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Breast cancer research in Iran: a scientometric analysis of publications output from 1991 to 2015 in Scopus

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Abstract

Introduction: As a common type of malignancy, breast cancer is one of the major causes of death in women globally. The purpose of the current study was to analyze Iran research performance on Breast Cancer in the context of national and international studies, shown in the publications indexed in Scopus database during 1991-2015.

Methods: Data were retrieved from the Scopus citation database in this scientometric study. The following string was employed; "breast cancer OR breast malignancy OR breast tumor OR mammary ductal carcinoma" keywords in the main title, abstract and keywords and Iran in the affiliation field were the main related keywords. The terms used were searched in Scopus using the tab specified for searching documents. Time span analyzed was 1991 to 2015 inclusive. Using the analyzing software of Scopus, we analyzed the results.

Results: Iran's increasing publication production during 1991–2015 in breast cancer research which indexed in Scopus, consists of 2,399 papers with an average of 95.96 papers per year, and achieved an h-index of 48. Iranian cancer research articles have received 15,574 citations during 1991-2015, and average citations per paper were 6.49. Iran ranked 27th among the top 30 nations with a worldwide stake of 0.67 %, the 20 top publishing journals published 744 (31%) Iranian research articles on breast cancer, among them, there were 15 Iranian journals.

Conclusion: The number of Iranian research papers on breast cancer and also the number of citations to them, is increasing. Although the quantity and quality of papers are increasing, regarding the prevalence of breast cancer in Iran and also the ineffectiveness of screening programs in the early detection of the cases, more effort should be made, and Iranian policy makers should consider more investment on breast cancer research.

Keywords: Bibliometrics, Breast cancer, Bibliographic database, Scopus, Iran

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1. Introduction

Breast cancer is the most common type of malignancy and one of the major causes of death in women worldwide. More than one million new cases suffer from this malignancy each year, globally. In advanced nations, breast cancer is a very frequent malignancy diagnosed among women, and in the developing nations, it is placed second to cervical cancer (1). Breast cancer is also the primary cause of cancer death among women globally, responsible for around 375,000 deaths in the year 2000 (2). A total of 39,620 women died from this disease in the United States in 2013 (3). Studies have identified numerous risk factors for breast cancer in women, including increasing age, personal and family history, genetic factors, race and even socio-economic factors (1, 3-5). Breast cancer is estimated to account for 27% of all new cancer cases and 15% of cancer-related mortality in women in the USA (5). It is estimated that $17.2 billion has been spent on breast cancer care in the United States in 2014 (6). It is shown that a number of major developing economies such as India, China and Brazil will be facing breast cancer epidemics by 2020 (7). Also, breast cancer is considered as a costly disease, and inflicts a notable burden on economic resources of every nation because of its high incidence and prevalence (8). Iran has the highest incidence rate of cancer in the Middle East (9). In Asian nations such as Iran, the incidence of breast cancer is growing (10). Currently, the incidence and prevalence of breast cancer in Iranian women is 22 per 100,000 and 120 per 100,000 respectively (11). According to the National Center for Cancer Registration, breast cancer incidence has increased dramatically from 2001. In 2010, 23% of all cancers diagnosed in women were breast cancer cases. The incidence rate of breast cancer is estimated to be 22.09% in 100,000 women, with the age-standardized incidence rate estimated at 28.25% in 100,000 women (12). In Iran, breast cancer has a leading rank compared to other types of cancer identified in females (13) comprising 24.4% of all malignancies with a crude incidence rate and ASR of 17.4 and 23.1 per 100,000, respectively (14). Investigations have specified that the mean age of breast cancer patients in Iran is approximately 10 years younger than in Western countries (15-17). Given that Scopus covered more Iranian journals (18) and also was available, we used this database. The aim of this study was to analyze Iran research performance on Breast Cancer in national and international context, as reflected in its publications indexed in Scopus database during 1991-2015.

2. Material and Methods

The current experiment was rooted from the studies of breast cancer research from Iranian authors over a twenty-five-year period. Data were retrieved from Scopus Citation database produced by Elsevier. To estimate the global number of published works on breast cancer, the following string was used; “breast cancer OR breast malignancy OR breast tumor OR mammary ductal carcinoma” our main strings were keywords in title, abstract and keywords as well as Iran in the affiliation field. Also, the above mentioned expressions were looked for in the document search tab of Scopus. The time span analyzed, was 1991 to 2015 inclusive. The search was performed on December 31, 2015. By utilizing searching and analyzing strategies in Scopus, we first searched the data, then we used Scopus analyzer, and analyzed the results. Also, to recover the statistics of world research in breast cancer, the key words ‘breast cancer OR breast malignancy OR breast tumor OR mammary ductal carcinoma’ were looked for in various sections, such as title, keyword and abstract, using the software of Scopus search tab.

3. Results

From 1991 to 2015, the total number of articles about breast cancer research found in Scopus, were about 353,893 articles. During the study period, 126 nations with more than 10 papers, contributed to the literature on the topic of breast cancer. The share of global publication for the top 30 most prolific nations in breast cancer research fluctuated from 0.46 to 34.57% during 1991–2015. The United States scored the 1st rank with a global publication share of 34.57% (122,370 papers) during 1991–2015, followed by the United Kingdom (7.79% share, 27,584 papers), Germany (5.66% share, 20,045 papers), China (5.56% share, 19,711 papers) and Italy (5.15% share, 18,229 papers) at 2nd, 3rd, 4th and 5th positions, respectively. France, Japan, Canada, Netherlands, Australia, Spain, India, South Korea, Sweden, Switzerland, Belgium, Turkey, Denmark, Taiwan, Greece and Poland ranked from 6th to 21st positions with their global publication share ranging from 4.59 to 1.44%. Brazil, Austria, Israel, Finland, Norway, Iran, Singapore, Ireland and Egypt contributed less than 1% share in world research output in breast cancer (Table 1). Interestingly, among 30 most productive countries in terms of continental share in breast cancer research, there are 16 countries from Europe with publication share of 38.72%, 9 Asian countries with share of 18.16%, 2 countries from North America with share of 38.79%, 1 country from South America, 1 from Australia/Oceania and 1 from Africa with publication share of 0.99%, 2.57% and 0.46% respectively (Table 1). There were 147 journals that published 200 or more papers on breast cancer. “Breast Cancer Research and Treatment” with 7,348 items was the first in rank, and “Medical Care” with 200 items was the last. Among these 147 journals, 20 journals were the highest publishing journals, which published almost 25% of literature on breast cancer (Table 2).

Table 1. World publication output, share and rank of top 30 most productive countries in breast cancer research from 1991to 2015.

Country	No. of Papers	Share of papers	Rank
United States	122370	34.57	1
United Kingdom	27584	7.79	2
Germany	20,045	5.66	3
China	19,711	5.56	4
Italy	18,229	5.15	5
France	16,265	4.59	6
Japan	15,204	4.29	7
Canada	14,964	4.22	8
Netherlands	9,156	2.58	9
Australia	9,129	2.57	10
Spain	8,992	2.54	11
India	7,233	2.04	12
South Korea	6,693	1.89	13
Sweden	6,095	1.72	14
Switzerland	5,121	1.44	15
Belgium	4,727	1.33	16
Turkey	4,217	1.19	17
Denmark	3,882	1.09	18
Taiwan	3,729	1.05	19
Greece	3,705	1.04	20
Poland	3,694	1.03	21
Brazil	3,513	0.99	22
Austria	3,325	0.93	23
Israel	3,116	0.88	24
Finland	2,956	0.83	25
Norway	2,954	0.82	26
Iran	2,399	0.67	27
Singapore	2,079	0.59	28
Ireland	1,754	0.49	29
Egypt	1,656	0.46	30
Total	353,893	100	-

Iran's cumulative publication output during 1991–2015 in breast cancer research which indexed in Scopus, consists of 2,399 papers with an average of 95.96 papers per year and achieved an h-index of 48. Hence; with 2,399 papers, Iran ranked 27th among the top 30 nations with a worldwide share of 0.67 %. Over the 25-year period from 1991 to 2015, Iranian breast cancer research outputs increased from 1 paper in 1991 to 432 papers in 2015. The publication output in breast cancer has increased rapidly. From 2,399 papers, a total of 1,753 (73%) papers have been published during five years (2011-2015). Iranian cancer research articles have received 15,574 citations during 1991-2015, and average citations per paper were 6.49, the highest average citations per paper was for 2015 (8.79) and the lowest was during 1991-2005 (1.96) (Table 3). Iranian researchers have published their papers, mostly in domestic journals. The 20 top publishing journals published 744 (31%) Iranian research articles on breast cancer, among them, there were 15 Iranian journals. From the 20 top publishing journals, "Asian Pacific Journal of Cancer Prevention" ranks the first with 252 published articles and "International Journal of Hematology Oncology and Stem Cell Research" ranks 20th (Table 4). The higher numbers of publications were in the article type with 84.66%, followed by the review with 6.23%, conference papers with 4.25%, letters with 2.41%, articles in press with 1.20%, book chapters with 0.33%, editorials with 0.33%, short surveys with 0.25%, notes with 3.39%, errata with 0.08%, and the least number of publications was in books with 0.04%. Iran has collaborated with 103 countries in breast cancer research, among them, the United States ranked 1st with 124 papers followed by Canada with 84 papers, United Kingdom with 55 papers, Malaysia with 53 papers, Germany with 48 papers, Sweden with 47 papers, Australia with 32 papers, Italy with 31 papers, India with 21 papers and France with 18 papers. In total, these ten countries published 513 (21%) papers in collaboration with Iran. Altogether, 160 Iranian universities and research centers have produced a total of

2,399 papers on breast cancer. Tehran University of Medical Sciences has contributed 638 (26.59%) publications followed by Shahid Beheshti University of Medical Sciences 220 (9.17%), Shiraz University of Medical Sciences 217 (9%), Tarbiat Modares University 209 (8.7%), Isfahan University of Medical Sciences 182 (7.58%), Mashhad University of Medical Sciences 155 (6.46%), Tabriz University of Medical Sciences 152 (6.33%), Islamic Azad University 152 (6.33%) and University of Tehran 143 (5.96%). We found six authors who wrote more than thirty documents on breast cancer studies as follows: Abdolrasoul Talei from Shiraz University of Medical Sciences with 59 papers and H-index of 15, Abbas Ghaderi from Shiraz University of Medical Sciences with 46 papers and H-index of 25, Ali Montazeri from Iranian Institute for Health Sciences Research with 42 papers and H-index of 37 , Mohammad Esmaeil Akbari form Shahid Beheshti University of Medical Sciences with 36 papers and H-index of 11, Zuhair Mohammad Hassan from Pasteur Institute of Iran with 35 papers and H-index of 22 and Ramin Sadeghi from Mashhad University of Medical Sciences with 33papers and H-index of 14.

Table 2. The most publishing journals on breast cancer

Source Title	Items On BC
Breast Cancer Research and Treatment	7,348
Cancer Research	5,328
Journal of Clinical Oncology	4,478
Cancer	3,714
British Journal of Cancer	3,552
Plos One	3,395
International Journal of Cancer	3,263
Journal of the National Cancer Institute	3,145
Anticancer Research	2,981
Clinical Cancer Research	2,842
Oncogene	2,590
Annals of Oncology	2,477
Breast	2,471
European Journal of Cancer	2,278
Breast Journal	2,261
Breast Cancer Research	2,003
Journal of Biological Chemistry	1,925
Annals of Surgical Oncology	1,886
International Journal of Radiation Oncology Biology Physics	1,873
Total	59,819

Table 3. Iranian research papers in breast cancer research according to number of papers, citations and average citations per paper by year

Year	Papers	Citations	Average citations per paper
2015	432	3,800	8.79
2014	401	3,491	8.70
2013	387	2,494	6.44
2012	284	1,864	6.56
2011	249	1,455	5.84
2010	188	809	4.30
2009	140	603	4.30
2008	75	352	4.69
2007	53	260	4.90
2006	56	183	3.45
1991-2005	134	263	1.96
Total	2,399	15574	6.49

Table 4. The most publishing journals which published Iranian researchers` papers on breast cancer

Source Title	Country of Origin	Items on BC
Asian Pacific Journal of Cancer Prevention	South Korea	252
Iranian Journal of Cancer Prevention	Iran	71
Tumor Biology	Netherlands	36
Journal of Isfahan Medical School	Iran	36
Journal of Research in Medical Sciences	Iran	35
Archives of Iranian Medicine	Iran	32
Medical Oncology	United States	29
Tehran University Medical Journal	Iran	29
Iranian Red Crescent Medical Journal	Iran	29
Iranian Journal of Pharmaceutical Research	Iran	23
Iranian Journal of Basic Medical Sciences	Iran	22
Breast Journal	United Kingdom	20
Iranian Journal of Obstetrics Gynecology and Infertility	Iran	19
Acta Medica Iranica	Iran	18
Iranian Journal of Public Health	Iran	17
Breast Cancer Research and Treatment	United States	17
Journal of Cancer Research and Therapeutics	India	16
Journal of Mazandaran University of Medical Sciences	Iran	15
Iranian Journal of Radiation Research	Iran	14
International Journal of Hematology Oncology and Stem Cell Research	Iran	14

4. Discussion

This study specified that Iran, with 2,399 papers in breast cancer research, ranked 27th amongst the top thirty countries and its worldwide portion was 0.67 %. Although the number of papers have increased over 1991-2015, breast cancer cases are increasing too. Iran has the highest incidence of cancer in the Middle East at 110 cases per 100 000 population per year, leading to 105 deaths every day (9, 19). Iran is quickly moving toward an "elderly society" with an associated growth in cancer incidence, including breast cancer (19). Statistics show that the prevalence of non-communicable diseases such as cancer increased dramatically in Iran, also, the results of the Iranian Cancer Registry, displays that the screening programs are not yet operative in the initial screening of the cases (20). This increases significant concern for law makers to describe suitable diagnostic and treatment facilities, and improve breast cancer control policies in Iran (19). It seems that more effort should be made to control breast cancer, including screening and diagnostic programs also conducting supported studies in this field. The findings of the present study indicated that the higher numbers of publications were in the article type with 84.66%, followed by the review with 6.23%, and the least number of publications was in books with 0.04%. These findings are inconsistent with a study by Tawfeeq (21). It seems that books are neglected, and not only Iranian researchers but also all researchers on breast cancer research worldwide should pay more attention to this issue. Iranian researchers have published their papers, mostly in domestic journals; the reason for this is that, most Iranian journals have only recently been qualified to be indexed by Scopus. In a study by Rasolabadi et al, there were 5 journals publishing 140 (20%), of which there was just one Iranian publication which became the first amongst other publications (22). Biglu in his study, found that most of the Iranian studies were issued in Thailand, the United States and the United Kingdom (23), which is not consistent with the current study. Perhaps the reason is that Biglu conducted his study on papers indexed in MEDLINE. Results showed that Iranian cancer research articles have received 15,574 citations during 1991-2015, and average citations per paper were 6.49. This finding indicated that research quality in this field is increasing alongside with quantity. This finding is consistent with findings of Rasolabadi et al, which showed Iran's publication output in diabetes research as measured by average citation per paper was 6.19 on the whole (24). Iran has collaborated with 103 countries in breast cancer research, among them United States ranked 1st followed by Canada, United Kingdom, Malaysia, Germany, Sweden, Australia, Italy, India and France. In total, these ten international collaborative partners published 513 (21%) papers in collaboration with Iran. This finding is inconsistent with findings of Rasolabadi et al studies (12, 24 and 25). Among ten international collaborative partners, Malaysia ranked fourth, perhaps the reason is that in past decade many Iranian students had graduated from Malaysian universities. There were 9 most productive Iranian universities with more than 140 papers in the field of breast cancer research including; Tehran, Shahid Beheshti, Shiraz, Isfahan, Mashhad, Tabriz University of Medical Sciences , Tarbiat Modares University, Islamic Azad University and University of Tehran . These 9 most productive

Iranian universities have published 2,068 (86.20%) papers out of 2,399 papers in total. This finding is inconsistent with findings of Rasolabadi et al and the Biglu study (22-24). Though; these 9 Iranian universities are among the biggest domestic universities, with predictable productivity. The results showed that 6 authors have produced 251(10.46%) papers in breast cancer research, namely Abdolrasoul Talei, Abbas Ghaderi, Ali Montazeri, Mohammad Esmaeil Akbari, Zuhair Mohammad Hassan and Ramin Sadeghi. According to the Lotka's law (The quantitative percentage of researchers in a discipline that have contributed to its many research practices), they are regarded as prolific researchers in the production of information on breast cancer in Iran. This finding has also been confirmed by Biglu (23).

5. Conclusions

The number of Iranian research papers on breast cancer and also the number of citations to them are increasing. Although the quantity and quality of papers are increasing, regarding the prevalence of breast cancer in Iran and also the ineffectiveness of screening programs in the early detection of the cases, more effort should be done and Iranian strategy designers should invest more on breast cancer research.

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Conflict of Interest:

There is no conflict of interest to be declared.

Authors' contributions:

All authors contributed to this project and article equally. All authors read and approved the final manuscript.

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