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Original Research Article

The impact of pre reading material before didactic lectures on the learning outcomes of second year medical students in Pharmacology

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ABSTRACT

Background: Although didactic lectures remain the primary mode of teaching in pharmacology, they often encourage passive learning. Providing pre-reading materials before lectures may enhance understanding and facilitate clinical application. This study aimed to evaluate the academic performance of second-year medical students using pre-reading materials and to compare two modes of pre-reading in pharmacology teaching.
Methods: A cross-sectional study was conducted among 99 MBBS students, who were provided with pre-reading material for four out of six lectures on the Central Nervous System. The materials were in the form of videos for two lectures and brief notes for two others, provided one week before the lecture. Student performance was assessed through MCQ tests conducted. Feedback obtained. Comparison was made between the performance of students with and without pre-reading material by using paired T-test.
Results: Teaching with pre-reading material (Mean± SD: 10.06±3.18) significantly improved the performance of the students in the test as compared to the test in which no pre-reading material was given (4.56±2.49) which was statistically significant($p<0.001$). Pre reading material with video as resource (11.18±3.73) compared with notes (8.95±4.01) was also statistically significant($p<0.001$). 90% of students felt that teaching with pre-reading material improves their understanding of the subject and can be implemented in routine curriculum in future.
Conclusions: Providing pre reading material can be effectively integrated into the undergraduate curriculum to make pharmacology more engaging and applicable in the clinical setting.

Keywords: Didactic lectures, Pre-reading material, Undergraduate curriculum

INTRODUCTION

The National medical commission (NMC) has introduced competency-based medical education (CBME) in undergraduate medical training with the objective of producing an Indian medical graduate (IMG) who is clinically competent, ethically sound and capable of lifelong learning.[1] This curriculum emphasizes learner-centred teaching–learning strategies, outcome-based education and the development of competencies such as critical thinking, clinical reasoning and self-directed learning (SDL). In this evolving educational framework, pharmacology plays a pivotal role by equipping students with the knowledge and skills required for rational and safe use of medicines in clinical practice.[2] In pharmacology, teaching–learning methods have evolved from conventional didactic lectures to the use of audio-visual aids and computer-assisted learning to support this paradigm shift.[3] Despite these advancements, didactic lectures continue to be widely employed for teaching large groups of students. However, such lectures often result in passive learning, limiting students' ability to integrate pharmacological knowledge with clinical practice, which is a key expectation of CBME.[4] CBME advocates the development of competencies such as critical thinking, clinical reasoning and SDL.[5] In this context, providing pre-reading material prior to classroom teaching serves as an effective learner-centric strategy to promote active

engagement. Pre-reading refers to the structured review of learning material before a scheduled class and reflects students' preparedness for learning. It facilitates activation of prior knowledge, improves comprehension of core concepts and enables students to participate more effectively during classroom interactions.[6] This approach aligns with NMC's emphasis on SDL, wherein students take responsibility for identifying learning needs and acquiring knowledge independently.

The effectiveness of pre-reading strategies has been supported by several studies. Hwang et al, demonstrated that students who were provided with pre-reading material achieved significantly higher post-test scores compared to those who did not receive such material, indicating a positive impact on learning achievement.[6]

Similarly, Beg et al reported a statistically significant improvement in class test performance among students who received pre-reading material prior to teaching sessions, reinforcing the role of pre-class preparation in enhancing academic outcomes.[3] These findings suggest that pre-reading can serve as a valuable adjunct to traditional teaching methods. Additionally, earlier studies indicate that pre-reading assists students in identifying key concepts and challenging areas prior to class, thereby allowing more focused attention on clarifying these aspects during lectures.[7,8]

In the context of CBME, where the focus is on achieving defined competencies rather than mere knowledge acquisition, integrating pre-reading material into pharmacology teaching may enhance active learning, promote self-directed learning and improve academic performance. However, evidence regarding the implementation and effectiveness of pre-reading strategies in undergraduate pharmacology teaching within the Indian CBME framework remains limited. Therefore, the present study aims to evaluate the impact of pre-reading material on students' learning and performance in pharmacology, thereby contributing to the growing body of evidence supporting learner-centred teaching–learning methods under the NMC curriculum.

METHODS

A cross-sectional study was conducted among 99 second year MBBS students in department of Pharmacology for a period of 3 months from 1st June 2024 to 31st August 2024. The study was undertaken after obtaining written informed consent from the students and approval from the Institutional Ethics committee. Interactive sessions were conducted to orient the departmental faculty and 2nd professional MBBS students towards the pre-reading method of teaching. For a total of 6 lectures on central nervous system (CNS), pre reading teaching material was provided for 4 lectures and no pre-reading material was provided for other 2 lectures. Pre reading material was in video format for two lectures and brief notes for other two lectures (Table 1). Pre reading materials were given one week prior to the lectures. The assessment of students was done on the basis of MCQs test before all the six lectures. Feedback from students were obtained. Comparison was made between the performance of students with and without pre-reading material by using paired T-test.

RESULTS

Teaching with pre-reading material (Mean±SD: 10.06±3.18) significantly improved the performance of the students in the test as compared to the test in which no pre-reading material (control) was given (4.56±2.49) which was statistically significant($p<0.001$) (Figure 1). When pre reading material with video as resource (11.18±3.73) compared with control (4.56±2.49) was statistically significant($p<0.001$) (Figure 2). When pre reading material with notes as resource (8.95±4.01) compared with control (4.56±2.49) was statistically significant($p<0.001$) (Figure 3).

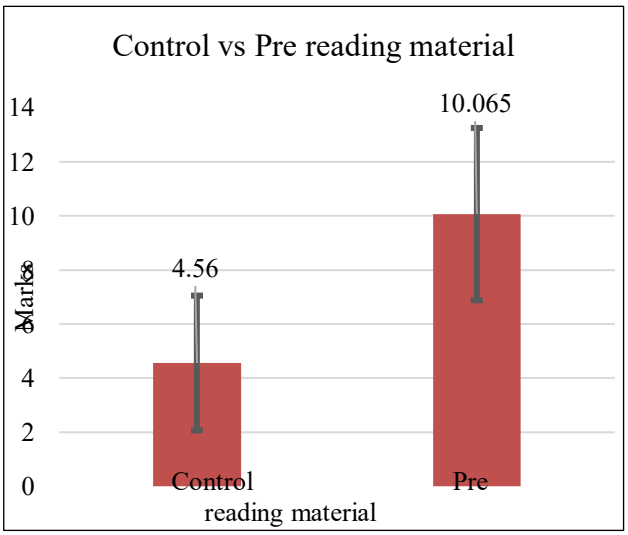

Figure 1: Control vs Pre reading material.

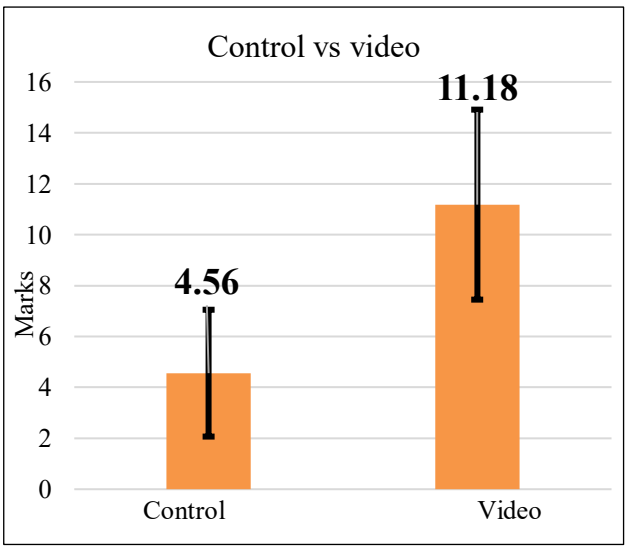

Figure 2: Control vs Video.

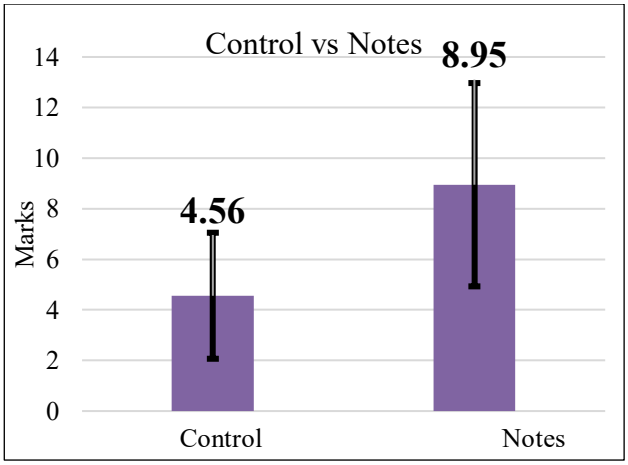

Figure 3: Control vs Notes.

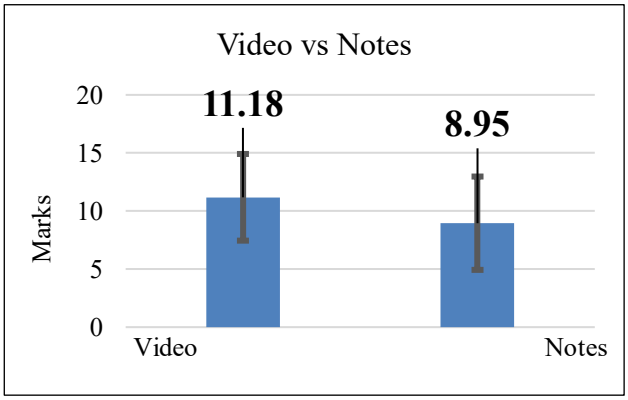

Figure 4: Video vs Notes.

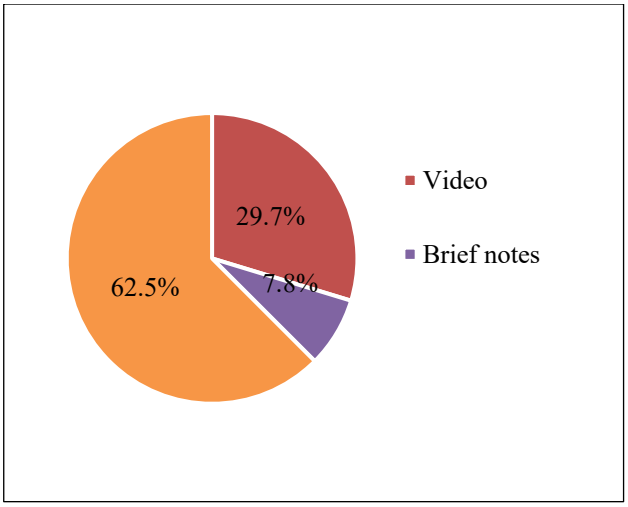

Figure 5: Contents of pre-reading material can be.

Pre reading material with video as resource (11.18±3.73) compared with notes (8.95±4.01) was also statistically significant ($p<0.001$) (Figure 4). Feedback form was obtained from all MBBS students at the end of the study period and were marked using a 5-point Likert scale (Table 2). About 90% of students felt that teaching with pre-reading material improves their understanding of the subject and can be implemented in routine curriculum in future. Additionally, their opinion regarding pre reading material resources was also obtained and around 62% of students suggested both video and notes as pre reading material (Figure 5).

Table 1: Topics and intervention given.

CNS topics	Intervention- pre reading material
General anaesthesia	Not provided
Local anaesthesia	Not provided
Antiparkinsonian drugs	Brief notes
Sedatives and hypnotics	Brief notes
Opioids	Video format
Antipsychotics	Video format

Table 2: Feedback form filled by MBBS Students (n=99).

S. no.	Questions/statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1.	Teaching with pre-reading material increases my understanding of the subject	31.3%	48.4%	15.6%	1.6%	3.1%
2.	Teaching with pre-reading material is more interactive than the conventional teaching without preparation	26.6%	48.4%	18.8%	4.7%	1.6%
3.	Teaching with pre-reading material increases my attention/concentration in class	26.6%	45.3%	21.9%	3.1%	3.1%
4.	Teaching with pre-reading material can be implemented in routine curriculum in future	43.8%	46.9%	7.8%	0%	1.6%

DISCUSSION

The present study evaluated the impact of providing pre-reading material prior to didactic lectures on the academic performance and perceptions of second-year MBBS students in pharmacology. The findings demonstrate that the incorporation of pre-reading material significantly enhanced students' test performance compared to lectures delivered without prior preparation. This supports the growing evidence that pre-class preparation is an effective learner-centered strategy, particularly within the framework of competency-based medical education (CBME). Didactic lectures continue to be the predominant teaching modality in pharmacology due to their feasibility for large groups. However, they are often associated with passive learning and limited student engagement. In the present study, students who were provided with pre-reading material demonstrated significantly better performance in the class test compared to tests conducted without pre-reading material ($p=0.01$). These findings are consistent with previous studies reporting improved academic performance among students when pre-reading resources were made available prior to instruction.[9,10]

An important observation in this study was the differential impact of the type of pre-reading material. Students who received video-based pre-reading resources performed significantly better than those provided with written notes. This may be attributed to the multimodal nature of video content, which combines visual and auditory stimuli and may enhance attention, conceptual clarity and memory retention which was similar to the previous study.[8]

Video resources may also simplify complex mechanisms of drug action and clinical correlations, making them more accessible to undergraduate learners. Nevertheless, written notes also resulted in significantly improved performance compared to no pre-reading, highlighting that any structured pre-class material can positively influence learning outcomes. The positive student feedback further reinforces the educational value of pre-reading strategies. A large proportion of students perceived that pre-reading improved their understanding of pharmacology and supported its integration into the routine curriculum. This favourable perception is particularly relevant in the CBME context, which emphasizes SDL as a core competency. By engaging with learning material before class, students assume greater responsibility for their learning, develop preparedness and participate more actively during classroom sessions.

The findings of this study are consistent with previous research demonstrating improved academic performance and learner engagement following the use of pre-reading or pre-class learning materials.[3,6] Similar studies have reported that students who prepare in advance are better able to identify difficult concepts and utilize classroom time more effectively for clarification and discussion. Such strategies also align with the flipped classroom and blended learning approaches increasingly advocated in medical education.

Limitations

This study was conducted in a single institution with a limited sample size, which may restrict the generalizability of the findings. The intervention was limited to selected CNS topics and long-term knowledge retention and clinical application were not assessed. Student engagement with the pre-reading material was not objectively monitored and assessment was based solely on MCQ tests, which may not fully capture higher-order cognitive skills.

CONCLUSION

Providing pre-reading material prior to didactic lectures significantly improved students' academic performance in pharmacology. Both video-based and text-based resources were effective, with videos showing greater benefit. Pre-reading promotes active learning and self-directed learning, aligning with the objectives of CBME. Incorporation of structured pre-reading material into the undergraduate pharmacology curriculum may enhance student engagement and learning outcomes.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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