

INTRODUCTION OF CASE BASED LEARNING (CBL) IN FIRST YEAR MBBS AND ITS COMPARISON WITH TUTORIAL AS A TEACHING LEARNING TOOL.

Dr Ketaki Poorey¹, Dr Manish Lamoria², Dr Yogesh Singh⁴, Dr Shishirkumar C Naik⁴.

¹Assistant Professor, Department of Physiology, JNUIMSRC, Jaipur

²Associate Professor, Department of Physiology, JNUIMSRC, Jaipur

³Assistant Professor, Department of Physiology, JNUIMSRC, Jaipur

⁴Associate Professor, Department of Anatomy, JNUIMSRC, Jaipur

Corresponding Author: Email: dr.shishirkumar4142@gmail.com

ABSTRACT:

Background: Case based learning rather than tutorials, right from first year MBBS may help the student to understand how the concepts of basic sciences will direct him/her to diagnose as well as to cure the diseases when required.

Aims & Objectives:

To introduce case based learning in pre-medical subjects as a teaching and learning method and measure its effectiveness in first year MBBS students in comparison to tutorials.

Methodology:

After sensitization and didactic lecture, students were divided into two groups A and B (50 each) randomly on the basis of even and odd roll numbers. Pre-test questionnaire was given to both the groups. Paper based case scenarios of the topic were given to A group for 1st topic (Contraceptives). Cases were discussed in small groups of 8-10 students with a facilitator. In the mean-time group B had tutorial for the same topic, followed by Post-test Questionnaire to both the groups. The same sequence was followed for 2nd topic (Thyroid disorders) with cross-over of the groups. Feedback of the CBT (Case based teaching) experience was taken from the students using 5 point Likert scale.

Result:

After the didactic lecture both CBL and tutorial were found to be effective as a small group teaching learning method, but on further analysis CBL group performed better in both the sessions.

Conclusions:

It will be beneficial to introduce CBL as a small group teaching learning method in pre clinical subjects. It is better and more effective than tutorial to understand the concepts of medicine to the core.

Background

Anatomy, Physiology and biochemistry are the foundation subjects for medical curriculum. It needs to be taught in an effective manner, so that the student can relate with the disease process when they practice in the community. In most of the medical institutes in India, Anatomy, Physiology and Biochemistry are being taught in the first year of medical curriculum with least interdisciplinary interaction. Emphasis still remains to imparting knowledge rather than correlating the knowledge with skills. The teaching still remains teacher centered with minimal active participation from the students. Early clinical exposure has been promoted by Medical Council of India (MCI) in its Vision 2015 document⁽¹⁾. Case base studies right from first year may help the student to understand how the concepts of basic sciences will direct him/her to diagnose as well as to cure the diseases when required.⁽²⁾

Margetson⁽³⁾ described learning to become a thoroughly competent practitioner as “the development of an integrated, coherent ‘growing web’ of understanding, knowledge and skill.” For an undergraduate, early learning environment play a critical role in foundation of ‘this web’ and develop student’s confidence to undertake the journey to their goal. Case base learning (CBL) is one such teaching method described in Advances in Physiology Education by Hudson in 2001⁽⁴⁾. CBL can enhance the development of skills in analytical thinking and increased clinical co-relation by reading and discussing real life scenarios in students⁽⁵⁾.

CBL: A BACKGROUND⁽²⁾

CBL is an educational paradigm closely related to the more common Problem Based Learning. This PBL approach is andragogic (adult teaching/learning), posing contextualized questions that are based upon “real

life'' problems that may be clinical or non- clinical.

CBL's main traits derived from PBL are that a case, problem, or inquiry is used to stimulate and underpin the acquisition of knowledge, skills, and attitudes. Cases are generally written as problems that provide the student with a background of a patient or other clinical situation. Supporting information is provided, such as vital signs, clinical signs and symptoms, and laboratory results. CBL allows students to develop a collaborative, team based approach to their education. Other characteristics include hypothesis generation and the consolidation and integration of learning activities. Other benefits:

- intrinsic and extrinsic motivation is developed, allowing individualized learning;
- encourages self-evaluation and critical reflection;
- allows scientific inquiry and the development of support provision for their conclusions,
- integration of knowledge and practice,
- development of learning skills.

It is a student centric method of teaching which acts as a stimulus and creates self-directed learning environments for students to explore more. Judicious and adequate use of CBL method along with traditional teaching methods will create a strong foundation of the students for medical training⁽⁶⁾.

Aim

To introduce Case based learning in first year MBBS as a teaching and learning method and measure its effectiveness in first year MBBS students.

Specific Objectives

- Introduction of Case based learning in first year subjects as a teaching learning method in first year MBBS students.
- Comparison of effectiveness of Case based learning with tutorials as a teaching learning method.
- To analyze the perception of students for Case based learning as a teaching learning method.

Methodology

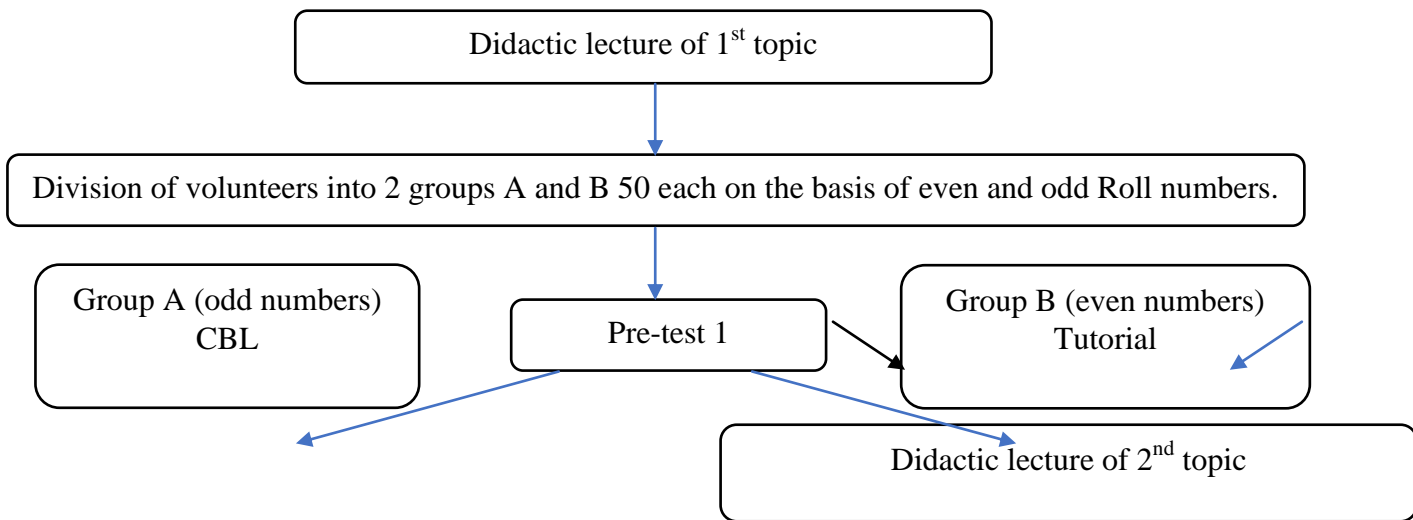
The study was conducted on first professional undergraduate medical students of Jaipur National University Institute for Medical Sciences and Research Centre, Jaipur (Rajasthan) after obtaining approval of the Institutional Ethics Committee.

An inter-departmental faculty meeting was held in the Department of Physiology to discuss the need for development of critical thinking, analysis and problem-solving attitude in our students. The faculty unanimously agreed on the requirement of some educational intervention in the first professional itself. All faculty members were sensitized regarding Case based learning (CBL) as a teaching and learning tool. All the pre-test, post-test and paper based cases were pre-validated by the department and the Medical education unit members. The pre- and post-test questionnaires included MCQs, 1 line answers and true/false questions.

The students were sensitized about the case based learning. Two topics were selected for the educational intervention as per the running syllabus as Thyroid disorders and Contraception. First, topic was taught in didactic lecture as usual followed by random selection for the education intervention. Students were divided into two groups taking odd numbers in A and even numbers in B with 50 students each. Before the intervention a pretest questionnaire was given to the students. Paper based case scenarios of the topic selected were given to A group (Odd numbers) for 1st topic. Cases were discussed in small groups of 10 students. Teacher acted as a facilitator during this discussion. After students had discussed amongst themselves, the cases were discussed in the whole group. Group B (Even numbers) had tutorial for the same topic, which included mutual question and answer sessions and subsequent discussion in small groups (10 students each) between the student and facilitator. In both the groups learning was preceded by Pre-test and was followed by Post-test Questionnaire. The same sequence of lecture followed by CBT/Tutorial was done for the 2nd topic, but this time Group B (Even numbers) was taught with the help of case scenarios (CBL) while group A (Odd numbers) had the usual tutorials. Pre- and post-test questionnaires were filled in the similar manner.

Perception of students regarding Case based learning as a teaching learning tool was taken by a feedback questionnaire using 5 point Likert scale once both the groups had experienced both the teaching learning methods. At the end of the study it was made sure that all the students get benefit of learning with CBL for both the topics.

Flow-chart for methodology:-



Observations and

In the first educational intervention after didactic lecture (Topic – Contraceptives), students were divided into two groups on the basis of even and odds of Roll numbers, where it was found that 88.57% of students in the CBL group scored more in the post test while only 59.38% of students scored more in post-test in case of the tutorial group. The mean increase in the marks of CBL group was almost 3 marks and that in tutorial was about 1 mark. During the second session with Thyroid disorders 76.27% of students scored more in post test than the pre-test in CBL while 71.43% of students scored more in post test than the pre-test in Tutorials. The mean increase in the marks of CBL group was about 2 marks and that in tutorial was about 1 mark. Table 1 shows the descriptive analysis of the pre- and post-test questionnaire scores in the two sessions.

Results

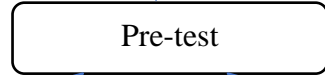


Table 1

Group A - Tutorial		Group B - CBL			
Topic	Teaching tool	Pre/Post-test	Mean Score	Standard Deviation	Confidence Interval
Contraceptives	CBL	Pre	7.357	2.072	7.357 ± 0.494
		Post	10.186	2.292	10.19 ± 0.547
	Tutorials	Pre	6.781	2.016	6.781 ± 0.504
		Post	7.883	1.729	7.883 ± 0.432
Thyroid disorders	CBL	Pre	4.373	1.649	4.373 ± 0.430
		Post	6.424	1.632	6.424 ± 0.425
	Tutorials	Pre	3.492	1.501	3.492 ± 0.378
		Post	5.095	2.153	5.095 ± 0.542

When we compared pre-test and post-test scores of the candidates using paired ‘t’ test, all the 4 sessions including 2 CBL sessions and 2 tutorial sessions their was a significant difference in the pre- and post-test scores.

‘Contraceptives’ tutorial p = 0.0142 (< 0.05)

‘Contraceptives’ CBL, $p = 0.0000 (< 0.05)$

‘Thyroid disorders’ tutorial, $P = 0.00001 (< 0.05)$

‘Thyroid disorders’ CBL, $P = 0.00000 (< 0.05)$

Thus, we can conclude that both CBL and tutorials had a significant impact on learning of the students. As we can see in the table 1 that, in all cases post-test average score is better than the pre-test average score.

Comparing the Tutorial and CBL assessment scores with unpaired ‘t’ test for Contraceptives session, the difference was found to be highly significant $p=0.00000 (< 0.05)$. For Thyroid disorders also the difference was found to be highly significant $p=0.0001 (< 0.05)$. Therefore, the study could conclude that there is a significant difference between **Tutorial & CBL**. According to the average score **CBL** group’s performance is better than **Tutorial** group’s performance in both the sessions which is also eminent from the score representation in figure 1.1 and 1.2. Both the figures clearly show that the post test scores of the CBL group were on the higher side as compared to that of the tutorial.

Figure 1.1

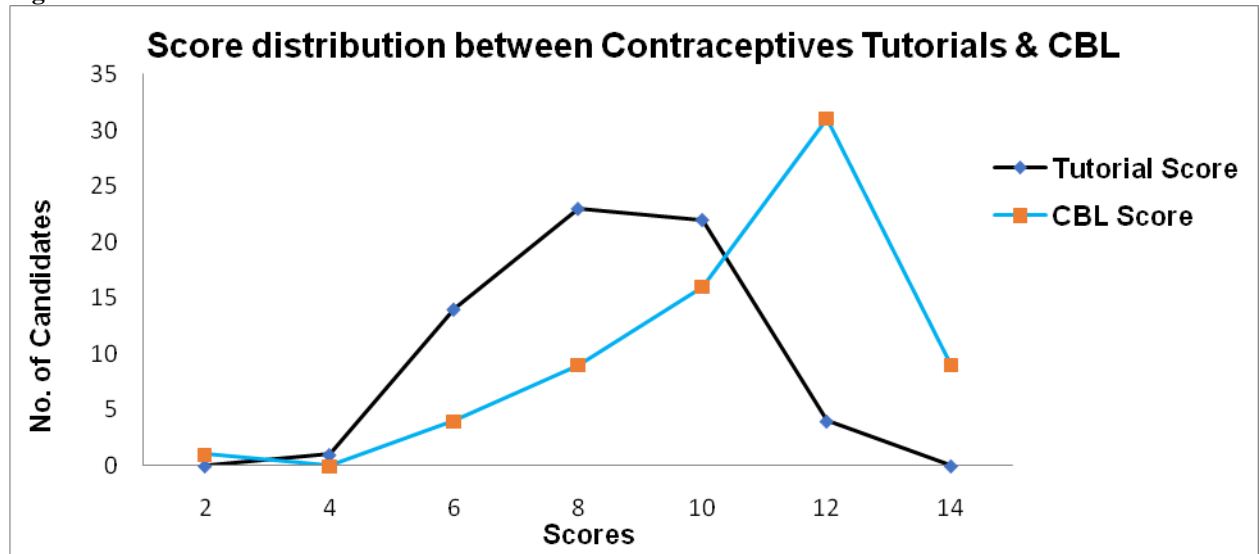
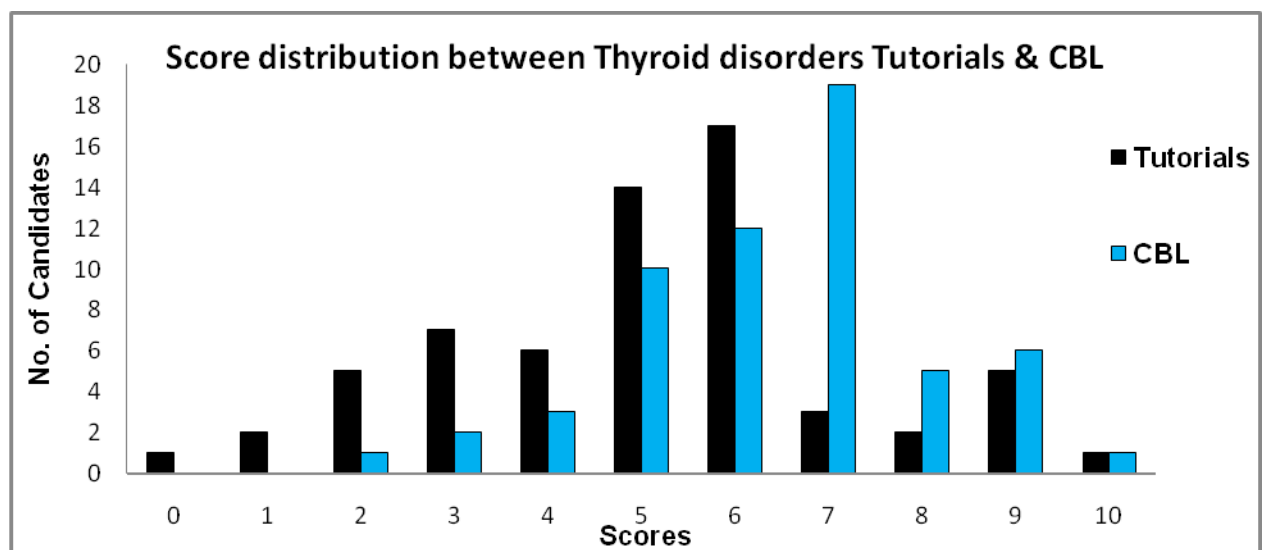


Figure 1.2

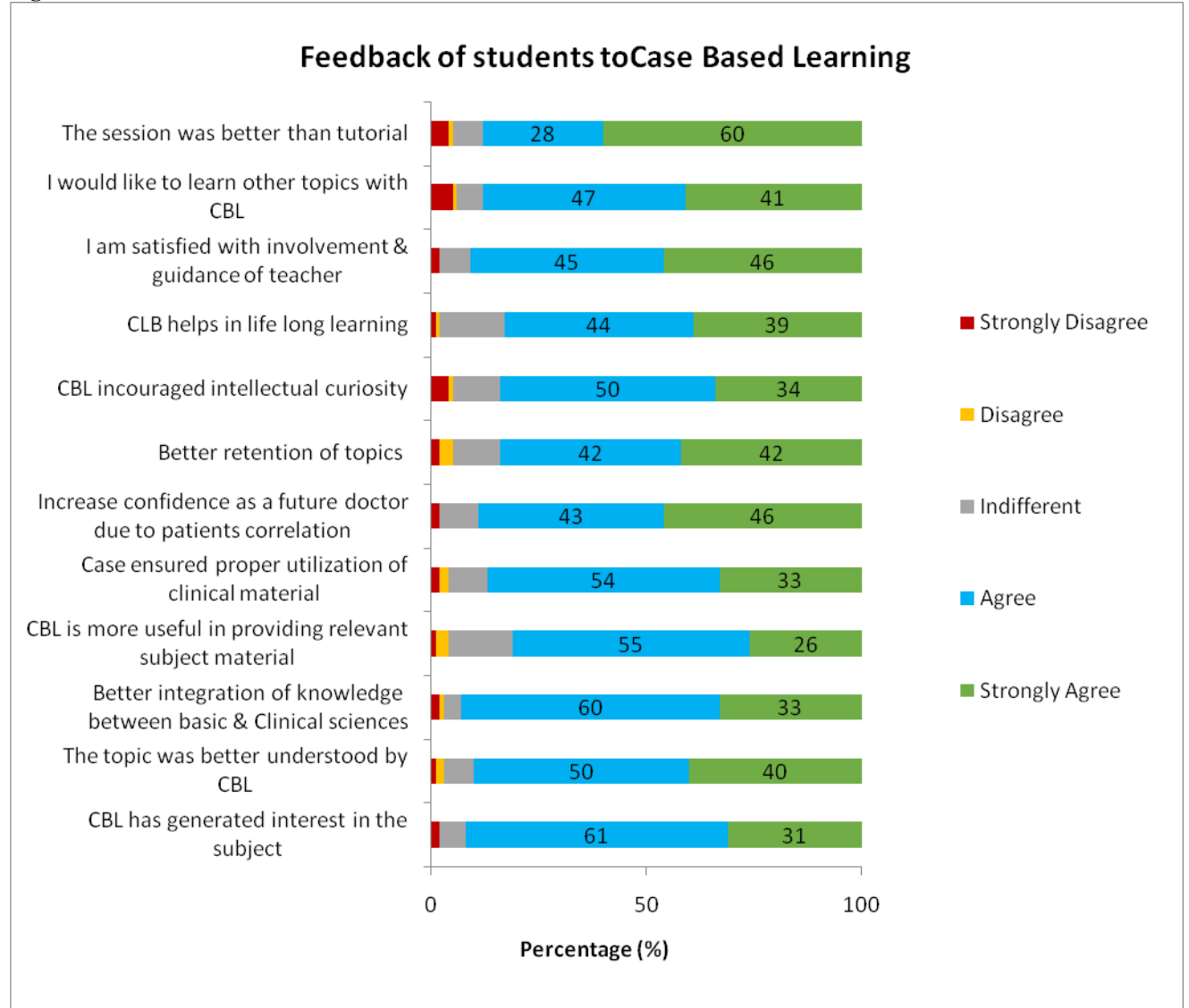


Students attending CBL sessions gave a positive response to CBL as a teaching method (fig 2).

92 % of the students felt that case based learning generated interest in the subjects of first year. 90% felt that they could understand the topic better. 93% students found it to be a proper integration between basic and

clinical sciences while 81% agreed that it could deliver relevant subject material to them. More than 80% agreed that CBL will help them retaining what they had learnt and that they feel confident as a future doctor to be able to apply their knowledge. 88% found the CBL to be better than tutorial. The graphical representation of the feedback questionnaire response has been presented in Figure 2.

Figure 2



We had put 3 open ended questions in the feedback questionnaire (Annexure-viii) as - What was best about the session; What can be improved; Any other comments or suggestions. In response to these open ended questions regarding suggestions for improvement, most of the students responded saying no improvement was required. 4 students suggested that if their was a 10 minutes summary on powerpoint with some flowcharts and pictures then the session would have been better. 1 student suggested that it should also include discussion of 1-2 theory questions related to the topic directly. 3-4 students suggested that some more time should be given for discussion. Most of the students when asked 'what they found best about the CBL sessions', they wrote that the cases made the topic interesting and inculcated interest to study it further. Some students wrote that they were able to understand the topic better and wanted more frequent CBLs. They felt that they could apply their knowledge and would be able to retain it longer. One student on the contrary to the others said that this method was a waste of time and instead some question and answers should be discussed in the given time rather than these cases.

Summary of Results:

After the didactic lecture although both CBL and tutorial were found to be effective as a small group teaching learning method by comparing the pre-test and post-test scores, but on further analysis CBL group performed better in both the sessions when compared with the tutorial group, as summarized in table 2.

Table 2

	CBL Group	Tutorial Group
Session 1 (Contraceptives)*	10.19 ± 0.547	7.883 ± 0.432
Session 2 (Thyroid disorders)**	6.424 ± 0.425	5.095 ± 0.542

*p=0.00000, t=-6.638615636, **p=0.0001, t=-3.855832253

Discussion

The literature says that getting students involved in the process of learning prepares them for a life-long, self-directed learning process.⁽⁷⁾ Learning by presently adopted approach of didactic lectures and tutorials still remains teacher centric and fails to develop the higher order of learning like analysis and synthesis. It has been reported that medical graduates in India generally possesses reasonably sound knowledge of medical science but they are often found deficient in the performance of clinical skills and problem solving, which form the core of clinical competence⁽⁸⁾ There has always been a question as how early clinical exposure can be managed in the pre-clinical period so as to involve the students and also integrate their knowledge to clinical practice right from the beginning.

CBL is one such method where students are motivated to learn on their own so as to inculcate the habit of self-learning and integrating knowledge of the basic sciences with the clinical cases. It is not always possible to find appropriate cases in the hospital during the running curriculum. This problem can be very well overcome by paper-based cases which can be collected and used for discussion during the sessions of CBL.

The results of this study indicate that the learning of students is significantly enhanced with this new teaching learning methodology, as students were able to answer application-based questions as well. The results of the study also indicate that the assimilation of the knowledge was also improved because discussing a case after the didactic lecture was helpful in reinforcing the key elements of the topic.

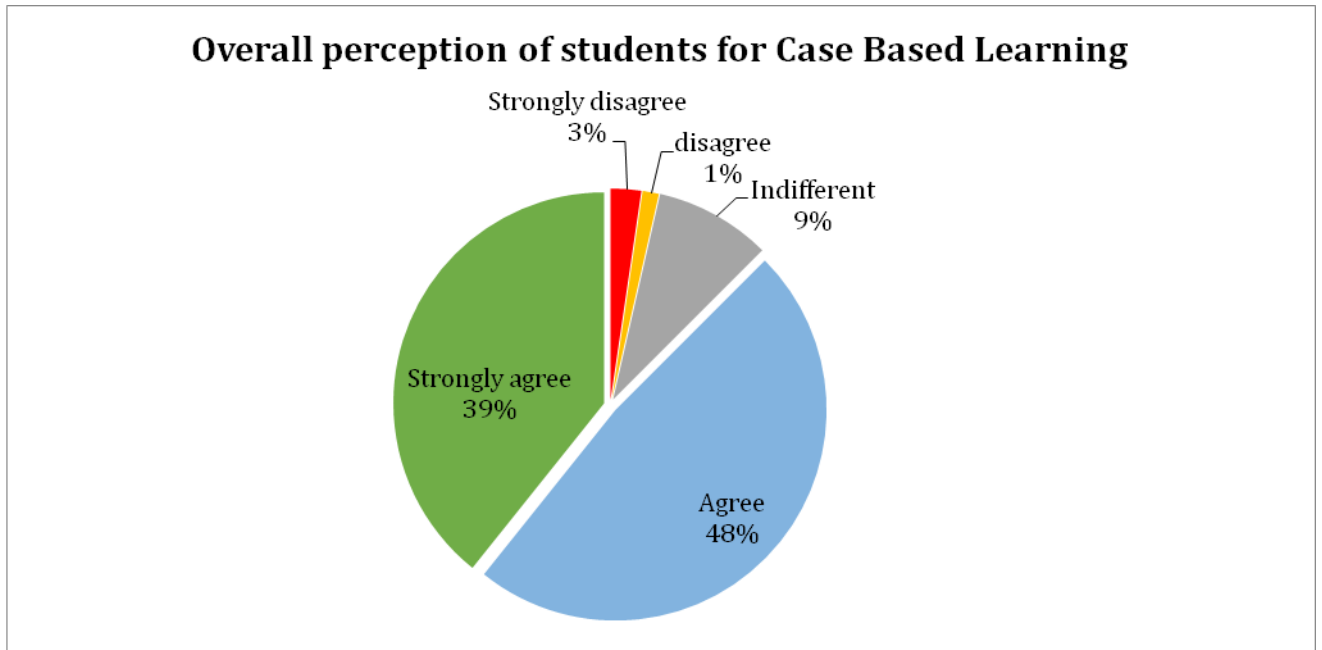
The present study was done to Introduce CBL in first year subjects as an innovative teaching tool for the first year MBBS students. The overall impact of the study was positive in terms of improved test score, overwhelming positive feedback given by students. CBL stimulated and motivated the desire to learn, build confidence, develop clinical reasoning and understand the subject in a better way among the students, these findings are consistent with the studies carried out by Garvey et al, Kassebaum et al, Engel and Hendricson, Hay and Katsikitis, Pearson et al and Hansen et al.^{9,10, 11}

When we compared pre-test and post-test scores of the candidates using paired ‘t’ test, all the 4 sessions including 2 CBL sessions and 2 tutorial sessions their was a significant difference in the pre- and post-test scores. So, this is clear that both tutorial and CBL are helpful but as we compared the average scores, we found that, it was more in the CBL group as compared to Tutorial in both the sessions (table 1). Similar types of studies have been introduced in some medical colleges in India, and the results have been encouraging.^(12, 13,14)

When we talk about the perception of students about CBL, the response was better than the scores. More than 85% students agreed that CBL was helping them to understand the subject more and they felt satisfied with this method of learning (figure 3). Similar results were quoted by study done by Suparna Dubey and Ashok Kumar Dubey.⁽⁵⁾ Here the study was done in the subject of pathology and they also found a overwhelming positive response for the case based learning. In a study by Kassebaum et al⁽¹⁰⁾ students felt that the lecture format was superior in preparing for a written exam as compared to CBL. This again is similar to a few responses of open-ended questions in our study where students suggested that there should be discussion of a few questions as asked in exam. Some wanted to have a formal power-point session before the cases so that they revise the knowledge which they need to apply. Regarding this I feel that there may be initial problems for the students to get used to the method. Some students may need more guidance during the discussion to give directions to their

thought-process. This will need some extra time for session planning and also dedicated staff to be able to conduct such sessions effectively.⁽¹⁵⁾

Figure 3



Outcomes:

The purpose of this study was to introduce this new method of small group interactive teaching in first year subjects in our institute. The study has definitely played a major role in changing the mindset of our faculties as well as students. This method was welcomed by the students and they showed keen interest in learning more topics by case based learning. Even faculties from other departments were keen to know about the results of the study and showed interest in adopting it in their own subject. There was a lot of interaction among the different department faculties during framing and validating cases, which brought some indirect integration in our teaching learning plan. Even the senior students who had passed 1st year MBBS contacted to have a look at the study materials, which showed that there was a positive attitude of students towards this learning method.

Conclusions

Our study concluded that CBL is a better method than tutorial when used in adjunct to didactic lectures. CBL being a student-centric motivates students toward self-directed learning and to develop analytic and problem-solving skills, it will be beneficial for students to get exposed to this learning method in the pre-clinical period itself, so that they are able to understand the concepts of medicine to the core and are able to apply their knowledge when they are exposed to the official clinical postings.

Implications

Promoting student-centric methods of teaching and learning have wide implications. As discussed previously this method inculcates the desire to learn in the student. Students will develop the understanding towards concepts rather than just increasing their rote memory. Self-directed learning will definitely improve understanding of the topic. The problem of anxiety and depression may come down to an extent as the interest in the subject increases. This may give us individuals who have the power to analyze situations and solve problems. A confident, learned and skillful IMGs who love their job as a doctor will be able to serve the humanity in a much better way.

References

1. MCI-Vision; 2015.https://old.mciindia.org/tools/announcement/MCI_booklet.pdf [last assessed on 14th September 2018]
2. Williams B, Case based learning—a review of the literature: is there scope for this educational paradigm in prehospital education? *Emerg Med J* 2005;22:577–581. doi: 10.1136/emj.2004.022707
3. Margetson DB. The relation between understanding and practice in problem-based medical education. *Med Educ* 33: 359–364, 1999.
4. Hudson JN, Buckley P, and McMillen IC. Linking cardiovascular theory to practice in an undergraduate medical curriculum. *AdvPhysiolEduc* 25: 193–201, 2001.
5. Dubey S, Dubey AK. Promotion of higher order of cognition in undergraduate medical students using case-based approach. *J Edu Health Promot* 2017;6:75.
6. Ghosh S. Combination of didactic lectures and case-oriented problem-solving tutorials towards better learning: perception of students from a conventional medical curriculum. *AdvPhysiolEduc* 31: 193-197, 2007.
7. 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.
8. Verma K, D'Monte B, Adkoli BV, Nayar U. *Inquiry-Driven Strategies for Innovation in Medical Education in India*. New Delhi: AIIMS, 1992.
9. Garvey T, O'Sullivan M, Blake M. Multidisciplinary casebased learning for undergraduate students. *Eur J Dent Educ*. 2000;4(4):165-8.
10. Kassebaum D, Averbach R, Fryer G. Student preference for a case-based vs. lecture instructional format. *J Dent Educ*. 1991;55(12):781-4.
11. Hay P, Katsikitis M. The 'expert' in problem-based and casebased learning: necessary or not? *Med Educ*. 2001;35:22-6.
12. Jamkar A, Yemul V, Singh G. Integrated teaching programme with student-centered case-based learning. *Med Educ* 40: 466–467, 2006.
13. Vyas R, Jacob M, Faith M, Isaac B, Rabi S, Sathishkumar S, Selva- kumar D, Ganesh A. An effective integrated learning program in the first year of the medical course. *Natl Med J India* 21: 21–26, 2008.
14. Bansal M, Goyal. To introduce and measure the effectiveness of case based learning in physiology. *Int J Res Med Sci*. 2017 Feb;5(2):437-445
15. Gade S, Chari S. Case-based learning in endocrine physiology: an approach toward self-directed learning and the development of soft skills in medical students. *AdvPhysiolEduc* 37: 356–360, 2013.