

Original Article

A Survey of Scientific Outputs of Iranian Researchers in the Field of Poisonous Animals in Web of Science: a Scientometric Study

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ABSTRACT

ISI Web of Science (WOS) is the world's most prestigious database that is used in order to evaluate and rank the countries, researchers, institutions, and universities. Therefore, determining the status of Iranian articles in this database in the field of poisonous and venomous animals is important. Quantitative and qualitative assessments of scientific outputs are the main goals of this study. In order to conduct this research, 220 articles written by Iranian researchers during 1973 to 2010 in the field of poisonous animals which have been indexed in Web of Science were reviewed. Scientometric, survey and citation analysis methods have been used. In this research, number of papers in different years, annual growth rate of papers, international collaboration of Iranian researchers with their counterparts from other countries, impact factor, average citation per paper in comparison with some selected countries, subject categories, and the most prolific institutes and authors have been surveyed. Results of the present study showed that from 2004 onwards, the number of papers increasingly enhanced. The most collaboration of Iranian authors has been done respectively with their counterparts and colleagues from USA, Belgium and Scotland; Poisonous animals articles have had the most interaction with the fields of toxicology and pharmacology. The mean impact factor was 1.731 and the average citation per paper was 4.15. Tehran University, Razi Vaccine and Serum Research Institute, Tehran University of Medical Sciences and Tarbiat Modarres University were the most Iranian prolific universities and institutes respectively. Number of articles in the field of poisonous animals has been increased significantly in recent years. The most collaboration was with USA and European countries respectively. The average citation per paper of Iranian articles in poisonous animals is lower than selected countries. Besides universities, Razi Vaccine and Serum Research Institute, is among the most prolific universities and institutes. The mean impact factor of Iran in poisonous animals has relatively good position in comparison with other fields of Iran, but lower than other fields in some mentioned countries.

Keywords: Poisonous animals, Articles, Iran, Ranking, Scientometrics, ISI Web of Science Database

INTRODUCTION

Currently, the scientific output indexed in major databases such as ISI is important criteria for citation

analysis (de Granda-Orive, 2011). Also, Essential Science Indicators (ESI) database that affiliated to ISI, evaluate and rank the countries, institutes and universities in the world (ESI, 2011). Each country's share of world scientific output in general and specifically in a particular field is calculated

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accordingly. Therefore, because of the increasing importance and necessity of these assessments and rankings, scientometrics emerged, quantitative and qualitative assessments of scientific products are the main goals of scientometrics. Determination of the impact factor status, distribution and growth rate in different years, average citations per paper in comparison with some Middle East countries, collaboration and co-authorship, participation of Iranian universities and institutions, are the most important goals of this research. The previous researches show that the mean impact factor of journals in the field of medicine in Iran, Pakistan and Egypt was reported to be 1.36, 1.75, and 1.33 respectively (Rezaii Ghale *et al* 2003). The mean impact factor in the field of nuclear medicine in Europe including Switzerland, Netherlands, England and Belgium was reported as 2.36, 3.49, 3.26, 3.07, 3.06 respectively (Signore & Annovazzi, 2004). Impact factor of forensic medicine in Europe was 2.46 (Ferrara, 2011), Epidemiology in America, 2.8, epidemiology in Canada, 2.4, and epidemiology in Japan was 2.3 (Soteriades & Falagas, 2006). Average citation per paper of China in modern biomedical research is 3.9 (Makris *et al* 2009), in National Institute of Biotechnology and Genetic Engineering (Pakistan) were 8.07 (Bajwa & Yaldram, 2013). Average citation per paper of Iran in the fields of parasitology was 3.48 (Khaseh *et al* 2010), immunology 6.26 (Yousefi *et al* 2012a), veterinary science 1.89 (Yousefi *et al* 2012b), and in microbiology were 3.78 (Yousefi *et al* 2012c). Survey of Iranian articles on poisonous and venomous animals was not reported till now and this work may help the researchers and research managers in order to make a better policy and planning the research affairs. Thus, survey and assessment of Iranian articles in the field of poisonous and venomous animals according to the quantitative and qualitative indices are the main purposes of this research which may helps the policymakers of science and research in Iran.

MATERIALS AND METHODS

The study area is scientometrics. In addition to scientometric method, survey and citation analysis methods have been used. ISI Web of Science has been used for data gathering (ISI Web of Science, 2011). For data analysis, custom charts and tables, the ISI Web of Science database analysis software and Microsoft Excel were used. Data analysis method has been descriptive and inferential statistics. Meanwhile, all 220 Iranian articles, without sampling, in poisonous animals were reviewed and analyzed. In this research, number of papers in different years, annual growth rate of papers, international collaboration of Iranian researchers with their counterparts from other countries, impact factor, average citation per paper in comparison with some selected countries, subject categories, and the most prolific institutes and authors have been surveyed. In order to retrieve articles, from the Advanced Search section of the database, the word Iran along with other keywords in the field of poisonous animals searched. All articles from the beginning to the end of 2010 have been retrieved and analyzed. In order to calculate the impact factor of journals, the Journal Citation Reports (JCR) has been used (JCR, 2011).

RESULTS

From 2004 onwards, the number of papers increased remarkably and in 2010 it reached to its top of growth rate. Considering all the papers publishes as 100%, During the 30 years (1973 to 2002) only 20.88% of papers were published while during 7 years (2004-2010) 79.1% of papers were published. The annual growth rate of papers was 39.78% (Table 1). In the present survey it was found that Iranian researchers in writing articles had most collaboration with their counterparts from USA, Belgium and Scotland respectively (Figure 1). Web of Science database itself, categorized published papers in different subject areas. Iranian articles in the field of poisonous animals were distributed in the fields of Toxicology,

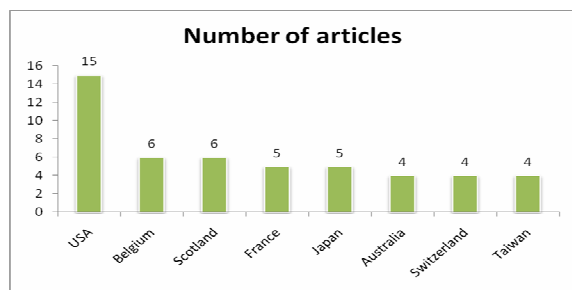


Figure 1. Amount of Iranian researchers' collaboration with their foreign colleagues in writing the articles in the field of poisonous animals

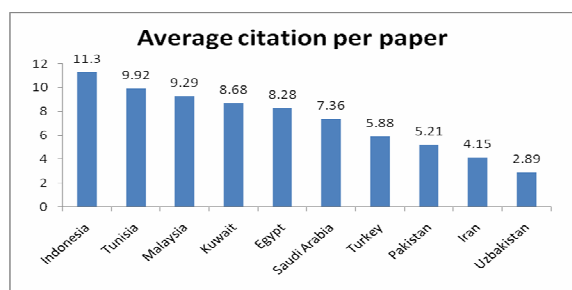


Figure 2. Average citation per paper of Iranian articles in the field of poisonous animals in comparison with selected countries.

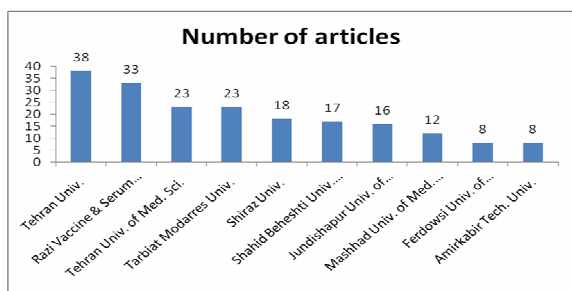


Figure 3. Number of articles of the most prolific universities & institutes of Iran in the field of poisonous animals.

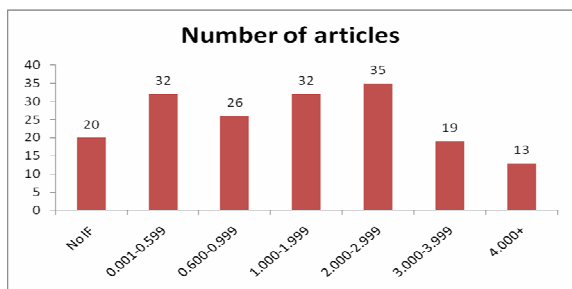


Figure 4. Distribution of Impact Factors of journals published Iranian articles in poisonous animals.

Table 1. Number, percent and annual growth rate of Iranian articles on poisonous animals over the years.

Row	Pub. Year	No.	Percent	Annual growth rate
1	1973	2	0.91	-----
2	1974	1	0.45	-50.00
3	1975	1	0.45	0.00
4	1978	2	0.91	100.00
5	1979	2	0.91	0.00
6	1984	1	0.45	-50.00
7	1985	1	0.45	0.00
8	1994	2	0.91	100.00
9	1995	4	1.82	100.00
10	1996	3	1.36	-25.00
11	1997	1	0.45	-66.67
12	1998	4	1.82	300.00
13	1999	2	0.91	-50.00
14	2000	1	0.45	-50.00
15	2001	3	1.36	200.00
16	2002	9	4.09	200.00
17	2003	7	3.18	-22.22
18	2004	13	5.91	85.71
19	2005	10	4.55	-23.08
20	2006	19	8.64	90.00
21	2007	27	12.27	42.11
22	2008	33	15	22.22
23	2009	35	15.91	6.06
24	2010	37	16.82	5.71
Total		220	100	Average 39.78

pharmacology/pharmacy and biochemistry/molecular biology, as 49, 38 and 29 respectively (Table 2). As shown in the figure 2 when average citation per paper of Iran was compared with selected countries, Indonesia 11.3 and Tunisia 9.92 located at top ranking and Uzbekistan with 2.89 and Iran with 4.15 located at lowest ranking (Figure 2). When different Universities and research institutes were analyzed for their

publications in this field Tehran University with 38 publications got the first rank, while Razi Vaccine and Serum Research Institute with 33 publications, Tehran University of Medical Sciences with 23 publications and Tarbiat Modarres University 23 publications were the most prolific universities and Institutes respectively (Figure 3). The mean impact factor of journals that Iranian papers were published in the field of poisonous animals was 1.731 (Figure 4).

Table 2. Distribution of Iranian articles in the field of poisonous animals in different subject areas.

Row	Subjects	No	%
1	TOXICOLOGY	49	22.27
2	PHARMACOLOGY PHARMACY	38	17.27
3	BIOCHEMISTRY MOLECULAR BIOLOGY	29	13.18
4	VETERINARY SCIENCES	18	8.18
5	ZOOLOGY	18	8.18
6	TROPICAL MEDICINE	12	5.45
7	GENERAL INTERNAL MEDICINE	11	5.00
8	ENTOMOLOGY	9	4.09
9	PUBLIC ENVIRONMENTAL OCCUPATIONAL HEALTH	9	4.09
10	BIOPHYSICS	8	3.64

DISCUSSION

Iranian papers in the field of poisonous animals did not grow until 2004 and even in some years the number of articles had been lower. From 2004 onwards, except 2005, we have witnessed a remarkable growth. Also, this study shows that during the 30 years from 1973 to 2002, only 30 articles (13.64%) and in 2010 alone, with 37 articles (16.82 percent), is allocated. Overall, 190 articles (86.36%) of the total articles published in the past 9 years, which reflects the rapid growth in recent years. Also, findings of some other previous researches showed high growth rate of Iranian articles in other fields of research in recent years (Noori *et al* 2006), (Khaseh *et al* 2010), (Shahbodaghi & Shekofteh 2009), (Ebrahimi & Jowkar 2010). The annual growth rate of papers in the field of poisonous animals of Iran is 39.78% which is comparatively high. It is higher than

annual growth rate of Pakistan in the field of biotechnology with 22% (Bajwa & Yaldran 2013).

In our opinion, factors that increase the number of Iranian papers in recent years include: 1. Importance, compulsory and designating high score to articles that published in ISI journals in regulations of faculty members evaluation, 2. Bonus allocated to ISI articles, 3. The emergence and spread of ranking systems, and competition between universities and research institute in order to gain a better position in the rankings, 4. Increase the number of faculty members and researchers, 5. Increase the number of graduate students, 6. Establishment of new various universities and institutions of higher education, 7. Increase the number of Iranian journals that are indexed in the ISI database, and 8. Iranian researchers eager to share their research findings at international level. Of course, in order to identify the factors influencing the growth of scientific output of Iran and to identify the contribution of each factor, it is necessary to conduct an independent research.

Iranian researchers in the field of poisonous animals have the most collaboration with their counterparts from the United States, Belgium, Scotland, and France respectively. But Pakistan researchers in the field of biotechnology had the most collaboration with their counterparts from United States, United Kingdom and Germany respectively. Also, in the field of parasitology Iranian researchers had the most collaboration with their counterparts from the England, Germany, United States, and Spain (Khaseh *et al* 2010), faculty members of Shahid Beheshti University of Medical Sciences have the most collaboration with their colleagues from the United States, Canada, Japan, England, and Australia (Shahbodaghi & Shekofteh, 2009), and other research results in all fields show that Iranian researchers have the most co-authorship with their counterparts from England, Canada and the United States (Hasanzadeh *et al* 2010). Overall, the results of this study and the all mentioned studies indicate that always Iranian researchers, in the first priority, have the most collaboration with their counterparts from the

United States in the most subject areas. But, in the field of poisonous animals of Iran, there is difference in 2nd and 3rd countries (Belgium & Scotland). This is may be because the two Iranian researchers and their counterparts from Belgium and Scotland had several joint research projects and papers.

Average citation per paper is one of the most important quality indicators to evaluate and rank the articles, researchers, subject areas, and countries. The average citation per paper of Iran in the field of poisonous animals is 4.15. By comparing the average citation per paper of 10 selected countries, we realized that Indonesia 11.3 and Tunisia 9.92 located at top ranking and Uzbekistan 2.89 and Iran 4.15 located at the lowest ranking. Iran stands at 9th position. This fact shows that the Iranian poisonous articles didn't attract the other researchers suitably. The average citation per paper of poisonous animals of Iran is lower than in the stem cells of Iran 6.91 (Alijani & Karami, 2010), immunology of Iran 6.26 (Yousefi *et al* 2012a); and it is higher than parasitology of Iran 3.48 (Khaseh *et al* 2010), veterinary science of Iran 1.89 (Yousefi *et al* 2012b), microbiology of Iran 3.78 (Yousefi *et al* 2012c), biomedical research in China 3.9 (Makris *et al* 2009).

Respectively, University of Tehran (UT) with 38 articles, Razi Vaccine and Serum Research Institute (RVSRI) with 33 articles, Tehran University of Medical Sciences (TUMS) and Tarbiat Modarres University (TMU) equally with 23 articles are the most prolific universities and institutes. Also, in some other fields of Iran in parasitology, TUMS, UT, and Pasteur Institute of Iran (PII) (Khaseh *et al* 2010), in stem cells, Royan Institute, TUMS and TMU (Alijani & Karami, 2010), in veterinary science UT, Shiraz University of Medical Sciences (SUMS) and Islamic Azad University (Yousefi *et al* 2012b), in microbiology PII, UT and TUMS (Yousefi *et al* 2012c) and in immunology TUMS, SUMS and TMU (Yousefi *et al* 2012a), were the most prolific ones respectively. Because RVSRI is one of the foremost institutions on

poisonous animals, according to the number of papers gained the proper position.

The mean impact factor of journals that have published articles of Iranian researchers in the field of poisonous animals is 1.731 (Figure 3). It is lower than impact factor of medicine in Pakistan 1.75 (Rezaei Ghale *et al* 2003), nuclear medicine in Europe 2.36 (Signore & Annovazzi, 2004), forensic in Europe 2.46 (Ferrara *et al* 2011), epidemiology in the United States 2.8, Canada 2.4, and Japan 2.3 (Soteriades & Falagas, 2006); but it is higher than medicine in Iran 1.36, medicine in Egypt 1.33 (Rezaei Ghale *et al* 2003), Dentistry in Iran 0.718 (Gil-Montoya *et al* 2006). The mean of impact factor of Iranian poisonous animals has relatively good position in comparison with other fields in Iran, but lower than other fields in some European and American countries.

In recent years, especially from 2004 onwards, Iranian research papers in the field of poisonous animals have grown very significantly and it reached its peak in 2010. This increased trend shows that incentive policies had good influence to increase the number of articles. Iranian scientists writing articles in ISI Web of Science have highest collaboration and co-authorship with their counterparts from the USA and European countries respectively. So, in terms of international cooperation, researchers in the field of poisonous and venomous animals are matched with other Iranians. Average citation per paper of Iranian articles in poisonous animals is lower than all selected countries, except Uzbekistan. Therefore, in terms of average citations per paper is undesirable. Unfortunately, the quality sacrificed for quantity. This fact shows that the Iranian poisonous articles didn't attract the other researchers suitably. Besides universities, Razi Vaccine and Serum Research Institute, is among the most prolific universities and institutes. Of course, this review is based solely on the number of articles. It could be normalized based on the number of articles per faculty member, the amount of research funding, the number of graduate students and so on. Also, for more accurate assessment, we can analyses and rank

the universities and institutes according to qualitative indices of scientometrics like the average citations per paper, the mean of impact factor and so on. Of course, it does not fit in this compendium. The mean impact factor of Iran in poisonous animals has relatively good position in comparison with other scientific fields of Iran, but lower than other fields among the most mentioned countries. Publishing papers in journals with higher impact factor recommended. If so, they will also increase the amount of citations per paper. To publish articles in journals with higher impact factor, the researches must be genuine, original issues, hot topics and new issues of the world.

Ethics

I hereby declare all ethical standards have been respected in preparation of the submitted article.

Conflict of Interest

The authors declare that they have no conflict of interest.

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