*Educational Strategies*

**SCopeMed**

# Comparative evaluation of the ef ects of visual aids on learning pharmacology of autonomic nervous system

J Vidhiya Sagaran, Ravi Indla, Regina Roy,
Sureshkumar Srinivasamurthy, Alice Kuruvilla

Department of Pharmacology, Karuna Medical College, Vilayodi, Chittur, Palakkad, Kerala, India.

Address for correspondence:
Dr. J Vidhiya Sagaran, Karuna Medical College, Vilayodi, Chittur, Palakkad, Kerala, India.
drvidhu86@gmail.com

## ABSTRACT

**Objectives:** (1) To teach students about the pharmacology of autonomic nervous system through three different visual aids; (2) To evaluate the student's knowledge acquired through visual aids, by pre- and post-test; (3) To get student's feedback on three teaching methods. **Materials and Methods:** Subjects: MBBS students beginning the pharmacology course. Visual aids used: PowerPoint (PPT) slides, computers with Ex Pharm 2000 software (computer assisted learning [CAL]), graphic illustrations. Evaluation: Before initiating the lectures, the students are given a pre-test to assess their knowledge. Then, the students are taught with graphic illustrations, CAL, and PPT slides. After each teaching method, posttest with questions at more advanced level will be posed to probe their understanding. The students who are present for pre-test and at least two post-tests are alone included for statistical analysis. Students are grouped into three (Groups A, B and C) based on the marks they have received. Group A includes students who score below 50% and Group B between 50% and 75%. Group C includes above 75%. All the groups are compared between and within for all three modes of teaching. Finally, students will fill questionnaire to express their view on these teaching methods. **Results:** There was statistical significance between pre-test and all post-tests as compared by Mann–Whitney U test. The mean score within the Groups A and B were compared by paired t test which also showed significance ( $P < 0.05$). Statistical analysis by paired t test showed P value as highly significant (0.000). However, the comparison of mean score among Group C showed no statistical significance. Students expressed their opinion on each teaching method. **Conclusion:** Visual aids facilitate the learning process. In our study, all visual aids complemented each other and imparted a good knowledge to students.

**KEY WORDS:** Visual aids; Teaching and learning methods; Computer assisted learning; Graphical illustration

## INTRODUCTION

Pharmacology is introduced as part of curriculum during early phase of second MBBS. At this stage students begin to understand clinical aspects of diseases. Teaching pharmacology during this phase is a challenge. Lecture classes form the major part of teaching pharmacology; didactic lecture is a passive form of transfer of knowledge. In order to improve learning various methods have been adopted[1,2]. Attempts have been made to facilitate the process of learning[3-5]. Autonomic nervous system (ANS) forms a part of the curriculum during this phase. In order to understand the actions and uses of drugs, suitable teaching methods have to be adopted.

In this study following three different visual aids are used in sequence to evaluate their effects on learning outcome.

1. Illustration by graphs

2. Power Point presentation(PPT)

3. Computer Assisted Learning (CAL)

At the beginning of this study pre test on general aspects of ANS was conducted before any exposure to visual modes of teaching. Learning outcome is determined by three post-tests conducted following three different visual modes of teaching. The scores obtained in post tests were compared

with that of pretest individually. Finally students are given a questionnaire form, to fill their feedback on these visual modes of learning.

### Materials and methods

Students commencing the second MBBS course were the study subjects. The study was approved by the Institutional Ethics Committee (IEC) and informed consent obtained from all study participants.

A pretest was conducted before starting lecture sessions with visual aids. Totally 22 questions with answers expected of one word type were framed on neurotransmission of cholinergic and adrenergic system.

- **Graphic illustrations** from text books[6] were used in the initial session. Students were subdivided into 2 group. One faculty member was engaged for one topic (cholinergic or adrenergic); groups were exchanged after completion of one session which lasted for 1 hr 30 mins each. Diagrammatic presentations were used to explain the action of drugs as an interactive session. Post-test1 was conducted for the whole group after completion of this teaching method.

- **Lectures with PPT** were conducted for the whole batch to teach basic pharmacology of ANS. Eight

lectures of one hour each were conducted to discuss the basic action of drugs and their uses. Post- test 2 was conducted at the end of these lectures.

- Finally **CAL** mode of teaching was conducted during practical hours. Whole batch was divided into two groups; three sessions were allotted for each group. These sessions included experiment on ciliary motility of frog's esophagus, frog's heart and rabbit's eye. During three sessions students were given a brief discussion on the location and function of receptors. After completing observations students were required to tabulate their observations and interpret the results with inference. Posttest 3 was conducted at the end of these three sessions for the whole group. The questions for post tests were focused on ANS the total number of question were 22 for all tests. However the questions were of different configuration based on the content of each session.

In order to get feedback from students about the use of visual aids, a questionnaire was prepared. Students were asked to indicate their opinion anonymously, as yes/no and grade the methods of teaching based on scores (average below 5; good 5-7; excellent 8-10).

## RESULTS

Total of 47 students participated in pretest. Posttest 1 was given by 33 students; posttest 2 and posttest 3 by 43 students respectively. There was statistical significance between pretest and all post-tests mean scores as compared by Mann Whitney U test (Table 1). Among groupA 5 students appeared for pre test & post test1 and 9 students appeared for pre test & post test 2,3(Figure 1.a). Among group B 15 students appeared for pre test and post test 1, 16 students appeared for pretest and post test2, 18 students appeared for pre test and post test3.(Figure 1.b). The scores within the groups A and B were compared by paired t test which showed significance (P<0.05). However the comparison of scores among group C showed no statistical significance. Similarly, number of students securing higher marks improved in all A, B and C groups as compared to pretest as done by chi square test (Figure.2).

**Feedback from students**

Students are able to get an overall knowledge on topics from PPT. Yet they feel bored on too many slides with lengthy paragraphs. They suggest to add videos on drug action, instead of oral lecture. Specific action of drugs on organs can be visualized through CAL, but, without theoretical knowledge on drug mechanism, it is difficult for them to interpret. Unlike experiments done in lab, students can repeat the experiment in CAL very easily. Since it is a simulation technique, students feel on its artificiality compared to practicality of real experiments on animals. Regarding small group teaching on graphical illustrations,

students feel that they will get an individual attention. This mode of teaching helps them to understand the concept of the topic better. Descriptive statistics are used to present data on feedback questionnaire

CAL was rated as excellent by 8/47 and good by 19/47 students, PPT slides was rated as good by 3/47 and excellent by 10/47. Graphic illustration was rated as good by 9/47 and excellent by 5/47. (Table.2)

**Table 1**. Comparison of mean scores before and after intervention

| Number of students | Pretest (n=47) | Post-test 1 (n=33) | Post-test 2 (n=43) | Post-test 3 (n=43) |
|---|---|---|---|---|
| Mean score | 12.67 | 17.92* | 15.15* | 14.59* |
| SD | 3.28 | 3.01 | 3.57 | 3.82 |
| SEM | 0.48 | 0.63 | 0.54 | 0.58 |

Post-test 1- Graphical illustration; Post-test 2- PowerPoint; Post-test 3- Computer Assisted Learning

Comparison posttest with pretest by Mann Whitney U test; * p<0.05

**Table 2.** Grading of visual aids by students

| Visual aids | Average | Good | Excellent |
|---|---|---|---|
| Graphic illustrations | **22.72** | 65.90 | 11.36 |
| PPT | 6.66 | 71.11 | **22. 22** |
| CAL | 0 | 40.4**2** | 59.57 |

PPT-PowerPoint slides          CAL-Computer Assisted Learning

## DISCUSSION

Therapeutic use of drug is based on its action at various sites in the body. Clear understanding of drug receptor interaction is essential to determine the use of a drug. It is important to understand mechanisms of action as well as adverse effects. Therefore special effort is required to clarify the molecular aspects of drug actions related to ANS. Didactic lectures need to be complemented with visual aids and other forms of teaching methods to facilitate learning. This study is aimed to assess the effect of various visual aids in teaching pharmacology of ANS. Three types of visual aids were used in this study. Graphic illustrations in small group, PPT using slides and computer assisted learning exercise (CAL). The results indicate that visual aids improve the score in all the post tests. The number of students achieving higher scores increased as observed in all the three post- tests. Graphic illustrations showed highest number of students scoring above 75%; PPT and CAL showed higher number in group B (50-75%). It is clear from our results that visual aids facilitate learning process. PPT is adequate for overview and details like spinal pathways. CAL has advantage of demonstrating action of drugs on tissues. In addition to imparting knowledge CAL provides a simulation of animal experiment. Thus all three methods have additive effects on teaching of ANS. Feedback from students confirm this aspect. Grading of visual aids by students indicated graphs and PP as good and CAL as excellent.

Opinion of students about teaching methods is a good index to assess usefulness of visual aids as previously reported[6,7].
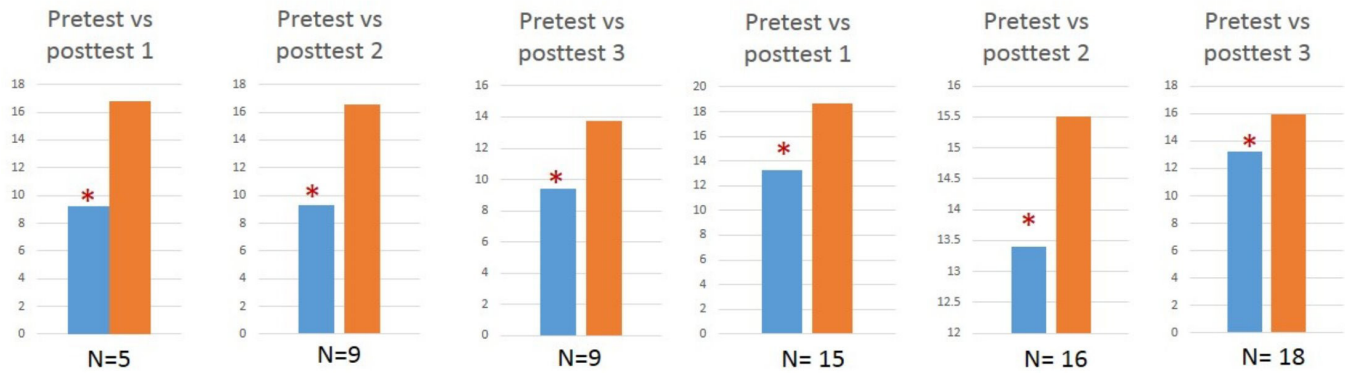
**Figure 1.** (a) Comparison of scores within group A (<50%), (b) comparison of scores within group B (50-75%)
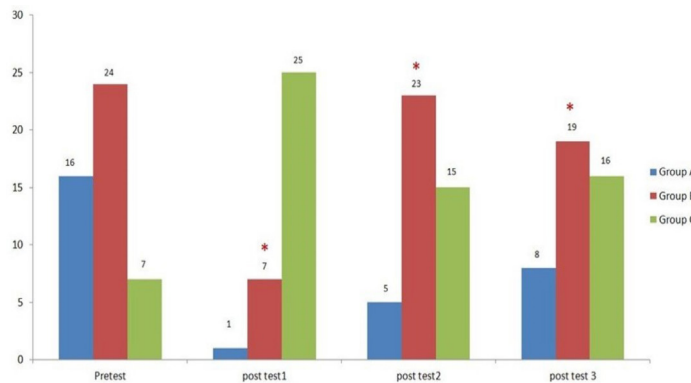


**Figure 2.** Comparission of Scores of posttest with pretest between Group-A,B&C

## CONCLUSIONS

Three visual mode of teaching such as power-point, small group graphical illustration and computer assisted exercises complement learning. These aids facilitate understanding of basic action of drugs on ANS as evidenced by the higher scores achieved by the students in the post tests.

## REFERENCES

1. Kuruvilla A, Ernest K. Patient oriented problem solving system of teaching pharmacology. Indian J Pharmacol 1994; 6: 185-7.
2. Kalpan ernest, KN Anand, Nalini Kanagabapathy, Sujith J Chandy, Alice Kuruvilla, Molly thoma. Patient oriented problems solving (POPS) approach and audiovisual aided lectures in teaching pharmacology a comparative study. Indian J Pharmacol 1998; 30:97-101
3. Momi Baruah, Laxmi Patel. Evaluation of different teaching used in physiology lecture. Indian Journal of Basic and Applied Medical Research 2014; 4: 271-6.
4. Ravi Indla, Thangam Chinnathambi, Regina Roy, Alice Kuruvilla. Introduction to concept of personal drugs essential drugs list and awareness of cost of drugs. Int J Basic clin Pharmacol 3(4); 696-700, 014
5. Kuruvilla A, Ramalingam S, Bose AC, Shastri GV, Bhuwaneshwari K, Amudha G. Use of computer assisted learning as an adjuvant to practical pharmacology teaching: advantages and limitations. Indian J Pharmacol 2001; 33:272-5
6. Williams & Wilkins drugs affecting autonomic nervous system Lippincott's illustrated reviews Pharmacology; 5th edition.Wolters Kluwer,2012-PP:37-90.
7. A Garg, PV Rataboli K Muchandi. Students opinion on the prevailing teaching method in pharmacology and changes recommended. Indian J Pharmacol 2004;36:155-8.