Research on Geriatric Health Care in BRICS Countries: A Scientometric Investigation of Open Access Journal Articles Indexed in Scopus Database

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Abstract

Aim: This study aimed to visualize the current research state and collaborative networks in geriatric health care in BRICS nations and to analyze the gaps of research and trends.

Materials and Methods: In this descriptive study, bibliometric data is collected from Scopus database with relevant search terms limiting the search to BRICS nations. Data collected in CSV format and analysis is performed using MS-Excel. Network analysis and visualization is done using VOS viewer.

Results: From the publications published between 1998 to September 2021, China leads in the number of publications (51.72% share) and maximum publications are in the year 2020. Chinese institution Huazhong University of Science and Technology has the maximum publications in name. Li J is the most productive author. China, Female, Male are some prominent keywords.

Conclusion: Despite the recent increase in geriatric research globally, the research output and quality of publications were low and did not address commonly seen geriatrics health conditions such as dementia, delirium and poly pharmacy. More high-quality research directed to address common geriatrics conditions is needed to better inform decision making.

Keywords: Scientometric analysis; Bibliometrics; Geriatric health care; Old-age care; BRICS

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Introduction

Due to dramatic growth of the aging population worldwide, there has been an urgent call for a public health strategy to manage healthy aging, with the ultimate goal being advancement of aging research. Considerable progress has been made in uncovering the mystery of aging process using multidisciplinary methods. There is a growing consensus in the field that aging traits which were originally thought to be disparate are likely to be interconnected [1]. Global ageing is becoming severe, and an increasing number of older adults choose to stay in their homes as they age; internationally, the demand for health care in home or community settings has increased [2]. However, safety in home for elderly people is a challenge. Although there is no clear definition of home care safety, safety related to home care generally includes two main aspects: Personal and home health care. Elderly people are at a higher risk of safety-related events than younger people due to the natural process of ageing and their health status due to multiple chronic diseases. Unique family situations, regarding the physical environment, caregiver knowledge, application of medical devices and availability of care resources, make home care safety in older adults complicated. Research on the safety of home care for elderly people has gradually increased over the past decade.

Scientometric analysis is involved in analysis of scientific productivity of measuring and analyzing scientific fields. The quantitative assessment of publication productivity by scientometric parameters is a very reliable technique to understand the impact of any research in a community. This study explores the global publications related to Geriatric Health Care by using scientific research through quantitative metrics of Scientometrics and Bibliometrics. Due to enormous research on Geriatric health it's a need of an hour to investigate these with data from some efficient databases like Scopus, Web of Science, PubMed etc. For this investigation Scopus was used as a source of data due to its wide coverage.

Large increase in subscription rates for conventional subscription-based journals and traditional publishing issues led to the formation of movement for Open Access (OA) scholarly communication.

In present scenario, OA to scholarly publications is widely accepted as a fruitful concept and has been adopted in many academic and research context [3]. OA allows free downloading, copy, distribute without copyright restrictions which is evolving as an alternative to conventional publishing models [4]. Brazil, Russia, India, China and South Africa are five countries included in BRICS abbreviation and these are very emerging economies of the world so studying the research output on Geriatric health care is of utmost importance. Moreover, no such study has been conducted so far. Hence, this study is an attempt to bridge this research gap.

Review of related literature

Many bibliometric investigations are encountered related to geriatric health or older adult health or ageing care or healthy ageing and other related topics. Some of the related literatures are reviewed and the research gap is formulated accordingly to proceed further in this study. Alamri [5] investigated Geriatric research in Saudi Arabia using bibliometric parameters with data sourced from PubMed. From the publications analyzed between the years 1980 to June 2018, 91% of the articles were published between the years 2000-2018, indicating the major contribution from Saudi Arabia in the field of geriatric research has been in the recent 20 years. In total, 34 publications were retrieved, of which, 85% were cross-sectional studies, with 66% of the studies carried out in hospitals or primary health care centers. The sub-topics with maximum number of publications included mental health, musculoskeletal health, and socio-gerontology. The most cited publications were related to the topics of depression, psychosocial health and osteoporosis. The study was completely related to performance measurement with manual practices but did not use any science mapping technique. Another interesting study was observed global publications related to safety in home care for older adults applying bibliometric indicators, carried out by Cao et al. This study extensively investigated the publications from Web of Science during 2009 to June 2020. The study used Histcite, VOS viewer, Bibliometrix online analysis and Cites pace for network analysis and visualization. The study reveals that number of articles increased over the years. Articles were identified from 79 countries, 3,630 institutions, 647 journals and 11,691 authors, and complex cooperative relations among them and five research topics were identified. A very recent study conducted by Zhao et al. [6] on publications related to pain in elderly from 2000 to 2019. The data for this study was sourced from Scopus database with related search terms. The analysis was performed using MS Excel, Cite Space and SPSS. The study reveals that total of 2,105 articles were included in this study. Statistical analysis revealed that the publication of articles on pain in the elderly increased in frequency over time (P<0.001). Most of the publications were original articles. Amongst the countries identified, the United States published the largest number of papers on this topic. Pain characteristics (50.21%), pain intervention (35.68%), and pain assessment (9.69%) were the main topics of research on geriatric pain. Back pain (12.30%) appeared to be the most popular pain type described in the included papers. This work provides researchers with an in-depth understanding of pain in the elderly by evaluating relevant publications in the past two decades.

Although these studies summarized some important bibliographic information on research publications on geriatric health, it is observed that there is no attempt has been made to investigate the publications from BRICS nations with data from Scopus database in a systematic manner using bibliometric analysis software packages. Moreover, no study has tried to quantify the citations, h-index, and number of publications, prolific authors, and institutions. So, this study is a simple attempt to fulfill this research gap.

Objectives

The study aims to give an overview of bibliometric information on the publications related to geriatric health care in general and in particular the study tries to find:

1.   Year-wise and country-wise distribution of publications related to geriatric health care.

2.   The most prolific author, institution and journals on the basis of number of publications, citations, h-index in research on geriatric health care.

3.   Map and perform cluster analysis of co-authorship of authors.

4.   Most prominent keywords and cluster analysis of them.

Methodology

The study is based on the publication output as based on Scopus database, largest database with citation data of peer-reviewed literature from various disciplines and it is a product of Elsevier. The following search string is used to search for documents in Scopus database: (ALL ("Geriatric Health") OR ("Old age health") OR ("Ageing and Health") OR (Geriatric Health Care" AND (LIMIT-TO (OA "all")) AND (LIMIT-TO (DOCTYPE, "ar")) AND (LIMIT-TO (AFFILCOUNTRY, "China") OR ((LIMIT-TO (AFFILCOUNTRY "India") OR (LIMIT-TO(AFFILCOUNTRY "Russian Federation") OR (LIMIT-TO(AFFILCOUNTRY "Brazil") OR (LIMIT-TO(AFFILCOUNTRY "South Africa")))). The data is exported in CSV format and further scrutinized and MS-Excel is used for tabulation, statistical analysis and graph visualization. MS-Excel is used for analysis of data and VOS Viewer is used for network visualization and mapping results [7].

Results

Country-wise and year-wise distribution of data

There are a total of 557 records available in Scopus database as on September 19th, 2021 with this search string and the data was indexed with publications since 1998. The data obtained is tabulated and the percentage is calculated on cumulative publications. Table 1 lists the number of publications country wise. Table 2 highlights the main information of the data retrieved.

Of the total publications, year 2020 has the highest number of publications (25.31% share in cumulative publications) followed by 2021 (20.29% share). The quinquennial 2016-2020 has the highest number of publications (350 publications; 62.84% share). The no. of publications is lowest in the years 1998, 2000, 2004 and 2006. There also nil publications in 1999, 2001, 2002, 2003, 2005 and 2007. The number of publications began to increase from 2014 (Table 3).

Table 1: Geographical distribution of publications.

Country	Number of Publications	% of 557
China	288	51.72
Russia	102	18.31
India	87	15.62
Brazil	52	9.32
South Africa	28	5.03

Table 2: Main information about the publications.

Description	Results
MAIN INFORMATION ABOUT DATA	
Time span	1998:2021
Sources (Journals, Books, etc)	160
Documents	557
Average years from publication	2.8
Average citations per documents	12.46
Average citations per year per doc	2.347
References	26994
DOCUMENT TYPES	
Article	557
DOCUMENT CONTENTS	
Keywords Plus (ID)	2516
Author's Keywords (DE)	1241
AUTHORS	
Authors	1683
Author Appearances	3635
Authors of single-authored documents	3
Authors of multi-authored documents	1680
AUTHORS COLLABORATION	
Single-authored documents	4
Documents per Author	0.331
Authors per Document	3.02
Co-Authors per Documents	6.53
Collaboration Index	3.04

Table 3: Chronological distribution of publications.

Year	No. of Publications	Year	No. of Publications
1998	1	2013	9
2000	1	2014	24
2004	1	2015	32
2006	1	2016	34
2008	2	2017	40
2009	4	2018	53
2010	3	2019	82
2011	8	2020	141
2012	8	2021	113

Prolific author

Of the total authors, Li J with 28 publications is the most productive author while Zhao Y with 19 publications and 508 citations is the most impactful author in terms of citations. The top 15 most prolific authors are listed on the basis of number of publications in Table 4. These authors contribute 331 papers in total which amounts to 59.43% share in the cumulative publications. The total citations received by these authors are 3,475 with Citation per Paper (CPP) of 10.5.

Most productive affiliation

The maximum numbers of publications are affiliated to Huazhong University of Science and Technology, China with 60 publications

Table 4: Top 15 most prolific authors in geriatric health care.

Author	NP	TC	h-index	g-index
Li J	28	394	10	19
Li Y	25	199	8	13
Yang Y	24	222	8	14
Zhang L	24	258	8	17
Wang Y	24	307	7	16
Wang J	23	260	8	16
Wang Z	22	129	6	10
Liu Y	21	157	7	12
Wang H	21	129	6	16
Zhang J	21	199	7	14
Zhang X	21	147	7	14
Li L	20	213	7	14
Zhang Y	20	90	5	9
Zhao Y	19	508	7	19
Li X	18	128	8	11

Table 5: Top 15 most productive organization in BRICS nations on geriatric health care.

Sl. No.	Affiliation	Number of Articles
1	HUAZHONG UNIVERSITY OF SCIENCE AND TECHNOLOGY	60
2	SHANDONG UNIVERSITY	52
3	PEKING UNIVERSITY	49
4	FUDAN UNIVERSITY	40
5	SICHUAN UNIVERSITY	38
6	WUHAN UNIVERSITY	31
7	ANHUI MEDICAL UNIVERSITY	25
8	SOUTHERN MEDICAL UNIVERSITY	20
9	XI'AN JIAOTONG UNIVERSITY	18
10	ZHEJIANG UNIVERSITY SCHOOL OF MEDICINE	15
11	ZHEJIANG UNIVERSITY	14
12	CAPITAL MEDICAL UNIVERSITY	12
13	HARBIN MEDICAL UNIVERSITY	12
14	CENTRAL SOUTH UNIVERSITY	10
15	DUKE UNIVERSITY	10

which take 10.77% share in cumulative publications. In the list of top 15 affiliations, an affiliation with minimum 10 publications are listed, and these organizations have 406 publications in total (72.89% share in total publications) (Table 5).

Most prolific journals

International Journal of Environmental Research and Public Health is the most productive journal in geriatric health care with 95 publications in total amounting to 17.06% share in cumulative publications (557) and 527 citations with CPP as 5.55. These top 10 journals have 302 publications in total (54.23% share) with CPP as 9.91. PLoS One is the most cited journal with CPP as 23.63. It also has the highest h-index and g-index (17, 28) (Table 6).

Co-authorship of authors

Figure 1 depicts the co-authorship of authors map created using

Table 6: Top 10 most prolific journals in research on geriatric health Care in BRICS countries.

Name	h-index	g-index	NP	TC
INTERNATIONAL JOURNAL OF ENVIRONMENTAL RESEARCH AND PUBLIC HEALTH	13	19	95	527
BMC GERIATRICS	12	19	55	406
PLOS ONE	17	28	35	827
BMC PUBLIC HEALTH	10	22	32	522
BMJ OPEN	6	7	29	117
BMC HEALTH SERVICES RESEARCH	5	13	14	193
SCIENTIFIC REPORTS	6	11	12	138
INTERNATIONAL JOURNAL FOR EQUITY IN HEALTH	8	11	11	169
FRONTIERS IN PUBLIC HEALTH	3	6	10	40
CLINICAL INTERVENTIONS IN AGING	3	7	9	53

Table 7: Top 20 most frequently occurring keywords.

Keywords	Frequency	Keywords	Frequency
China	1175	Very elderly	212
Female	849	Aged 80 and over	210
Male	833	Rural population	209
Aged	797	Health status	204
Middle aged	530	Cross-sectional study	203
Human	524	Controlled study	183
Humans	472	Prevalence	176
Adult	386	Cross-sectional studies	167
Article	365	Aging	157
Major clinical study	217	Depression	155

the visualization software VOS viewer. Each circle represents an author and the size of the circle is proportional to the number of documents in the name of the author represented by the circle. The authors in connected are divided into 7 clusters based on minimum number of 7 documents in common and taking 80 authors in total. Cluster 1 (Red) has 16 authors in total. Some of the prominent are Gu D; Zhao Y; Liu H; Wang J. Cluster 2 (green) has 15 authors, like Liu Y; Hu Y; Liu X; Chen H. Cluster 3 (blue) has 13 authors in all. Some of them are Chen G; Zhang I; Li X; Zeng Y. Cluster 4 (brown) has 12 authors in total, some are Feng Z; Li Y; Wang R; Wang Z. Cluster 5 (violet) has 10 authors in all. Some prolific among them are: Li J; Wang Y; Zhou C; Wang Q. Cluster 6 (shallow blue) has 9 authors in total like Guo Y; Yang I; Li I; Chen Y. At last, the cluster 7 (orange) has 5 authors in total: Guerra M; Huang Y; Liu Z; Sosa AI and Wang K. The authors in common cluster indicate close co-operation among them.

In bibliometric analysis, analysis of frequently appearing keywords can reveal the hotspot categories and development of a research topic [8]. Figure 2 created using VOS viewer represents the keywords that co-occur in at least 5 publications and a total of 125 keywords

are found to meet the threshold. These keywords are divided into 5 clusters represented in separate colors. Cluster 1 (Red) has the highest number of items. Like adult, China, cross-sectional study, human, psychology, etc. [9]. Cluster 2 (green) has 36 numbers of keywords; some are risk factor, educational study, prevalence, mortality, age. Cluster 3 (blue) has 31 keywords in total. Some are social status, rural population, economics, statistics and numerical data, health care cost, etc. Cluster 4 (brown) has 11 keywords in all. Some are depression, adolescent, child, health surveys, longitudinal studies, etc. Cluster 5 (violet) daily life activity, epidemiology, disabled person, disability, activities of daily life. Table 7 gives a list of most frequently occurring keywords along with their frequencies.

Major findings of the study

•   Total number of 557 publications are retrieved using the search query mentioned in the methodology and highest number of publications are in the year 2020 (141; 25.31 % share in total).

•   Li J is the most productive author in terms of number publications (28) with h-index 10, while Zhao Y is the highly impactful author with 508 citations and 19 publications with CPP of 26.74.

•   International Journal of Environmental Research and Public Health is the most productive journal in geriatric health care
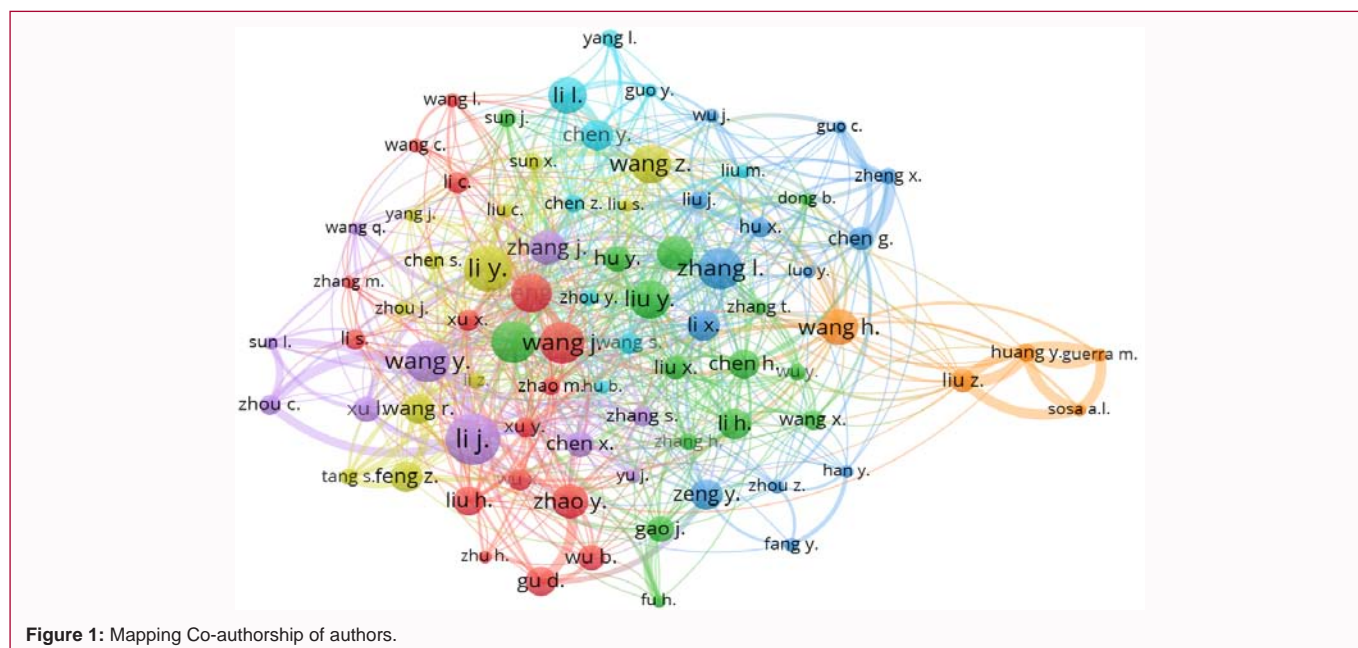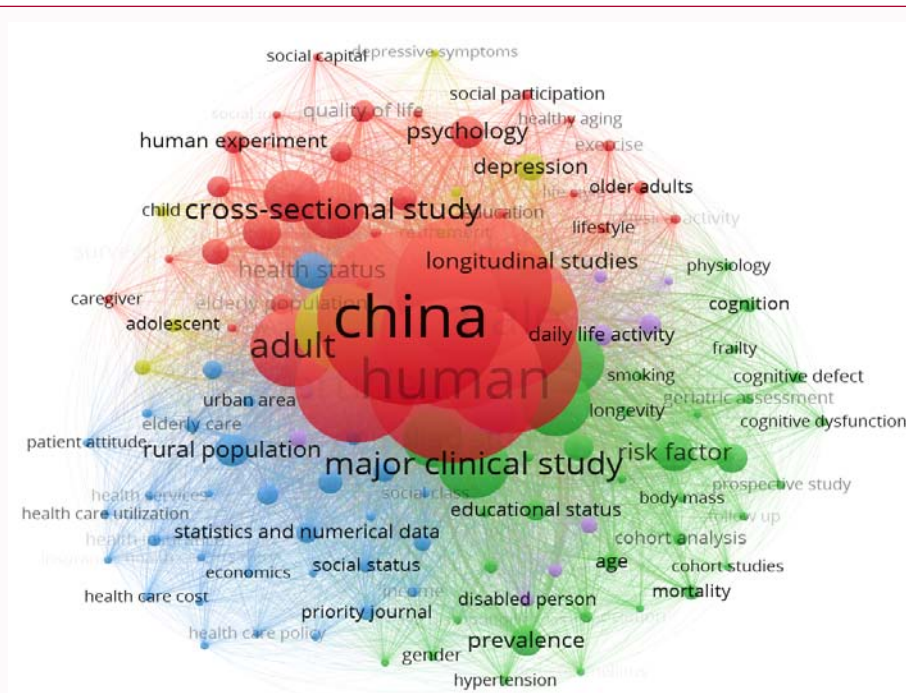

Figure 1: Mapping Co-authorship of authors.

Figure 2: Network visualization of keyword co-occurrence.

with 95 publications in total amounting to 17.06% share in cumulative publications (557) and 527 citations with Citations per Paper (CPP) as 5.55.

• Huazhong University of Science and Technology, China with 60 publications which takes 10.77% share in cumulative publications is the most productive affiliation.

• Co-authorship analysis refers to quantifying the relationship among them using the number of co-authored documents. This was used to evaluate the co-operation between different authors from different affiliations. Analysis of co-authorship of authors divided the connected authors into 7 clusters with common publications among them (Figure 1).

• Keyword analysis classifies the mostly occurring keywords into 5 clusters with keywords in matching themes in a common cluster (Figure 2).

Conclusion

Research on geriatric health care in BRICS nations is on a developing stage in comparison to world publications. With China taking the major percentage share in cumulative publications implies that other nations are far behind to complete China. Governments of nations like India, South Africa which should fund more research projects on this area. Moreover, analysis of keywords also implies that research on geriatric health care as emerged as a transdisciplinary social science research field with the emergence of keywords like disability studies, epidemiology etc.

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