



Why scientists perform animal experiments, scientific or personal aim?

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ABSTRACT

Objective: Although all animal studies are conducted in line with a specific purpose, we think that not all animal studies are performed for a scientific purpose but for personal curiosity or to fulfill a requirement. The aim of the present study is to reveal the purposes of experimental studies conducted on animals.

Material and Methods: We searched for experimental studies performed on rats in general surgery clinics via PubMed, and obtained the e-mail addresses of the corresponding authors for each study. Afterwards, we sent a 7-item questionnaire to the authors and awaited their responses.

Results: Seventy-three (22.2%) of 329 authors responded to the questionnaire. Within these studies, 31 (42.5%) were conducted as part of a dissertation, while the remaining 19 (26.0%) were conducted to meet the academic promotion criteria. Only 23 (31.5%) were conducted for scientific purposes. The cost of 41% of those studies was higher than 2500 \$.

Conclusion: As shown in this study, the main objective of carrying out animal studies in Turkey is usually to prepare a dissertation or to be entitled to academic promotion. Animal experiments must be planned and performed as scientific studies to support related clinical studies. Additionally, animal studies must have well-defined objectives and be carried out in line with scientific purposes that may lead to useful developments in medicine, rather than personal interests.

Keywords: Animal experiment, experimental study, ethics, general surgery

INTRODUCTION

It has long been known that the very first animal experiments were conducted 2500 years ago. Galen, who used live goats and dogs for his researches in the second century, became known as the 'Father of Vivisection'. Animal testing has played an important role in the development of Medicine: Insulin, some anti-cancer drugs, modern anesthetics, tetanus vaccine and other vaccines are some of the medications that have been discovered thanks to direct and indirect outcomes of animal testing (1). Some surgical procedures including transplantation, and even space research, have been conducted with animals for the first time. Furthermore, scientists have benefited from animal experimentation in the development of specific imaging methods, such as computed tomography and magnetic resonance imaging. However, while animal studies are becoming increasingly popular, there are some ethical concerns associated with the use of animals in experiments. In 1959, Russell and Burch introduced a principle regarding animal experimentation, which is known as the 3R principle (replacement, reduction and refinement) (2). This principle suggested Replacement: using non-animal methods such as tissue cultures, tissue slices, perfused organs, and computer simulations for experiments, Reduction: using methods that can reduce the number of the animals used, and Refinement: using methods that may improve animal welfare, being sensitive about analgesia, anesthesia and other significant issues, and minimizing invasive procedures. In addition to the 3R principles, many other regulatory and restrictive laws were suggested to regulate animal testing. Recently, People for the Ethical Treatment of Animals (PETA) and many other similar organizations have started questioning the necessity of animal studies (3, 4).

Despite attitudes towards animal testing and advances in technology for development of alternative methods instead of animal testing, animal studies are still frequently performed. It is estimated that approximately 100 million animals are used for experimentations each year all over the world (5, 6). A total of about 12.1 million animals have been used in Europe in the year 2005, according to report of the European Commission (7). One of the earlier studies concerning this issue reported that 1286 animal studies were carried out in Turkey in 2006 and 455692 animals were used in those studies (5). According to the search we conducted via PubMed, almost 1000 animal studies conducted just on rats were published in Turkey in 2013.

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Although all animal studies are conducted in line with a specific purpose, all animal studies had not been published, and not all animal studies were done for a scientific purpose but for personal curiosity or because of necessity. The aim of the present study is to reveal the purposes of experimental studies conducted on animals.

MATERIAL AND METHODS

Using the keywords "Turkey", "rat", and "general surgery", we searched for and found experimental studies performed on rats in general surgery clinics. By analyzing the studies published between March 2006 and March 2014, we obtained the e-mail addresses of the corresponding authors for each study. Afterwards, we sent a 7-item questionnaire to the authors and waited for their responses (Appendix-1).

Statistical Analysis

The questionnaire-based data were recorded and then analyzed with the Statistical Package for Social Sciences (SPSS Inc.; Chicago, IL, USA) for windows 16.0 program. The chi-square test was employed for analyzing. P<0.05 was considered statistically significant.

RESULTS

The number of published studies between 2006 and 2014, and complying with the aforementioned criteria was 340 in total. However, only 329 corresponding authors could be reached via e-mail. 73 (22.2%) of those authors responded to the questionnaire. While 54 (74%) of the analyzed studies were conducted in university hospitals, 19 (26%) took place in training and research hospitals. Figure 1 shows the academic titles of the researchers who participated in these studies.

Of all those studies, 31 (42.5%) were conducted as part of a dissertation, while the remaining 19 (26.0%) were conducted to meet the academic promotion criteria. The rate of published dissertation studies was higher in training and research hospitals in comparison to university hospitals; however, the difference was not significant (p=0.260). Objectives of the studies are indicated in Table 1.

Nineteen (61.3%) of those 31 dissertation studies did not have any purpose other than completing specialization in medicine. Similarly, 7 (36.8%) of those 19 dissertation studies that were carried out to satisfy the academic promotion criteria just pursued the goal of getting a promotion.

The cost was more than 2500 \$ in 41% of studies. The rate of studies that cost more than 2500 \$ was higher for the studies carried out at university hospitals (p=0.009). However, when the cost was compared between studies grouped according to their objectives, it was similar for all studies regardless whether they were conducted for dissertation, academic promotion or other purposes (p=0.548).

The factors considered while identifying the study subject can be listed as follows: The significance of the study-whether it would be the first study on the matter, the success potential-whether it could yield a favorable result or not, and the potential for publication (Table 2). When those factors were considered, there was no statistically significant difference between the studies, which were carried out respectively for dissertations, academic promotion and for other specific purposes.

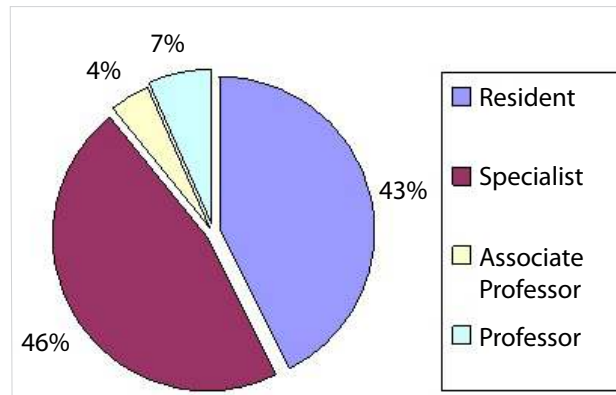


Figure 1. Academic titles of the researchers

Table 1. The objectives of animal studies

Purposes	n	%
To write a dissertation	31	42.5
To provide a sufficient number of publications required for promotion to associate professorship/professorship	19	26.0
To carry out further experiments related to my/our former studies	23	31.5
To carry out new studies in my field of interest	28	38.4
To have information on a field that I have not researched before	8	11.0

Table 2. The factors taken into consideration when planning a scientific research

Factors	n	%
Ease of conducting	21	28.8
Whether it would be the first study or not	46	63.0
Whether it could yield significant results or not	38	52.1
Presence of several similar studies	2	2.7
Whether it could contribute to former relevant international studies	27	37.0
Whether it could contribute to author's further studies on her/his field of interest or to her/his earlier studies	21	28.8
Publication potential	32	43.8

While 59 (80.8%) of all studies were submitted for publication by the person who conducted the study, 8 (11.0%) of them were submitted by secondary parties participating in the study, and 6 (8.2%) were submitted by thesis advisors. 18 (58.1%) of dissertation studies, 18 (94.7%) of those which were performed to fulfill academic promotion criteria, and all the other theses were published by the researchers conducting the studies. The rate of publication by the physician who conducted the study showed a significant difference between the three groups (p=0.001).

DISCUSSION

Experimental studies conducted on animals are mainly used for the following types of research (in order of frequency):

Pharmaceutical research, vaccines, biological research, cancer studies, and toxicology studies (2). Besides those areas, animal experimentation may be also conducted while analyzing physiological mechanisms and with the aim of training and education. Animal studies offer some advantages. They can be performed with a smaller number of subjects and lower budgets as compared to clinical studies. The required subject number can be easily reached. Study design is easier. Agents whose efficacy or side effects are not clearly known can be administered on animals. There are fewer ethical restrictions as compared to human studies. Animal studies allow room for experiments which cannot be practiced on humans such as genetic and morphological analyses, and facilitate the analysis of the natural history of diseases such as cancer (8).

As animal studies may be conducted on living creatures and cost significant amounts of money, there is an ethical concern regarding their necessity. Animal studies should be applied primarily for scientific purposes and in cases where it is not possible to conduct the required experimental study on human beings (9). Furthermore, such studies should be planned in line with relevant clinical studies (8).

In Turkey, it is obligatory to prepare a dissertation at the end of residency programs in medicine. Because of a lack of time for clinical studies due to the heavy work-load of specialization training, and the desire to do a unique or uncomplicated study, researchers prefer animal studies for their dissertations.

It is also shown in this study that another significant reason for animal studies is to achieve the number of published dissertations required for academic promotion. In Turkey, specialized physicians must have specific number of papers published in SCIE journals to be promoted to associate professorship. Animal studies are likely to be published because carrying out new and unique studies in this field is not so difficult. Animal studies may be completed and submitted for publication within a shorter period as compared to clinical studies. As a result of those advantages, researchers aiming to increase their number of publications prefer animal studies over clinical studies.

As shown in this study, the main objective of carrying out animal studies in Turkey is usually to prepare a dissertation or to be entitled to academic promotion. In other words, there is a malpractice of animal testing in Turkey. Using large budgets and numerous experimental animals for personal goals is unethical. It has also been indicated in our former study that only 23% of animal experiments conducted for dissertation studies had been published. Additionally, Riet has reported that only 50% of animal studies may be published (10). It is understood from the low publication rate that a significant portion of animal studies fail to reach the scientific community. Furthermore, the fact that merely 58% of thesis-oriented animal studies were submitted for publication by the real owner indicates that the study did not have any scientific goal. It can be inferred from all those findings that even if conducting experimental tests on animals just for completing a dissertation is unethical, many researchers do so.

Questionnaires have indicated that the cost of 41% of animal studies was higher than 2500 \$. Considering that more than

1000 animal studies are performed in Turkey per year, a large amount of money is spent not for scientific purposes but only for personal interests, such as promotion and dissertation.

In our study, it was determined that animal experiments have been performed for personal aims. This does not mean that animal experiments do not contribute to science, but we believe that the aim of performing these studies were not appropriate. Clinical studies should also be undertaken to make a contribution to science. There is no such information about the purpose of the clinical trials carried out. This can be demonstrated by further new studies.

There are some limitations of this study: Firstly, the study was designed as a questionnaire study, so the analyses performed within the scope of the study were based on participants' answers. However, participants may have given wrong or biased answers to the questions; therefore, the results obtained from the analyses may be incompetent or inaccurate. Secondly, rats and mice are the most commonly used animals in animal experiments (8). However, when we used only the keyword "rat" while searching the studies in PubMed, the results included merely the studies depending on rat experiments. As studies performed using other animals were left out of the scope of the study, the results may have been affected. Thirdly, the study analyzed only the animal studies conducted in Turkey, thus it may be incorrect to adapt these results for all animal studies world-wide. Because there may be differences between countries which have advanced research laboratories and those which do not. Nevertheless, it may be anticipated that the study results may be similar in countries whose development level is similar to that of Turkey.

CONCLUSION

This is the first study reporting the objectives of researchers who conduct animal studies. The present study has indicated that, in Turkey, animal studies are often performed to prepare a dissertation or get promotion as part of an academic career. Animal studies performed for personal requirements must be terminated. Furthermore, ethics committees approving animal researches should thoroughly analyze the authors' objectives prior to their approval.

Ethics Committee Approval: Ethics committee approval was not required because our study is a questionnaire study.

Informed Consent: Patient approval was not required because the study did not include patients.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept - B.M.; Design - B.M.; Supervision - B.M., U.D., T.B., E.C.Y., T.Ç., A.A., Y.A.M., M.T.O.; Resources - B.M., U.D., T.B., E.C.Y., T.Ç., A.A., Y.A.M., M.T.O.; Materials - B.M.; Data Collection and/or Processing - B.M., E.C.Y.; Analysis and/or Interpretation - B.M.; Literature Search - B.M.; Writing Manuscript - B.M.; Critical Review - B.M., U.D., T.B., E.C.Y., T.Ç., A.A., Y.A.M., M.T.O.

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Appendix-1

1. What was the academic title of the researcher when she/he conducted the study?

- a) Resident
- b) Specialist
- c) Associate Professor
- d) Professor

2. Where was the study conducted?

- a) University Hospital
- b) Training and Research Hospital
- c) State Hospital

3. Was the study planned as a dissertation study?

- a) Yes
- b) No

4. What was the budget of the study (approximately)?

- a) <500 \$
- b) 500-1000 \$
- c) 1000-2500 \$
- d) 2500-5000 \$
- e) >5000 \$

5. What was the aim of the study?

- a) To write a dissertation
- b) To provide a sufficient number of publications required for promotion to associate professorship/ professorship
- c) To carry out further experiments related to my/our former studies
- d) To carry out new studies in my field of interest
- e) To have information on a field that I have not researched before

6. Which factors were taken into consideration in the planning phase?

- a) Ease of conducting
- b) Whether it would be the first study or not
- c) Whether it could yield significant results or not
- d) Presence of several similar studies
- e) Publication potential
- f) Whether it could contribute to former relevant international studies
- g) Whether it could contribute to author's further studies on her/his field of interest or to her/his earlier studies

7. Who did submit the study for publication?

- a) The owner/author of the study
- b) Second parties contributing to the study
- c) Thesis advisor (if it is a dissertation)
- d) Unrelated parties who were present in the same working environment