

## Evaluation of effective instructional teaching methods used for learning in pharmacology among second year medical students and their feed back

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### Abstract

**Introduction:** To evaluate the existing teaching methods in pharmacology classes using Black board teaching, Video-tapes and learning by Poster based exercise.

**Material and Method:** Second year medical students (4<sup>th</sup> term=66) were participated in the study at MVJ medical college and Research hospital, Bangalore. Initially, the students were thought about anti-epilepsy drugs and anti-Parkinsonism drugs by black board teaching. Then students were given 4 days gap. Later, they were asked to answer 20 multiple choice questions (MCQ's) regarding anti-epilepsy and anti-Parkinsonism drugs on the basis of knowledge they acquired. Further, students were divided into group A and group B. Group A students (n=33) were given Video-tape learning on anti-epilepsy drugs and group B students (n=33) Poster exercise on anti-epilepsy drugs. Further, cross-over design was applied to the study, where Group B students were given Video-tape learning on anti-Parkinsonism drugs and group A students were given Poster exercise on anti-Parkinsonism drugs. Students were asked to answer 20 MCQ's.

**Results:** The correct response score of the students were expressed as percentages and Mean  $\pm$ SD. One way ANOVA was used for comparison between the groups, followed by post hoc Tukey's test. For all the tests  $p \leq 0.05$  was considered statistically significant. The correct response score of the students who received Video-tape learning was (216 $\pm$ 14.5), when compared to lecture educational session they scored (132 $\pm$ 3.0) with statistically significant difference ( $p < 0.05$ ). There was no statistical significant difference in total correct response scores between Video-tape exercise (216 $\pm$ 14.5), when compared to Poster-exercise learning (195 $\pm$ 9.5).

**Conclusion:** Student's preferred horizontal integration of Poster exercise, Video-tape with didactic lectures.

**Keywords:** Medical education, Black board, Posters, Video-tapes

### Introduction

Innovative teaching methods, embracing of technology and responsive to individual student needs, are essential to help academics manage increasing pressures and facilitate student learning in the face of competing interests.<sup>(1)</sup> Undergraduate training in pharmacology has been developing with the use of new methods of teaching including use of audiovisual aids, group discussion, role plays, clinical pharmacology studies, and computer assisted learning.<sup>(2)</sup> To make the lectures of pharmacology more interesting and understanding, one has to review the teaching program at regular intervals. It is agreed that the modifications in methodologies of providing basic knowledge about drugs and drug therapies is need of the hour.<sup>(3,4)</sup> The best way to assess and improve the teaching methodology is through the students' feedback. To date, the most common methods used for teaching pharmacology in the lecture classes using overhead projector (OHP) and transparencies, PowerPoint presentations, and traditional black board method.<sup>(4)</sup> Various studies have been conducted to know the best method from these available teaching methods and some of these studies have even ended inconclusively. Gordon and Cooper explore the concept that simulation sessions can provide 'microworlds' whereby important patient/doctor/nurse interactions can be highlighted,

illustrated, explained and replayed. This important concept of simulation mimicking real life is seen as a major strength.<sup>(5)</sup> To mention, some studies like Garg et al have observed that there should be an inclusion of audio-visual aids and group discussions in the teaching,<sup>(3)</sup> while Dudley et al stated that the method of lecture delivery has no significant impact on learning outcomes.<sup>(6)</sup> Seth et al have concluded that traditional black board and PowerPoint teaching was far better than OHP & transparencies in improving students' performance.<sup>(4)</sup> Many of these studies show that there is no significant difference in knowledge and skill retention between those taught didactically or by seminar when compared to those taught by computer teaching modules, but there are some studies suggesting that other forms of teaching (e.g. didactic lecture) are still superior.<sup>(2,4,7-9)</sup> According to J. Thirunavukkarasu et al, interactive lecture classes have more role in gaining knowledge than tutorials and small group discussions which suggests that inclusion of interactive classes in teaching the subject is necessary.<sup>(10)</sup>

As the dictum says, "Tell me, and I will forget. Show me, and I may remember. Involve me, and I will understand", is said to have influenced the formulation of the experiential learning cycle of David Kolb.<sup>(11)</sup> The use of videotape presentations in medicine is becoming increasingly popular, although its use is largely felt in

distance learning,<sup>(12)</sup> such as videoconferencing or viewing taped lectures or informational materials. More specifically, the use of video, video streams or video-web communication has spanned the educational curriculum in a range of fields of medical science inferred by Constantinou and Papadouris.<sup>(13)</sup> Even from the students' perspective, studies have shown that video can be a more effective medium than text to enhance their satisfaction and motivation during the learning process as observed by Choi et al<sup>(14)</sup> and Shyu, et al.<sup>(15)</sup> Educators have recognized the power of audio-visual materials to capture the attention of learners, increase their motivation and enhance their learning experience. Moreno and Mayer confirmed in their study that students who watched the animation and listened to the narration performed significantly better in retention, matching and problem solving tests than those who watched the animation and read the on-screen text.<sup>(16)</sup>

Poster presentations in academics have also been used as a method of transmitting knowledge. Poster presentations provide the viewer with a bird's eye view of the topic. A good poster is student friendly and a succinct tool to convey knowledge to a student's.<sup>(17,18)</sup> Posters can serve as modified mind-maps for students to get a better grasp of the subject. Posters are progressively being recognized both as a means of and as a strategy for transmitting or gaining knowledge and also as a different novel approach for learning.<sup>(19)</sup> It also helps the presenter to discuss the poster topics with colleagues and peers.<sup>(20,21)</sup>

So, in a view to modify and improvise our teaching methodology, we conducted this study to evaluate the effectiveness of currently used teaching methods in pharmacology subject for the undergraduates.

## Materials and Method

The study was conducted at MVJ medical college and research hospital, Bangalore. Permission was duly taken from Institutional Ethics Committee to conduct the study. 4<sup>th</sup> term, second year medical students (66) participated in the study. The educational interventions were carried out by trained faculties in the Pharmacology department.

Initially, the students were taught Pharmacology aspect of anti-epileptic drugs and anti-Parkinsonism drugs through black board lecture method. After 4 days of gap, to check their retention effect of their acquired knowledge, they were asked to answer the 20 multiple choice questions (MCQ's). The MCQ's, were mainly related to classification of drugs, mechanism of action, adverse effects, drug-to-drug interactions. Later, students were divided into group A (n=33) and group B (n=33). Further, the group A students were exposed to Video-tape educational method of anti-epileptic drugs, whereas, group B students were given poster exercise of anti-epileptic drugs. All the educational interventions were designed with same theoretical content on anti-epilepsy drugs and anti-Parkinsonism drugs. The

Video-tape illustrations were accompanied by narration. Both these educational sessions were lasted for 40 minutes each. Later on, cross over study design was applied where there was an inter-change of educational methodology among group A and group B students. Thereby, group B students were exposed to Video-tape learning consisting of anti-Parkinsonism drugs and group A students were given Poster exercise learning consisting of anti-Parkinsonism drugs. Again, both educational sessions were lasted for 40 minutes each. When they finished both the educational sessions, they were again given the same 20 MCQ's on anti-epileptic drugs and anti-Parkinsonism drugs to test their knowledge they acquired by these educational sessions. Student's correct response scores were later evaluated to know the most effective educational intervention. Student's feedback was also taken to know the most effective teaching methodology according to their point of view.

The main aim of the educational interventions was to educate students on the pharmacodynamic mechanisms of these two drug classes. To achieve this, illustrations met the following learning objectives: (1) Describe the normal physiological processes regulating the release of dopamine in parkinsonism and role of GABA, glutamate, NMDA receptors, ion channels effects in epilepsy.(2) Describe the pharmacological mechanism of dopaminergic agonistic drugs, COMT-inhibitors, central anti-cholinergic drugs in Parkinsonism pharmacotherapy and drugs causing inhibition of release of Glutamate, Ca<sup>2+</sup> and drugs prolonging the Na<sup>+</sup> channel inactivation, the role of GABAergic drugs in pharmacotherapy of epilepsy (3) State the main indications and adverse drug reactions for these drugs.

**Statistical analysis:** Results were expressed as percentages and Mean±SD. Statistical comparison of data between the groups was done by one way ANOVA test, followed by post hoc Tukey's test. For all the tests  $p \leq 0.05$  was considered statistically significant.

## Results

In Table 1, it is evident that in group A, the correct response score of the students who received Video-tape learning was (187±14.5), when compared to lecture educational session they scored (138±3.0) with significant difference ( $p < 0.05$ ). There was no statistical significant difference in total correct response scores when students who received Video-tape learning (187±14.5), when compared to scores obtained by Poster-exercise learning (176±9.5), and when students who received Poster exercise learning (176±9.5), was compared to lecture educational session (138 ±3.0).

In Table 1, it was found that in group B, the correct response score of the students who received Video-tape learning was (216±14.5), when compared to lecture educational session they scored (132±3.0) with significant difference ( $p < 0.05$ ). There was no statistical

significant difference in total correct response scores when students who received Video-tape learning ( $216 \pm 14.5$ ), was compared to scores obtained by Poster-exercise learning ( $195 \pm 9.5$ ), and when students who received Poster exercise learning ( $195 \pm 9.5$ ), was compared to lecture educational session ( $132 \pm 3.0$ ).

From Fig. 1 it is evident that, <50 of the score was performed by 39.3% of students in Lecture method, in Video-tape exercise it was 39.3% and in Poster-exercise it was 33.3%. The student's scores (between 51-60%) was found to be more in Poster-exercise (21.2%) and it was 15.2% in both Lecture method and Video-tape exercise. The students' scores (between 61-70%) were found to be more in Video-tape exercise (27.8%), in Poster-exercise it was 21.2% and 15.2% in Lecture method. The student's scores (between 71-80%) were convincingly more in Video-tape exercise (21.2%), in Poster-exercise it was 18.2% and 12.1% in Lecture method. The students' scores (between 81-90%) was found to be more in Video-tape exercise 18.2% and 9.1% in both Lecture method and poster based method of learning.

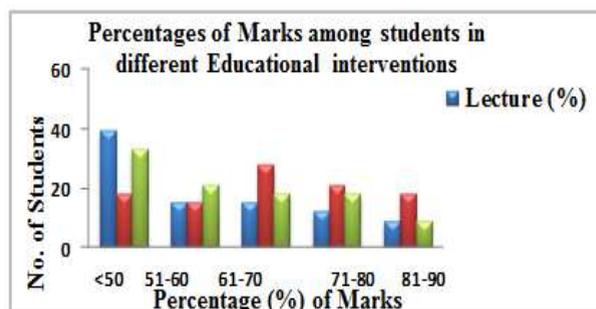
In Table 2, feedback from the students was encouraging and positive. Video-tape helped students to provide more information (98.5%). The Video-tape educational session was most effective teaching method (59.1) in understanding Pharmacology concepts, which increases grasping. Students also were of the opinion that Video-tape teaching method which helps to retain

and remember Knowledge about drugs was (63.6%). Majority of the students preferred horizontal integration of Poster exercise, Video-tape with didactic lectures (94%).

**Table 1: The total correct response scores by different educational interventions**

Groups	Lecture-(Mean±SD)	Video-tape-(Mean±SD)	Poster-exercise (Mean±SD)	p-value
1. Group-A	138±3.0	187±14.5*	176±9.5	0.043
2. Group-B	132±3.0	216±14.5*	195±9.5	

(\* p < 0.05 vs. Poster based learning)



**Fig. 1: Percentage of marks obtained by student's through different educational interventions**

**Table 2: Student Feedback regarding different Educational methodologies**

Students opinions:	Response	n (%)
1. Was the Lecture informative to you?	Yes	66 (100)
2. Was the Video-tape informative to you?	Yes	65 (98.5)
3. Was the Poster exercise informative to you?	Yes	60 (91)
4. Most effective teaching method in understanding Pharmacology concepts and which increases grasping –	-Lecture -Video-tape -Posters	-16 (24.2) -39 (59.1) -11 (16.6)
5. The teaching method which helps to retain and remember Knowledge about drugs-	-Lecture -Video-tape -Posters	-11 (16.6) -42 (63.6) -13 (19.7)
6. I would like horizontal integration of Video-tape with didactic lectures-	Yes	66 (100)
7. I would like horizontal integration of Poster exercise with didactic lectures-	Yes	53 (80.3)
8. I would like horizontal integration of Poster exercise, Video-tape with didactic lectures-	Yes	62 (94)
9. Are you willing to undertake Video-tape learning in future?	Yes	64 (97)
10. Are you willing to undertake Poster based learning in future?	Yes	56 (84.9)
11. If you were given a choice to select an instruction methodology, which one you would prefer among the three? (select any one)	-Lecture -Video-tape -Posters	-17 (25.8) -40 (60.6) -09 (13.6)

n- Number of responses, (%) - percentage of responses

## Discussion

The present study was undertaken to evaluate different existing teaching methods in pharmacology including black board teaching, video-tapes exercise and poster study exercise to find out the best method amongst them. As far as superiority of particular method is concerned, students preferred video-tape than blackboard and poster exercise than blackboard. This finding is in accordance with previous study conducted by Vikas Seth et al<sup>(22)</sup> where majority of student's preferred audio-visual presentations. Although earlier studies have inferred that traditional black board method is superior to other two methods, a study has pointed out that in powerpoint presentations the ability to integrate the text and the pictures and images is a great advantage and improves the educative value of the subject.<sup>(23)</sup> It is also suggested that although PowerPoint has some advantages, it reduces the interactive discussion between teacher and students.<sup>(24)</sup> However, this method avoided the issue of poor handwriting and less attractive blackboard. These findings are in accordance with previous studies.<sup>(25-29)</sup> In the present study, students also gave suggestions and recommendations like inclusion of interactive lecture classes and case based learning. So, frequent feedbacks from the students will definitely help teachers to modify the curriculum and improvise themselves in teaching.

Students who completed video-tape learning intervention significantly outperformed all other intervention groups in the MCQ assessment. This would imply that these Video-tapes have the potential to facilitate transfer of factual knowledge, particularly in relation to drug mechanism of action, when added to traditional lectures. This study therefore confirms that there is added educational value in combining Video-tape learning with conventional lectures as part of a blended learning approach in pharmacology teaching and learning. This notion is supported by the findings of Allen et al,<sup>(30)</sup> who showed that adding web-based interactive instructional techniques, which supplemented traditional lectures, significantly improved student performance. By adherence to these teaching theories/principles during development, students' attention was focused on the major points by the linked narration and visual depiction of mechanism of drug actions.<sup>(31)</sup> Students learn better when corresponding words and pictures are presented simultaneously rather than successively by temporal contiguity principle.<sup>(32)</sup>

Comparing students' performance between the Poster exercise only and Lecture only groups showed no significant difference. Many of the students requested that these Video-tapes to be included into their course to assist them in their preparation for final assessment.

Poster presentation is becoming more popular day by day as a platform for disseminating knowledge.<sup>(33)</sup> For a poster presentation to be successful, it has to be

done meticulously and thoroughly.<sup>(34)</sup> The Posters gave clarity in their understanding of concepts equipping them to fix them in their long-term memory.<sup>(35)</sup> Posters make the process of learning pharmacology subject more picturesque, interesting and attractive. It created awareness about the topic amongst the students, which is positively expected to propel them to learn and understand the topic more clearly and thus encourage them to have a broader perspective of the subject of pharmacology. A well-made Poster can captivate the imagination of students and make an indelible imprint on their minds. The picture will automatically fix in their minds effortlessly.<sup>(36)</sup> Posters making provides a place to express one's adroitness and helps one to translate a mental image or idea into physical reality. Posters making gives an occasion to demonstrate their adeptness, expertise, knowledge and finesse.<sup>(37)</sup>

At the end of the Posters presentation, students are filled with a sense of accomplishment and this boosts their selfconfidence.<sup>(38)</sup> Students also have to develop the adaptability for group work and team-spirit during this exercise. Teachers all over the world have now realized that it is a student-centered learning, which provides a favorable milieu, wherein the students are motivated by personal involvement in the activity.<sup>(10)</sup> In this poster exercise, they had to work in a group setting. This finding confirms the belief that when learners are provided a suitable occasion and prompted to apprise themselves, they would develop independence, creativity and this would boost their self-confidence.<sup>(39)</sup> In our study, the students performed better in poster exercise which is in accordance with previous study by Samuel LJ et al.<sup>(40)</sup>

The feedback from our study was encouraging and positive. Many students felt that horizontal integration of Poster exercise, Video-tape with didactic lectures. The instruction methodology, which they preferred the most among all was Video-tape learning.

The major limitations of this current study were - the study period was too short, the concept of long-term knowledge retention following the use of Video-tape and poster exercise was not assessed. The study findings could not be applied to the wider community of medical students as the study was restricted to 4<sup>th</sup> term medical students in department of Pharmacology.

## Conclusion

Student's preferred horizontal integration of Poster exercise, Video-tape with didactic lectures. The instruction methodology, which they preferred the most among all was Video-tape learning. Therefore we recommend that several such studies of similar kind should be conducted among wider community medical students to find out the innovative effective educational intervention to benefit the medical students.

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