Original Research Article

Guinea pig versus computer mouse in post graduate practical pharmacology

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ABSTRACT

Background: Pressures from animal right organizations like PETA lead to stringent animal handling guidelines by CPCSEA, UGC, MCI which resulted in limitation of animal experiments in postgraduate practical pharmacology. So, this study is designed to know the perceptions and alternative suggestions of pharmacology postgraduate students about animal experiments in their practical curriculum.

Methods: 127 pharmacology postgraduate students who participated southern regional conference of IPS -2016 at Belgaum, Karnataka were included in this questionnaire based study. The data was analysed using descriptive statistics.

Results: Majority 79% students favoured animal experiments even though only 53% of students were conducting animal experiments at their institute. Some of the reasons quoted by the students to favour animal experiments were, provide better understanding of drug effects (66%), interested in preclinical research & drug development (60%), provides hands on experience (56%) etc. Some of the virtual experiments suggested by students which can be used in parallel to animal experiments to reduce animal sacrifice were computer simulated animal experiments (78%), preformed graphs/charts (65%), video films (53%) and so on. Main reasons to like CAL were effects of drug can be clearly visualized (72%), can be repeated (63%), avoids error (57%), saves time (54%) etc.

Conclusions: There is a need to incorporate CAL along with continuation of animal experiments in postgraduate practical pharmacology, so that both will compliment, enhance, reinforce the learning from each other and also drastically reduce the number of animals sacrificed.

Keywords: Animal experiments, Computer assisted learning (CAL), Students

INTRODUCTION

Animal experiments which includes the demonstration of drug effects on tissues or whole animal are an essential component of post graduate practical pharmacology.[1] However, because of pressures from animal right organisations with subsequent guidelines by CPCSEA (Committee for the purpose of control and supervision of experiments on animals), UGC, Supreme court ban on animal experiments in educational institutions have seriously limited animal use in post graduate practical pharmacology.[2-4]

Students are important stake holders who can provide valuable feedback about their training.[5] A number of feedback studies conducted on undergraduate medical students have confirmed the effectiveness of Computer assisted learning (CAL) in terms of meeting learning objectives with additional advantages when compared to animal experiments.[6-8] CAL has now become an integral component of undergraduate practical pharmacology curriculum.[9-11] But no such feedback studies were conducted among postgraduate pharmacology students.

As an alternative to animal experiments computer assisted learning has been increasingly implemented by several medical schools across the world including India.[9] In 2009, Medical council of India officially amended its bachelor of medicine and bachelor of surgery (MBBS) regulations to state that experimental work on animals can be demonstrated by computer aided education.[12] But to date there is no clear cut guidelines for conducting

animal experiments in post graduate pharmacology practical and it is a topic of debate.

Considering all these facts this study is undertaken to know the perceptions and suggestions of postgraduate pharmacology students about various aspects of animal experiments and alternative to it.

METHODS

The present study was conducted in January 2016 at southern regional conference of Indian pharmacological society held at Belagavi institute of medical sciences, Belagavi, Karnataka. After obtaining permission from organising secretary a total of 127 pharmacology post graduate students were included in this questionnaire based study. A structured validated questionnaire was developed consisting of eight questions having options and a space for suggestion/remarks.

The students were permitted to indicate more than one option for the questions asked. The questions explored various aspects of animal experiments and also provided a platform for expressing views on alternatives. A brief explanation was given about the questionnaire before it was handed over to post graduates in pharmacology. The participants were asked to be truthful and unbiased in answering the question. They were asked not to reveal their identities to ensure freedom of expression. The data was analysed using descriptive statistics.

RESULTS
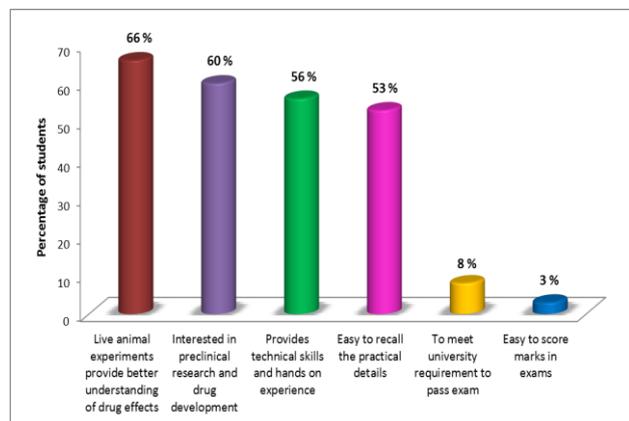
Note: The total percentages may not be 100 as students could choose multiple answers

Figure 1: Reasons to favour animal experiments.

All the 127 students who enrolled in the study completed the questionnaire. An overwhelming majority of students favoured animal experiments (100/127; 79%) even though only 67/127; 53% of the students were conducting animal experiments at their institute. Some of the reasons quoted by the students to favour animal experiments were, provide better understanding of drug effects (84/127; 66%), interested in preclinical research & drug

development (76/127; 60%), provides hands on experience (71/127; 56%) etc. (Figure 1).

A minority of students disfavoured animal experiments (27/127; 21%). Reasons for not favouring animal experiments were, repetition of already established facts (27/127; 21%), unpredictability of getting results (23/127; 18%), ethical issues (19/127; 15%) etc. (Figure 2).
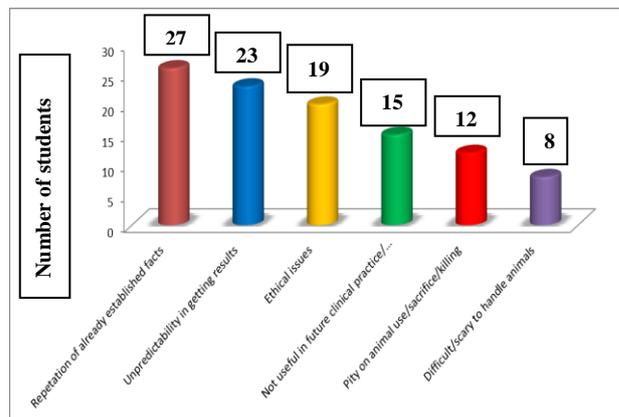
Figure 2: Reasons to disfavour animal experiments.

Some of the virtual experiments suggested by students which can be used in parallel to animal experiments to reduce animal sacrifice were computer simulated animal experiments (99/127; 78%), preformed graphs/charts (82/127; 65%), video films (67/127; 53%) and so on (Figure 3). Main reasons to like CAL were effects of drug can be clearly visualized (91/127; 72%), can be repeated (80/127; 63%), avoids error (72/127; 57%), saves time (69/127; 54%) etc. which is shown in Table 1.

Table 1: Reasons to prefer CAL -Computer simulated animal experiments as a supplement to animal experiments.*

Reasons	n	%
Effect of drugs can be clearly visualized by computer simulations	91	72%
When used to train prior to live experiments can reduce the number of animals	89	70%
Can be repeated as many times as required	80	63%
Errors in live experiments can be avoided by computer simulation	72	57%
Cal saved time when compared to live experiments	69	54%
Overcome ethical issues related to animal experiments	69	54%

* students were allowed to prefer more than one reason (multiple responses allowed)

Majority of postgraduate students (120/127; 95%) who participated favoured that feedback is necessary to

bring about educational innovations and curricular reforms.
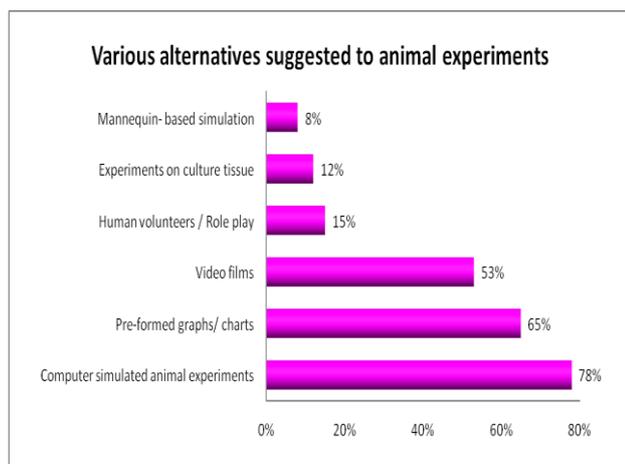
Figure 3: Various virtual experiments suggested as a supplement to animal experiments.

DISCUSSION

Out of the 127 students who participated in the study only 53% were conducting animal experiments at their institute. But a majority (73%) favoured animal experiments in postgraduate practical pharmacology. On the contrary in many similar such studies involving undergraduate medical students majority felt animal experiments can be discontinued with virtual experiments as alternative.[6-8] Authors are of the opinion that undergraduate students do not require the skills of dissection and setting up of experiments in their later years of medical practice. But the same is not true for post graduates in pharmacology. These skills are very much necessary irrespective of whether they get employed in a research /academia/industry. Careers in pharmaceutical industry where animals are used in drug development need skills in animal experimentation. Preclinical safety and efficacy data on animals is a must for submission to drug regulatory authorities before the permission for clinical trials in humans granted.[2] So, there is a need of professionals with animal handling and dissection skills. This talent pool can be created by continuing animal experiments for research aspects of postgraduate practical pharmacology.

Overwhelming majority of postgraduate students felt that the live animal experiments provide opportunity to develop technical skills and gain hands on experience of individual technique with better understanding of the topic as well as ability to recall. Also the authors feel that animal dissection provides the learner with real material and experience as no alternative could fully replace live animal use in education. But at the same time the animals used in experiments should not be considered as dispensable tools, their judicious use is a must with application of 3R concept proposed by Russel and Burch so as to minimize the pain and distress to animals.[13] In

this context, it is worth to note that 78% of the students suggested simultaneous use of CAL along with live animal experiments. Similar suggestion was seen with studies done by Gibbon et al, Toth et al, Dantas et al, Franklin et al.[14-17] The authors feel that CAL (virtual laboratories) can be used before live animal experiments as preparation for the later. So, they complement and enhance the learning from each other. This will be a good move towards the goal of achieving three R concepts-reduce, refine and replace animal experimentation. Some of the other virtual experiments as a supplement to animal experiments suggested by postgraduate students were preformed graphs, video films, human volunteers, culture tissue, mannequin etc. Virtual teaching reduces animal use, total investment, space, equipment and faculty time.

Some of the advantages of CAL mentioned by students in our study are CAL gives a better understanding of the topic, reduces animal use, clear estimation of drug effects, errors in experiments can be reduced, can be repeated , saves time, avoids ethical issues related to animal experiments. These study results match with many other well executed studies.[6,7,9,11,18] Many studies endorsed the fact that both live animal experiments and CAL are equally effective in knowledge acquisition and meeting learning objectives.[9,14] Also CAL in medical education has been implemented by 95% of medical schools in US and 100% medical schools in Canada and UK.[9] Even though CAL requires technical knowledge of computers, expensive software, prefixed doses which hinder students to observe biological response at desired doses, its advantages outweigh the disadvantages.

Leading drug discoveries in the past were possible due to experimentation on animals. The CPCSEA guidelines, clearly instructs that animal experiments shall not be performed for the sole purpose of attaining skills. Authors are of the opinion that CAL should be used parallel to animal experiments even in postgraduate pharmacology, whenever the effects of a drug which is conclusively known and animal experiments can be reserved for research aspects of post graduate pharmacology. The students also need to be made aware of the CPCSEA rules and regulations on animal experimentation.[3] Also in our study 21% of students disfavoured animal experiments quoting reasons such as repetition of already established facts, unpredictability in getting results, ethical issues, not useful in future clinical practice, pity on animal sacrifice, scary to handle animals. Authors also are of the opinion that students can be given a choice to use alternatives to dissection. In this context it is worth to note that several states of USA have passed choice in dissection laws.[2] Meanwhile animal use for training purpose should be delayed until a student decides to pursue a research carrier which involves animal experimentation.

CONCLUSION

Animal experiments still play a role in drug development. In the absence of clear guidelines there are concerns in continuing animal experiments in postgraduate practical pharmacology. Computer simulated experiments when fully integrated alongside live animal experiments each compliment, reinforce and enhance learning from other. In this regard regulatory bodies like the MCI, CPCSEA, UGC, ICMR together along with consultation of all stakeholders involved should finalize uniform guidelines for conducting animal experiments along with virtual experiments in postgraduate practical pharmacology. Also feedback from students must be examined with great deliberation while formulating guidelines.

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