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Original Research

Bibliometric analysis of Iranian Authors in High-Impact Medical Science Journals

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Abstract

This retrospective study aims to bibliometrically analyze Iranian publications in high-impact medical journals, considering the vital role of these journals in guiding scientific research. Articles by Iranian researchers in the top 10 medical specialty journals across 41 categories, published between 2013 and 2022, were extracted based on the Journal Citation Reports (JCR) in 2023. The publications of the top 5 Middle Eastern countries were also examined. A total of 3,737 articles were published by 35,650 authors (9.5 authors per paper). Teams wrote half of the articles of 3-6 members. The average number of citations per article was 37.43, and 58% of the articles had funding. Articles with funding received more citations than those without funding, and articles involving international collaboration received more citations than those involving national cooperation. Iran had the highest annual growth rate of publications among the top 5 Middle Eastern countries. Iranian authors were present in articles with international collaboration as first,

corresponding, and last authors in 55.13%, 44.14%, and 32.15% of articles, respectively. Iranian researchers collaborated with 162 countries, with the USA (almost a quarter), England, and Canada as the main partners. China had the highest annual growth rate (26.7%) among major partners. Most publications were in nutrition and diet, tropical medicine, endocrinology, and metabolism. This study provides a comprehensive map for Iranian policymakers and researchers, as well as for policymakers in Middle Eastern countries, to inform the development of health research. It highlights the importance of international collaboration and funding.

Keywords: Bibliometric Analysis, Citations, Research Funding, Medical Journals, Publications, International Collaboration, Iran.

Introduction

Scientific progress and development lead to expanded knowledge, a better understanding of the world, and technological advancements, ultimately improving the quality of human life (Nichols & Petzold, 2021). In today's era, scientific progress is not only a choice but a necessity, and societies must prioritize it (Azadi Ahmadabadi, 2023; Toffler, 2021). The concept of scientific authority, which refers to the credibility and impact of science and research (Azadi Ahmadabadi, 2023), has become a key concept in Iran's contemporary scientific policies (Haghdoost, Noori Hekmat, Dehnavieh, & Poursheikhali, 2019). Scientific authority, referred to as scientific leadership, competence, and hegemony in other countries, can indicate the scientific status and progress of that country. As Booshehri and Bagheri (2016) noted, evaluating the effectiveness of scientific policies, especially in the age of information and knowledge, is essential. Such evaluations help identify and address deviations from intended objectives, preventing the waste of time and energy while ensuring that more resources are allocated to teaching foundational principles (Booshehri & Bagheri, 2016). Given the pivotal role of scientific publications in driving societal progress, research that is more effectively considered and used is particularly important. Publishing in high-impact journals is a key indicator of research excellence and global influence. These journals, with their rigorous standards, peer-review processes, and valid and influential impact factors, represent the pinnacle of scientific publishing and attract large audiences (Traag, 2021). By publishing in such pioneering journals, Iranian researchers can significantly contribute to promoting their country's scientific authority through their publications in these journals.

However, publishing is becoming increasingly competitive. Between 2005 and 2010, out of 3,000,000 manuscripts submitted to 4,000 journals by 300 publishers using the ScholarOne submission and publication system, the overall acceptance rate was 37% (Reuters, 2012). During this period, the acceptance rate of articles in high-impact journals such as Nature (2013) decreased from 10.7% in 1997 to 7.6% in 2017. Moreover, Science (2023) reported an acceptance rate of 6.1% in 2022, and for specialized journals such as World Psychology, only 5% of articles reach the publication stage, according to the editor. High-impact journals, with their strict criteria, reject many articles without sending them for review (Science, 2023). The tendency to publish in journals with high impact factors has become a tradition, despite some criticisms (Bodaghi, Sanni, & Zainab, 2015; Eston, 2005; Falagas, Kouranos, Arencibia-Jorge, & Karageorgopoulos, 2008; McKiernan, Schimanski, Muñoz Nieves, Matthias, Niles, & Alperin, 2019). In the meantime, high-impact journals are favored by researchers due to advantages such as the chance of receiving more citations, enhancing academic life and career

prospects, and attracting prestigious grants, all of which have a profound influence on knowledge in the relevant field, making them attractive to many researchers (Clemens, 2017; Traag, 2021).

Evaluating scientific output reveals a country's standing in science, and bibliometric analysis is a widely used and effective method for analyzing data (Donthu, Kumar, Mukherjee, Pandey, & Lim, 2021). These studies are valuable for research evaluation because the productivity of international scientific publications is a tangible indicator of the effectiveness of scientific policies (Yılmaz, Babazade, Turan, Babazade, Koyuncu & Turan, 2017). Bibliometric analysis is a standard and reliable method for exploring and analyzing large amounts of scientific data (Donthu et al., 2021). Researchers have focused on high-impact journals in the field of health in several bibliometric studies. For instance, a bibliometric analysis was conducted to study prominent anesthesia topics in five high-impact journals from 2010 to 2019, in which 5,782 original research articles were analyzed based on topic, funding, citations, and countries of the researchers (Grace, Wiepking & van Zundert, 2021). Another study examined the representation of nursing scientists from German-speaking countries in high-impact journals over five years, screening 106,939 articles from 126 journals and identifying 100 publications with 229 contributions from 114 nursing scientists. Forty-two percent of the studies were observational, and 11% were experimental, with most being clinical (55%). The study found that few publications from nursing scientists in German-speaking countries were published in high-impact journals (Hirt, Buhtz, Meyer, & Balzer, 2019). Additionally, a study analyzed the participation of Indian researchers in three high-impact periodontal journals. In this retrospective observational study, China, followed by the United States, showed the highest level of involvement in the journals. However, India experienced an increase in publications (Kumar et al., 2021).

This research aims to examine and analyze the contributions of Iranian researchers to high-impact journals, which are renowned for their rigorous review processes and frequent citations. Publishing in such journals enhances the credibility and visibility of researchers and amplifies the impact of their research on the advancement of medical science (Kretchmer, 2024). In addition, the findings of this research could offer strategic insights for policymakers and institutions to maximize research output and impact through efficient allocation of funding institution resources and facilitate international collaboration to optimize research impact.

Objectives

The objectives of this study are to analyze the number of articles authored by Iranian researchers across 41 health sciences specialties, examining metrics such as the number of authors, authors per article, document types, team sizes, citations, and citations per article. Additionally, we will examine the relationship between article funding and the kind of collaboration among authors, specifically in relation to citation counts. We aim to assess publication trends and citations of Iranian authors in high-impact journals compared to the top four Middle Eastern countries, identifying highly cited articles, most prolific authors, institutions/universities, and prolific journals. The comparisons provide the potential to explain similarities between Middle Eastern countries, contribute to a better understanding of regional cooperation, enhance research output and impact, and encourage collaboration to address common scientific and societal challenges. Furthermore, we investigated the position of Iranian authors in articles, the partnership of international authors with Iranians, and identified key

funding agencies and sponsoring countries involved in this research landscape.

Materials and Methods

Data source

We selected 41 medical specialty categories based on a prior study (Pinho-Gomes, Vassallo, Thompson, Womersley, Norton & Woodward, 2021) that identified these fields as relevant to health research. The purpose of selecting these specific fields was to focus our investigation on high-impact medical journals that represent the diversity of Iranian authors' health-related research. It ensures that our findings truly reflect the contributions of Iranian researchers across various medical specialties.

We selected the top 10 journals of each field by journal impact factor based on Clarivate Analytics Web of Science 2023 citation reports. For categories with fewer than 50 journals (including Allergy, Integrative and Complementary Medicine, Medical Legal, Primary Health Care, and Transplantation), only the first five journals were chosen so as not to compromise their quality. Finally, 385 high-impact journals were reviewed. Data extracted in October 2023 from the Web of Science (SCI-Expanded, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI) included only original and review articles published between 2013 and 2022, originating from Iran. This time frame was chosen to capture a recent and relevant dataset that reflects Iranian researchers' current trends and contributions within the high-impact medical literature over the past decade.

Regarding the inclusion and exclusion criteria, articles with incomplete information were removed to enhance the quality and reliability of our analysis. Additionally, to represent the actual quality of the articles, we followed the criteria available in the scientific evaluation system of the Ministry of Health of Iran (Iran's Scientometric Information Database, www.isid.research.ac.ir). Therefore, we excluded articles with one hundred authors or more to analyze articles in which the authors made significant contributions.

Since a country's progress in science and technology requires understanding and determining its position relative to other countries in the region (Kianazad & Basirnia, 2010), we included the top five Middle Eastern countries (including Turkey, Iran, Israel, Saudi Arabia, and Egypt) based on the SCImago Journal & Country Rank system to compare the performance of Iranian researchers with those in the region (Scimago, 2023). The SCImago Journal & Country Rank is a publicly available portal with journals and country indexes compiled from the Scopus® database (Elsevier B.V.) and ranks countries worldwide. This information includes the number of scientific papers published by each country, the number of citations, the H-index, self-citations, and citations per document (SID, 2024). After applying inclusion and exclusion criteria, articles with incomplete information were excluded.

Bibliometric parameters

In this research, bibliometric indicators were examined at the document level (number and type of document, number and average of citations, funding, citations in articles with and without funding, type of collaboration and citations in articles with international and national cooperation) as well as at the author level (number of authors, average author per document, most prolific author, and author position). Furthermore, the international collaboration network was analyzed and drawn. Notably, we refrained from displaying and visualizing the top keywords as the diversity of topics compromised their interpretation.

Study Tools

In this study, Microsoft Excel software was used to save documents. VOSviewer v1.6.15, a widely used software for visualizing international cooperation in articles (Van Eck & Waltman, 2010), ScientoPy, and the Python programming language (to identify authors' positions in documents) were employed.

Results

Our search in Web of Science showed that there were 3,971 documents with Iranian affiliation in health-related publications of high-impact journals between 2013 and 2022. After removing the inclusion and exclusion criteria, 3,737 articles by 35,650 authors remained. The number of articles and their frequency percentage for each field are shown in Figure 1.

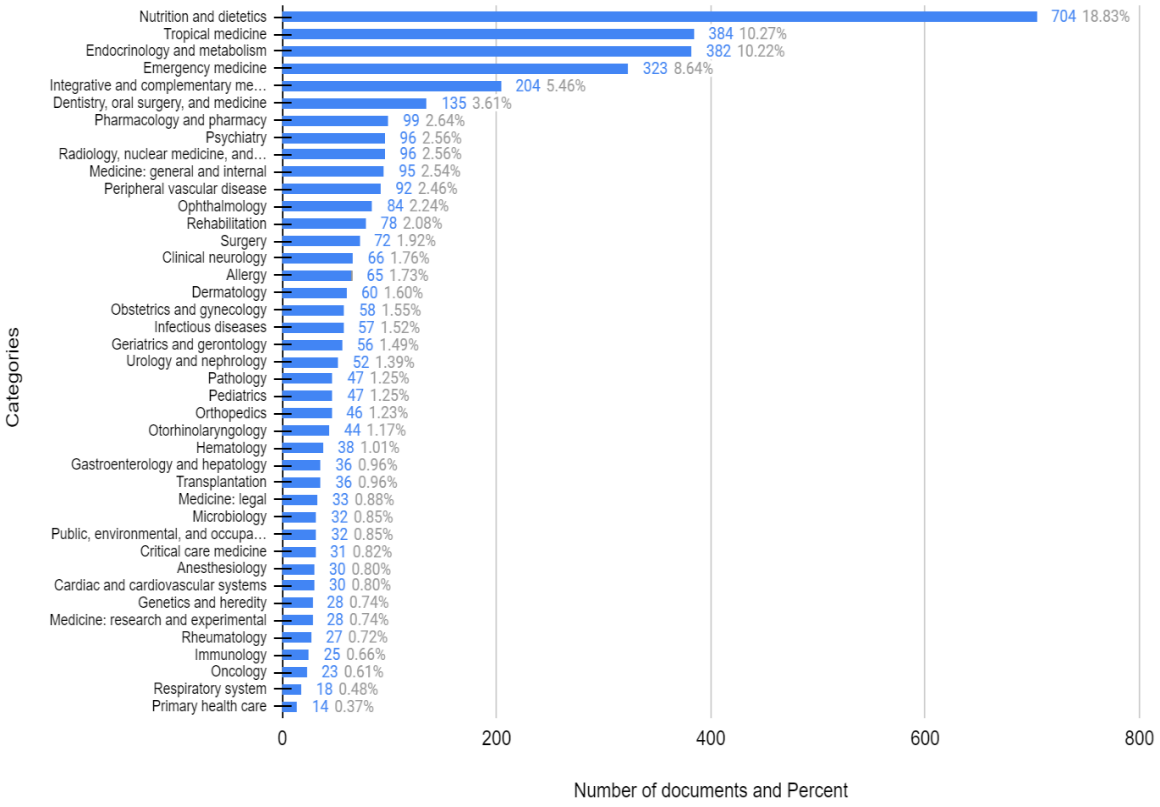

Figure 1: Number of documents based on categories

Three-quarters of the documents were in the form of original articles. Although teams with more than 11 authors wrote a fifth of the articles, half were created in groups of 3-6 members. Citations, research funding status, and other characteristics are displayed in Table 1.

Table 1

Iranian documents' characteristics in high-impact medical journals

Description	Findings
Timespan	2013-2022
No. of documents	3737

Authors	
Total Authors	35650
Avg. Authors per Document	9.5
Authorship team size	
1	24(0.64%)
2	210(5.61%)
3	462(12.36%)
4	545(14.58%)
5	542(14.50%)
6	456(12.20%)
7	294(7.86%)
8	223(5.96%)
9	159(4.25%)
10	118(3.15%)
≥11	704(18.83%)
Document Type	
Article	2789 (74.6%)
Review	948 (25.4%)
Citations	
Total Citations	139887
Avg. Citations per Document	37.43

We also investigated the funding status of the articles and the type of collaboration between authors in relation to the number of citations to determine the relationship between these factors. The results showed that articles with funds (2187 articles, 95706 citations, average citation per article 43.76, p-value < 0.05) receive more citations than articles without funding (1550 articles, 44181 citations, average citation per article 28.50). Similarly, articles written with international collaboration (1812 articles, 97,390 citations, average citation per article 53.74, p-value < 0.05) have been cited twice as much as articles with national collaboration (1925 articles, 42,944 citations, average citation per article 22.30).

Our findings also showed that over the last decade, Iran's publications have experienced an increase in articles in high-impact journals, with the number of articles reaching 564 in 2022 compared to 213 in 2013. Further investigation revealed that nearly 30% of articles (1,084) were published within the last two years. Also, the publications of the countries of Israel (n=12414), Turkey (n=5919), Iran (n=3737), Saudi Arabia (n=2926), and Egypt (n=2645) were calculated, and their publication trends were drawn (Figure 2).

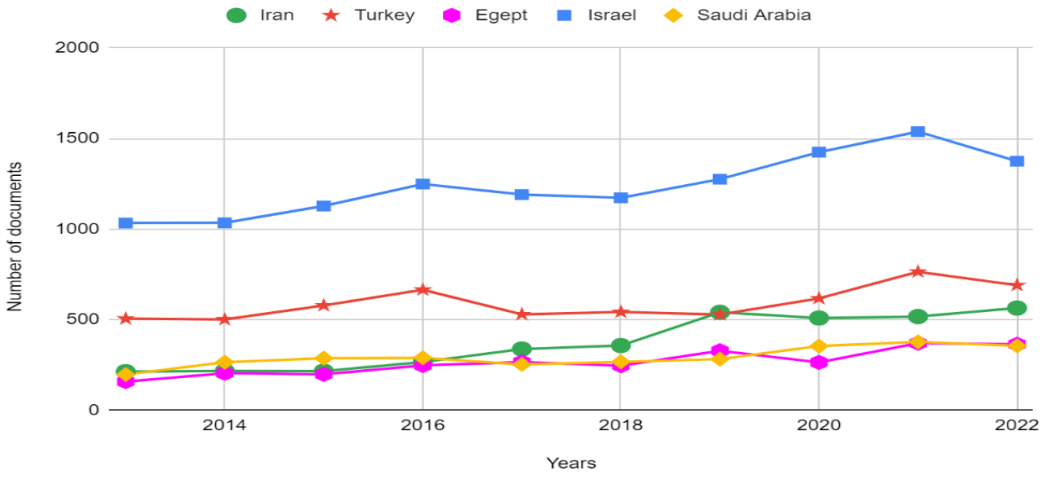

Figure 2: Publication trends for the top five countries in the Middle East in high-impact medical journals

During the last ten years, the annual growth rate (AGR) of article publication has been different in the five countries, with the highest AGR in article publishing belonging to Iran at 14.1%, followed by Egypt at 10.5%, Saudi Arabia at 5.3%, Turkey at 3.8%, and Israel at 2.8%. The findings showed that in terms of receiving citations, Israel (940853), Turkey (311083), Saudi Arabia (258363), Iran (139887), and Egypt (113909), and in terms of receiving citations per article, Saudi Arabia (88.29), Israel (75.78), Turkey (52.55), Egypt (43.06), and Iran (37.34). The trend of citations for the five countries is shown in Figure 3.

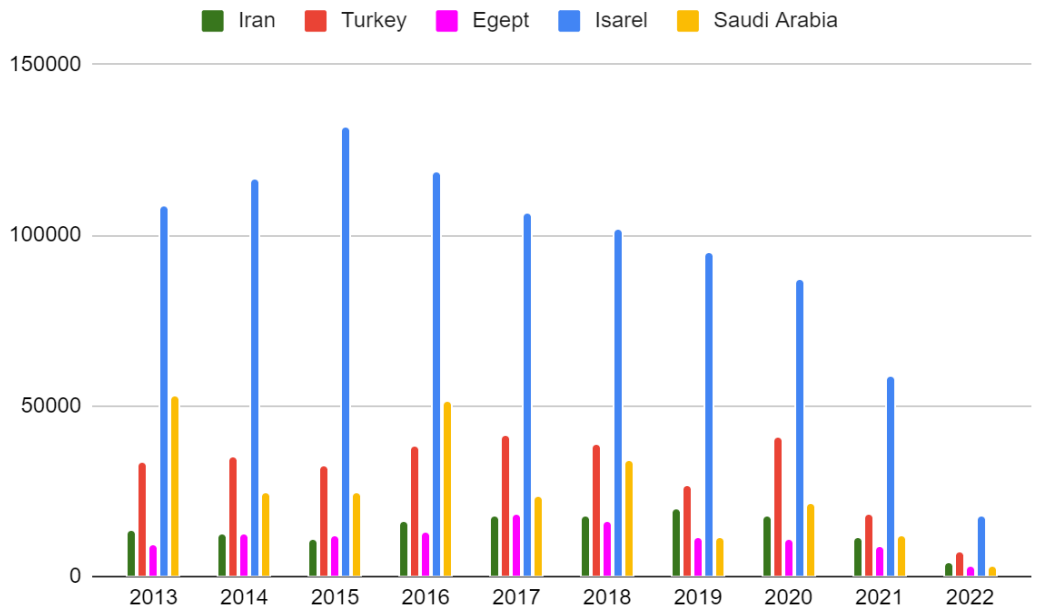

Figure 3: Citation trends of the top five Middle East countries in high-impact medical journals

Table 2 shows the ten articles that have received the majority of citations, the number of citations, the subject matter, and the type of article.

Table 2
Top 10 Cited Papers in High-Impact Medical Journals.

#	Author	DOI	Source title	DT*	TC*
1	Liu et al. (2015)	10.1038/ng. 3359	Nat. Genet	Article	1347
2	Agha et al. (2016)	10.1016/j.ijsu.2016.08.014	Int J Surg	Article	1305
3	Davies et al. (2013)	10.1016/S0140-6736(12)61963-1	Lancet	Article	1287
4	Forouzanfar et al. (2017)	10.1001/jama.2016.19043	JAMA	Article	1187
5	Chow et al. (2013)	10.1001/jama.2013.184182	JAMA	Article	1162
6	Akinyemiju et al. (2017)	10.1001/jamaoncol.2017.3055	JAMA Oncol	Article	1146
7	Swinburn et al. (2019)	10.1016/S0140-6736(18)32822-8	Lancet	Revie w	1125
8	Dorsey et al. (2018)	10.1016/S1474-4422(18)30295-3	Lancet Neurol	Article	1086
9	Leong et al. (2015)	10.1016/S0140-6736(14)62000-6	Lancet	Article	1013
10	Stovner et al. (2018)	10.1016/S1474-4422(18)30322-3	Lancet Neurol	Article	916

**DT: Document type; CT: Citations*

Regarding the results related to the top journals, the ten journals hosting the highest number of Iranian articles, along with the number of articles and citations, are shown in Table 3.

Table 3
The top ten high-impact medical journals

#	Source Title	JIF*2023	NP*	CT*	Avg. CPP*
1	Food Chemistry	8.8	458	21332	46.57
2	Diabetes & Metabolic Syndrome: Clinical Research & Reviews	10.0	343	4098	11.94
3	Archives of Academic Emergency Medicine	5.4	213	2003	9.403
4	Critical Reviews in Food Science and Nutrition	10.2	163	4719	28.95
5	Journal of Ethnopharmacology	5.4	144	3136	21.77
6	Asian Pacific Journal of Tropical Medicine	3.1	119	1754	14.73
7	Parasites & Vectors	3.2	85	1019	11.98
8	American Journal of Emergency Medicine	3.6	83	1146	13.80
9	Psychiatry Research	11.3	67	1290	19.25
10	PLoS Neglected Tropical Diseases	3.8	58	1337	23.05

**JIF: Journal Impact Factor; NP: Number of publications; CT: Citations; Avg. CPP: Average Citations per Publication*

Table 4 also lists ten institutions and active authors, among which Tehran University of Medical Sciences was at the top, having published a quarter of all articles.

Table 4
Contribution of the top ten universities/institutions and authors in high-impact medical journals

#	Universities/Institutions	N* (%)	Total**	#	Author	Total
1	Univ Tehran Med Sci	283(29%)	976	1	Sahebkar, Amirhossein	70
2	Shahid Beheshti Univ Med Sci	191(33%)	578	2	Malekzadeh, Reza	34
3	Iran Univ Med Sci	119(36%)	330	3	Esmaillzadeh, Ahmad	32
4	Mashhad Univ Med Sci	92(29%)	317	4	Rezaei, Nima	31
5	Isfahan Univ Med Sci	93(31%)	299	5	Jafari, Saeid Mehdi	31
6	Tabriz Univ Med Sci	91(32%)	285	6	Larijani, Bagher	29
7	Shiraz Univ Med Sci	84(30%)	280	7	Azizi, Fereidoun	27
8	Islamic Azad Univ	80(33%)	242	8	Mansournia, Mohammad Ali	24
9	Univ Tehran	38(23%)	167	9	Abolhassani, Hassan	24
10	Ahvaz Jundishapur Univ Med Sci	28(20%)	139	10	Yousefifard, Mahmoud	23

**Number and percentage of documents published in the last years 2021-2022; ** Articles published from 2013 to 2022.*

Moreover, the analysis of the author's position in the articles with international cooperation showed that Iranian authors held the first author position in 998 articles (55.13%). Other positions are shown in Table 5.

Table 5
Position of Iranian authors in articles published in high-impact medical journals

Positions	Documents with International collaborations	All collaborations
First author	998 (55.13%)	2901 (77.62%)
Corresponding author	799 (44.14%)	2725 (72.91%)
Last author	582 (32.15%)	2489 (66.6%)

The analysis of the type of collaboration revealed that half of the articles resulted from national collaboration among Iranian authors (51.56%). Additionally, the examination of international cooperation with Iranian researchers revealed that 162 countries collaborated with Iranian researchers, with the United States being the most prominent collaborator in the last decade, contributing to nearly a quarter of all articles. The findings indicated that China has experienced the highest annual growth rate of collaboration with Iranian researchers in the past decade. (Table 6).

Table 6
Top countries collaborating with Iranian researchers from 2013 to 2022

Countries	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	AGR*	Total
USA	33	42	41	53	67	89	102	129	131	143	10.3%	889
UK	20	20	22	23	39	43	63	75	79	69	14.3%	605
Canada	18	19	18	21	29	31	47	66	57	59	16.9%	426
Australia	14	10	14	23	23	28	38	49	53	55	14.8%	330
Italy	12	7	15	20	18	25	41	58	55	46	18.4%	307
Germany	9	12	17	20	18	21	36	51	54	61	22.2%	299
China	7	13	15	20	19	18	30	37	42	46	26.7%	247

Countries	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	AGR*	Total
France	13	13	15	14	15	27	29	31	46	38	16.9%	226
Netherland	9	10	14	10	18	16	21	32	40	32	15.3%	202

AGR: Annual Growth Rate

Besides, out of 162 countries collaborating with Iran, 86 countries cooperated with Iranian researchers in at least ten articles. Figure 4 shows the Iranian researchers' international relationship and collaboration in more detail.

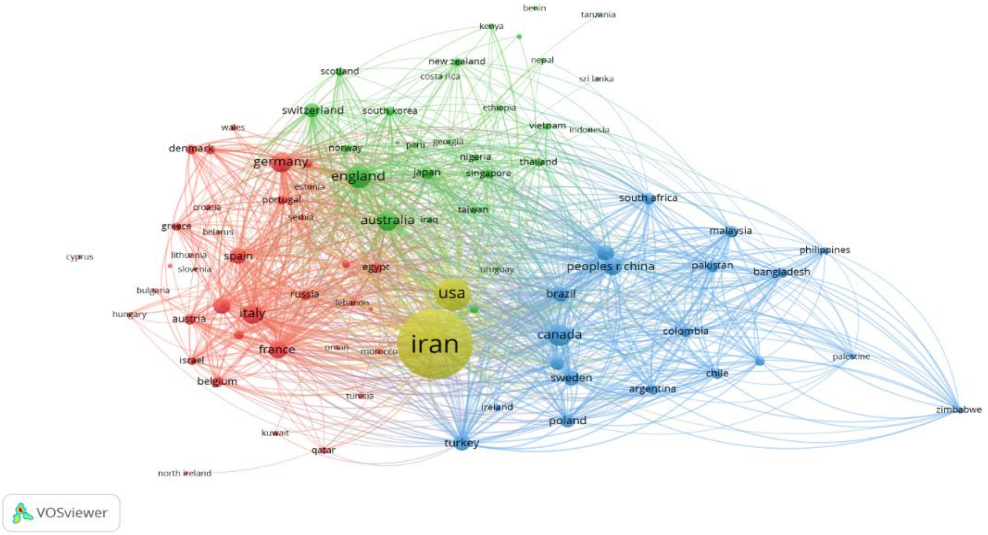

Figure 4: Visualization of a co-authorship network of countries with a minimum of ten documents by Iranian researchers in high-impact medical journals (2013-2022)

Also, Table 7 presents the top ten funding agencies supporting Iranian researchers in high-impact medical journals from 2013 to 2022. The data includes the name of the agency, the percentage of related records, and the respective country of the agency. According to the table, the United States Department of Health and Human Services has provided the most support, with 4.88% (176 records). Iranian universities and research institutions also appear on the list, including Tehran University of Medical Sciences and Shiraz University of Medical Sciences.

Table 7
Top 10 funding agencies for Iranian researchers in high-impact medical journals, 2013-2022

Funding agencies	Record (%)	Country
United States Department of Health and Human Services	176 (4.88)	USA
National Institutes of Health NIH USA	173 (4.80)	USA
Tehran University of Medical Sciences	165 (4.58)	Iran
Canadian Institutes of Health Research (CIHR)	81 (2.24)	Canada
UK Research Innovation (UKRI)	76 (2.11)	United Kingdom
Iran National Science Foundation (INSF)	68 (1.88)	Iran
Medical Research Council (MRC)	64 (1.77)	United Kingdom
National Health Medical Research Council (NHMRC)	54 (1,50)	Australia
Shiraz University of Medical Sciences	47 (1.30)	Iran
German Research Foundation (DFG)	46 (1.27)	German

Discussion

Since scientific capacity and research potential serve as key indicators of a country's progress and development, indicating its progress in various dimensions (Nazarzadeh Zare, Jamali, Arein, Skrouchi & Nasiri Firuz, 2014), this study, for the first time, examined the performance of Iranian researchers in high-impact journals in the field of medicine over the last decade. In this review, 3,731 articles were identified. The average number of authors per article was 9.9, which varied in other studies between 5 and 22 (Dmytriw, Hui, Singh, Nguyen, Omid-Fard, Phan & Kapadia, 2021; López-López, Salas, Vega-Arce, Cornejo-Araya, Barboza-Palomino & Ho, 2020; Yılmaz et al., 2017), probably due to differences in subject matter. On the other hand, only 24 articles were written by a single author, indicating that Iranian researchers are well aware of the fact that research is a team effort, which requires the presence of experts from the relevant field to improve the quality of the products resulting from that study (El-Omar, 2014). Nevertheless, more than half of the publications have been the result of national collaboration, while research with international cooperation can help increase citations and scientific impact (Alamah, AlSoussy & Fakih, 2023; Kohus, Demeter, Szigeti, Kun, Lukács & Czakó, 2022), since international cooperation increases the visibility and communication of an article (Alamah et al., 2023).

In a comparative study of scientific publications across all 41 fields, the results showed that nutrition and diet had the most significant number of articles, which can be attributed to the existence of their branches in food science and technology, chemistry, and plant science, leading to more scientific publications. Also, tropical medicine, endocrinology, and metabolism ranked next, with 46% and 36% of their publications related to 2020-2022. These publications can be attributed to the scientific activity of researchers in these fields during the COVID-19 epidemic. Some areas, such as oncology, the respiratory system, and primary health care, had fewer publications. However, it should be noted that the scientific production of each field can be attributed to several factors, including the field itself, the number of experts in the area, research budgets, health priorities, population demographics, and so on. Therefore, it is impossible to easily express the weaknesses or strengths of fields, which is one of the limitations of bibliometric studies (Hicks, Wouters, Waltman, de Rijcke & Rafols, 2015).

The number of citations an article receives indicates its influence in the academic world (Kim, Wahid, Choi, Das, Jungn, & Khosa, 2020). In the current study, the average number of citations was 37.42. These results show that Iran ranks third in terms of the number of articles in high-impact journals, but is ranked last in terms of the average number of citations per article. This weakness in citations for Iran compared to other countries in the region has also been stated in previous studies (Azadi Ahmadabadi, 2023).

Such a situation can be due to several reasons. One of them is the pressure to increase the quantity of articles in prestigious journals, which may reduce the quality of articles **or** the number of articles with international collaborations. A critical factor, such as funding, also has a significant impact on the quality of research (Kim et al., 2020). Indeed, funded studies enable researchers to address more complex questions and important issues and conduct more extensive experiments. For this reason, we calculated the number of citations from funded and unfunded articles. Our findings showed that there is a significant difference between the two groups ($P<0.05$) in such a way that funded articles have received more citations (an average of 42 citations per funded article and 29 citations per unfunded article), which highlights the importance of funding for early-stage researchers who try to establish themselves in this context (Grace et al., 2021). However**,** more than 40% of articles in this study did not have a budget,

which is a global problem (Dmytriw et al., 2021). The power of funding in receiving more citations is evident in the average number of citations of articles in Saudi Arabia. Although they have fewer publications than the other countries, they receive more citations. Usually, factors such as the open access of articles, which is a factor in obtaining more citations, are not irrelevant in this case. Therefore, logically, Iran can receive more citations by strengthening its funding.

The publications of Iranian researchers have increased significantly over the last decade, and in the past two years, they have accounted for approximately one-third of the total production. In addition, the top countries in the Middle East regarding article production were analyzed to show the growth of Iranian researchers among other competitors. The results showed Iran had the highest annual growth rate (14.1%). On the one hand, this growth has been challenged by economic sanctions on Iran in recent years, and on the other hand, publishers have avoided receiving articles authored by Iranians (Akhondzadeh, 2019). In addition, many top journals demand a publishing fee that has been increasing daily (Morrison, Borges, Zhao, Kakou & Shanbhoug, 2021), which is a significant obstacle for Iranian researchers. Iran's proximity to rich Persian Gulf countries such as Saudi Arabia, Qatar, and Kuwait, which have large research budgets, provides an excellent opportunity to enter into agreements and joint scientific cooperation with them to leverage their budgets for advancing science and research in Iran, and could be an effective solution to reduce financial problems and furnish laboratory equipment. In addition, our analysis showed a significant difference in receiving citations based on the type of collaboration of authors in articles. Our findings showed that articles written with international collaboration received, on average, more than twice as many citations as articles written with national partnership, which is consistent with previous studies (Hall et al., 2018; Zhou, Cai, & Lyu, 2020). This suggests that international collaboration may have a positive impact on the visibility and impact of research articles.

Since the position of researchers can indicate their participation and credit, the position of Iranian authors in articles with international cooperation was analyzed. More than half of the articles had an Iranian first author, indicating their prominent role because the first author is often the researcher who contributes the most to the work, especially regarding execution and time allocated (González-Alvarez, 2018). Iranian researchers were the corresponding authors in 44.14% of the examined articles. The corresponding author is the person not only fully responsible for the manuscript during the stages of submission, revision, and production to whom all communications from submission to publication are addressed (Nature.com, 2020), but he/she is also the one who has the original idea and is responsible for inviting other colleagues and assigning tasks (Pain, 2021). This issue is important because the corresponding author has the same score as the first author in scientific assessments in some countries, such as Iran and India. Almost a third of the last authors were Iranians, indicating their professorship and guidance status in the articles because the previous author is the primary principal investigator (PI) who supervised, financed the project, or otherwise was the primary person responsible for it (Pain, 2021).

The geographical analysis of the collaboration between Iranian researchers reveals that they have engaged in scientific cooperation with 162 countries worldwide. The USA was the most extensive scientific partner in production, and cooperation with other countries, such as England and Canada, has also been reported in previous studies (Jiménez-Caballero & Polo Molina, 2017; López-López et al., 2020). Such cooperation was also observed among funding agencies,

with five sponsors from the same countries, which demonstrates the global desire for scientific collaboration with Iranian researchers. It was also found that among countries with a high level of cooperation with Iranian researchers, China had the highest annual growth rate. China is a current research phenomenon, and according to statistics, Chinese authors contributed the most to high-quality natural science research in 2022, as well as to highly cited articles (Baker, 2023). Our review showed that half of the studies were a function of national collaboration. Cooperation between institutions can help produce articles with high-quality content, enhance quality and adaptability, and increase visibility for readers (Kim et al., 2020); therefore, researchers participating in investigations with only Iranian members should consider these factors.

Conclusion

Over the last decade, Iranian researchers have made notable progress in publishing in high-impact journals. However, challenges like insufficient funding and limited international collaboration continue to hinder their full potential. Increasing investment, strengthening global partnerships, and upgrading research infrastructure are essential to address the issues. Supportive policies, such as incentivizing international projects and providing targeted grants, can enhance research quality and impact. These strategic initiatives are essential not only to maintain Iran's competitive edge in scientific research but also to achieve greater recognition and impact in the global academic community. By adopting these measures, Iranian medical research can overcome current barriers and secure a stronger position in the international scientific arena.

Limitations

This study had several limitations. First, out of the 41 fields, five had a limited number of journals, so selecting the top ten journals may have included Q2 and Q3 journals. To address this, we focused on quality and selected only the top five. Second, we do not claim to have reviewed all medically related specialties, but we did cover a large portion. Lastly, our review was limited to publications from health sciences-related fields, so it would be valuable to explore other areas in future studies.

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