Faculty outlook towards animal experiments in postgraduate medical education

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ABSTRACT

Objective: Animal experiments form an essential component of postgraduate medical education in the discipline of Pharmacology. In this context, the present study aimed to assess the perceptions of Pharmacology faculty members in South Indian medical colleges regarding the use of animals in postgraduate training.

Materials and Methods: A cross-sectional survey was done among 70 Pharmacology faculty in 15 South Indian medical colleges. A validated pre-tested 27-statement, 5-domain questionnaire was used to collect the data. Data were analyzed using SPSS 19 version. Categorical variables were described by frequencies and percentage.

Results: With 52 faculty members responding to the content validated questionnaire, the response rate was 84.3%. The analysis of results revealed that the majority of the faculty members agreed with statements about the advantages and some disadvantages of animal experiments. About 88 % stated that animal experiments should be conducted in the program. The majorities were also aware of alternatives to animal experiments and agreed that animal experiments should be continued with a reduction in the number or with refinement of the use of animals in spite of the availability of alternatives.

Conclusion: The majority of faculty members of South Indian medical colleges, who took part in our study, support animal use in postgraduate courses in spite of being aware of their drawbacks and the availability of alternatives. Hence, in view of the trend to "*Replace, Reduce and Refine*" animal use, greater awareness is needed regarding the utilization of alternatives to animal experiments in postgraduate medical education.

Key words: animal experimentation, attitudes, medical faculty, pharmacology, postgraduate medical education.

INTRODUCTION

Animal experiments (AE) are fundamental in the training of almost all pharmacology-related postgraduate courses[1]. However, research studies have questioned their applicability, toxicological utility and validity[2]. Other limitations like their exorbitant costs, difficulty in procurement of animals, strict regulations and reservations about animal ethics by animal rights organizations and students have also been observed[3-10]. Moreover, newer opportunities and requirements in the pharmaceutical industry and clinical research organizations[11] and recent trends in areas like pharmacoepidemiology, pharmacoeconomics, pharmacovigilance, rational pharmacotherapeutics[1] have thrown AE out of focus.

Faculty perceptions have a strong influence on the curriculum adopted and help in developing the diverse postgraduate curricula followed in different medical colleges of India. Though many studies have explored the student and faculty perceptions of the use of animals in undergraduate medical education[6-10,12], the faculty perceptions regarding use of animals in postgraduate training have not been looked into. Thus, it was deemed essential to assess the perceptions of the medical faculty about various aspects of AE in postgraduate medical education (PGME).

MATERIALS AND METHODS

A cross-sectional survey was done among the Pharmacology faculty in South India. Approval from the Ethics Review Committee of the authors' institution was obtained prior to the study.

Faculty members from medical colleges, selected by convenience sampling

method in the four southern states of India: Tamil Nadu, Karnataka, Kerala and Andhra Pradesh took part in the study.

The questionnaires with explanations of the objectives and instructions for filling were sent through post to the consenting faculty. Voluntary participation was emphasised and full confidentiality of the data was ensured to all the participants.

Instrument

A structured questionnaire with closed ended statements was used to collect the data. The statements of the questionnaire were determined through multiple focus group discussions with six pharmacologists (who themselves used AE in their teaching) and review of literature. Two professors in the subject, a medical education expert, and a socio-psychologist validated the content of the questionnaire. The panel ensured that the statements in the questionnaire addressed all the study objectives.

After pilot testing on a group of five pharmacology faculty members, the face validated questionnaire finally contained 27 statements. Some negative statements were introduced into the questionnaire and the statements were jumbled up in their order to minimize answering bias.

The questionnaire was divided into the following five domains:

1. **Advantages of animal experiments in learning (ADV)**: This domain comprised seven statements about the usefulness, relevance and worth of animal experiments in learning.
2. **Disadvantages of animal experiments in learning (DIS)**: Five statements regarding the drawbacks of animal experiments in PGME were included in this domain.
3. **Logistics of conducting animal experiments (CON)**: The time duration, economics and other details about the conduct of AE were elaborated in six statements.
4. **Faculty perceptions of student experiences with animal experiments (PER):** This domain, with four statements, focused on students finding these experiments stimulating, having lower examination stress and being aware of the learning objectives.
5. **Alternatives to existing animal experiments (ALT)**: The five statements in this domain considered the knowledge about Government laws and characteristics of alternatives to existing animal experiments.

Statistical analysis

Data were entered into Excel and statistical package SPSS 19 version (IBM, Illinois, Chicago, USA) was used for analysis. Categorical variables were described by frequencies and percentage.

RESULTS

Fifteen medical colleges in southern India, of which eight were private institutions and seven were State government, were involved in the study. With 52 faculty members responding to the content validated questionnaire the response rate was 84.3%. Half of the respondents were teaching in government institutions and the other half in private colleges. The mean age of respondents was 40.5±9.5 years. The majority of the respondents were female, with less than eight years of total teaching experience, holding a MD or a PhD degree and involved in postgraduate teaching.

At the time of the survey, the AE conducted in the participating colleges were in vivo screening and toxicity in rat, mice and rabbit (100%) and graded dose responses in isolated tissues like frog rectus (100%), rat colon (83%), guinea pig ileum (50%), frog heart (33.3%) and rabbit aorta (16.7%).

The response analyses revealed that around 75% of faculty members were in agreement with the advantages of animal experiments. However, opinions were divided on statements relating to disadvantages (Table 1). As far as logistics for conducting experiments are concerned, majority of the faculty members agreed with the statements except the potential for repeatability of learning exercise

through AE. However, other statements generated no unanimous response. The majority faculty members perceive AE as a good learning experience for the students. The statements in PER domain again indicated the positive opinion about AE though the majority of faculty members (60%) disagreed with the statement that AE helped to lower the students' stress. The faculty members were in favor of utilizing alternatives for practical training but nearly half (52%) of them was not willing to totally discontinue AE in PG training.

DISCUSSION

Animal experiments are an important element in the training of postgraduates in the discipline of pharmacology[1]. However, AE are known to be associated with many shortcomings[2-5]. Moreover, national legislations, student objections, animal right activists' concerns,[6-10] global awareness of Three R concepts (Replace, Reduce and Refine)[13] and the attraction for the pharmaceutical industry/ Clinical Research Organizations[1,11] have made the use of animals in PGME debatable.

The results of our study have revealed that the majority of the participants support AE in PGME. A plausible reason for this may be that they perceive the need for postgraduates to train in AE for biomedical research and compliance with regulatory toxicology requirements in the new drug development by the pharmaceutical industry.

We could not find any other studies involving faculty members' perceptions of AE in PGME. However, studies elaborating faculty members' perceptions in undergraduate education revealed that there should be either a total discontinuation of AE or a continuation with reduction and refinement[6,12].

In our study, the general agreement of the faculty members with all the statements in the advantages domain reveals that the teachers support AE in PGME. However, agreement with statements like AE give "importance to factual learning" and "cause distress to animals" in the disadvantages domain show that many are familiar with the disadvantages of AE. Disagreement with statements that "students resist performing AE" but still perform them "to pass University examinations" reveals the faculty members' perceptions about positive opinions of postgraduates towards AE (maybe due to its relevance in the postgraduates' future professional career). In the third domain CON, agreement with statements about conduct of AE and ethical justification again conveys the positive perceptions of the respondents. The faculty members are conceding the disadvantages of AE through disagreement with the statement about enhanced repeatability of learning exercises. In the fourth domain PER, agreement with statements such as "students find AE stimulating" and being "aware of learning objectives" again divulges their substantial support for animal use. The perception of the faculty members in favor of postgraduates performing AE individually is observed by their disagreement with the statement about demonstrations being preferred. The analysis of statements in the last domain ALT reveals that faculty members are aware of the alternatives to AE and there should be a shift to the Three Rs concept.

Practical sessions in PGME involve learning outcomes like expertise in preparation-specific skills, animal handling skills, animal behavior observational skills, surgical skills, methods of scientific research, developing responsible attitudes towards animals, etc. Alternatives can fulfill some of these objectives at least as effectively as live AE. However, our study indicates the positive perceptions of the faculty members towards AE in spite of their awareness of the drawbacks and alternatives to AE. Hence, we perceive the importance of convincing all the teachers, many of whom have been trained with AE, that there are viable alternatives which can achieve these learning objectives. The introduction of alternatives into PGME training necessitates the availability and familiarity with alternatives. We advocate

Table 1. Faculty Members' Perceptions regarding Animal Experiments in Postgraduate Medical Education

Domain	Statement	Agreement No. (%)	Disagreement No. (%)	Uncertain No. (%)
ADV	Animal experimentations leave a long lasting impression of your discipline on students	36(69.2)	7(13.5)	9(17.3)
	Animal experimentations help to encourage "student centred education.	37(71.2)	9(17.3)	6(11.5)
	Animal experimentations improve dissection skills.	38(73.1)	7(13.5)	7(13.5)
	Animal experimentations encourage development of scientific research outlook	44(84.6)	3(5.8)	5(9.6)
	Students learn to handle live tissues through animal experimentations	35(67.3)	10(19.2)	7(13.5)
	Animal experimentations provide an opportunity for deep learning rather than surface learning.	39(75)	5(9.6)	8(15.4)
	Animal experimentations seem relevant to a career in biomedical research	43(82.7)	2(3.8)	7(13.5)
DIS	*Animal experimentations gives too much of importance to factual learning (A method of learning which concentrates on memorizing information)*	26(50)	18(34.6)	8(25.4)
	Animal experimentations cause unnecessary distress to animals	39(75)	9(17.3)	4(7.7)
	The same understanding of concepts of your discipline can be achieved without these experiments	21(40.4)	22(42.3)	9(17.3)
	The main objective of students to do animal experimentations is to pass University examinations	17(32.7)	28(53.8)	7(13.5)
	Students resist performing animal experiments	16(30.8)	24(46.2)	12(23.1)
CON	Animal experiments should be conducted in the program	46(88.5)	4(7.7)	2(3.8)
	The current use of animals for teaching purpose is ethically justified.	38(73.1)	10(19.2)	4(7.7)
	The duration of time spent in animal experiments is too much	23(44.2)	24(46.2)	5(9.6)
	Animal experimentations allow enhanced potential for repeatability of learning exercises compared with other alternatives	14(26.9)	29(55.8)	9(17.3)
	Animal experimentations are economically viable	19(36.5)	21(40.4)	12(23.1)
	Animal experimentations offer flexibility as to when & where experiments are conducted.	15(28.8)	23(44.2)	14(26.9)
PER	Students find animal experimentations stimulating.	30(57.7)	11(21.2)	11(21.2)
	Students are aware of the learning objectives for animal experiments prior to the practical.	47(90.4)	3(5.8)	2(3.8)
	Animal experimentations result in lower student stress during exams	12(23.1)	31(59.6)	9(17.3)
	Demonstrations (of animal experiments in batches) are preferred rather than experiments done by students individually	15(28.8)	34(65.4)	3(5.8)
ALT	*There are alternatives to animal experiments for practical teaching.*	36(69.2)	8(15.4)	8(15.4)
	Alternatives to animal experiments can achieve equivalent learning outcomes compared to animal experiments	26(50)	16(30.8)	10(19.2)
	If alternatives (like Computer assisted learning experiments, models) are available, animal experimentations should be totally discontinued.	18(34.6)	27(51.9)	7(13.5)
	If alternatives are available animal experimentations should be continued with reduction in no. or refinement of use of animals	40(76.9)	8(15.4)	4(7.7)
	Government laws have been framed with regard to use of animals in education/research.	49(94.2)	0	3(5.8)

ADV**:** Advantages of animal experiments in learning; DIS: Disadvantages of animal experiments in learning; CON: Logistics of conducting animal experiments; PER: Faculty members' perceptions of Student experiences with animal experiments ALT: Alternatives to existing animal experiments.
Negative statements are in italics.

faculty training in physio-chemical methods and techniques utilizing tissue culture, microbiological system, stem cells, DNA chips, micro fluidics, computer analysis models, epidemiological surveys and plant-tissue based materials, which would minimize the number of animals used and minimize some of the accepted disadvantages of AE[14,15]. Furthermore, combinations of Computer-aided Learning techniques with manikin and chemical sensors can deal with some of the disadvantages of the alternatives and be a training tool which can completely replace a few AE in PGME[16].

CONCLUSION

Regular curricular evaluations incorporating successful educational and scientific trends result in positive learning outcomes. Our study endeavors to assess faculty members' perceptions regarding the use of animals in the curricula of PGME which could help to incorporate necessary curricular changes in tune with the recent trends. Our findings indicate that faculty members in southern Indian medical colleges support animal use in PGME in spite of being aware of their drawbacks and the availability of alternatives. In view of the global efforts to "Replace, Reduce and Refine" animal use, greater awareness needs to be generated regarding availability of alternatives to AE in PGME which will help our postgraduates to carry out scientifically valid animal-based research giving due consideration to ethical issues.

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