

Iranian Scientific Productions about Gastric Cancer: An Analysis of Web of Science from 1983 to 2017

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ABSTRACT

Background:

Scientific productions are among the most important criteria in the development of countries. Gastric cancer is the most common gastrointestinal cancer in Iran. In this study, we aimed to analyze the publications about gastric cancer in Iran from 1983 to 2017 using the Web of Science (WoS) database.

Materials and Methods:

In this scientometric study, at first, all terms related to «Gastric Cancer» were extracted using the Medical Subject Headings. Then, WoS database was searched using these terms. The time frame was until the end of 2017. Then, the results were refined to the countries. The data analyses were performed using Excel software.

Results:

Among 38554 records indexed in the WoS, 372 (0.965%) were published in Iran, ranking the country 16th in the world. Compound annual growth rate of Iranian scientific productions was 16.76%. Tehran University of Medical Sciences and Shahid Beheshti University of Medical Sciences were identified as the most productive centers with a contribution rate of 31.45% and 15.05%, respectively. The most international collaborations of Iranian researchers were with the United States (5.37%), Sweden (2.68%), and Germany (2.41%). Most articles were published in the Asian Pacific Journal of Cancer Prevention (9.67%). Most scientific productions were related to oncology (36.29%), gastroenterology and hepatology (21.23%), and general internal medicine (11.02%). Most scientific productions were published in the form of an “Article” (63.71%). All of the Iranian scientific productions about gastric cancer were in the English language.

Conclusion:

Iranian scientific productions in the field of gastric cancer have been increased from 1983 to 2017, although Iran was ranked 16th in the world.

Keywords: Publications, Stomach neoplasms, Database, Iran

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INTRODUCTION

Currently, developed countries use a significant portion of their resources for doing research, because enhanced research activities are the main cause of the development and progress of each country. Therefore, different countries try to increase their role in political, economic, and scientific affairs by increasing their share in global science production. Not all countries can invest in all fields of knowledge because subject areas of science are widespread and different countries have complex limitations in intellectual, human, and economic

properties. Therefore, various countries are trying to evaluate scientific productions through a variety of studies including scientometrics studies. In this way, they can identify the scientific fields in which they have high potential; hence invest more in those areas (1).

Scientometrics studies focus on statistical and quantitative analysis of scientific productions based on their quality in well-known science citation databases such as PubMed, Scopus, Google Scholar, and Thomson Reuters Institute for Scientific Information (ISI) (2). These studies analyze the growth rate of scientific productions in different years, thematic distribution, contribution, and various universities, institutes, and countries ranking, authors ranking based on the number of scientific productions, article citations, and impact factor (IF) of journals in which the articles were published (3). Therefore, in addition to identifying the number and location of doing research in specific fields, top researchers in each subject area can also be nominated, and hot topics are specified. Scientometrics studies introduce a group of individuals and institutions that researchers can collaborate within a specific subject area. These studies, while providing an accurate understanding of the status of science production in a country and its ranking in the world, facilitate scientific planning and policymaking, because the results of scientific studies are one of the most significant tools of scientific planning and policymaking in countries. They can easily identify existing scientific gaps and prevent waste of time and resources. There will not be any accurate planning and policymaking unless there is a correct understanding of the status of science production in every country and its ranking in the world (1).

Measuring the number of scientific publications and their effectiveness is usually based on the indexed documents in citation databases. One of the most important databases is the Institute for Scientific Information (ISI). It has various databases among which Web of Science (WoS) offers web access to the citation indexes. WoS is a bibliographic database and currently, most of the scientometrics studies are done using this database, because in addition to indexing the most important scientific publications throughout the world, it depicts citation analysis between them and provides quantitative and qualitative measurements of scientific productions using various scientometrics indicators (1).

Gastric cancer is one of the most common cancers constituting about 10% of all cancers worldwide. The prevalence of gastric cancer has increased in Iran within the last 30 years. Unfortunately, gastric cancer and its consequences affect patients' lifestyle and their family members (4).

Ghojzadeh and colleagues in their Medline study on gastric cancer evaluated the productivity of Iranian researchers during 2000-2011 and concluded that improving the collaboration of researchers in conducting scientific and research studies in various scientific fields as well as in the field of gastric cancer can play an important role in increasing the quality and quantity of published studies (4). Therefore, scientific productions of countries should always be correctly evaluated. Awareness about the conditions of diseases by using scientific production analysis can help interested people to recognize existing scientific gaps. The lack of objective information about the current status of diseases, including gastric cancer will make difficult the designing of necessary improvements in the infrastructures for understanding, treating, and preventing illnesses. Therefore, in this study, we aimed to investigate the Iranian research productivity in the field of gastric cancer based on the WoS database.

MATERIALS AND METHODS

In this scientometrics study, we evaluated Iranian scientific activities based on their productions in the gastric cancer category indexed in WoS from 1983-2017. The data were collected on July 28, 2018. At first, all terms related to gastric cancer were extracted from the Medical Subject Headings (MeSH). They were:

(Stomach Neoplasms; Neoplasm, Stomach; Stomach Neoplasm; Neoplasms, Stomach; Gastric Neoplasms; Gastric Neoplasm; Neoplasm, Gastric; Neoplasms, Gastric; Cancer of Stomach; Stomach Cancers; Gastric Cancer; Cancer, Gastric; Cancers, Gastric; Gastric Cancers; Stomach Cancer; Cancer, Stomach; Cancers, Stomach; Cancer of the Stomach; Gastric Cancer, Familial Diffuse).

Then, WoS was searched using these terms. The terms were combined with OR Boolean operator and were selected in the «title» field. The time frame was until the end of 2017. Then, the results were refined to the countries. Therefore, the total number of documents related to gastric cancer in Iran and

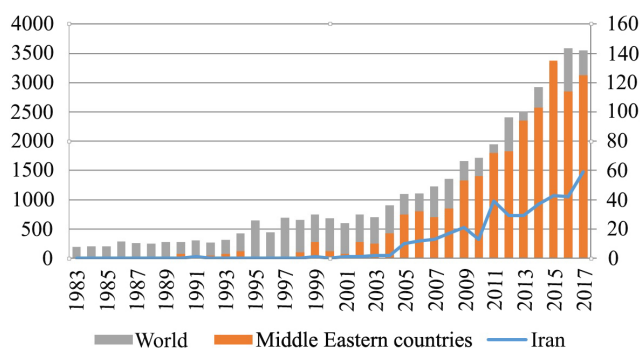


Fig.1: Total number of publications for the world, Middle Eastern countries, and Iran for «Gastric Cancer» per year for the period 1983-2017

other countries were recovered. The Middle Eastern countries were Iran, Iraq, Turkey, Egypt, Yemen, Bahrain, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, United Arab Emirates, Cyprus, and Palestine. The compound annual growth rate (CAGR) of publications was calculated by CAGR formula. The CAGR is defined as the year-on-year constant growth rate over a specified period of time. Starting with the first value in any series and applying this rate for each of the time intervals yields the amount in the final value of the series:

$$CAGR(t_0, t_n) = \left(\frac{V(t_n)}{V(t_0)} \right)^{\frac{1}{tn-t_0}} - 1$$

Where $V(t_0)$ is the starting value, $V(t_n)$ is the finishing value, and $tn-t_0$ is the number of years. The data analyses were performed using Excel software.

RESULTS

From the beginning of 1983 until the end of 2017, there were 38554 publications related to gastric cancer in WoS. Of these, Iran and the Middle Eastern countries produced 372 and 1026 publications, respectively. The average CAGR for Iran, the Middle Eastern countries, and World was 16.76%, 14.79%, and 8.74%, respectively. Sum of Times Cited for Iran in gastric cancer from 1983 to 2017 until July 28, 2018, was 3295 with 259 self-citations. The average citations per item and per year were 8.86 and 131.80, respectively. H-index showed that, on average, 26 Iranian publications related to gastric cancer indexed in WoS were cited at least 26 times. Figure 1 shows that Iranian researchers produced the largest number

of publications in 2017. The largest number of publications for the Middle Eastern countries and World related to gastric cancer were produced in 2015 and 2016, respectively (figure 1).

The total number of Iranian publications in the field of gastric cancer was written in English. Most of the productions were published in the form of an “Article” (63.71%) (table1). Publications were related to 45 research areas. The most preferred subject about which publications were produced was oncology (36.29%), gastroenterology hepatology (21.23%), and general internal medicine (11.02%) (Table 2).

Japan, China, and the USA had the highest number of publications in gastric cancer and together accounted for more than 50% of the productions. Iran with the 16th rank was not among the top ten countries in the world. Turkey had the highest rank among Middle Eastern countries with 534 publications (52.04%). It is followed by Iran (372, 36.25%) (Table 3). Iranian researchers in the field of gastric cancer collaborated with researchers from 29 countries. The highest international collaboration was with the United States (20, 5.37%), Sweden (10, 2.68%) and Germany (9, 2.41%).

Tehran University of Medical Sciences produced the largest number of Iranian publications in the field of gastric cancer (31.45%), followed by Shahid Beheshti University of Medical Sciences (15.05%), and Tarbiat Modares University (9.40%). National Cancer Center had the highest collaborative publications in gastric cancer in the world (3.07%) (Table 4). Most of the Iranian publications in gastric cancer were published in the Asian Pacific Journal of Cancer Prevention (Table 5).

Table 6 shows that highly cited Iranian articles in the field of gastric cancer were published in 2006 and 2007.

DISCUSSION

Iranian scientific productions in the field of gastric cancer have increased during the past years. It was consistent with the findings of Ghojzadeh and colleagues. They showed a significant increase in published articles about gastric cancer by Iranian researchers in Medline during 2006-2011 (4). The highest number of ISI-indexed Iranian publications were published in 2017. While most publications in the field of gastric cancer in Middle Eastern countries and the world were published in 2015 and 2016, respectively. Lack of funding may be the cause of low

Table 1: Document types for the world, Middle Eastern countries, and Iran for «Gastric Cancer» per year for the period 1983-2017

No	Iran		Middle Eastern countries		World	
	Document types	Total numbers (%)	Document types	Total numbers (%)	Document types	Total numbers (%)
1	Article	237 (63.71)	Article	650 (63.35)	Article	23913 (62.02)
2	Meeting abstract	85 (22.84)	Meeting abstract	246 (23.97)	Meeting abstract	9416 (24.42)
3	Review	27 (7.25)	Review	62 (6.04)	Review	1654 (4.29)
4	Letter	11 (2.95)	Letter	42 (4.09)	Proceedings paper	1631 (4.23)
5	Proceedings paper	8 (2.15)	Proceedings paper	20 (1.94)	Letter	1019 (2.64)
6	Editorial material	4 (1.07)	Editorial material	13 (1.26)	Editorial material	995 (2.58)
7	Retracted publication	2 (0.53)	Retracted publication	2 (0.19)	Correction	191 (0.94)
8	Biographical item	1 (0.26)	Correction	2 (0.19)	Note	150 (0.38)
9	Correction	1 (0.26)	Biographical item	1 (0.09)	News item	110 (0.28)
10	-	-	Book chapter	1 (0.09)	Retracted publication	36 (0.09)

Table 2: Research areas for the world, Middle Eastern countries, and Iran for «Gastric Cancer» per year for the period 1983-2017

No	Iran		Middle Eastern countries		World	
	Research areas	Total numbers (%)	Research areas	Total numbers (%)	Research areas	Total numbers (%)
1	Oncology	135 (36.29)	Oncology	444 (43.27)	Oncology	18130 (47.02)
2	Gastroenterology/ Hepatology	79 (21.23)	Gastroenterology/ Hepatology	189 (18.42)	Gastroenterology/ Hepatology	10062 (26.09)
3	General internal medicine	41 (11.02)	General internal medicine	100 (9.74)	Cell biology	1647 (4.27)
4	Microbiology	36 (9.67)	Biochemistry Molecular biology	44 (4.28)	General internal medicine	1622 (4.20)
5	Pharmacology/ Pharmacy	21 (5.64)	Research experimental medicine	44 (4.28)	Research experimental medicine	1549 (4.01)
6	Biochemistry Molecular biology	19 (5.10)	Microbiology	39 (3.80)	Biochemistry Molecular biology	1329 (3.44)
7	Public environmental occupational health	19 (5.10)	Pharmacology/ Pharmacy	39 (3.80)	Pharmacology/ Pharmacy	1140 (2.95)
8	Research experimental medicine	16 (4.30)	Genetics heredity	27 (2.63)	Genetics heredity	725 (1.88)
9	Genetics heredity	14 (3.76)	Cell biology	23 (2.24)	Public environmental occupational health	638 (1.65)
10	Cell biology	11 (2.95)	Public environmental occupational health	21 (2.04)	Microbiology	518 (1.34)

scientific productions in Middle Eastern countries and the world. It is possible that overall growth of Iranian scientific productions is partly due to the increased number of foreign international conferences, which can significantly affect the rate of publication in

internationally published journals. The use of statistics in each field can be considered as a key factor in assessing the degree of development of that field (5). Also, the number of scientific productions represents the level of activity and scientific level

Table 3: Publication share per country for the world and Middle Eastern countries for «Gastric Cancer» per year for the period 1983-2017

No	World countries		Middle Eastern countries	
	Country	Total numbers (%)	Country	Total numbers (%)
1	Japan	9183 (23.81)	Turkey	534 (52.04)
2	China	9174 (23.79)	Iran	372 (36.25)
3	United States	4482 (11.62)	Egypt	37 (3.60)
4	South Korea	4409 (11.43)	Saudi Arabia	29 (2.82)
5	Italy	1922 (4.98)	Oman	17 (1.65)
6	Germany	1690 (4.38)	Lebanon	14 (1.36)
7	England	1355 (3.51)	United Arab Emirates	10 (0.97)
8	Taiwan	710 (1.84)	Cyprus	6 (0.58)
9	Spain	683 (1.77)	Jordan	5 (0.48)
10	France	640 (1.66)	Iraq	4 (0.39)

Table 4: The most prolific institutions for the world, Middle Eastern countries, and Iran for «Gastric Cancer» per year for the period 1983-2017

No	Iran		Middle Eastern countries		World	
	Institution	Total numbers (%)	Institution	Total numbers (%)	Institution	Total numbers (%)
1	Tehran University of Medical Sciences	117 (31.45)	Tehran University of Medical Sciences	117 (11.40)	National Cancer Center	1184 (3.07)
2	Shahid Beheshti University of Medical Sciences	56 (15.05)	Istanbul University	57 (5.55)	Seoul National University	799 (2.07)
3	Tarbiat Modares University	35 (9.40)	Shahid Beheshti University of Medical Sciences	56 (5.45)	Yonsei University	716 (1.85)
4	Ardabil University of Medical Sciences	31 (8.33)	Hacettepe University	43 (4.19)	Shanghai Jiao Tong University	649 (1.68)
5	Pasteur Institute of Iran	27 (7.25)	Gazi University	35 (3.41)	Nanjing Medical University	570 (1.47)
6	Tabriz University of Medical Sciences	27 (7.25)	Tarbiat Modares University	35 (3.41)	China Medical University	514 (1.33)
7	Islamic Azad University	26 (6.98)	Ankara Numune Training and Research Hospital	31 (3.02)	The University of Tokyo	476 (1.23)
8	Isfahan University of Medical Sciences	25 (6.72)	Ardabil University of Medical Sciences	31 (3.02)	Fudan University	474 (1.22)
9	Mazandaran University of Medical Sciences	20 (5.37)	Dr. Lütfi Kırdar Kartal Research and Training Hospital	30 (2.92)	Kyushu University	455 (1.18)
10	Mashhad University of Medical Sciences	18 (4.83)	Erciyes University	29 (2.82)	University of Sungkyunkwan	451 (1.17)

of each country. Iran ranked 16th in the world and ranked second among Middle Eastern countries in the field of gastric cancer. A similar study showed that

Iran was ranked second in Middle Eastern countries in publications related to polycystic ovary syndrome (6). Iran's high ranking in science production in these

Table 5: The most prolific journals for the world, Middle Eastern countries, and Iran for «Gastric Cancer» per year for the period 1983-2017

No	Iran		Middle Eastern countries		World	
	Journal	Total numbers (%)	Journal	Total numbers (%)	Journal	Total numbers (%)
1	Asian Pacific Journal of Cancer Prevention	36 (9.67)	Annals of Oncology	65 (6.33)	Gastroenterology	1749 (4.53)
2	Helicobacter	28 (7.52)	Asian Pacific Journal of Cancer Prevention	62 (6.04)	Journal of Clinical Oncology	1691 (4.38)
3	Annals of Oncology	26 (6.98)	Journal of Clinical Oncology	45 (6.38)	Annals of Oncology	1368 (3.54)
4	Archives of Iranian Medicine	15 (4.03)	Helicobacter	29 (2.82)	World Journal of Gastroenterology	975 (2.52)
5	American Journal of Gastroenterology	8 (2.15)	World Journal of Gastroenterology	25 (2.43)	Journal of Gastroenterology And Hepatology	809 (2.09)
6	Iranian Journal of Public Health	8 (2.15)	Hepato Gastroenterology	23 (2.24)	Gastrointestinal Endoscopy	713 (1.84)
7	Clinical Biochemistry	6 (1.61)	European Journal of Cancer	22 (2.14)	Annals of Surgical Oncology	680 (1.76)
8	Indian Journal of Cancer	6 (1.61)	Medical Oncology	21 (2.04)	Cancer Research	644 (1.67)
9	Journal of Research in Medical Sciences	6 (1.61)	Turkish Journal of Gastroenterology	20 (1.94)	Gastric Cancer	630 (1.63)
10	World Journal of Gastroenterology	6 (1.61)	Archives of Iranian Medicine	15 (1.46)	Hepato Gastroenterology	606 (1.57)

Table 6: Highly cited articles from Iran in the field of «Gastric Cancer» per year for the period 1983-2017

No	Article	Average Citations per Year	Total citations
1	Rhead Joanne L, Letley Darren P, Mohammad M, et al. A new Helicobacter pylori vacuolating cytotoxin determinant, the intermediate region, is associated with Gastric Cancer. <i>Gastroenterology</i> . 2007; 133(3):926-936.	18.33	220
2	Went P, Vasei M, Bubendorf L, et al. Frequent high-level expression of the immunotherapeutic target Ep-CAM in colon, stomach, prostate and lung cancers. <i>British Journal of Cancer</i> . 2006; 94(1):128-135.	16.92	220
3	Karimi P, Islami F, Anandasabapathy Sh, et al. Gastric Cancer: Descriptive Epidemiology, Risk Factors, Screening, and Prevention. <i>Cancer Epidemiology Biomarkers & Prevention</i> . 2014; 23(5):700-713.	35.60	178
4	Tramacere I, Negri E, Pelucchi C, et al. A meta-analysis on alcohol drinking and Gastric Cancer risk. <i>Annals of Oncology</i> . 2012; 23(1):28-36.	16.00	112
5	Malekzadeh R, Derakhshan MH, Malekzadeh Z. Gastric Cancer in Iran: Epidemiology and Risk Factors. <i>Archives of Iranian Medicine</i> . 2009; 12(6):576-583.	10.60	106
6	Derakhshan MH, Malekzadeh R, Watabe H, et al. Combination of gastric atrophy, reflux symptoms and histological subtype indicates two distinct etiologies of gastric cardia cancer. <i>GUT</i> . 2008; 57(3).	9.55	105
7	Saadat I, Saadat M. Glutathione S-transferase M1 and T1 null genotypes and the risk of gastric and colorectal cancers. <i>Cancer Letters</i> . 2001; 169(1):21-26.	5.72	103
8	Saadat M. Genetic polymorphisms of glutathione S-transferase T1 (GSTT1) and susceptibility to Gastric Cancer: a meta-analysis. <i>Cancer Science</i> . 2006; 97(6):505-509.	6.92	90
9	Gorouhi F, Islami F, Bahrami H, et al. Tumour-necrosis factor-A polymorphisms and Gastric Cancer risk: a meta-analysis. <i>British Journal of Cancer</i> . 2008; 98(8): 1443-1451.	6.00	66
10	Pourfarzi F, Whelan A, Kaldor J, et al. The role of diet and other environmental factors in the causation of Gastric Cancer in Iran-A population based study. <i>International Journal of Cancer</i> . 2009; 125(8):1953-1960.	6.00	60

diseases can be due to the growing trend of diseases. When the incidence of diseases increases, research in those fields also increases. These results also indicate the interest and experience of Iranian researchers in these subjects.

It is necessary that at least 2 years pass from the publication of articles to have the opportunity for visibility and being citable by other authors. Then, by calculating the number of citations, impact factor of journals in which the articles were published, can be calculated (3). Based on this study, the Iranian productions in the field of gastric cancer were cited 3295 times by July 28, 2018. H index was 26, which means the gastric cancer field in Iran had 26 documents, each of which had been cited 26+ times. The publication of more articles in valid international journals can increase the number of citations and thus increase the H index.

The most prolific institution in the field of gastric cancer in Iran was Tehran University of Medical Sciences followed by Shahid Beheshti University of Medical Sciences and Tarbiat Modares University. Ghojzadeh and colleagues showed that Tehran University of Medical Sciences had the greatest number of publications in gastric cancer among Iranian universities and scientific institutes (4). According to the study by Alijani and Karami, Tehran University of Medical Sciences and Tarbiat Modares University were in the second and third ranks of science production in the field of stem cells (7). The study of Iranian research in the field of nephrology and urology showed that Tehran University of Medical Sciences was more active than other universities and research institutes (8). Tehran University of Medical Sciences is one of the most important Iranian universities and institutes of research, due to its strong research infrastructure, which has a very good capacity for scientific cooperation (9).

Iranian researchers in the field of gastric cancer collaborated with researchers from 29 other countries. The most frequent cooperation was with researchers in the United States. This is congruent

with the studies done by Zeraatkar and Alijani and Karami who showed the most collaboration of Iranian researchers in the field of dentistry and surgery was with researchers in the United States (10,11). Enhancing international collaboration in scientific

productions can lead to more scientific knowledge and experience exchange. This can be accomplished through researchers and students exchange programs between national and international institutions (10).

Scientific journals are one of the most important means of publishing the results of scientific research in each field (12). Asian Pacific Journal of Cancer Prevention and Helicobacter published 9.67% and 7.51% of the Iranian scientific publications in the field of gastric cancer, respectively. Suk and co-workers showed that Alimentary Pharmacology and Therapeutics published the most articles in the field of Helicobacter pylori research followed by Helicobacter journal (13).

Iranian research in the field of gastric cancer has been published in 45 major topics. Oncology, gastroenterology, hepatology, and general internal medicine were the most prevalent topics, respectively. The subject category of oncology was also the most common research interest of Iranian dental researchers (10). Science production in other thematic areas is needed.

“Articles” were the most frequent type of documents, followed by «Meeting Abstracts». This result is congruent with the study done by Delirrad and colleagues who showed that the most common document types in Iranian scientific productions in the field of toxicology were the «Article» and «Meeting Abstract» (14). Suk and co-workers also showed that most of the Helicobacter pylori studies were published in the form of «Article» and «Meeting Abstract» (13).

All of the Iranian scientific productions in the field of gastric cancer were in the English language. It is congruent with Zeraatkar and colleagues who showed all «dental» scientific productions produced by Iranian researchers were written merely in English (10). Despite English is an international and understandable language, science production in other languages can increase scientific communication around the world.

CONCLUSION

According to results, there was an increasing trend in the number of Iranian publications in the field of gastric cancer over the years. Although H index showed that the gastric cancer field in Iran was somewhat satisfactory from the qualitative point of view, Iran ranked 16th in the world. Scientometrics studies show a wide view of the research status of countries and

examine the strengths and weaknesses of universities and scientific centers in various fields. Therefore, it is suggested that by conducting further studies in other fields of medical sciences and determining the current status of medical sciences in the country, policymakers and research directors of the country can be assisted, and through more targeted and organized planning, the quantitative and qualitative level of scientific products of the country will be increased.

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CONFLICT OF INTEREST

The authors declare no conflict of interests related to this work.

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