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A scientometric study of dementia research in geriatrics and gerontology journals

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ABSTRACT

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Background and Objectives: Dementia is a global epidemic in the modern world, which causes disabilities for individuals, particularly the elderly. There is an increasing number of studies conducted on dementia due to the increasing elderly population of the world and consequent increase in the prevalence of dementia. Scientometric studies can help monitor research and publications on dementia.

Materials and Methods: In the present study, the Web of Science database was searched for articles published on geriatric dementia and scientometric methods along with network analysis were used to examine the selected articles.

Findings: Of the total of 14417 articles examined in this study, 8650 articles (60%) were published from 2006 onward. Among the 96 countries active in dementia research, the United States, the United Kingdom and Italy were ranked first to third with 5288, 1963 and 958 articles, respectively. Moreover, the United States and the United Kingdom had the highest scientific collaboration with 185 joint articles. Australasia had the highest ratio of articles/dementia population based on GBD regions.

Conclusion: Due to the increasing elderly population of the world and consequent increase in the prevalence of dementia, it is mandatory for different countries, particularly middle and low-income countries, to promote dementia research through national dementia programs and collaboration with other countries.

Introduction

Dementia is a global epidemic in the modern world, which causes disabilities in individuals and imposes a heavy burden both on the diagnosed and their families and caregivers. Moreover, it is considered one of the main factors contributing to disability and dependence in the elderly across the world (1). The consequences and symptoms of this syndrome include behavior, speech and memory disorders as well as inability to perform daily activities (2). Dementia is currently a serious and costly problem (3) that has gained the interest of financial and health policymakers (4).

The number of people diagnosed with dementia across the world was reported as 46.8 million in 2015, and it is estimated to reach about 75 million in 2030 and 131.5 million in 2050 (5). According to the estimates, low and middle-income countries will have the highest prevalence of dementia by 2050 (6).

For dementia, age is the most important risk factor and its prevalence in the age group over 65 is much higher. About two in 100 people between the age of 65 to 69 have dementia in the United Kingdom, and this number increases to one in five for those who have the age of 85 to 89. However, the reported statistics do not imply that this syndrome is entirely absent in individuals younger than 65. Although, 7.1% of all people over the age of 65 have dementia, about 2% to 10% of all cases of dementia are estimated to occur before the age of 65 (7). Nevertheless, the prevalence of this syndrome is one in 20 in the age group over 65 and one in six in the age group over 80. Due to changes in the population pyramid, the age group over 65 will form 22% of the world's population by 2050, i.e. a total of 1.25 billion people, 79% of whom will be living in non-developed countries (8).

Due to the growing increase in the elderly population of the world and the consequent higher prevalence of dementia, extensive studies have been conducted on this subject (9), thereby increasing the number of publications in the field (10). Studies show that, from 1974 to 2009, the

rate of increase in the number of articles published on dementia has been 5.6 times the rate of increase in the number of articles indexed in MEDLINE (11). Due to the significant growth in research on dementia (12), conducting an independent study for carrying out an analysis of these studies is necessary. The few studies that carried out a general examination of the articles published in this field only focused on a specific part or aspect of the subject (9 & 11). Thus, the present study was conducted to analyze dementia articles through scientometric techniques and draw their scientific maps. Given the extensive scope of this area, the present study examined only articles on dementia that were published in geriatrics and gerontology journals.

Materials and Methods

The present study adopted a quantitative approach to examine scientific articles on dementia published by the end of June 2015 and indexed in the Web of Science database, which focused on geriatrics and used scientometric methods and social network analysis. The bibliometric indicators used for evaluating publications on dementia and social network analysis techniques used for analyzing the scientific maps drawn to illustrate collaborations. The study was conducted on 14417 articles with the subject of dementia published in geriatrics and gerontology journals during the specified interval of time. To retrieve the articles, the advanced search option of the Web of Science database was used according to the following strategy.

TS = (dementia or amentia or "familial dementia" or "senile paranoid dementia") and
WC = geriatrics & gerontology

The researchers chose to exclude all the other items of information, including seminar reviews, and limit their examination of articles to the Science Citation Index (SCI-EXPANDED) and the Social Sciences Citation Index (SSCI). Bibexcel was used for preprocessing the data, determining the word co-occurrence matrix and preparing network output files. NetDraw 2.153 and UCINET 6.581 (19 & 20) were used to

determine social network analysis indicators. Centrality indicators are major network analysis indicators and include degree centrality, betweenness centrality and closeness centrality. These indicators address the node's position in the network (21). The centrality of a node in a social network indicates the number of direct connections between the node and neighboring nodes in the network (22). In other words, in a scientific cooperation network, the degree of centrality of each node indicates the scientific cooperation between that node and other nodes in the network. The betweenness of a node indicates the number of shortest paths from any other two nodes in the network to that particular node. Nodes with a high betweenness play a key role in data transfer in the network and in connecting the nodes. The third central indicator, i.e. the closeness of a node, shows the mean length of the shortest paths between any particular node and other nodes in the network. Nodes with a high closeness have a better access to other nodes in the network and as a result play a more influential role in it (23).

The World Health Organization's regional classification system known as the GBD was used to review the number of articles written on dementia and published in different countries in

relation to the country's total elderly population (age group over 60) and number of patients diagnosed with dementia residing in the country.

Research findings

A total of 14417 articles on dementia were indexed in the Web of Science and published in geriatrics and gerontology journals by the end of June 2015. The number of articles published on dementia and indexed in this database went from 14 articles in 1983 to 1130 in 2014, indicating a growth of 80.71 times. In contrast, the growth of articles published in the field of geriatrics during the same interval of time went from 760 articles in 1983 to 4766 in 2014, showing a growth of 6.27 times.

The obtained results revealed a total of 14417 articles on dementia published in 79 geriatrics journals. Table 1 shows the data on the top 20 journals in terms of their number of publications on geriatric dementia. With the publication of 12,600 articles out of the total of 14417 articles found on the subject, these 20 journals published 87.40% of all the articles on dementia. With the publication of 2090 articles, the International Journal of Geriatric Psychiatry published 14.50% of all the articles on dementia.

Table 1.*The Top 20 Geriatrics Journals Publishing on Dementia*

Journal Name	IF	NAD *	TAJ**	PADJ/NA D	PADJ** *
International Journal Of Geriatric Psychiatry	2.745	2090	3,428	14/50	60/97
Dementia And Geriatric Cognitive Disorders	1447	1700	3.267	10/04	85/12
Journal Of The American Geriatrics Society	1398	7079	4.176	9/70	19/75
Neurobiology Of Aging	4.659	1201	4,887	8/33	24/58
International Psychogeriatrics	1.934	1067	1547	7/40	68/97
American Journal Of Geriatric Psychiatry	3.535	805	1841	5/58	43/73
Aging Mental Health	1.565	646	1455	4/48	44/40
Archives Of Gerontology And Geriatrics	1.707	612	3196	4/24	19/15
Journal Of Geriatric Psychiatry And Neurology	2.210	441	637	3/06	69/23
American Journal Of Alzheimers Disease And Other Dementias	1.475	404	483	2/80	83/64
Age And Ageing	3.365	350	2841	2/43	12/32
Journals Of Gerontology Series A Biological Sciences And Medical Sciences	4.593	313	3207	2/17	9/76
Journal Of Nutrition Health Aging	2.448	258	1144	1/79	22/55
Journal Of The American Medical Directors Association	2.942	254	962	1/76	26/40
Journals Of Gerontology Series B Psychological Sciences And Social Sciences	0.900	251	1774	1/74	14/15
Zeitschrift Fur Gerontologie Und Geriatrie	0.124	218	1144	1/51	19/06
Aging Clinical And Experimental Research	3.535	198	1575	1/37	12/57
Gerontology	1.712	173	1666	1/20	10/38
Psychogeriatrics	0.598	168	251	1/17	66/93
Geriatrics Gerontology International	1.921	155	693	1/08	22/37
Journal Of Gerontological Nursing	1.150	151	589	1/05	25/64

*The percentage of articles on dementia in the Journal/The total number of articles on dementia

**Total articles of the journal

***Percentage of articles on dementia in the Journal

Table 1 presents the impact factors for the top journals publishing articles on dementia, number of dementia articles published by these journals, total number of articles published by each journal, ratio of articles on dementia to all the articles published in each journal (in percentage) and number of articles on dementia published in each journal (in percentage). The Dementia and Geriatric Cognitive Disorders Journal published the highest number of dementia articles in comparison with the other journals and dedicated more than 85.12% of its pages to articles about dementia. The American Journal of Alzheimer's Disease and Other Dementias is next in rank with a publication percentage of 83.64%.

A total of 96 countries across the world published 14417 articles on dementia, and the

United States, the United Kingdom and Italy were ranked first to third in their contribution to this number with the publication of 5288, 1963 and 958 articles, in respective order. Figure 1 shows a Google map of the geographical distribution of countries by their contribution to the publication of articles on dementia, drawn by reference to the latitude and longitude coordinates of the cities publishing the articles and using GPS Visualizer (<http://www.gpsvisualizer.com>) and Bibexcel. Figure 2 presents the data on 20 of the countries with the highest number of publications on dementia.



Image 1. Geographical distribution map of countries by their contribution to the publication of articles on dementia

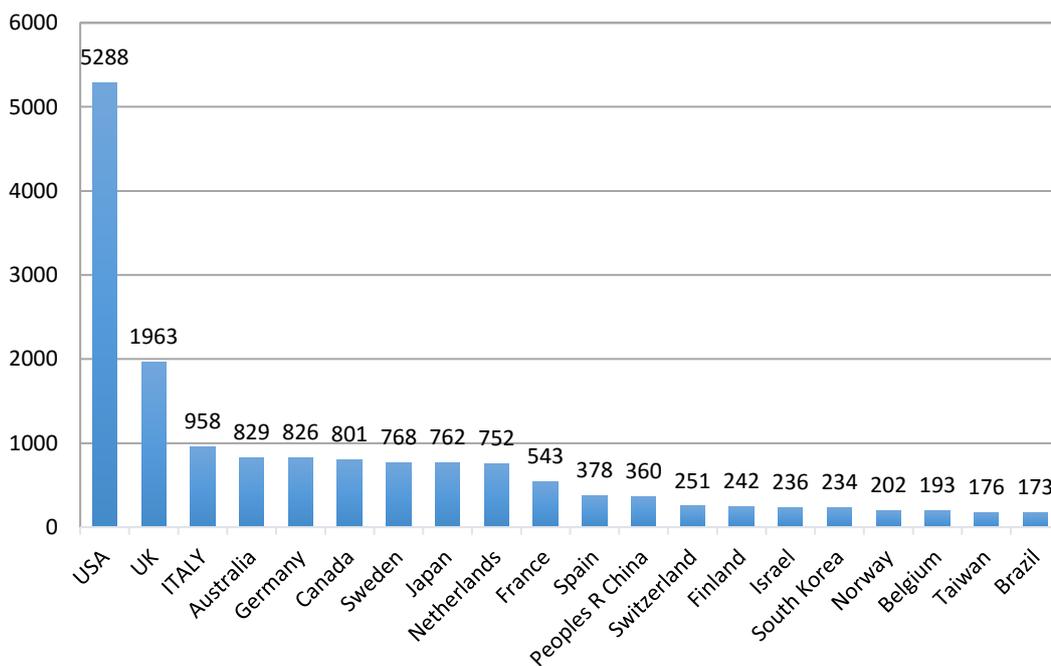


Figure 2. The top 20 countries with the highest number of articles published on dementia

Among the regions surveyed based on the World Health Organization’s regional classification system and the Global Burden of Disease (GBD), Australasia, a region comprising Australia and New Zealand, had the highest ratio of publications on dementia to the overall prevalence of dementia in the region (2.36) with the publication of 874 out of the total of 14417 articles and a population of 370 thousand

diagnosed with dementia. In other words, in this region, 2.36 articles were published on dementia per each 1,000 patients diagnosed with the condition. Next in ranking were high-income North American countries, i.e. the United States and Canada, which had a dementia publication to dementia prevalence ratio of 1.33. The lowest dementia publication to dementia prevalence ratio pertained to Central Asia; among the nine

countries of this region, i.e. Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Mongolia, Tajikistan, Turkmenistan, Uzbekistan, which had a total of 290 thousand patients diagnosed with dementia according to the WHO classification system, only Kazakhstan published one article on dementia. Table 2

presents some information on other regions of the world with regard to the number of publications on dementia, number of patients diagnosed with dementia, number of patients over 60 and dementia publication to dementia prevalence ratio.

Table 2. *The Number of Publications on Dementia, Elderly Population, Number of Patients Diagnosed With Dementia and Number of Dementia Publications per Each Thousand Patients Diagnosed With Dementia by the GBD Regions*

GBD Region	articles	Numbers of people with dementia in Thousands	Numbers of people over 60 in Thousands	Ratio articles/Dementia population
Asia/Pacific				
Australasia	874	370	5525	2/36
High-income Asia Pacific	1094	3260	49960	0/34
South Asia	78	4740	125560	0/02
Southeast Asia	58	2740	55808	0/02
East Asia	542	10460	195420	0/05
Central Asia	1	290	7030	0/00
Africa				
North Africa and Middle East	138	1470	36145	0/09
Central sub-Saharan Africa	8	130	4889	0/06
Eastern sub-Saharan Africa	6	550	15419	0/01
Southern sub-Saharan Africa	11	190	4750	0/06
Western sub-Saharan Africa	31	440	15814	0/07
Europe				
Central Europe	155	1230	25798	0/13
Eastern Europe	27	1860	40478	0/01
Western Europe	7846	7840	104170	1/00
The Americas				
High-income North America	6089	4580	71398	1/33
Caribbean	21	380	4727	0/06
Andean Latin America	9	310	4897	0/03
Central Latin America	61	1380	22210	0/04
Southern Latin America	45	710	15353	0/06
Tropical Latin America	173	1420	25584	0/12

A network of scientific collaborations between the top countries in terms of their number of publications on dementia and with at least 10 scientific collaborations was then drawn to

review scientific collaborations between the countries publishing articles on dementia using UCINET and NetDraw. In the co-authorship network of the countries, each node is taken to

Studies showed that the frequency of dementia had a direct relationship with age, and that its prevalence increased from 4.8% in the age group of 15-44 to 13.2% in the age group over 60 (33). The results of the present study showed that the elderly population in the 10 countries with the highest number of publications on dementia constituted over 20% of their total population based on the United Nations population statistics in 2012. Countries with a larger elderly population appeared to have published more research on dementia and the increase in the elderly population of these countries appeared to also increase the number of research published on this subject.

In addition, the review of data in this study showed that 93% of the articles on dementia were published in high-income countries (i.e. countries with an income exceeding \$12736) (25), and the remaining 7% of the articles were published in other countries. According to estimates and statistics, however, 38% of the patients diagnosed with dementia are living in high-income countries while 62% are living in low and middle-income countries (5). It can therefore be inferred that the rate of research and publication on geriatric dementia is not consistent with the population of patients diagnosed with dementia in low and middle-income countries and that these countries do not have a significant contribution to the publication of articles on dementia.

Studies also showed that one of the most powerful tools for providing protection and care to patients with dementia in every country is to have a national dementia program, which entails an increase in and a commitment to conducting research on this topic. When the National Dementia Plans were adopted in France, 165 million Euros were dedicated to conducting 143 research projects (26). At the present time, of the

194 WHO member states, 21 countries have adopted a national dementia program, including Australia, Belgium, Costa Rica, Cuba, Italy, Denmark, the United Kingdom, Ireland, Finland, Japan, Mexico, France, Israel, South Korea, Luxembourg, Malta, Norway, Switzerland, Taiwan, the United States and the Netherlands, and 9 countries are currently making plans for adopting a national dementia program, including Argentina, Indonesia, Canada, Austria, Chile, Peru, Greece, Portugal and Slovenia (27). The data obtained from this study showed that 75.07% of the articles on geriatric dementia were published by the 21 countries with a national dementia program and that the 9 countries currently planning for adopting a national dementia contributed to 6.25% of the publications. A total of 81.32% of the articles on geriatric dementia were thus published by the 30 countries that had a national perspective on dementia.

Conclusion

Due to the global demographic changes and growing elderly population of the world as well as the increase in the number of patients diagnosed with dementia and enormous economic, medical and social burden imposed by dementia on countries and societies, it appears necessary for countries to adopt national and international programs for collaboration in geriatrics research. Although the results of this study revealed a variety of scientific collaborations between different countries in the field of dementia, these publications and collaborations were concentrated in high-income countries; thus, low and middle-income countries that host the majority of patients diagnosed with dementia need to make efforts to increase their publications and cooperation in this field.

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