Table-2: Analysis of feedback of the Faculty (n=5)

Sl. No.	Statement	Response				
		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1.	It is feasible to conduct CBL session	0 (0%)	0 (0%)	0 (0%)	0 (0%)	5 (100%)
2.	CBL is time consuming &hinders the normal speed of class	0 (0%)	0 (0%)	0 (0%)	1 (20%)	4 (80%)
3.	CBL preparation requires a lot of efforts	0 (0%)	0 (0%)	0 (0%)	0 (0%)	5 (100%)
4.	CBL stimulates students' desire to learn	0 (0%)	0 (0%)	0 (0%)	1 (20%)	4 (80%)
5.	It helps towards SDL in students	0 (0%)	0 (0%)	0 (0%)	1 (20%)	4 (80%)
6.	Student felt confident to apply the theoretical knowledge of anatomy to solve clinical cases	0 (0%)	0 (0%)	0 (0%)	0 (0%)	5 (100%)
7.	CBL is a good method to practice integration of knowledge and skill	0 (0%)	0 (0%)	0 (0%)	1 (20%)	4 (80%)
8.	I am satisfied with CBL approach of teaching	0 (0%)	0 (0%)	0 (0%)	0 (0%)	5 (100%)
9.	Other topics of anatomy should be taught by CBL	0 (0%)	0 (0%)	0 (0%)	0 (0%)	5 (100%)
10.	CBL be used as a TLM for future batches	0 (0%)	0 (0%)	0 (0%)	0 (0%)	5 (100%)

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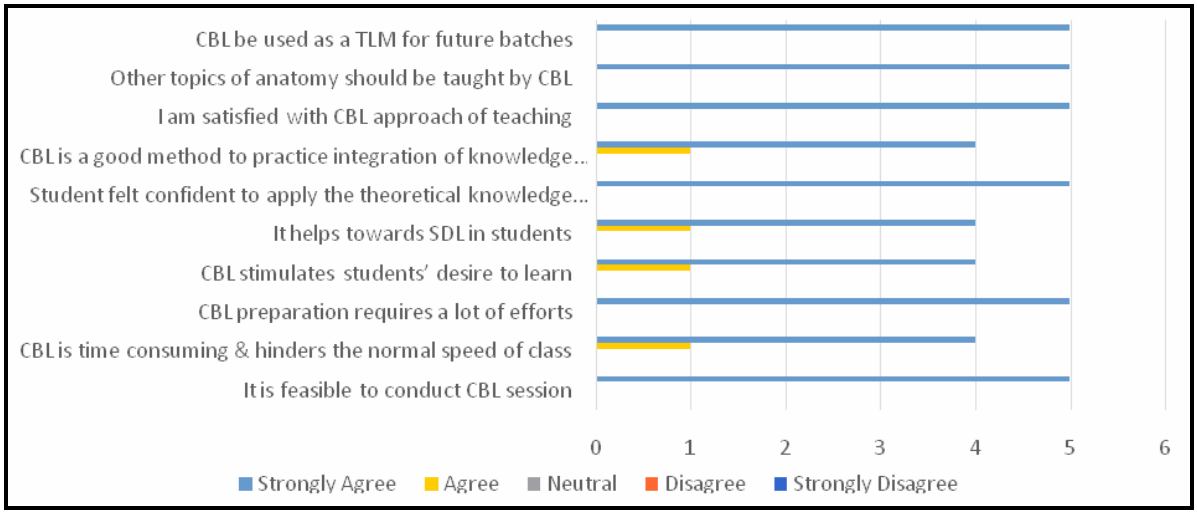
Fig-2: Feedback of the Faculty (n=5)



Eighty percent faculties felt that CBL was time consuming & hinders the normal speed of class, CBL stimulated students' desire to learn, it helped towards self directed learning in students and CBL was a good method to practice integration of knowledge and skill (Table-2, Fig-2).

Though hundred percent faculties and students did not attempted the open ended questions, different suggestions were summarized and classified from the obtained responses. Various suggestions of the students and faculties are depicted in the Table 3 & 4.

Table-3: Percentage of students attempting for different open ended questions and frequency of their common answer

Open Ended Questions	Response obtained	No. of students	Percentage
1. What do you think was best about the session?	1. The cases depicted the picture of the topic clearly.	70	70 %
2. What improvement can be done to make it even better?	1. More number of cases can be included	27	27%
	2. Duration of the class can be extended	13	13%

Table-4: Percentage of faculty attempting for different open ended questions and frequency of their common answer

Open Ended Questions	Response obtained	No. of faculty	Percentage
1. What did you like the most in CBL session?	1. Students are more interactive.	3	60%
	2. Performance of individual student can be assessed.	2	40%
2. Any other suggestion/ comments	1. More number of faculty are required	4	80%
	2. Preparation of more number of cases are required	3	60%

Discussion

Several medical education researches stated that CBL could help in developing an effective learning environment, with the use of specific learning objects [5-8]. Kassebaum et al. (1991) [3], Pearson et al. (2003) [9] and Hansen et al (2005) [10] discussed the comparison of CBL with traditional lecture in didactic formats. According to Ghosh et al. (2007) [11] majority of students favored the combination of didactic lectures and case-oriented problem solving methods. The authors also suggested

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for the case-oriented problem-solving tutorials with the traditional didactic lecture modules in the Phase-1 medical education under the conventional curriculum. Pearson et al. (2003) [9] narrated that the innovative CBL paradigm appeared to be an effective adjunct to the traditional lecture format. But they were unable to determine whether this method of teaching could increase other problem solving attributes or improve clinical performance.

McRae Marc et al. (2012) [12] mentioned that the clinical case studies were extremely helpful for the students to memorize the subject topics possibly due to its clear relevance with the real world. It also motivated the students to be more attentive to the numerous complicated facts of Anatomy.

According to Meyer et al. (1993) [13] CBL was also proved to be an interesting concept which helped in developing interest about the subject. It also helped the students in improving their academic performances. As all the students were curious and attentive, everyone provided their inputs and thus CBL motivated all of them to actively participate. It also made the subject easier to learn and it also solidified their understanding of the subject. It helped them in developing logical thinking, clinical reasoning and diagnostic interpretation [13-14].

In the present study CBL promotes self-directed learning among the phase-1 students. It improves their power of critical analysis. The faculties feel that it was one of the ways that makes the subject more interesting. It was also a way by which the students feel the importance of early clinical exposure. Popil et al. (2010) [15] suggested that the use of case studies in teaching could promote active learning and furthermore, it would be helpful to develop critical thinking skills among the medical students and other health care professionals.

Sutyak et al. (1998) [16] conducted a prospective study of seventy-nine medical students to assess whether student learning activity in CBL would vary between a structured and an unstructured case presentation. The structured student groups were asked to establish and address a given diagnosis and were given clear and specific identification of the disease being studied. The unstructured student groups were given the same task. However, they did not receive any confirmatory results. Despite this, their study produced preliminary evidence that medical students preferred an unstructured approach to their cases.

According to Williams et al. (2005) [17] CBL allows students to develop a collaborative, team based approach to their education and their profession. It is intended to foster learning for competence, deep level understanding and provide opportunities for vertical and horizontal integration of the syllabus. The study reported that female students may perform better at a CBL style of education early in their medical education but no literature was found of any measurement and subsequent results of whether CBL had any impact on clinical performance or skill improvement [18].

The use of case studies in the basic sciences has shown a positive effect on the learning outcomes [19-20]. Many textbooks of Anatomy depicted various clinical cases, but much of this material does not appear to have been specifically written to reinforce the student's understanding of the subject. So, it seems that CBL may prove to be an interesting exercise and it can help the students in improving their academic performance. It may also help them in developing logical thinking, clinical reasoning and diagnostic interpretation [19-20]. During conducting the present study, the students were immensely motivated for self-directed learning of Anatomy. Faculties were trained in preparing the cases for case-directed learning. Faculties were also trained in conducting case-directed learning.

Conclusion

CBL is a different method than the conventional teaching method. In conventional method the information is delivered without any interaction with the students. But the CBL stimulates the analytic power of the students and makes the subject and topics more interesting. CBL allows students to develop a collaborative, team based approach to their education. Other characteristics include hypothesis generation

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and the consolidation and integration of learning activities. CBL promotes critical thinking and better understanding of Anatomy in Phase-I students.

In addition CBL is also helpful for the followings:

a) Intrinsic and extrinsic motivation;
b) Individualized learning;
c) Self-evaluation and critical reflection and scientific inquiry;
d) Integration of knowledge and practice;
e) Development of learning skills.

As the cased based learning is an effective tool for teaching, the essential topics of Anatomy can be taught by this method. For this the topics for CBL should be selected and prepared before the beginning of the session of Phase-1 students. Moreover, in foundation course students can be sensitized about the CBL method. But for this all the faculty and the concerned authority should be motivated to implement the CBL in UG Curriculum. Teaching of a topic by CBL method is time consuming and sometimes appropriate cases may not be available for CBL classes. So, this method can be implemented in UG curriculum along with other methods to improve the better understanding of the subject.

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