

Use of computer-assisted teaching with animal simulator in experimental physiology for the first year MBBS students

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ABSTRACT

Background: Experimental physiology practicals are part of the syllabus for first year MBBS students. Amphibian heart and nerve-muscle experiments help the students to understand the concepts of physiology. Use of live animal is banned while training first MBBS students. So, there is a need for an alternative method to teach experimental physiology practicals as they are still a part of the syllabus. **Aims and Objectives:** To compare the effectiveness of computer-assisted teaching method using animal simulator with the traditional method of teaching in experimental physiology and to know the perception of students about the computer-assisted teaching method using the animal simulator. **Materials and Methods:** The study included 60 first year MBBS students, randomly divided into Group I and Group II of 30 students each. One practical class for the Group I students was conducted using animal simulator for practicals in experimental physiology by Elsevier (computer-assisted teaching method), and Group II was taught same practical topic using traditional teaching method (using university practical manual). After completion of the practical session, a questionnaire about computer-assisted teaching method was given to the students of Group I and their responses were obtained. After 2 weeks, a multiple choice questions test of all the participants based on the same practical topic was conducted, and test score obtained was compared between Group I and II using GraphPad InStat Version 3.06 software. **Statistical Analysis:** Student's unpaired *t*-test was applied for statistical analysis. The outcomes were presented as a mean (standard deviation), and $P < 0.05$ was considered as significant. The perception of students toward the use of computer-assisted teaching using animal simulator was analyzed on Likert scale. **Results and Conclusion:** Students taught by computer-assisted teaching method using animal simulator scored significantly higher than the students who were taught by a conventional method. Students taught by computer-assisted teaching method showed the better perception for the teaching method. Our study concluded that the use of the computer-assisted teaching of animal experiments using animal simulator is more effective than the traditional method and should be encouraged for teaching practicals in experimental physiology for first year MBBS students.

Key words: Animal simulator, Computer-assisted teaching, Experimental physiology, First year MBBS students, Perception of students

INTRODUCTION

Experimental physiology practicals are part of the syllabus for first year MBBS students. Amphibian heart and nerve-muscle experiments help students to understand the concepts of physiology, however, live animal experiments have been discontinued by MCI as per the guidelines issued by the Government of India.^[1] As a result teaching in experimental physiology for first MBBS students is carried out by

explaining the experimental setup, the procedure of experiment and record obtained without actually performing or seeing the demonstration of the experiment. Students have to imagine experimental setup, procedure, and often find it difficult to understand the experiment without actually witnessing it. This necessitates the need to use an alternative method of teaching practicals in experimental physiology. Use of animal experiment videos instead of using live

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animals proved to be an effective method of teaching experimental physiology.^[2] The emerging trends of using computer-assisted learning techniques as an alternative to animal experiments has a greater significance of reduction of time, human source, and repeatability.^[3] There is adequate literature to support of the fact that knowledge acquired using computer simulations for animal dissection is well on par with using animals.^[4]

Therefore, this study was undertaken to evaluate the efficiency of computer-assisted teaching method with animal simulator for teaching first year MBBS students practicals in experimental physiology.

Aims and objective

To compare the effectiveness of computer-assisted teaching using animal simulator over the traditional method of teaching practicals in experimental physiology for first year MBBS students. To know the perception of students about the use of computer-assisted teaching method with the animal simulator.

MATERIALS AND METHODS

The study was conducted in the Department of physiology, Seth G. S. Medical College, Mumbai. There were 180 students in first MBBS. The practical in experimental physiology are being conducted in three batches on different days. Each batch of 60 students regularly attended practical in a group of 10 each and 6 teachers take the practical session every day.

After taking written informed consent, one batch of 60 students attending regular practical was randomly selected from the three batches of 60 students each. The students were divided into six small batches of 10 each as per the routine practical class. Three batches (30 students) were randomly selected to form Group I while other three batches (30 students) formed the Group II.

Training of teachers

Three teachers from the Department of Physiology were trained to teach a practical topic using the trial version of animal simulator for practical in experimental physiology by Elsevier on their laptops.

The practical class was conducted for three batches of the Group I using computer-assisted teaching method and for three batches of Group II using traditional teaching method using medical university practical manual.

After completion of the practical session a questionnaire, validated by senior faculty members of the

department about computer-assisted teaching method using animal simulator was given to the students of Group I and their responses were obtained.

After 2 weeks, a multiple choice question (MCQ) with the single best response, test of all 60 students (Group I and Group II) based on the same practical topic was taken, and their score in the test was analyzed.

Statistical analysis

The scores obtained by the students in both the group were compared using GraphPad InStat Version 3.06 software. The responses about the computer-assisted teaching method on Likert scale were converted into percentages.

RESULTS

Out of 60 participants, 30 students from Group I attended the MCQ test while one student from Group II was absent for the test.

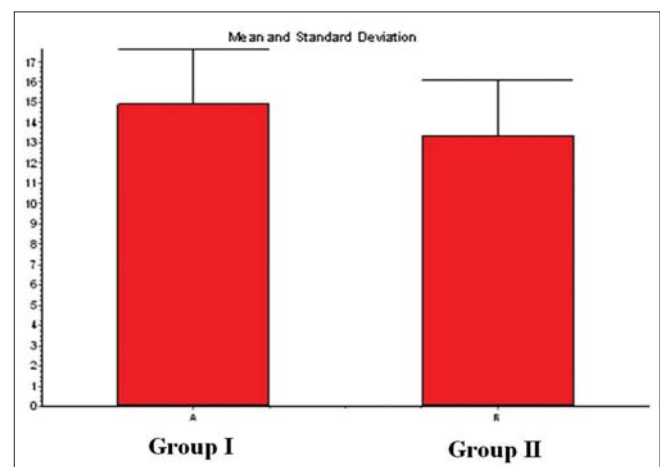
Table 1 and Graph 1 depicts the statistical analysis for MCQ test score of the students in between Group I and Group II, which were expressed as mean and standard deviation for both the study groups.

Table 2 depicts the perception of students (Group I) toward the computer-assisted teaching of practical in

Table 1: Test score of the students of Group I and Group II

Groups	Number of students	Mean score	SD	P value
Group I	30	14.86	2.66	P=0.02*
Group II	29	13.4	2.74	

*P<0.05. SD: Standard deviation



Graph 1: Mean and standard deviation of the test scores between the two groups

Table 2: Perception of students toward computer-assisted teaching using Likert scale

Questions	Number of students (%)				
	1	2	3	4	5
I find the regular practical sessions in experimental physiology interesting	4 (13)	10 (33)	8 (27)	6 (20)	2 (7)
It is difficult to understand the procedure of the animal experiments during experimental physiology practicals	-	7 (23)	8 (27)	13 (43)	2 (7)
Computer-assisted teaching generated interest in the topic taught in the practical	-	1 (3)	-	17 (57)	12 (40)
I find computer-assisted teaching helpful in understanding the experimental setup and procedure	-	-	-	10 (33)	20 (67)
Computer-assisted teaching will help me to remember the topic better than traditional method	-	1 (3)	3 (10)	15 (50)	11 (37)
I prefer learning through computer-assisted teaching over the traditional method	-	-	4 (13)	13 (43)	13 (43)
Computer-assisted teaching will help me to improve my performance in the examination	-	2 (7)	7 (23)	15 (50)	6 (20)
Computer-assisted teaching should be routinely used for all practical in experimental physiology	-	-	4 (13)	11 (37)	15 (50)

1 - Strongly disagree, 2 - Disagree, 3 - Neutral, 4 - Agree, 5 - Strongly agree

experimental physiology using Likert scale. Number of students out of 30 are converted into the percentage.

DISCUSSION

Practical work plays an essential part of teaching and learning.^[5,6] Understanding physiology of nerve, muscle, and cardiovascular system (CVS), experimental physiology practicals play a key role. Due to discontinuation of use of live animal in training first-year medical students, they have to depend only on the theoretical discussion while studying animal experiments on nerve-muscle and CVS physiology. Many places this problem is solved using alternative methods and newer technologies such as computer-assisted teaching.^[2,3] In our study, we tried to find out the efficacy of this type of teaching in experimental physiology practicals. In market animal simulated experiment software are available which claim to help the student to understand experiments and concepts in experimental physiology. Some medical colleges in India are using them to teach the MBBS students.^[7] Some of the studies have demonstrated the equivalent efficacy of animal as well as a non-animal teaching method.^[8,9] Whereas, many studies have demonstrated the superior efficacy of non-animal teaching method.^[10-13] In spite of doing a lot of searches, we were unable to get a single study available about the effectiveness of animal simulator software specially designed for experimental physiology practical for first MBBS students.

Our study compares the efficacy of computer-assisted teaching method and found that score obtained by the student in the group taught with

computer-assisted learning method using animal simulator was significantly higher than the group taught by the traditional method. In computer-assisted teaching methods learning ability of a student increases.^[14] Our teachers also experience the more concentration and participation of students in this type of teaching. Visual recognition memory is superior to the auditory recognition.^[15] During computer-assisted teaching, student receives interesting visual stimulation with auditory as well. All these factors may be playing a role for getting them more score with computer-assisted teaching.

In the present study, the perception of the students about computer-assisted teaching method was obtained with the help of the questionnaire. We found that more than half of the students who took the questionnaire did not find the regular practical in experimental physiology interesting and about one-fourth were neutral about it. More than half of the students had difficulty in understanding the procedure of the animal experiments during experimental physiology practical without actual demonstration. More than 90% of the students agreed that computer-assisted teaching generated interest in the topic taught in the practicals, and all the students found it to be helpful in understanding the experimental setup and procedure. 87% students felt that this method would help them to remember the topic better and 86% preferred teaching by this method. 70% of the students felt that teaching by this method will help them to improve performance in the examination and 87% students wanted this method to be routinely used for all practical in experimental

physiology. It means the perception of the student is also better for this type of teaching.

CONCLUSION

The use of computer-assisted teaching using animal stimulator is a better method of teaching experimental physiology. It is also well appreciated by the students. Its use should be encouraged for teaching practicals in experimental physiology for first year MBBS students.

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