

Iran's Global Scientific Growth in the Medical Sciences: A 23-year Scientometric Evaluation

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Abstract

Background: The international standing of a nation is based on its status in science production.

Objectives: We aimed to assess the scientific growth and global ranking of Iran regarding the domain of medical sciences, based on the Scopus database.

Methods: In the scientometric evaluation, we considered two indicators for the evaluation of Iran's global ranking in medical sciences and "emergency medicine", as a subcategory of medical science namely the number of documents and citations using the Scopus database (ranking of countries was extracted from the SCImago website).

Results: Iran's trend in the number of documents and citations was progressive. This improvement trend had a slower slope in the medical sciences and emergency medicine.

Conclusion: The results showed Iran's scientific growth to be consistent. It is recommended that indexing Iranian journals in the Scopus database, promoting scientific collaborations, and providing the necessary funding could promote Iran's scientific growth.

Keywords: Scientometric, Science, Medical, Scientific ranking.

Introduction

The international standing is linked to its status in science production.¹ Countries regularly survey their scientific productivity and ranking vis-à-vis other countries. The number of documents and citations are presented as common indicators of scientometric study to assess the ranking of institutions, and countries.

International databases such as Scopus and Web of Science present important sources for scientometric surveys seeking to determine the scientific ranking of countries in the world.

Gupta et al.² showed India ranked 12th among countries in medical research according to the number of documents indexed in the Scopus database between 1998 and 2008. Cami et al.³ assessed the science production of Spain indexed in the Science Citation Index (SCI). They showed increasing growth in health sciences in Spain. Also, several studies in Iran demonstrated a sharp increasing trend in scientific production, not least in the medical sciences.⁴⁻¹⁰ Recent

decades have witnessed a dramatic rise in the number of journals and articles published in the field of medical science.¹¹⁻¹³ These journals have been as a facilitator to publish articles and consequently improve countries' position. But to translate medical research into clinical practice we need to conduct and apply high-quality research in different medical fields. Among the medical specialties, emergency medicine has certain conditions. Emergency medicine is a broad field involving multiple disciplines with unique features in research including urgency and location of the treatment. Thus research in emergency medicine includes clinical, basic, and health services researches.¹⁴

Nonetheless, to clarify the conditions of research in Iran, we conducted the present study to assess the scientific position of Iran based on the Scopus database, especially regarding the discipline of medicine and "emergency medicine", as a subcategory of medical science, and to compare the findings with those from other countries.

Materials and Methods

The current scientometric study was designed to evaluate Iran’s research position trend in the domains of global and medical science in the world and the Middle East. Two indicators were considered for the ranking including the number of published documents in the Scopus database and number of citations to the published documents according to the same database. The changes and trends of Iran’s scientific ranking as regards all disciplines of science, including medical in particular, were extracted and the slopes of their changes were compared.

Extraction Process of Scientific Ranking

Information about the ranking of countries was extracted according to the number of published documents and the number of citations through the SCImago website (<http://www.scimagojr.com/countryrank.php>). The website is connected and supported by the Scopus citation database and evaluates different countries according to the latest Scopus reports of published documents and reveals their position and status among different countries. These calculations can be seen in different countries for the years 1996 to 2019. The ranking is conducted based on various

parameters such as the number of documents, citations, citations per document, and the H index. In the present study, the ranking of Iran was extracted according to the number of documents and citations. In the first step, the categories of “all subject areas”, “medicine” or “emergency medicine” were chosen along with the categories of “all regions” or “Middle East. Afterward, the ranking of Iran in the world and the Middle East was determined by selecting appropriate options for different years. Finally, Iran’s ranking in the world and the Middle East was reported according to the number of documents and citations in various tables and interpretive figures by using GraphPad.

Ethical consideration: The protocol of the study was confirmed in the ethical committee of Baqiyatallah university o medical sciences.

Results

Iran in the World

The results of the changes in Iran’s international ranking are depicted in Table-1 and Figure-1 (A1, A2). Figure A1 and Figure A2, correspondingly, show the trend of changes in terms of the number of documents and citations.

Table-1. Scientific ranking of Iran in the world based on the Scopus database

Field	Year	1996	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
	Overall science	Document	53	48	44	40	39	39	34	31	25	22	22	21	17	17	18	16	17	16	16	16
Citation		56	45	42	41	40	39	38	37	33	32	30	27	23	22	22	20	19	19	17	17	15
Medicine	Document	59	53	50	44	41	40	36	31	27	25	24	22	21	21	18	18	19	18	17	16	17
	Citation	65	51	46	43	40	40	39	39	37	36	35	34	33	31	29	28	32	27	22	21	21

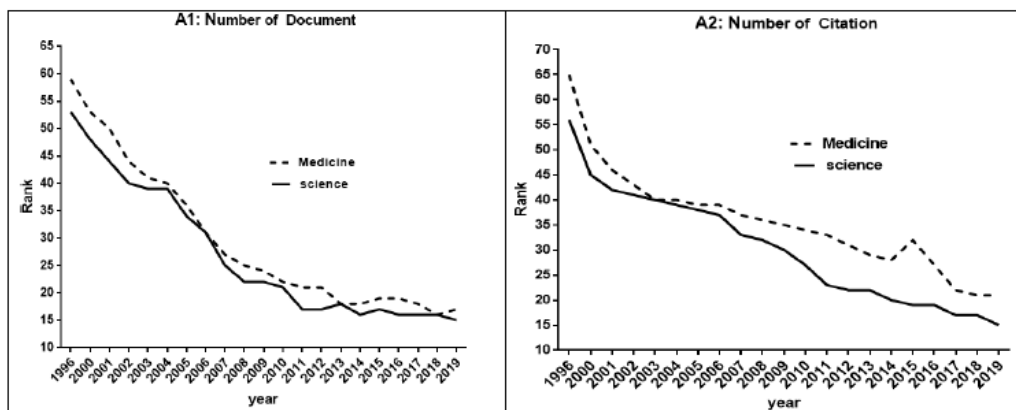


Figure-1. Scientific ranking of Iran in the world according to the Scopus database

Global Science

According to the number of published documents, Iran ranked 53rd in all fields of science among the countries in the world in 1996. Afterward, Iran experienced an improvement in its scientific status and ranked 16th globally from 2016 to 2018, and then 15th in 2019, in terms of the number of documents. In general, its trend was upward, however, there were some interruptions in the years 2004, 2009, 2012 to 2013, 2015 and 2017 to 2018. Moreover, in terms of the number of citations, Iran's ranking was elevated from 56th in the year 1996 to 15th in the year 2019. The results indicated that Iran's rank suffered only a short setback in the years 2013 and 2016 in terms of the number of citations.

Medical Science

In the discipline of medicine, the ranking of Iran rose from 59th in the year 1996 to 17th in the year 2019 regarding the number of documents and from 65th in the year 1996 to 21th in the year 2019 in terms of the number of citations. Thus,

there was a significant difference between the 2 ranking systems in the field of medical science. Regarding the number of documents in the years 2012, 2014 to 2016 and according to the number of citations in the years 2004, 2006, and 2015, there were some short interruptions in the upward trend of Iran's ranking in medicine.

Emergency Medicine

In the discipline of Emergency Medicine, as a subcategory of medical science, the ranking of Iran rose from 41th in the year 1998 to 18th in the year 2019 regarding the number of documents and from 34th in the year 1998 to 24th in the year 2019 in terms of the number of citations.

Iran in the Middle East

The results of the trend of changes in Iran's regional ranking among the 16 Middle Eastern countries are illustrated in Table-2 and Figure-2 (B1, B2). Figure B1 and Figure B2 demonstrate the trend of changes in terms of the number of documents and citations.

Table-1. Scientific ranking of Iran in the Middle East based on the Scopus database

Field	Year	1996	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	
Overall science	Docu ment	5	5	4	4	3	3	3	3	3	2	2	2	1	1	1	1	1	1	1	1	1	
	Citatio n	5	4	4	4	3	3	3	3	3	3	3	3	2	1	1	1	1	1	1	1	1	1
Medicine	Docu ment	6	5	5	4	4	3	3	3	3	3	2	2	2	2	2	2	2	2	2	1	1	1
	Citatio n	7	5	5	5	3	3	3	3	3	3	3	3	3	3	3	3	3	3	1	1	1	1

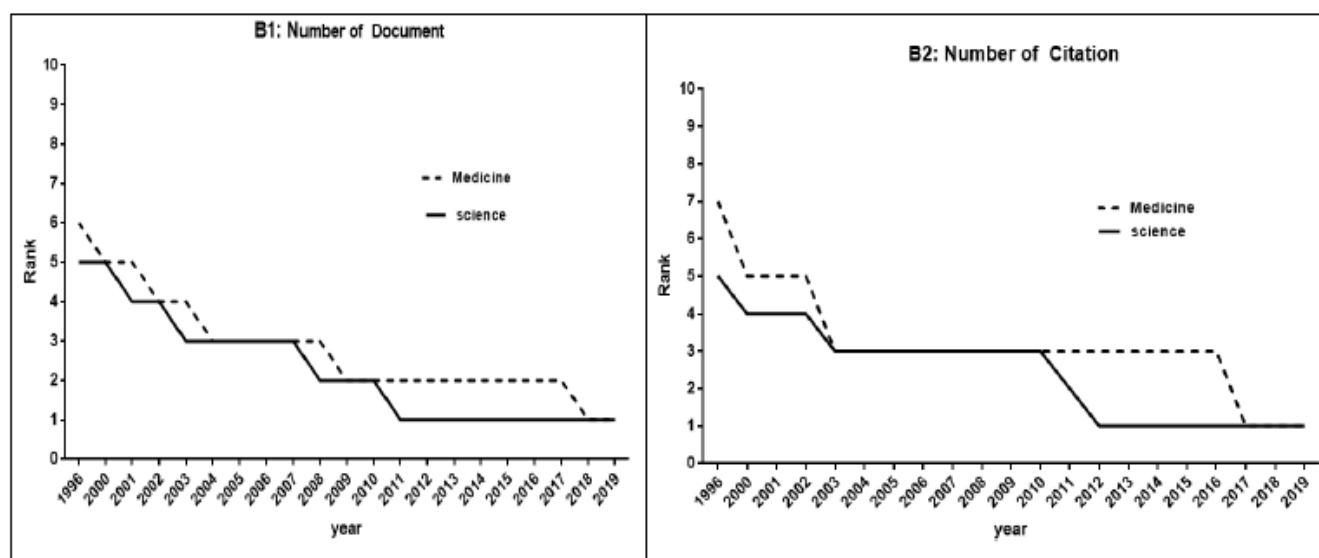


Figure-1. Scientific ranking of Iran in the Middle East based on the Scopus database

Global Science

According to the number of documents, Iran ranked fifth in all fields of science in the year 1996 among the countries of the region. Iran's ranking increased and reached third between 2003 and 2007, and subsequently ranked second between 2008 and 2010. Turkey ranked first in the region in the years 2008 to 2010. Eventually, Iran ranked first among the countries of the Middle East between the years 2011 and 2019. In terms of the number of citations, Iran's ranking demonstrated a rise—albeit slightly less favorably than that in terms of the number of documents—and went up from fifth in the year 1996 to third in the years between 2003 and 2010. Also, from 2012 to 2019, Iran ranked first in terms of citations in global science in the Middle East.

Medical Science

In the field of medical sciences, in terms of the number of documents, Iran's ranking had an upward trajectory from sixth in 1996 to third between 2004 and 2008. From 2009 to 2017, Iran was second in the region after Turkey. In the years 2018 and 2019, Iran ranked first among the countries of the Middle East. Based on the number of citations, the ranking of Iran rose from sixth in 1996 to third in the years between 2003 and 2016 and ranked first between 2017 and 2019.

Emergency Medicine

In the field of emergency medicine, as a subcategory of medical science, the ranking of Iran rose from sixth in the year 1998 to second in the region after Turkey in the year 2019 regarding the number of documents and from fifth in the year 1998 to second in the year 2019 in terms of the number of citations.

Discussion

In the present study, we investigated the trend of changes in Iran's scientific ranking in the world and the Middle East, especially in the field of general, medical sciences and "emergency medicine". The results showed that Iran's ranking in all areas of science had a satisfactory trend. The number of citations and documents showed an upward growth trend in Iran's ranking. In 2019, in the number of documents and citations, Iran's ranking in the world and the Middle East was 15th and first, respectively. This trend was also seen with a slower slope in the medical sciences and emergency medicine, as a subcategory of medical science. In agreement with these results, Iranian researchers have

reported a rise in Iran's scientific status over the past two decades in the general and medicine sciences.⁴⁻¹⁰ The development in the medical sciences might have played a vital role in overall scientific Iran's progress.¹⁵

The sixth report on the international comparative performance of UK research in 2009 also confirmed that the growth rate of Iran's research outputs doubled in the field of health and biological sciences between 2006 and 2008, and praised it as a "fast-growing phenomenon".¹⁶

Some contributing factors such as increased research budgets, the establishment of research centers affiliated to universities, and the graduation of doctoral and postgraduate students in Iran's ranking have been mentioned by several researchers.^{9,10}

Our result showed that, based on the number of citation, researches of emergency medicine field have lower quality compared to global and medical science. Maybe it's because the environment of emergency medicine is pressurized, emotional, and overburdened. Therefore, there is not Time for research and it makes to quick study rather than use the project to produce work of higher quality.¹⁷

To examine the gaps in emergency medicine research knowledge and improve the quality of the emergency clinician research activity, we can provide research time and facilities, training new emergency care investigators, development of an acute injury template for clinical research, develop multicenter research networks, improve research coordination and involving funding agencies, performing research to address ethical and regulatory issues, supporting learn-phase or small, clinical trials.^{14,17,18}

On the other hand, scientific collaboration, especially at the international level, substantially augments the quality of research outputs^{19,20} and boosts their visibility and citations.²¹ We would, therefore, recommend that more attention should be paid to multi-authored, multi-institutional, multi-college, and multi-national research²² to enhance Iran's ranking in different research fields in terms of the number of citations.

Conclusions

The results showed that Iran's growth follows a consistent and logical trend. We suggested that Indexing Iranian journals in the Scopus database, fostering scientific collaborations, and providing the necessary funding to enhance the quality of documents specially emergency medicine field can elevate Iran's scientific ranking in terms

of the number of documents and citations in the different research fields.

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None

Authors' Contribution

All authors pass the four criteria for authorship contribution based on the International Committee of Medical Journal Editors (ICMJE) recommendations.

Conflict of Interests

None.

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