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Original Research Article

Perception of MBBS Students About Pharmacology Teaching in New Competency-based Medical Education (CBME) Curriculum at a Tertiary Care Medical Institute of Haryana

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Abstract

Background: Competency-based medical education (CBME) is an approach that ensures that the focus of teaching, learning, and assessment is on real-life medical practice. There is a radical shift in the teaching, learning, and assessment methods from the traditional curriculum.

Objectives: The current study aimed to assess the perception of students regarding the recently implemented undergraduate pharmacology curriculum.

Materials and Methods: This was a cross-sectional study conducted among MBBS students with the help of a semi-structured questionnaire. The questionnaire consisted of various domains, namely, general perception about CBME, perception about pharmacology teaching and assessment patterns using a 5-point Likert scale, and the scoring system based on the responses. Based on the scoring system, positive, neutral, or negative perceptions of the students toward the CBME curriculum were analyzed.

Results: Out of the 175 participants, 165 (94.4%) of the students scored more than 60%, and hence, they had a positive perception of the newly implemented CBME curriculum in pharmacology. 159 (91%) students favored the incorporation of competencies like intravenous (I/V) drip setting. Most students opined that conceptual teaching like the personal drug (P-drug) concept, drug promotion literature (DPL), and prescription writing in the new curriculum will be helpful in better understanding the subject and will set a firm foundation for becoming a good practitioner. The majority of the students agreed with the inclusion of periodic and formative assessments in the new curriculum.

Conclusion: The majority of participants preferred the new curriculum over the previous one, which is a welcome sign for the successful outcome of the revised CBME curriculum in pharmacology.

Keywords

Competency-based medical education curriculum, traditional educational approach, drug promotion literature, P-drug concept

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Introduction

The aim of imparting medical education is to train graduates to take care of the health needs of society efficiently.[1] The traditional medical education system was based on a curriculum that was subject-centered and time-based. The teaching–learning activities and the assessment methods focused more on knowledge than on attitude and skills.[2] Traditional pharmacology teaching has been criticized for not preparing students for medical practice nor teaching the safe and rational use of medicines. Competency-based medical education (CBME) is an approach that ensures that the focus of teaching, learning, and assessment is on real-life medical practice.[1] It allows students the opportunity to attain broader views of their role in their profession.

The traditional educational approach was teacher-centered, with a focus on one-sided communication-based knowledge

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acquisition and single-time, summative assessments.[3] CBME aims to improve student competence and performance by shifting the educational approach to a learner-centered one, with focused student learning, knowledge application, and frequent, formative assessments.[4] Various skills and competencies have been introduced in the new pharmacology curriculum, and there is a radical shift in the teaching, learning, and assessment methods from the traditional curriculum.[5]

Student feedback can be considered an effective methodology for making pharmacology more interesting and practicable, as students' feedback helps to provide several useful inputs for educational improvements.[3] Since the new curriculum was recently introduced, very few studies have been done on the same. Hence, a study was planned to be carried out to assess the perception of students regarding the recently implemented undergraduate pharmacology curriculum, pharmacology teaching, and learning methods, and their suggestions to improve present pharmacology teaching and curriculum.

Objectives

This study aimed to assess the perception of MBBS students about pharmacology teaching in the newly implemented CBME curriculum. The present study was conducted to evaluate the students' opinions regarding the application of the CBME curriculum and the extent to which their perceptions support the curriculum.

Materials and Methods

This was a cross-sectional study conducted among MBBS students in the 2019 batch who had already completed the undergraduate pharmacology course. A total of 168 students were enrolled in the study. Online informed consent was obtained from all the participants before the study. A semi-structured questionnaire focusing on the perception of various aspects of the pharmacology syllabus, teaching, and measures to improve the existing pharmacology curriculum and assessment was developed. Data collection was done through Google Forms online survey platform. Only those who provided the informed consent were taken to the questionnaire web page. The questionnaire was validated for its feasibility in content, construction, and language by three subject experts in the field of pharmacology. Most of the questions were framed on a 5-point agree–disagree Likert scale. During the data analysis phase, the 5-point scale was transformed into a 3-point response scale ranging from one (disagree) to three (agree), with two corresponding to "neither agree nor disagree." A scoring system was developed based on the responses. The maximum score for the positive response (strongly agree) was given five points, the next better response (agree) was given a score of four, and so on. The overall total score was calculated for each respondent. An arbitrary scale was developed to categorize the responses obtained from the students, namely, negative perception (total score in each category <40%), neutral perception (41%–60% of the total score), and positive perception (>60% of the total score) toward the curriculum.[6] The study had been approved by the Biomedical Research Ethics Committee of the Institute (Pandit Bhagwat Dayal Sharma Post Graduate Institute of Medical Sciences, Rohtak) vide letter no. BREC/23/382 dated December 16 2022.

Data were collected, coded, and analyzed using Statistical Package for the Social Sciences (SPSS) software Version 20. Quantitative analysis was done using frequency distributions, mean, and standard deviations when applicable. Qualitative analysis for open-ended questions was performed, and summaries of responses were recorded, analyzed, and categorized into different themes.

Sample Size Calculation

$$\text{Population size} = \frac{\frac{Z^2 \times p(1-p)}{e^2 N}}{1+\left(\frac{Z^2 \times p(1-p)}{e^2 N}\right)}$$

The margin of error = e (at 5%), Z-score = $z - 1.96$ (with 95% confidence interval), p = standard deviation 0.5.

According to the formula, the sample size comes out to be 151.44443. Assuming a response rate of 90%, a minimum sample size of 168 was required, and 175 participants were enrolled for the study.

Results

Demographic and Survey Characteristics

Out of 175 participants, 76 were female and 99 were male. The majority of the students, 135 (77.1%), were in the age group of 20–22 years. The mean age of the students was 21.75.

General Perception About Teaching

Students had mixed opinions about teaching methods. The majority of the students, 110 (62.9%), wanted lecture classes using both PowerPoint incorporating videos and blackboard teaching, while 46 (26.3%) of students wanted only blackboard teaching. 124 (71.4%) of students believe that offline teaching is better than online teaching to understand pharmacology. This batch could give their perception about online or offline teaching because many classes of this batch had to be conducted online because of the COVID-19 pandemic. Table 1 summarizes the drawbacks of online and offline teaching as suggested by the participants.

Table 1. Students' Perception Toward Online and Offline Teaching.

Perception of Students About Online Teaching	Perception of Students About Offline Teaching
Lack of classroom environment	Lots of disturbance
Not able to ask doubts	Time wastage
Network issues	Requires more time than online
Lack of concept understanding	Difficult to interact with the teacher as one-way teaching (didactic)
Straining of eyes due to increased screenexposure	Not convenient
One-way communication	More distractions
Lack of concentration	
Lack of discipline from our side	

General Perception About the New CBME Curriculum

CBME is a competency-based learning program that encompasses small group discussions, self-directed learning (SDL), role plays, and so on, to give the students a better conceptual understanding of the topics. The majority of students, 135 (77%), agreed that small group discussions are very helpful in understanding the subject. Moreover, 96 (54.8%) students believed that SDL is a more effective way of teaching and learning than traditional didactic lectures. The majority of the students had an opinion that tutorials on different topics are a good form of learning the subject, as 132 (75.4%) students agreed on the five-point Likert scale regarding their opinion on tutorials. 138 (78.8%) agreed that implementation of attitude, ethics, and communication (AETCOM) at this early stage will set a firm foundation to become a good practitioner by engraving the principles of empathy and ethics. Students had mixed opinions on maintaining logbooks: that is, 83 (47.4%) believed that maintaining logbooks has helped them improve their skills, while 114 (65%) students thought that writing practical notebooks would be helpful. The perception of students regarding assessment patterns, horizontal and vertical integration, and inclusion of multiple choice questions (MCQs) in the new CBME curriculum are also shown in Table 2.

Perception About Pharmacology Teaching in the New CBME Curriculum

The results of this study reveal insights into students' perceptions of different modes of pharmacology teaching classes according to the recently implemented CBME curriculum. A large number of students appreciated the department's well-organized and systematic teaching program.

106 (60.6%) of the students were of the opinion that reducing the total duration of the course of 2nd Prof from 1.5 to 1 year is not sufficient. 155 (89.1%) of students were aware that the number of lectures in pharmacology had been reduced from the traditional curriculum. 114 (65%) believed that the reduced number of lectures had affected their attainment of adequate knowledge of pharmacology. The previous belief among students was that pharmacology as a subject is tough and volatile among all the second professional subjects. Still, after the implementation of CBME, new skillful ideas in the curriculum have made it one of the interesting subjects and helped the students to learn the subject enjoyably, according to the results of our study (Figure 1).

The agreement about the utility of incorporation of competencies like intravenous (I/V) drip setting was observed in 159 (91%) of students, whereas the agreement about the utility of incorporation of dosage calculations, personal drug (P-drug) concept, drug promotion literature (DPL), and prescription writing in the pharmacology teaching curriculum was seen in 157 (89.7%), 151 (86.3%), 143 (82%), and 165 (94.2%) students, respectively. Students believed that one discussion had helped them better understand the drugs and their clinical implications. The practical demonstration of exercises relating to techniques of injection, correct usage of devices (inhalational), and demonstration of dosage forms were reported to be very useful in 164 (93.7%), 162 (92.6%), and 160 (91.4%) students, respectively. 150 (85.7%) students found computer-assisted learning and simulations (CAL) and graphs more interesting as they could have a better understanding of animal experiments and graphs. The reporting of adverse drug reactions (ADRs) is the key role of pharmacologists and is the moral duty of every physician. Exercises taught on pharmacovigilance, like ADR reporting and causality assessment, were reported to be useful by 155 (88.5%) of students.

The majority, 144 (82.3%), of the students agreed that communication skills-based competencies in pharmacology would help them build a better doctor–patient relationship.

The study included various open-ended questions for the students' perception and for better suggestions by the students to be incorporated into the future pharmacology curriculum. Apart from the skills mentioned above, many students suggested visits to clinical departments to learn about the practical use of drugs in a real-time scenario. The students also wanted to learn how to manage various emergency conditions like myocardial infarction (MI), status asthmatics, snake bite, and so on, in real-world scenarios. Some of the students had suggested some more topics, which, according to them, should have been included in the syllabus

Table 2. Perception of Students Regarding New CBME Curriculum and Assessment Pattern.

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
Small group discussions are more helpful	49 (28%)	86 (49%)	28 (16%)	08 (4.5%)	02 (1.1%)
Self-directed learning (SDL) is more effective	35 (20%)	61 (34.8%)	60 (34.3%)	13 (7.4%)	06 (3.4%)
Vertical and horizontal integration	66 (37.7%)	82 (46.8%)	23 (13.1%)	01 (0.6%)	03 (1.7%)
Periodic and formative assessment is a vital component	75 (42.8%)	71 (40.5%)	20 (11.4%)	02 (1.1%)	01 (0.6%)
MCQs will be helpful in future exams	85 (48.6%)	68 (38.9%)	17 (9.7%)	00 (00%)	00 (00%)

Notes: CBME, competency-based medical education; MCQs, multiple choice questions.



Figure 1. The Perception of Students Regarding Assessment Pattern in Pharmacology.

in order to provide a thorough understanding of the subject. Students have suggested that competencies related to drug development and clinical trials should be incorporated. Students also wanted to have more elaborate exercises on dosage calculations in special populations. Also, the skills and competencies in drug interactions, fixed drug

Table 3. Perception of Students About Inclusion of OSPE in CBME Curriculum.

Opinions About OSPE	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
Better scoring	68 (38.8%)	78 (44.5%)	23 (13.1%)	02 (1.1%)	00 (00%)
Testing the knowledge gained	65 (37.1%)	85 (48.5%)	21 (12%)	00 (00%)	00 (00%)
Timely finishing the examination	68 (38.8%)	74 (42.3%)	28 (16%)	02 (1.1%)	00 (00%)
It will be more helpful in future	67 (38.2%)	70 (40%)	34 (19.4%)	00 (00%)	00 (00%)

Notes: CBME, competency-based medical education; OSPE, objective structured practical examination.

combinations, and medication errors should be a part of the Pharmacology curriculum, according to the participants.

In the new curriculum, the number of questions and weightage of theory paper was increased from 40 to 100 marks, which 107 (61.2%) students favored, and they found this a better way to assess their knowledge of Pharmacology, while 68 (38.8%) students found this change stressful. The conduct of the practical examination in the new curriculum is based on the objective structured practical examination (OSPE). Most of the students gave a positive response regarding OSPE, which is shown in Table 3.

The overall total score was calculated for each respondent based on the responses to every question. 165 (94.4%) of the students scored more than 60%, and hence, they had a positive perception of the newly implemented CBME curriculum in pharmacology, while 10 (5.7%) students scored between 40% and 60%, and hence, they had a neutral perception. None of the students showed a negative perception (less than 40% score) of the curriculum.

Discussion

The CBME curriculum has recently been introduced in India, and it is very different from traditional teaching. It mainly focuses on skill development and makes the student competent enough to practice in the future by incorporating various skills, hands-on experience, ethics training, and so on. Since the new curriculum has been recently implemented, there is limited information regarding its benefits and differences from traditional teaching. Although the majority of the students feel that the newly implemented CBME curriculum is better than the traditional one, a few students also disagree on certain things in the new curriculum.

In this study, 138 (78.8%) agreed that implementation of AETCOM at this early stage would set a firm foundation for becoming a good practitioner by engraving the principles of empathy and ethics. In contrast, in a study by Patil et al.,[7] 92% of the respondents stated that the AETCOM module is important for building doctor–patient relationships, which is in accordance with our study.

More than half, that is, 96 (54.8%) of the students, agreed that SDL is a good form of learning and is vital for initiating self-motivation and creativity among the students. These findings are similar to the study done by Muraleedharan et al.,[8] where 75.5% (n = 111) students reported SDL was extremely useful. Similarly, in a study done by Patil et al.,[7] 69% of students favored the SDL sessions in the new CBME curriculum. Along with SDL, students also supported the concept of short group discussions (SGD), and 135 (77%) of the students agreed that SGDs are very helpful in understanding and building interest in a particular subject in the present study, and 67% and 72% students had a similar opinion in studies by Patil et al.[7] and Ramanathan et al.,[9] respectively.

In the present study, 148 (84.5%) students felt that vertical and horizontal integration would make them understand the topics better, as horizontal alignment of topics with pathology and microbiology helped the students to correlate the pathophysiology of the diseases with causing organism and how drugs act to get the pharmacological effect. Students had the same thoughts in the study done by Patil et al.,[7] where the majority 93% of the students agreed that vertical and horizontal integration of topics provides them better comprehensive learning. According to a related study by Muraleedharan et al.,[8] 67% of the students were of the opinion that vertical integration with other departments would give them a better interest in listening to the classes as it would give them a better understanding. Similarly, Nehra et al.[10] and Selva and Rithikaa[11] concluded that 85% and 76% of students, respectively, agreed that it would be more useful to learn pharmacology along with clinical subjects.

In our study, 150 (85.7%) agreed that studying the effects of drugs by means of CAL and graphs is a good form of learning pharmacology. Similar results were found in a study by Gurudeva et al.,[12] where 95.4% of students indicated CAL and graphs as interesting exercises to understand basic pharmacology.

Assessment is an important component of CBME to improve the learning skills of the students. In the present study, 146 (83.4%) students agreed that periodic assessment is a better method than only assessing at the end of the session. In a study done by Selva and Rithikaa,[11] 69.9% of the participants agreed to it. Students also support formative assessments with the thought that this makes them more familiar with various question patterns assisting them in better time management and better presentation style in exams. Young minds have progressive thoughts that the inclusion of evaluation by means of MCQs in the pharmacology article will be helpful for them in future exams, and 153 (87.4%)

students agreed to it in the present study. In another study by Vegi et al.,[13] and Patil et al.,[7] a large number of students claimed that preparation that is MCQ-oriented will help them for MBBS professional (theory and practical) examinations with strong concept-based learning. The increase in weightage of theory paper to 100 marks was supported by 107 (61.2%) students in this study. In contrast, previous studies had contrary findings, that 65% of the participants in a study by Patil et al.,[7] 86.6% in Ramanathan et al.,[9] and 65% in Muraleedharan et al.[8] found it to be stressful.

Only 47.4% of students were in favor of maintaining logbooks, and only 65% were in favor of writing practical notebooks. Previous studies also had mixed views regarding this. In a study done by Patil et al.,[7] around 56% of the students showed a positive attitude toward maintaining a separate log book for each department. In contrast, the remaining 44% assume it to be difficult.

In our study, 94.4% of students supported the implementation of a new curriculum that would be most helpful in achieving roles and goals at a stipulated time. Similarly, in a study by Ramanathan et al.,[9] 89.3% of students had positive perceptions about the CBME curriculum. A similar study done by Selva and Rithikaa[14] showed that 71.8% of participants opined that to achieve the roles and goals, the new curriculum in MBBS would be immensely helpful, but this study included both students and the teaching faculty.

A large number of students appreciated the department's well-organized and systematic teaching program. Some students expressed their opinion about pharmacology that although the subject itself is tough and volatile, the new, skillful ideas have helped them to learn the subject enjoyably. The majority of participants preferred the new curriculum over the previous one, which is a welcome sign for the successful outcome of the revised CBME curriculum in Pharmacology.

The study focuses on students' perceptions of a newly introduced CBME curriculum, offering valuable insights into educational enhancements. In this study, not only the general perception of students was evaluated but also the perception toward the subject of pharmacology. Suggestions were also sorted by students for further improvement of the pharmacology curriculum. This can be a stepping stone for evaluating and refining the new curriculum to serve students' needs better and optimize their learning outcomes.

However, the study is restricted to a single institute, which limits the generalizability of the findings. To ensure a more comprehensive understanding, further multicentric studies with larger sample sizes need to be done to explore the long-term effectiveness of the curriculum. Another limitation of the study is that only the learners' perspective was sought for the newer curriculum; however, the faculty perspective needs to be explored in the overall CBME framework for strong evidence-based literature on medical education reform.

Conclusion

Overall, the majority of the students had a positive perception of the competencies and exercises designed in the Pharmacology CBME curriculum. Nevertheless, the study also identified priority areas of improvement with some valuable suggestions by the learners, which need to be addressed by the stakeholders to mitigate the general boring stigma of pharmacology for the students.

Abbreviations

ADR: Adverse drug reaction; **AETCOM:** Attitude, ethics, and communication; **CAL:** Computer-assisted learning; **CBME:** Competency-based medical education; **DPL:** Drug promotional literature; **MCQ:** Multiple choice questions; **OSPE:** Objective structured practical examination; **SDL:** Self-directed learning; **SGD:** Small group discussion; **SPSS:** Statistical Package for the Social Sciences.

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Ethical Approval and Informed Consent

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