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Computer Assisted Learning Software's used in Pharmacology Practical's for Pharmacy Students

Mr. Digambar C. Jadhav
Head of Department, Diploma in Pharmacy
Padmini College of Pharmacy, Dighanchi, Maharashtra, India
digambarjadhav02@gmail.com

Abstract: *Pharmacology practicals of pharmacy curriculum include study of effect of drugs on animals. For education purpose experiments were conducted on animals to develop skills for performing in-vivo and in-vitro experiments and to correlate the results with theoretic concepts explained in the books. Animal experiments have to perform according to guidelines of CPCSEA. It has been reported that animals are being subjected to painful procedure in education and training unnecessarily. In response to that, in 2014, PCI and UGC notified all pharmacy educational institutes to stop use of animal for experiments and use some other alternatives. Computer assisted learning (CAL) software's are used as an alternative for animal experiments. Commonly used computer assisted learning (CAL) software's in pharmacology practicals for pharmacy students are discussed in this article.*

Keywords: Pharmacology, CAL - Computer assisted learning, UGC – University grants commission, Animal experiments, CPCSEA – Committee for Purpose of Control and Supervision of Experiments on Animals

I. INTRODUCTION

Pharmacology is a branch of pharmacy dealing with effect of drug on living organism. Animals are used to study beneficial as well as harmful effect of drug. To provide trained and qualified persons for the development and testing of new drugs, animal experiments are included in the syllabus of pharmacy. The syllabus of D.Pharmacy and B.Pharmacy includes more than 20 animal experiments. These experiments require small animals like frog, mice, rat, rabbit and guinea pig. The main purpose of animal experiment was to develop skill for performing in-vivo and in-vitro experiments and tocorrelate the finding with the theoretical concepts explained in the explained in lectures and textbook. However the use of animals for the teaching and learning pharmacology has shown a downward trend over the last decade due to ethical concern, practical problems associate with the animal experiments such as availability of animals, cost of purchasing animals and maintaining animal houses.[1,2] Due to serious ethical concerns related to use of animals for experiments, the University Grant Commission (UGC) decided to stop the animal experimentations for students.[3]

As per prevention of Cruelty to Animal act 1960, the use of animals in experiments should be minimized and they are used only when there are no alternatives available. If the alternatives of animal use for educational purpose are available then the Rule 17(d) of the act states the use of alternatives for educational purpose.[4]

As alternative to animal experiments of pharmacology, experimental procedure videos and computer assisted learning (CAL) are widely used in pharmacy education field. Computer assisted learning can provide an interactive and personalized learning experience and thus promote active and self-directed learning. Many computer assisted learning software's are used in practical classes, for better understanding theoretical concepts. Most commonly used computer assisted learning software's are discussed in this article.

II. COMPUTER ASSISTED LEARNING (CAL) SOFTWARE'S

Most commonly used computer assisted learning (CAL) software' in pharmacology practical of pharmacy education are as follows

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2.1. X-cology: An Interactive CD-ROM for Pharmacology Undergraduates [5]

This software (developed in Multimedia Director, Flash and visual basic for Windows) displays complete video demonstrations of different procedures such as isolation and mounting of animal tissues followed by on-screen interactive interface to study the effects of various drugs on the isolated tissues. The details on the experiments involving animal use are divided into different topics to facilitate their presentation and ease the navigation through the details. The content is classified into following topics –

1. **The experimental animals:** This topic includes biological names of the common experimental animals and their uses in experimental pharmacology.
2. **The equipments:** This topic includes the common instruments used for demonstration of animal experiments. The instrumental setups for routine as well as modern instruments have been presented in the interactive form.
3. **Experimental techniques:** This topic includes the information on manual skill and routine procedures involved in the experimental pharmacology such as collection of blood samples, preparation of drug solution and routes of drug administration.
4. **The experiments:** This topic includes exhaustive details like video demonstrations on isolation and mounting of different tissues from experimental animals, an interactive interface to study effect of different drugs on isolated tissues, procedures to carry out bioassays and experiments on whole animals related to screening and evaluation of drugs.
5. Each topic has been further appended with links of important definitions, viva questions and historic information on scientists related to each topic.

Figure 1: An interface showing video demonstration and link for navigation.

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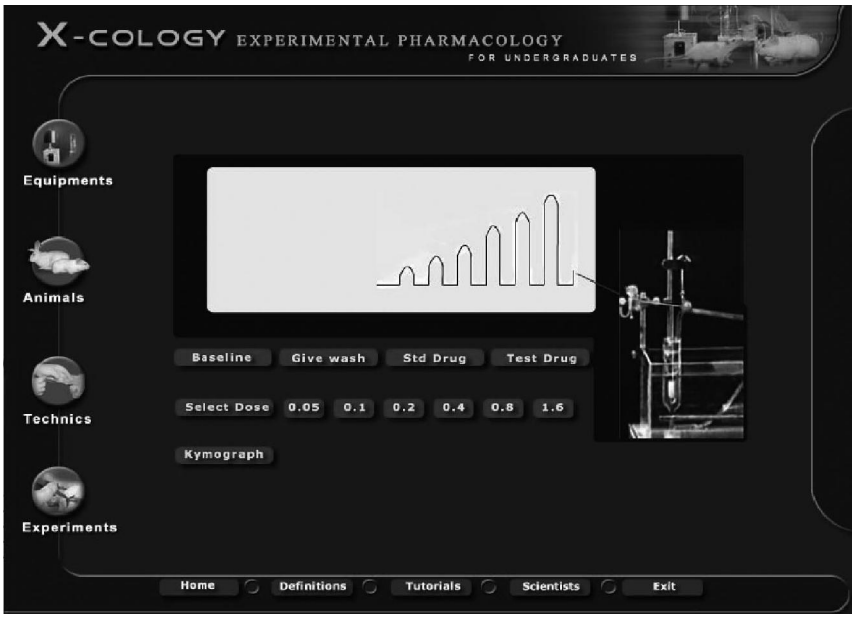

Figure 2: Interactive interface for performing bioassay.

2.2 Ex-Pharm (Experimental Pharmacology) Series Software [6,7]

This is computer assisted learning package containing various programs which stimulate animal experiments in pharmacology. These programs can be used to demonstrate the effect of drugs on different animal tissues, organs and system. The package is user friendly, highly interactive and full of animated sequence which makes stimulation appear realistic. The current version of this software contains programs such as effect of drugs on rabbit eye, effect of drugs on frog heart, bioassay of histamine on guinea pig ilium, screening of analgesic activity, muscle relaxant activity, anticonvulsant activity, pyrogen test on rabbit, toxicity study and effect of drugs on dog BP and heart rate.

The user can conduct experiment and collect as well as analyse data. Each program can be run in two mode – Tutorial mode and examination mode. This software requires active internet connection for its working. For use of this software user have to take paid subscription for the period of one or three years. This software is recommended by Pharmacy Council of India (PCI) for study of Pharmacology practicals of D. Pharmacy & B.Pharmacysyllabus.

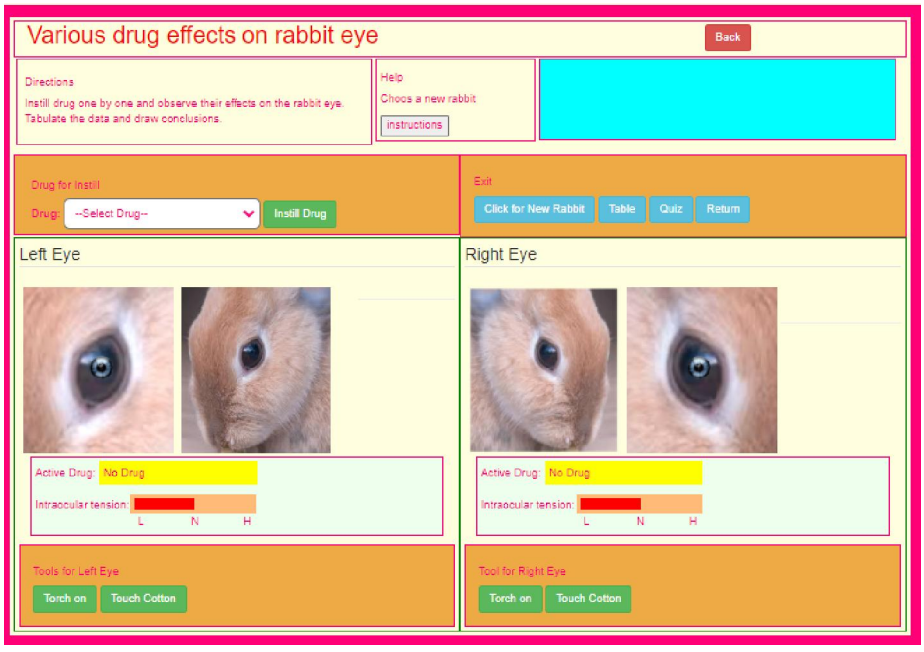

Figure 3: An interactive interface for study of effect of drugs on Rabbit eye

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2.3 Computer Aided Instructional Package for Experiments in Pharmacology [8]

Computer aided instructional package for experiments in pharmacology, this software is developed by Maharashtra State Board of Technical Education (MSBTE) Mumbai, in technical collaboration with Technobahn Infotech Pvt. Ltd. This software is specially prepared and developed for D. Pharmacy second year students to learn pharmacology practicals. This is multimedia software for demonstrating animal experiments in pharmacology. It consist detail information about Frog dissection, mounting of frog heart, assembly setup for study of effect of drugs on frog hearts. It is also useful for study of effect of acetylcholine on rectus abdominus muscle of frog & guinea pig ilium, effect of spasmogens & relaxants on rabbit intestine, effect of local anaesthetics on rabbit eye, effect of hypnotics in mice, effect of convulsants & anticonvulsants in mice, taming & hypnosis potentiating effect of chlorpromazine in mice, effect of diphenhydramine in experimentally produced asthma in guinea pig and test for pyrogen by rabbit method. Each experiment is provided with definitions, theoretic information, observation, conclusion related with experiments. This software can run offline and does not require active internet connection. Pharmacy colleges can purchase this software from MSBTE, Mumbai and regional offices of MBSTE located at Pune, Aurangabad and Nagpur.

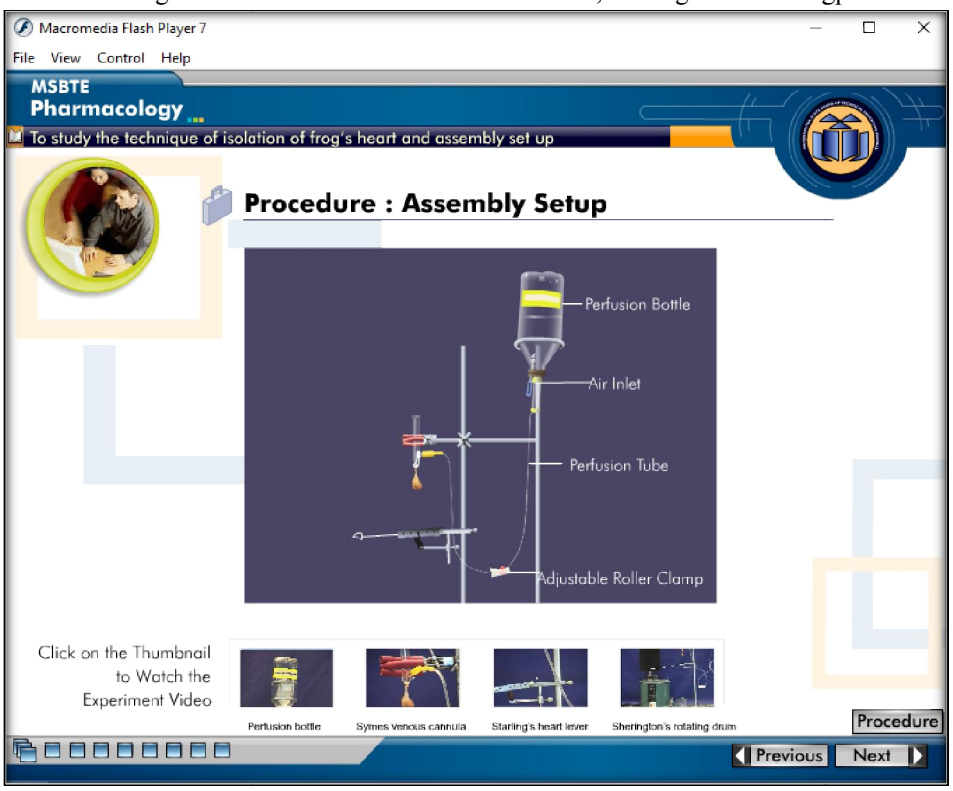

Figure 4: An interface showing techniques of isolation of frog heart and assembly setup

III. CONCLUSION

Computer assisted learning (CAL) software's are effective and interesting for teaching and learning practicals of pharmacology. CAL is good alternative for animal experiments.

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