Kafkas Univ Vet Fak Derg
17 (1): 83-87, 2011
DOI:10.9775/kvfd.2010.2429

RESEARCH ARTICLE

Determining Scientific Performance of Some of Laboratory Animal Journals in Veterinary Science with the Ethical Approach

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Makale Kodu (Article Code): KVFD-2010-2429

Summary

The present study was conducted to analyses the scientific performance of the veterinary studies with considering ethical approach which were published in laboratory animal journals by using rat and mouse. The following journals were investigated in this study: ATLA- Alternatives to Laboratory Animals, Comparative Medicine, Experimental Animals, Lab Animal, Laboratory Animals, and Scandinavian Journal of Laboratory Animal Science. These journals (sourced from ISI Web of Science database) were selected on the basis that they included too many publications with rats and mice. The present study determined that there were 519 articles between 1998-2007 years relating to mice being used in laboratory animal studies. Furthermore, 190 of the articles were published with rats at the same period. It was also found that the average citation of mice publishes was higher than rats in all journals.

Keywords: *Citation, Ethics, Journal, Mouse, Rat*

Veteriner Bilimleri Alanında Yayımlanan Bazı Laboratuar Hayvanları Dergilerinin Bilimsel Performanslarının Etik Yaklaşımla Değerlendirilmesi

Özet

Bu araştırma veteriner bilimlerinde rat ve fareyle yapılan ve laboratuar hayvanlarıyla ilgili dergilerde yayımlanan çalışmaların bilimsel performanslarını etik yaklaşımla değerlendirmek için gerçekleştirilmiştir. Bu çalışma kapsamında incelenen dergiler şunlardır: ATLA- Alternatives to Laboratory Animals, Comparative Medicine, Experimental Animals, Lab Animal, Laboratory Animals, ve Scandinavian Journal of Laboratory Animal Science. Bu dergiler, ISI "Web of Science" veri tabanı kullanılarak araştırılmış, rat ve fareyle ilgili bilimsel yayınların fazla olduğu dergiler araştırılmak üzere seçilmiştir. 1998 ile 2007 yılları arasında farelerle ilgili 519 bilimsel çalısmanın yayımlandığı tespit edilmiştir. Aynı tarihlerde ratlarla yapılan bilimsel çalışma sayısı ise 190 olarak belirlenmiştir. Ayrıca, farelerle yapılan calışmaların yukarıda belirtilen dergilerde aldığı ortalama atıf sayısının ratlarla gerçekleştilen çalışmaların üzerinde olduğu saptanmıştır.

Anahtar sözcükler: *Atıf, Etik, Dergi, Fare, Rat*

INTRODUCTION

The World Veterinary Association states that it is not possible to abstain from using animals in laboratory experiments for the purposes of furthering research applicable to human health and well-being [1]. In this context, millions of experimental animals are used worldwide [2,3]. More than 70 Nobel prizes were awarded to studies conducted in the medical field of which 44 studies involved animals [4]. According to the British Home Office statistics [5-7]; mice, rats and other rodents were consist the majority in experimental researches. In 2000; the percentage of mouse used in research was 59% and rat has 20%, in 2005; mouse has 68% and rat

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has 15%, in 2008; mouse has 66% and rat has 10%.

Whilst it is acknowledged that research has progressed as a result of using animals, such as rats and mice, there is still growing concern [8] among animal activists demanding that the scientific community minimise the pain and distress of animals used in experimental processes [9]. It is important that experiments are designed to avoid needless use of laboratory animals [1]. Furthermore, 3R (replacement, reduction, refinement) principles have improved the welfare of animals used in experiments [10]. Generally speaking, the community at large supports animal experiments providing humane and ethical practices are adopted. 74% of the participants support the item of "Animals can be used in the experiments if it is conducted by humane methods" [11]. 60% of the participants found animal experiments acceptable if these ensured the contribution towards medical progress and advancement [12]. However this support decreased to 43% if the experiments were found to cause any pain to animals.

On the other hand, achievement of the scientific studies was evaluated according to its citation index [13]. It was found by, Levitt and Thelwall [14] that there is a positive relationship between high citation numbers and high quality research in terms of highly cited articles. Furthermore, it was also expressed that the journals with high impact factors (IF) included the most prestigious [15] scientific journals.

The present study is aimed to determine the performance of the journals by comparing citation levels that included rats and mice in their studies. This situation is critically important for animal and research ethics because animals are used in research.

MATERIAL and METHODS

The present study was conducted using ISI "Web of Science" database, under the guidelines established by its founder, Dr. Eugene Garfield, 1958. Nowadays, ISI has 3 main indexes and SCI Science Citation Index is one of them. The average citation rate is one of the important criteria of journals that are indexed by ISI [13].

It was given at the follow, IF calculation methods of any journal [16];

A = Total cites in 1992

B = 1992 cites to articles published in 1990-1991 (this is a subset of A)

C = Number of articles published in 1990-1991

D = B/C = 1992 impact factor

This study investigated six, main journals (as listed below) that related to laboratory animals at the sub-heading of veterinary science:

Abbreviation List of Journals[1a] which are Researched in the Study:

ATLA- Alternatives to Laboratory Animals: *ATLA*

Comparative Medicine: *Comparative Med*[2a]

Experimental Animals: *Exp Anim Tokyo*

Lab Animal: *Lab Animal*

Laboratory Animals: *Lab Anim-UK*

Scandinavian Journal of Laboratory Animal Science: *Scand J Lab Anim Sci*

Rats and mice were selected for this research since these animals are commonly used in research purposes. The present study covered a ten-year period from 1998 - 2007.

RESULTS

It was found that in a ten-year period, 709 articles were published in veterinary science journals that mentioned using rats and mice in laboratory experiments - 190 of the articles were with rats while the remaining 519 articles used mice. The studies with rats were published mostly in *Experimental Animals, Laboratory Animals* and *Comparative Medicine*, respectively. On the other hand, the studies with mice were published mostly in *Experimental Animals, Comparative Medicine* and *Laboratory Animals.* The publications related to rats and mice between 1998 and 2007 are shown in *Fig. 1*.

When the journals were evaluated for their citations performance *(Fig. 2)* it was seen that the first three journals for the rat publishes were *Laboratory Animals, ATLA- Alternatives to Laboratory Animals and Comparative Medicine*. It was also determined that the first three journals are *ATLA-Alternatives to Laboratory Animals, Laboratory Animals* and *Comparative Medicine,* for the mouse publishes, respectively. Furthermore, the publications were investigated for their citations performance related to rat and mouse. It was found that mouse studies cited more than rat studies at whole journals. It was also introduced that mouse publications cited double than rat studies in *ATLA-Alternatives to Laboratory Animals* and *Scandinavian Journal of Laboratory Animal Science.* The lowest performance

1[a] The abbreviation of the journals accessed from http://www.ulakbim.gov.tr/cabim/ubyt/dergiler.php

2[a] This Journal published in 1998 and 1999 years with the name of Laboratory Animal Science by the publisher of American Association for Laboratory Animal Science

about citations in both rat and mouse studies can be attributed to *Scandinavian Journal of Laboratory Animal Science*.

The highest cited journal (between 25 and 99) mentioning the use of rats in laboratory experiments was determined to be *Lab Animal* with 11% (*Table 1*). Also %56 of the studies in *Lab Animal* was not cited in any subsequent published papers. It was seen that the first journal was *Lab Animal* both in highest and lowest cited rates. The highest cited journal (between 25 and 99) mentioning mice was determined *Laboratory Animals* with 8% (*Table 2*). It was also introduce that *Comparative Med,* was the first journal that cited between the 10 and 24. Furthermore, 33% of the studies in *Lab Animal* was not cited by any subsequent published papers.

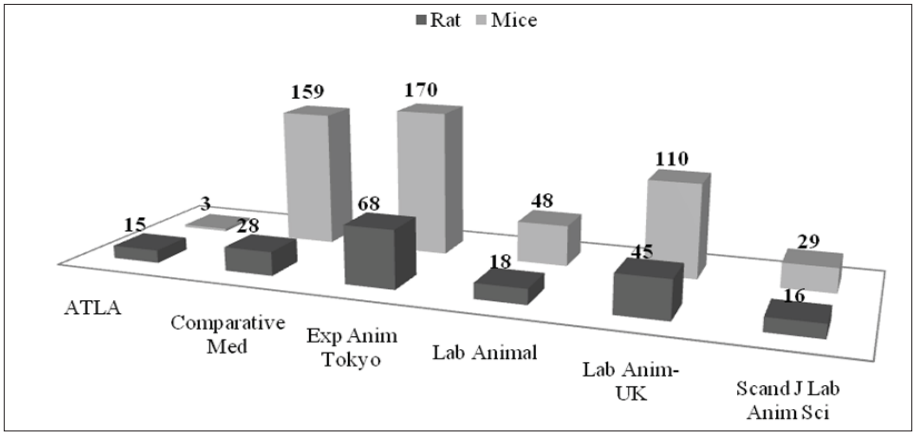
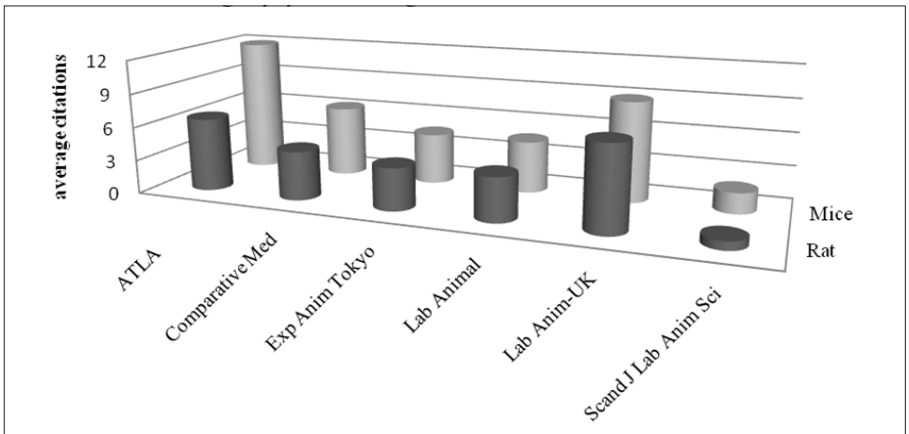


Fig 1. Published articles in laboratory animal journals related to rat and mouse between 1998- 2007

Şekil 1. 1998-2007 yılları arasında laboratuar hayvanları dergilerinde yayımlanan rat ve farelerle ilgili yayınlar



	ATLA	Comparative Med	Exp Anim Tokyo	Lab Animal	Lab Anim-UK	Scand J Lab Anim Sci
Rat	6.53	4.36	3.79	3.94	7.56	0.75
Mice	12	6.33	4.56	4.64	8.95	1.86

Fig 2. Average citations in laboratory animal journals related to rats and mouse between 1998-2007

Şekil 2. 1998- 2007 yılları arasında laboratuar hayvanları dergilerinde yayımlanan rat ve farelerle ilgili yayınların aldığı atıflar

Table 1. *Citation performance of laboratory animal journals with rat publications (1998 - 2007)*

Tablo 1. *Ratlarla yapılan çalışmaların dergilere göre atıf performansları (1998 - 2007)*

Citations	**0**		**1**		**2-4**		**5-9**		**10-24**		**25-99**		**Total**
Journals	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**
ATLA	1	6.66	3	20.00	3	20.00	4	26.66	3	20.00	1	6.66	15
Comparative Med	1	3.57	6	21.42	12	42.85	6	21.42	3	10.71			28
Exp Anim Tokyo	11	16.17	12	17.64	27	39.70	12	17.64	6	8.82			68
Lab Animal	10	55.55	3	16.66	3	16.66					2	11.11	18
Lab Anim-UK	1	2.22	7	15.55	16	35.55	12	26.66	7	15.55	2	4.44	45
Scand J Lab Anim Sci	11	68.75	2	12.50	3	18.75							16

Table 2. *Citation performance of laboratory animal journals with mice publications*
Tablo 2. *Farelerle yapılan çalışmaların dergilere göre atıf performansları*

Citations	0		1		2-4		5-9		10-24		25-99		Total
Journal	n	%	n	%	n	%	n	%	n	%	n	%	n
ATLA									3	100			3
Comparative Med	18	11.32	22	13.83	46	28.93	38	23.89	31	19.49	4	2.51	159
Exp Anim Tokyo	25	14.70	23	13.52	65	38.23	43	25.29	11	6.47	3	1.76	170
Lab Animal	16	33.33	9	18.75	13	27.08	6	12.50	1	2.08	3	6.25	48
Lab Anim-UK	17	15.45	10	9.09	19	17.27	29	26.36	26	3.63	9	8.18	110
Scand J Lab Anim Sci	9	31.03	7	24.13	8	27.58	5	17.24					29

DISCUSSION

Zhao et al.[17] found that 36% of the published studies were done with rats, 24% studies were done with mice, between the 1995-2005 years. Between 1966-1995, the publications were done with rats increased by 4.18% on average each year, after 1996, this state entered into a downward trend. The publications containing mice research increased continuously after 1966 and it was firstly passing the number of publications which used rats in their studies in 2003. Toth et al. [18] investigated the types of articles which were published in the journal of *Comparative Medicine* and found that in 2008 and 2009 there were 19 and 21 articles published using mice in experiments respectively and also, 7 and 9 articles published with rats. In the present study *(Fig. 1)*, it was found that 709 publications were published in veterinary science with rats and mice in laboratory animal journals. The figures indicate that mice studies appeared to be published more than three times in journals compared to rats' studies. These results were similar with Toth et al.[18] studies and Zhao et al.[17] findings which are related to 2003.

When the journals were evaluated of their 2007 IF [19] value, their ranking level was high to low as follows: *ATLA-Alternatives to Laboratory Animals (3.203) >Scandinavian Journal of Laboratory Animal Science (1.154) > Comparative Medicine (1.153) > Laboratory Animals (0.905) > Lab Animal (0.615) > Experimental Animals (0.551).* In the present study, it was found *(Fig. 2)* that the journals ranking about their average citations via with the mouse studies between 1998-2007 years is as follows: *ATLA-Alternatives to Laboratory Animals > Laboratory Animals > Comparative Medicine > Comparative Medicine > Lab Animal > Experimental Animals > Scandinavian Journal of Laboratory Animal Science.* According to present study, *ATLA-Alternatives to Laboratory Animals* has displayed a good performance about average citations in both rat and mouse studies. However, *Scandinavian Journal of Laboratory Animal Science* has displayed a low performance in terms of citations in both rat and mouse studies when it was compared with the IF values [19].

Garfield [20] introduced citation frequency distribution of papers in the SCI Science Citation Index 1945-1988. He found that 55.8% of them cited only once, %24.1 of them cited between 2-4, %9 of them cited between 5-9, %7 of them cited between 10-24, %3.6 of them cited between 25 and 99 and %0.4 of them cited between 100 and 499, in 32.7 million publishments. Garfield [15] has also revealed that, only %0.5 of the studies has received more than 200 citations and half of the studies did not receive any citation in total in the 38 million cited studies in between 1900-2005. Over a period of 1995-2004, Knight [21] investigated studies that were conducted with chimpanzees, where 95 randomly selected published papers out of a possible 749, only 50% of articles did not receive citations. He commented this finding; "little obvious contribution toward the advancement of biomedical knowledge. The approval of these experiments indicates a failure of the ethics committee system". In the present study, it was found that 18% of published rat studies were not cited by any subsequent papers. This figure was nearly the same in mouse studies with 16%. These findings are lower than Garfield's [15] general researches. It was also found that only 1.86% of published rat studies were cited more than 24 times. Furthermore, 3.66% of published mouse studies were cited more than 24 times. According to the author's study findings these results indicate that published articles with mouse show more successful performance than rat articles. Furthermore, both rat and mouse studies citation performance found better than Garfield's [15,20] researches. It was also determined that *Lab Animal* journal had the highest and lowest citations in the rat paper among all journals.

In conclusion, it was found that publications with mice were more than studies with rats. Animal ethics committees may need to review this tendency in terms of animal ethics. They might be also inducing the scientists

to use mice in their study instead of rat because of the high citations of mice studies. It may also assert that there is a positive relationship between the results of average citations and IF values of *ATLA-Alternatives to Laboratory Animals* and *Comparative Medicine.* Furthermore, it was found a negative correlation with IF value of *Scandinavian Journal of Laboratory Animal Science.* Although it has a high IF value [19] in 2007, it has displayed a weak performance according to this author's study results. In addition to these, mouse studies citation performance is higher than rat studies. Consequently, this may explain the increases of mouse publications worldwide.

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