Progress of Iran in Medical Research

Shadi Kolahdoozan and Sadegh Massarrat

Digestive Diseases Research Center, Digestive Diseases Research Institute, Tehran University of Medical Sciences, Tehran, Iran

Received: 02 Feb. 2015; Accepted: 22 Dec. 2015

Abstract- The indexed Iranian journals in ISI and PubMed at the end of 2012 with known impact factor (IF) were evaluated with regard to the number of articles published in 2010-2012, the number of citations by authors from inside and outside Iran, their IF as well as their ranking order among all other journals in their specialized categories. There were among 130 English journals, 21 indexed with known IF. The mean IF of these journals increased from 0.4 in 2010 to 0.68 in 2012. The number of citations per article by authors from outside Iran increased from 0.19 to 0.49 during the same time period. The rank of the majority of the indexed journals was in the lowest 20% of their category. Although some improvement has been observed in the quality and the number of citations of Iranian journals indexed in ISI during these two years, the quality of the manuscripts remains low. A reduction in the number of journals, a change of their structure as well as more financial resources for research is necessary for the improvement of the quality and better rank and status of Iranian science among an international audience.

Acta Med Iran, 2016;54(11):690-695.

Keywords: Medical research; Iran; Progress; Development

Introduction

Medical progress is a key factor in maintaining the good health of the society. The necessary conditions for its development depend on the economic and human resources provided by the society for research and the practice in all fields. The geographic position and social structure of population, as well as the prevalence of diseases, are very different among various countries. According to this heterogeneous nature of the problem, the type and direction of research must be adapted to the requirements of the society. The evaluation of research progress is an important factor in making the right decision for any change of direction. As Iranian publications have rapidly increased in the last decade and Iran becomes a country with one of the highest outputs of research manuscripts in the world, the question arises whether this rapid growth is associated with quality improvement and how sustainable it is in the future.

A comparative analysis of Iranian journals has recently made with those of Turkey (1). The aim of this study was to answer the question above by analyzing the quantity and quality of research of Iranian scientists on the basis of all publications made in Iranian journals indexed in Thomson Reuters (formerly ISI) during the last four years.

Materials and Methods

All Iranian journals indexed in ISI at the end of 2012 with a known impact factor (IF) were studied with regard to the number of publications and their total number of citations by all authors, distinguishing those from outside and inside Iran from 2009 to the end of 2012. The IFs of all journals during the last three years have been registered. The ranks of the indexed Iranian journals in the different categories are given.

Results

Totally, at the end of 2012, there were 268 medical journals in Iran, which were published at least quarterly. From 268 journals, 130 were published in the English language. Tehran University of Medical Sciences alone was the publisher of more than 52 journals. Thirty known IF at the end of 2012 (Table 1).

The number of articles published during this time period, total citations and citations from foreign authors and foreign citations per article are given.

Corresponding Author: S. Massarrat
Digestive Diseases Research Center, Digestive Diseases Research Institute, Tehran University of Medical Sciences, Tehran, Iran
Tel: +98 21 82415104, Fax: +98 21 82415400, E-mail address: massarrat@ams.ac.ir

Table 1. List of all indexed Iranian journals in 2012

No.	Journal name	Total articles	Total citations	Foreign citation only	Foreign citations per article	IF
1	**Hepatitis Monthly**	380	832	275	0.72	2.190
2	**Archives of Iranian Medicine**	473	564	495	1.04	0.972
3	**Iranian Journal of Kidney Diseases**	282	247	181	0.64	0.870
4	**Iranian Journal of Pharmaceutical Research**	341	178	115	0.34	0.637
5	**DARU-Journal of Pharmaceutical Sciences**	110	71	47	0.43	0.625
6	**Urology Journal**	257	189	179	0.70	0.577
7	**Iranian Journal of Arthropod-Borne Diseases**	55	64	56	1.01	0.526
8	**Iranian Journal of Allergy Asthma and Immunology**	120	93	82	0.70	0.508
9	**Jundishapur Journal of Microbiology**	162	58	37	0.23	0.474
10	**Journal of Research in Medical Sciences**	581	233	129	0.22	0.457
11	**International Journal of Fertility & Sterility**	127	65	40	0.31	0.439
12	**Iranian Journal of Parasitology**	185	109	72	0.39	0.421
13	**Iranian Journal of Public Health**	378	204	189	0.50	0.378
14	**Iranian Red Crescent Medical Journal**	502	202	119	0.24	0.371
15	**Yakhteh**	124	58	50	0.40	0.364
16	**Iranian Journal of Basic Medical Sciences**	179	65	47	0.26	0.324
17	**Iranian Journal of Pediatrics**	302	87	52	0.17	0.292
18	**Iranian Journal of Radiation Research**	112	46	33	0.29	0.262
19	**Iranian Journal of Reproductive Medicine**	177	56	45	0.25	0.257
20	**Iranian Journal of Ophthalmology**	160	30	9	0.05	0.065
21	**Iranian Journal of Radiology**	127	11	9	0.07	0.053
22	**Cell Journal**	51	1	0	0	0
Total		5185	3037	2261	Mean=0.40 (0.0–1.04)	Mean=0.49 (0.0–2.19)

The list of the indexed journals with their IF and citations from foreign authors during 2010 and 2012 are illustrated in (Table 2). Among 21 journals, 3 journals have an IF of more than 1. One of these three journals has its high IF due to a high rate of self-citation. The two others have self-citation rates of 10% or less and demonstrate their good quality through a higher citation rate from outside Iran; one is the "Iranian Journal of Arthropod-Borne Diseases" and the other is "Archives of Iranian Medicine". The former is a specialized journal with very few numbers of manuscripts in the field of arthropod-borne diseases. The latter is a journal of more general research themes that has the highest number of published manuscripts among all other journals in all fields of medicine. The majority of other journals had in 2012 a higher IF (mean of 0.68 with a range from 0.26 to 2.19) than 2010 (mean of 0.4 with a range from 0.07 to 0.97). The number of citations per article by foreign authors increased from 0.19 to 0.49 during the same time period.

All journals are published quarterly except for two journals; "Hepatitis Monthly" and "Archives of Iranian Medicine", which were published monthly in 2012.

The categories of indexed journals, the total number of journals in each category as well as their rank in the category are given in (Table 3). The rank of all indexed journals in their categories lies according to the ISI ranking system in the lower half, and the majority of journals remains in the lowest 20% of the ranking range.

Among the indexed journals of Iran, some contain

publications in the same specialty and in the same field of research. In the field of nephrology, there are two journals namely "Iranian Journal of Kidney Diseases" and "Urology Journal". In the field of pharmacology, there are two journals: "Iranian Journal of Pharmaceutical Research" and "DARU Journal of Pharmaceutical Sciences". In the field of basic cell research, there are two journals: "Yakhteh" and "Cell Research".

Table 2. Impact factors of Indexed Iranian journals in 2010 and 2012 with foreign citations

No.	Journal name	IF (2010)	IF (2012)	Foreign citations per article (2010)	Foreign citations per article (2012)
1	**Iranian Journal of Allergy Asthma and Immunology**	0.97	0.5	0.44	0.7
2	**Archives of Iranian Medicine**	0.87	0.92	0.6	1.04
3	**Hepatitis Monthly**	0.72	2.19	0.17	0.72
4	**DARU-Journal of Pharmaceutical Sciences**	0.37	0.62	0.18	0.43
5	**Iranian Journal of Arthropod-Borne Diseases**	0.35	1.01	0.1	0.52
6	**International Journal of Fertility & Sterility**	0.28	0.43	0.04	0.37
7	**Iranian Journal of Public Health**	0.24	0.37	0.09	0.5
8	**Iranian Journal of Pharmaceutical Research**	0.24	0.63	0.22	0.34
9	**Iranian Journal of Reproductive Medicine**	0.13	0.25	0.11	0.25
10	**Iranian Journal of Radiation Research**	0.13	0.26	0.12	0.29
11	**Iranian Red Crescent Medical Journal**	0.07	0.37	0.02	0.24
Mean (range)		0.40 (0.07-0.97)	0.68 (0.25-2.19)	0.19 (0.02-0.60)	0.49 (0.24-1.04)

Table 3. Ranking of indexed Iranian Journals according to the different categories

Rank	Journal name	IF	Category name	Total journals in the category	Journal rank in category
1	**Hepatitis Monthly**	2.190	Gastroenterology and Hepatology	74	41
2	**Archives of Iranian Medicine**	0.972	Medicine, General and Internal	155	87
3	**Iranian Journal of Kidney Diseases**	0.870	Urology and Nephrology	73	60
4	**Iranian Journal of Pharmaceutical Research**	0.637	Pharmacology and Pharmacy	261	230
5	**DARU-Journal of Pharmaceutical Sciences**	0.625	Pharmacology and Pharmacy	261	234
6	**Urology Journal**	0.577	Urology and Nephrology	73	64
7	**Iranian Journal of Arthropod-Borne Diseases**	0.526	Parasitology	34	32
			Public, Environmental and Occupational Health	158	142
8	**Iranian Journal of Allergy Asthma and Immunology**	0.508	Allergy	24	19
			Immunology	139	135
9	**Jundishapur Journal of Microbiology**	0.474	Microbiology	114	107

Continuance Table 3. Ranking of indexed Iranian Journals according to the different categories

10	**Journal of Research in Medical Sciences**	0.457	Medicine, General and Internal	155	116
11	**International Journal of Fertility & Sterility**	0.439	Obstetrics and Gynecology	79	71
12	**Iranian Journal of Parasitology**	0.421	Parasitology	34	33
13	**Iranian Journal of Public Health**	0.378	Public, Environmental and Occupational Health	158	146
14	**Iranian Red Crescent Medical Journal**	0.371	Medicine, General and Internal	155	122
15	**Yakhteh**	0.364	Medicine, Research and Experimental	112	100
16	**Iranian Journal of Basic Medical Sciences**	0.324	Medicine, Research and Experimental	112	104
			Pharmacology and Pharmacy	261	245
17	**Iranian Journal of Pediatrics**	0.292	Pediatrics	115	111
18	**Iranian Journal of Radiation Research**	0.262	Radiology, Nuclear Medicine and Medical Imaging	116	113
19	**Iranian Journal of Reproductive Medicine**	0.257	Obstetrics and Gynecology	79	75
20	**Iranian Journal of Ophthalmology**	0.065	Ophthalmology	58	57
21	**Iranian Journal of Radiology**	0.053	Radiology, Nuclear Medicine and Medical Imaging	116	115
22	**Cell Journal**	--	Cell Biology	--	--

Discussion

Before the Islamic revolution in 1979, there were less than ten universities with medical schools in Iran. The entry examinations were difficult, and only a few hundred students received access to free medical education each year. There were no more than 10 000 general practitioners and specialized doctors educated in those 10 universities; moreover, they were working mostly in the capital or in the large provincial cities. Health professionals with only a few years of education, as well as numerous foreign doctors from eastern Asian countries who did not speak the local language provided medical services to the majority of the population living in remote rural areas. During the first years after the revolution, the responsible academics in the government paid attention only to the education of doctors who were supposed to meet the urgent health requirements in small cities and rural areas. Research at the universities had no priority and almost stopped. The publications of two medical journals in English–"The Acta Medica Iranica" published by Tehran University and the "Pahlavi Medical Bulletin" published by the Shiraz Medical School–were aborted or came out with long delays. Since the education of physicians who would be able to practice in all regions of Iran was the main goal of the revolutionary government, numerous new state, and private medical schools were opened in small cities. All state-run hospitals, which were not part of academic institutions, were turned into academic centers for education of medical students. However, medical research was disregarded for almost two decades. As the number of physicians and graduates of the medical schools increased 10 times in comparison with the pre-revolutionary level, the need for the improvement of the quality and quantity of research was emerging as a new important goal in the second decade of the revolution. Therefore, publication of scientific works became obligatory for receiving medical degrees and becoming a doctor. As a result, the number of academics writing medical articles and the number of journals for publication of medical articles dramatically increased during the short time in the last decades. But the research budget remained the same during the last decade with less than 0.5% of gross domestic product (GDP). Only a few medical journals achieved the indexing capability in the last years. Furthermore, the substantial increase in scientific publications in the indexed Iranian journals was not associated with the sufficient improvement of the quality.

Although the impact factor increased a little bit in 2012 in comparison with 2010 but remained less than 0.5 in the majority of journals. In comparison with the 31 medical journals published in Arab and African countries, the IF of the Iranian journals in 2012 is in the same range as the majority of African medical journals.

Only "South African Medical Journal" (IF=1.23) and the "Annals of Saudi Medicine" (IF=1.24) have IF more than 1. All other journals have IF around 0.5 or less (2).

The quality of 509 clinical trials published in 2008-2010 in domestic journals registered in the Iranian registry system (Iran Medex) with adherence to the CONSORT checklist with 37 different items remained inadequate in 43.8% of cases (3).

In spite of the rapid increase in the number of scientific publication in the last decade, the financial resources for research did not change and remained around 0.4% of GDP. The number of academics working in the research centers almost did not increase. No effort was made to attract Iranians working at the renowned international scientific centers.

Due to the lack of funding and the absence of a policy to attract Iranian researchers working at the international scientific centers, we cannot expect any serious improvement of the quality of Iranian research published in the indexed Iranian and international journals.

Any advance in research must be associated with its impact on the health of the population. This supposes a long tradition in basic research, the performance of experimental studies in laboratories with animals, translational studies to humans and the implementation of multicenter randomized clinical trials. Each step of this research scheme needs time and will last for one or two decades when all cooperative measures are taken.

To improve the quality of research and to raise the number of publications with high citation rates, the following long-term and short-term strategies should be pursued. The short-term strategy consists of the reduction of the number of journals by various routes. The academics working at the universities should not be obliged to have medical publications so long as they have the excellent educational capability and do not aspire to academic promotion as associate professors. The Ph.D. candidates should also not be obliged to publish. In other countries the rate of publication of Ph.D. theses in national and international journals is low, for example, in Turkey, it is 18% and 11.9%, respectively (4).

The universities or research institutions should not be allowed to have their own journals to publish their research. Medical associations should have the right for publication of journals in their fields when they have enough qualified researchers in their associations and on the editorial boards. The members of medical associations are better prepared to take responsibility for the production of high-quality manuscripts. The journals with single individuals as responsible editors should be published under the supervision of the corresponding medical associations. This would guarantee the continuation of publication through contributions of members of the medical associations. The editors and a substantial number of the members of the editorial boards of all Iranian journals must have at least some publications as authors in highly cited international journals. Otherwise, the right for editorship must be withdrawn. Funding of the medical journals must be limited to those that improve their IF. Any subsidy to other journals should be interrupted.

The long-term strategy of raising the quality of medical journals requires an increase in the research budget that would lead to the continuous growth of research centers in Iran. This is only possible through the close cooperation between Iranian researchers and the international research centers in the developed countries. Short and long stays of Iranian researchers at the international research centers and of international researchers in Iran must be intensified. All Iranians working in the renowned research centers outside Iran should be identified and encouraged to cooperate with their Iranian colleagues. This communication must be associated with the fulfillment of individual need of researchers and the guarantees of academic freedom in Iran. This strategy which was implemented in the last decade by China attracts the Chinese researchers working in developed countries to continue their research in China.

The responsible officials at the universities and the governmental institutions should take into consideration the fact that innovative research and real progress in science have not happened automatically as a result of the 10 times increase in the number of paper production in one decade. However, they would be achievable by continuous hard work during decades and through the formation of Iranian research centers in close cooperation with the renowned centers in developed countries.

One limitation of our study was the omission of many publications in domestic journals, which are not indexed in ISI, but in Scopus or in Iranian indexing system like Iran-Medex. Iranians usually try to publish their important scientific products in the indexed international journals. However, we cannot exclude that a part of these publications is innovative and contains relevant information contributing to the progress of science.

References

1. Massarrat S, Kolahdoozan S. Critical assessment of progress of medical sciences in Iran and Turkey: the way developing countries with limited resources should make effective contributions to the production of science. Arch Iran Med 2011;14:370-7.
2. Bakoush O, Bredan A, Benamer H, Daw M. Libyan Journal of Medicine among top journals in African and Arab countries. Libyan J Med 2013;8:1-2.
3. Nojomi M, Ramezani M, Ghafari-Anwar A. Quality report on randomized controlled trials published in Iranian journals: application of the new version of consolidated standards of reporting trials (CONSORT). Arch Iran Med 2013;16:20-2.
4. Sipahi H, Durusoy R, Ergin I, Hassoy H, Davas A, Karababa AO. Publication rates of public health theses in international and national peer-review journals in Turkey. Iran J Public Health 2012;41:31-5.