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Evidence amalgamating case based teaching (CBT-E) in Physiology: An innovative learning approach for undergraduate medical students

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Abstract:

Context: Whether it is the teaching, evaluation or research, the element of evidence has to be integrated to the entire process. Amalgamating two teaching approaches viz case based teaching and evidence (CBT-E) will help medical students to enhance their learning and develop conceptual clinical approach in Physiology. **Aims:** To assess the learning of first year medical students towards the mixed teaching approach of CBT-E and to correlate the learning with other teaching methods. **Setting & Design:** Analytical cross sectional comparative study was conducted in the Department of Physiology, SBKS MIRC, SVDU for one year duration in first year MBBS students. EBM is a part of curriculum and paper based case was amalgamated with the recent evidence for teaching. **Method & Materials:** Once the students are sensitized for the PICO format and level of evidence, four sessions were taken for applied Physiology with a case scenario followed by the evidence related to the case for various topics. Along with CBT-E learning was also be assessed for the sessions with only evidence, sessions with only case and sessions with traditional teaching methods, 4 sessions of each. All the groups were analyzed compared for the learning outcome by pre-post analysis. **Statistical analysis used:** Data analysis was prepare evaluation matrix up to the level II. Chi-square analysis was done for association for post-test findings. **Results:** Study found highly significant difference for learning outcome for all the groups. Chi-square analysis for Post-test learning for four different methods on the basis of percentage grouping of post test score. The number of students in group3 (>75%)

is highest (N=110) for CBT-E method of teaching ($p < 0.0001$). **Conclusion:** CBT-E teaching approach may help students for understanding of the application of knowledge and higher level of thinking ability, which might influence students' performance for coming years in patients care.

Key words: CBT-E, Learning, EBM, PICO

Key message: Students learning improves the most with CBT-E amalgamate teaching approach since this process links preclinical courses with its clinical application.

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Introduction:

Today we live in an era of evidence. The experiential and the textual components, if not backed by the evidence, will not cut ice on scientific platform. Hence, whether it is the teaching, evaluation or research, the element of evidence has to be integrated to the entire process. In 1980's, Evidence-based practice had projected its rootlets in the medical field and goal was to give students and clinicians the skills to facilitate life-long learning. Literature has defined Evidence-based medicine as the conscientious, explicit, and judicious use of current best evidence¹

The acquisition of EBM knowledge and skills is becoming recognized as a core competency that must be acquired by all doctors and medical students.² At the preclinical level, undergraduate medical students can learn EBM principles, develop skill to formulate clinical questions and improve on searching skills and critically appraisal of an evidences in the medical literature.³ Sumandeep Vidyapeeth University has incorporated evidence into its curriculum for MBBS syllabus, as part of Evidence Based Education System (EBES) over and above this assessment has also be developed.⁴

Studies reported that traditional methods of teaching as lecture is a significant tool of sharing information to a large group of students in less time frame, but there always been a need for an alternate to the traditional format for undergraduate students.⁵⁻⁷ Case-based teaching has been

commonly used since long in medical and other health sciences courses.⁸⁻⁹ Real case scenario's in clinical field should be taught at the preclinical level so as to improve the conceptual application of the course more over make better clinical decisions with critical thinking for patient care.¹⁰

Case based teaching with recent evidences would be rewarding and will make the learning process interesting for medical undergraduates in physiology. Amalgamating two teaching approaches viz case based teaching and evidence (CBT-E) will help students to enhance their learning and develop conceptual clinical approach in physiology. Present study was aimed to assess the learning of first year medical students towards the mixed teaching approach of case based teaching and evidence and to correlate the learning achieved by this amalgamated method with EBM and traditional teaching methods.

MATERIAL & METHODS:

Study conducted in Physiology department in Smt. B.K. Shah Medical Institute and Research Center after taking prior approval (SVIEC/ON/MEDI/RP/16023) from the ethical committee. All first year medical students (2016-17) volunteered were included, while repeater student from earlier batch were excluded for the study.

Study procedure:

- EBM is the part of curriculum and first year medical students are sensitized for the basics of EBM, PICO format, level of evidence and other aspects of EBM. At the end of the theory lecture, related evidence is discussed in PICO format. EBM as a subject is the part of curriculum and students are already trained to the understanding of PICO format, searching evidence, evidence pyramid.
- Once the students are sensitized for the PICO format and level of evidence, four sessions were taken for applied Physiology with a case scenario followed by the evidence related to the case. The topics covered were of cardiovascular system, endocrinology, nerve- muscle physiology and CNS with same level of difficulty. The full text article was also provided to the students for the detail discussion of that case.

Pre and post test was conducted to assess the learning process for each session by this innovative teaching approach.

- Clinical case framing will be done and validated by the group of subject experts within the department or outside the department to make it appropriate for first year medical student's level of understanding.
- Along with CBT-E learning was also be assessed for the sessions with only evidence, sessions with only case and sessions with traditional teaching methods, 4 sessions of each.
- Pre and post test results were assessed in percentage and divided in three groups

Statistical Analysis: Statistical analysis of the data was done using SPSS-23 software. Data analysis was prepare evaluation matrix up to the level II i.e., we can find reaction as well as learning of the students.

RESULTS & ANALYSIS:

Table-I: Descriptive and paired sample statistics for four different teaching methodologies

Teaching Method	Pre-test (%)	Post-test (%)	Sig.
	Mean±SD	Mean±SD	
Case based with Evidence (CBT-E)	34.68±10.04	81.23±16.07	.000*
Traditional (T)	37.69±27.83	66.67±20.29	.000*
Evidence based (E)	34.93±18.05	49.13±25.59	.000*
Case based(CBT)	20.93±14.18	65.77±25.19	.000*

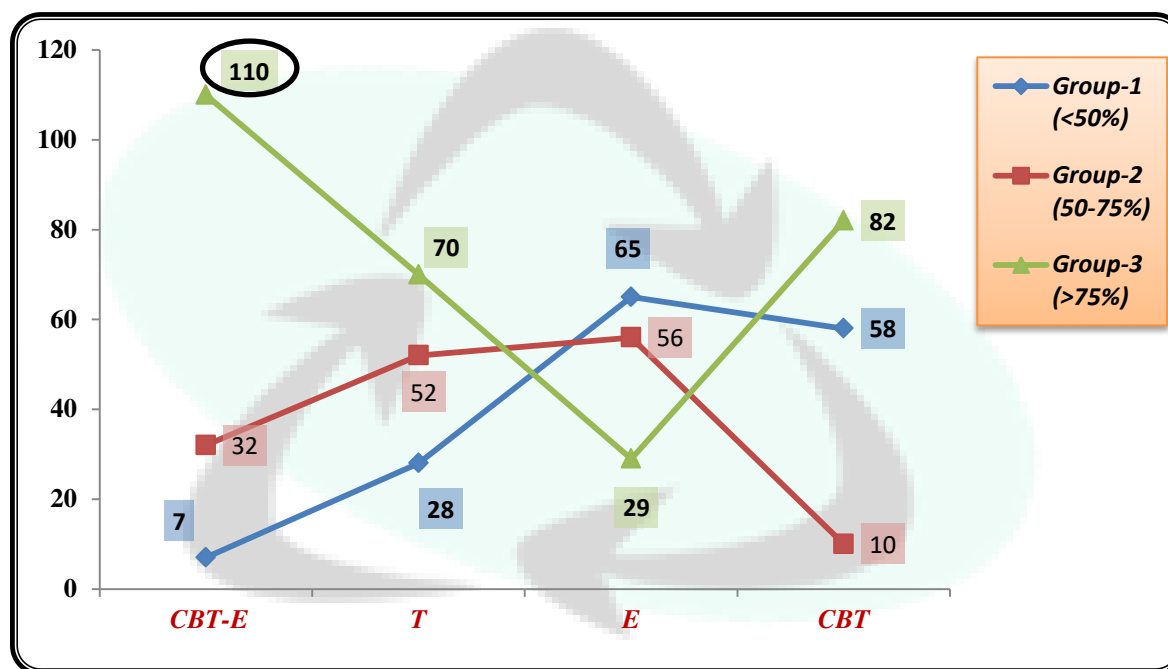
Table- I showed that pre- post difference for all teaching methods were statistical significant (p <0.001)

Table-II: Chi-square analysis for Post-test learning for four different methods

Percentage Grouping	Case based with Evidence (CBT-E)	Traditional (T)	Evidence (E)	Case based teaching (CBT)	Chi-square	P value
Group-1 <50%	7	28	65	58	148.07 85	<0.0 0001
Group-2 50-75%	32	62	56	10		
Group-3 >75%	110	60	29	82		

Table-II is showing Chi-square analysis for Post-test learning for four different methods on the basis of percentage grouping of post test score. The number of students in group3 (>75%) is highest (N=110) for CBT-E method of teaching ($p < 0.0001$).

Graph-I Percent distribution of students for different teaching and learning methodologies



DISCUSSION

Present study was aimed to evaluate the different teaching and learning methodologies for medical beginners. Case based teaching with evidence is a unique and innovative teaching approach, which improves the learning as shown in our results. Study reported in 2012 evaluated medical student performance using the Berlin questionnaire, which demonstrated that EBM knowledge and skills improved after six-week course. This EBM course can serve as a model for efficient, cost-effective delivery of important clinically relevant EBM content.¹¹

Puja D (2013) studied case based teaching in physiology and concluded that Case based teaching provides opportunity for students to use different resource materials and clarify the concepts, other than have better interaction with the instructor. Students commented that methodology helped them to correlate theoretical information with its clinical application and they started reading more books and gathers information from other resources.¹⁵ **Patel B. et al**

(2015) has evaluated the attitude and perception of faculties towards teaching Evidence Based Medicine to pre and para clinical undergraduate medical students, reported that majority had positive attitude towards this innovative aspect and agreed that it will help them in future clinical learning with more training to improve their ability to teach EBM. Almost 87% of faculties agreed that teaching EBM is a welcoming development and 87% medical faculties were agreed with the statement that literature searching skills and research writing improve their day to day teaching.¹² **Heiwe S. et al (2011)** specified that the dieticians, occupational therapists and physical therapists who participated in their study held positive attitudes towards evidence-based practice.¹³

Majeed F. (2014) found that performance of medical students was significantly improved after didactic lectures with an average of 17.53 than after CBT with an average of 16.47 (two-tailed $p = 0.003$). However, more than 70% students found that case-based teaching improved their knowledge about the topic better than lectures.¹⁶

Curran VR (2008) specified that students from across professions reported greater satisfaction with face-to-face, case-based learning when compared with other learning methods and his findings support the case-based method in facilitating interprofessional learning and highlight the importance of effective facilitation of small-group collaborative learning to enhance student satisfaction with inter professional learning experiences.¹⁷

Klakovic M et al (2004) assessed attitude of teachers towards EBM and reported that specialist university teachers as well as general practitioners those who were teaching EBM found that a high proportion of clinical teachers were mostly positive and confident about it.¹⁴

Researcher is keen to observe the perception of the students when these two teaching methods come together.

CONCLUSION:

Students learning improves the most with CBT-E amalgamate teaching approach since this process links preclinical courses with its clinical application. This may help students for understanding of the application of knowledge and higher level of thinking ability, which might influence students' performance for coming years in patients care. Last but not least this

approach will improve student's critical thinking and have better approach towards understanding of pre-clinical topics.

We as faculty will be able to have a better understanding for students' knowledge and can give updated approach to the students with evidence, advance over the traditional teaching methods.

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