ORIGINAL ARTICLE

Effectiveness of Early Clinical Exposure Module in Biochemistry to Understand the Basis and Rationale of Biochemical Tests for Diabetes Mellitus in First Phase MBBS Students

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Abstract

Background: Competency-driven curriculum designed and implemented for MBBS from year 2019 comes with some unique features, and early clinical exposure (ECE) is one of them. Biochemistry is considered by students as a subject of metabolic pathways that are difficult to retain and recall when learned. In biochemistry, ECE helps to recognize importance of subject in diagnosis, patient care, and treatment. It will motivate student for active learning through its context and clinical case exposure. ECE allows students to learn basic science subject with its applicative perspective.

Aim and objective: To study the effectiveness of ECE module of diabetes mellitus (DM) over didactic theory lecture in the understanding the disorder of carbohydrate metabolism.

Materials and methods: The present interventional study was carried out in SKNMC, Pune, on 80 voluntary first-year MBBS students of academic year 2019 to 2020. Participants were evaluated with pretest and posttest questionnaire that was designed on DM keeping in mind the competencies given in the curriculum for the said topic. Statistical analysis was done using paired *t* test.

Results: We have seen improved performance of students in posttest after ECE on DM as compared to pretest which was taken after traditional didactic lecture. Pretest and posttest score of students was 6.58 ± 2.86 (mean ± SD) and 12.36 ± 2.34, respectively. The *p* value for comparison was <0.001 which is highly significant.

Conclusion: ECE for DM in biochemistry improved interest of students in the topic making learning more interactive.

Keywords: Competency, Diabetes mellitus, Early clinical exposure, Student centric.

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Introduction

Competency-based undergraduate medical education program is designed with a goal to create an "Indian Medical Graduate" (IMG) possessing requisite knowledge, skills, attitudes, values, and responsiveness so that she or he may function appropriately and effectively as a physician of first contact of the community. Focus of medical education is to prepare students for lifetime patient care.[1] One of the key requisites of curriculum is providing relevance to learning. Competency-driven curriculum designed and implemented for MBBS from year 2019 comes with some unique features, and early clinical exposure (ECE) is one of them.[2] Early clinical exposure in biochemistry, which is one of the fundamental basic science subject, introduces some aspects of clinical context, such as basis and rationale of biochemical tests, their interpretation, their application in the patient care as early as in the first year of undergraduate teaching program. ECE allows students to learn basic science subject with its applicative perspective. The ability to learn concepts with emphasis of its future applications in patient care generates interest in learning process. It does provide a context that will enhance basic science learning and relate to experience of patients as a motivation to learn. It also provides great tool for retention of knowledge.[1,2] Biochemistry is considered by students as a subject of metabolic pathways with lot of enzyme names which are difficult to retain and recalled when learned. This makes traditional teaching methods like didactic theory lectures and practical sessions arousing less interest in students.[3,4] In fact, biochemistry forms the core subject of laboratory medicine in today's evidence-based treatment era of patient care. Importance of laboratory investigations in the screening, diagnosis, treatment, or monitoring of response to the treatment in various clinical conditions could be learned through its clinical application part of knowledge only. In biochemistry, ECE helps to recognize importance of subject in diagnosis, patient care, and treatment. It will motivate student for active learning through its context and clinical case exposure.[2] Clinical biochemistry topics are important in learning process, as they connect basic science subject with

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future practical application in the medicine.[4] ECE taken up with traditional teaching method is useful for basic science subject to improve understanding with better retention of knowledge due to clinical application part in the teaching methodology.[5] Hence, we decided to study the effectiveness of ECE module designed under CBME for diabetes mellitus in our institute for biochemistry subject. Competencies given in the curriculum are that students should be able to demonstrate understanding of alteration in metabolism in diabetes mellitus and its complications. Also, they should be able to explain the basis and rationale of biochemical tests done in the diabetes mellitus.

Materials and Methods

The present interventional study was carried out in SKNMC, Pune, on 80 voluntary first-year MBBS students of academic year 2019 to 2020 after their informed verbal consent. Our institute's intake capacity is 150 students, and ECE session was conducted for all of the present students on that day, but of them only 80 students volunteered to enroll in our study. Students were primed for the concept of ECE in the foundation course only conducted by the institute. Participants were evaluated with pretest and posttest questionnaire that was designed on diabetes mellitus keeping in mind the competencies given in the curriculum for the said topic. Faculties who completed curriculum implementation support program (CISP) for implementation of CBME were involved in designing the module and questionnaire. Three professors from department of Biochemistry, two professors from Department of Medicine, and Institutional Medical Education Unit (MEU) coordinator who have been working as subject expertise in the medical education field for more than 15 years have given inputs for the questionnaire designing. We kept in mind that students should understand basis, rationale, and interpretation of biochemical tests advised in diabetes mellitus. We included must know area of topic such as criteria for diagnosis of diabetes mellitus and its complications. We also kept in mind that they should know the significance of estimating Blood glucose levels, urinary glucose, ketone bodies, and HbA1c (Glycated Hemoglobin). They must know significance of HbA1c in the management of DM. They should know about uses of glucometer in monitoring of DM treatment by demonstrating its use. Total 20 questions were designed for one mark each. After morning didactic theory lecture on disorders of carbohydrate metabolism with emphasis on DM pretest was taken in the afternoon same day, and evaluation was done. This was followed by ECE on diabetes mellitus in the next day morning. ECE involved 3-hour session as designed in curriculum involving introduction, exposure to clinical context, and case-based discussion covering all competencies of disorders of carbohydrate metabolism. Detailed discussion on diagnosis of DM and its complication, monitoring of treatment, gestational DM, and use of glucometer by demonstration, significance of HbA1c in monitoring of treatment was done during session. ECE session involved case discussions, demonstration of Kussumul's breathing by using video clips, demonstration of use of glucometer, role-play by the faculties involved. Demonstration of use of glucometer and role-play was done in small groups of 20 students for clear understanding of the concept. The session was concluded with summary of the topic.

Posttest was conducted after the ECE session in the afternoon using same questionnaire as that of pretest. Both pretest and posttest were evaluated and data entered in excel sheet.

Statistical Analysis

The statistical analysis was done using primer of Biostatistics version 7 by Stanton A Glantz. The pre- and posttest data were presented in terms of mean ± SD. For pre- and posttest comparison of performance of students paired *t* test was used. The *p* value of <0.05 was considered to be statistically significant.

Results

Pretest score of students was 6.58 ± 2.86 (mean ± SD). Standard error of mean was 0.32. The posttest score was 12.36 ± 2.34 (mean ± SD). Standard error of mean was 0.26.

The paired *t* test value for comparison was 13.78. The *p* value for comparison was <0.001 which is highly significant.

Discussion

Medical education is evolved from teacher centric to student centric and competency based, as active participation of students in learning process will help them to retain the knowledge and it will also motivate them to read the subject by increasing their interest into it.[1,4–6]

Nowadays, so many tools are available to students besides books due to availability of internet, and it is very important to keep teaching learning methods interesting that will be helpful to the students promoting their learning process, making it easy but at the same time covering all three domains of learning. Because many research data has proven that involvement of students into learning process helps them in understanding of topic rather than just telling or demonstrating.[3–5] Every medical student is eager for patient interaction from the very first day. Biochemistry which is basic science subject with immense importance in laboratory medicine could be made much interesting by demonstrating application part of the subject in medicine practice from the first year only. ECE will help to strengthen comprehension of normal and its altered state in diseased state.[2]

In our study, as shown in Table 1 and Figure 1, we have seen improved performance of students in posttest after ECE on DM as compared to pretest which was taken after traditional didactic lecture. The difference between pre- and posttest performance is also statistically significant as shown by the *p* value <0.001.

In our department during ECE, DM topic was discussed with reference to cases involving diagnosis of condition, its complications, rationale of biochemical tests, and its applications. This has provided learners the stimulus and encouragement to focus on the learning from patients' perceptive and its importance in the management of DM. Students get an idea of its actual utility of biochemistry subject knowledge in patient management. This will shape learners commitment to acquire knowledge of the topic for the well-being of patients.

The findings of our study are in accordance with that of Dr Dhonde et al. who concluded in their study that active learning

Table 1: Pretest and posttest analysis

	Mean ± SD	*Standard deviation*	*Standard error of mean*
Pretest	6.58 ± 2.86	2.866	0.32
Posttest	12.36 ± 2.34	2.348	0.26
p value	<0.001 highly significant		

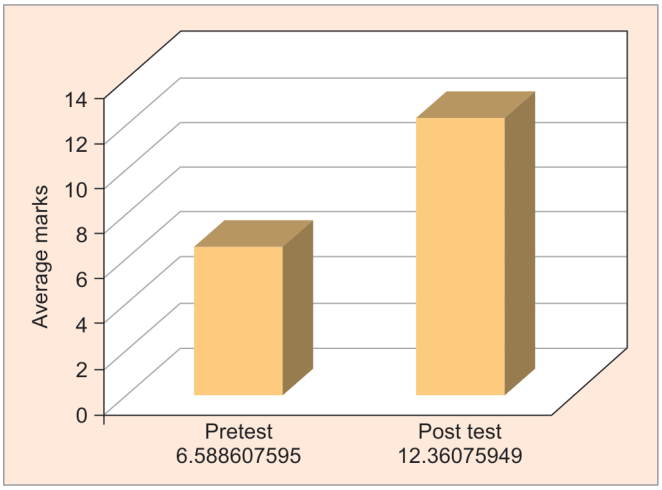

Fig. 1: Comparison between average marks of pretest and posttest

method through ECE, and small group teaching is attractive and useful approach to facilitate learning of biochemistry topics.[3]

Our finding is also in compliance with that of Amandeep Kaur et al. who showed in their study that ECE improved academic performance of students and motivated the students for self-directed learning by increasing their interest in subject.[4]

Tang et al. also found in their study that there is a positive correlation between students' learning achievement in basic medicine and their clinical exposure environment.[7]

According to a study result conducted by Das Piyali et al. in 2016, ECE is an effective technique to supplement didactic lectures to improve performance of students in the subject physiology.[8]

Nair et al., Surpaneni et al., and Joshi et al. also showed improved posttest scores in case-based learning tool of Biochemistry.[9–11]

Rawekar et al. also stated in their study that introduction of ECE in the first year was positively received by medical students through integrated clinical case-oriented teaching of basic science subject. They also said ECE being helpful prospectively in their clinical posting starting in second year.[12]

In our ECE session, students asked questions during laboratory investigation analysis parts showing their active participation in learning method. Students have also written feedback in their log books that ECE helps them in understanding topic better due to clinical application part associated with it which motivates them to read further about the topic. They liked the demonstration of use of glucometer bed side and in self-monitoring of blood glucose by the patient. Students also suggested that this kind of sessions should be conducted for better understanding of other topics also.

Chinmay in his review article of ECE concluded that it is a useful teaching learning method for basic science subject.[5]

ECE in biochemistry curriculum introduces medical students to clinical environment or case based scenario during early stage (First year) of undergraduate curriculum, which improves the academic interest of students in biochemistry in a positive way providing stimulus to active learning through self-directed learning and participation in case discussion. This will help to develop their analytical and decision making skills for the welfare of the patients in the medicine practice from early stage of MBBS.

Conclusion

We would like to conclude that it is very important to establish link between basic science First MBBS subject biochemistry with actual clinical application part of subject associated with it. This is done through introduction of ECE in the UG curriculum by MCI. ECE for DM in Biochemistry improved interest of students in the topic making learning more interactive which helped them in understanding basis and rationale of biochemical tests done in DM with its application in practical medicine. DM was better understood and retained with importance of biochemical investigations in overall management of disease through ECE. ECE is to be made interactive and interesting for students is always challenging for the teachers involved in the conduction which could be overcome through proper designing of the module keeping in mind the competencies.

Limitations

Effectiveness of ECE was studied for DM module only of the total 10 topics as per CBME for first-phase MBBS students.

References

1. Medical Council of India. Competency based undergraduate curriculum for the Indian Medical Graduate [Internet]. New Delhi: Medical Council of India, (I) 2018. pp. 14–16. Available from: https://www.mciindia.org/CMS/wpcontent/uploads/2020/01/UG-Curriculum-Vol-I.pdf.
2. Medical Council of India. Competency based undergraduate curriculum for the Indian Medical Graduate [Internet]. New Delhi: Medical Council of India; Early Clinical Exposure for the Undergraduate Medical Education Training Program; 2019. pp. 1–43.
3. Prakash DS, Pratap J, Belwalkar Gajanan J, et al. Early clinical exposure: a tool to learn biochemistry: a small group study. NJIRM 2015;6(5):76–80.
4. Amandeep K, Sahiba K, Tejinder S, et al. Early clinical exposure to enhance the learning of biochemistry in first year M.B.B.S students. Int J Clin Biochem Res 2018;5(3):401–405. DOI: 10.18231/2394-6377.2018.0084.
5. Chinmay S. Early clinical exposure- why and how? J Educat Technol Health Sci 2018;5(1):2–7. DOI: 10.18231/2393-8005.2018.0002.
6. Anika S, Kumar GS, Singh SV. The new 2019 medical curriculum in India; in light of the integration of medical curriculum. J Med Educat Fall 2019;18(4):251–259.
7. Tang K-P, Chen C-Y, Wu M-S, et al. Correlation between early clinical exposure environment, attitudes toward basic medicine, and medical students' basic science learning performance. BMC Med Educ 2019;19(1):183. DOI: 10.1186/s12909-019-1612-0.
8. Das P, Biswas S, Singh R, et al. Effectiveness of early clinical exposure in learning respiratory physiology among the newly entrant MBBS students. J Adv Med Educ Prof 2017;5(1):6–10.
9. Nair PS, Shah T, Seth S, et al. Case based learning: a method for better understanding of biochemistry in medical students. JCDR 2013;7(8):1576–1578. DOI: 10.7860/JCDR/2013/5795.3212.
10. Joshi KB, Nilawar AN, Thorat AP. Effect of case based learning in understanding clinical biochemistry. Int J Biomed Adv Res 2014;5(10):516–518. DOI: 10.7439/ijbar.v5i10.920.
11. Surpaneni KM. The effect of integrated teaching with case based learning (CBL) in the biochemistry of undergraduate medical curriculum. JCDR 2010;4(5):3058–3063.
12. Rawekar A, Jagzape A, Srivastava T, et al. Skill learning through early clinical exposure: An experience of indian medical school. J Clin Diagnos Res: JCDR 2016;10(1):JC01–JC04. DOI: 10.7860/JCDR/2016/17101.7022.