A Bibliometric Analysis of Publications on COVID-19 and Older Adults

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Background: Bibliometric analysis is important for guiding future research priorities. We evaluated the most relevant scientific research on coronavirus disease 2019 (COVID-19) and older adults, analyzed current hot topics, and identified the 50 most cited publications. **Methods:** Articles published between December 1, 2019 and March 17, 2021 were identified using the search terms "COVID-19" or "Novel Coronavirus" or "SARS-CoV-2" or "2019-nCoV" and "geriatrics" or "older adults" or "elderly" appearing in the title, abstract, keywords, or keywords plus. Original research articles, reviews, editorial materials, and letters were included. Information on articles year, journal, title, author, country, affiliation, keywords, document type, and counts of citations was collected. VOSviewer was used to analyze keywords. **Results:** A total of 784 publications were included. The most common keywords were "COVID-19" and "older adults," which were strongly related to "social isolation," "dementia," "mortality," and "loneliness." The most active (40.8%) and most cited (1,578) country was the United States. *The Journal of the American Geriatric Society* had the largest number of publications (22.7%) and citations (947). The most researched (84.0%) and most cited areas were geriatrics-gerontology (2,882). The median number of citations for the most cited 50 articles was 46.8. **Conclusion:** The results of the bibliometric analysis provided information about the quality and research areas of published studies on COVID-19 and older adults. Social and psychological support, nutrition, vaccines, and telemedicine may be hot research topics for the future.

Key Words: Bibliometrics, COVID-19, Geriatrics, Older adults, Web of Science

INTRODUCTION

The pneumonia outbreak that started in Wuhan, China in December 2019 and became a global pandemic was named coronavirus disease 2019 (COVID-19) and was caused by the newly identified severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).[1] As of March 5, 2021, over 110 million cases and over 2.5 million deaths have been reported worldwide.[2]

Many diseases cause greater morbidity and mortality in patients aged 65 years and older owing to the frailty, comorbidities, and age-related physiological changes in this population.[3] Older adults are at serious risk for COVID-19 and also have higher mortality rates owing to the disease.[4-6] Furthermore, older adults have experienced social and psychological effects, apart from the disease, during the pandemic.[7,8]

Bibliometry is a statistical method that determines which topics are trending by quantitatively analyzing articles in a particular field.[9] The results of bibliometric analyses may guide future studies by determining the quality and main research areas of existing publications in specific fields. Bibliometric analysis also enables researchers to easily obtain information about subjects of interest from among numerous and increasing number of published articles. The Web of Science (WoS) is an online database comprising almost all relevant research articles and various bibliometric analysis tools. Bibliometric analysis studies have been reported on various fields of medicine.[10,11]

The pandemic has not yet been controlled, and older adults are the most affected population. Therefore, bibliometric analysis of

COVID-19 and older adults is important to identify related subjects that require further research by determining which areas have been researched thus far and which have been most cited. However, to date, there has been no bibliometric analysis of COVID-19 in older adults. Thus, to guide future research priorities, the present study evaluated the most relevant scientific research on COVID-19 and older adults, analyzed current hot topics, and identified the 50 most cited publications.

MATERIALS AND METHODS

The data used in this bibliometric citation analysis were obtained from the Thomson Reuters WoS Core Collection database (Philadelphia, PA, USA). As the WoS database provides bibliometric analysis, it has been used in most previous bibliometric analysis studies. Therefore, we also used this database. We scanned the global literature on geriatric COVID-19 published between December 1, 2019 and March 17, 2021 for articles containing the terms "COVID-19" or "Novel Coronavirus" or "SARS-CoV-2" or "2019-nCoV" and "geriatrics" or "older adults" or "elderly" in the title, abstract, keywords, or keywords plus (additional relevant but overlooked keywords not listed by an article's author or publisher but identified by Thomson Reuters). The corresponding author then reviewed the titles of all articles. We also read the abstracts of articles whose titles were not clear and excluded articles not related to either COVID-19 or older adults. Missing article information was obtained by linking to other search platforms such as PubMed. The examination of the titles, abstracts, keywords, or keywords plus of studies on older adults and geriatrics showed that some studies included patients aged 60 years, while others included patients aged 65 years. We included studies that performed subgroup analyses of older adults. The keywords were the most common terms in all research fields and were selected using a combination of the research results from multiple search queries in the WoS Core Collection. We recorded article information such as the year of publication, journal, title, author, country, affiliation, keywords, document type, and citation counts, all of which were exported to CSV format. We defined authorship as primary and co-authorship. We also recorded authors' countries and affiliations for each article. If more than one author of an article had the same country or affiliation, only one author was recorded. The number of citations was determined using WoS database analyses to identify the top 50 cited articles. From these results, we also recorded the journals in which the top 50 articles were published, article type, country of the corresponding author, publication date, and number of citations. VOSviewer (version 1.6.16, https://www.vosviewer.com) is a software tool for constructing and visualizing bibliometric networks that we used to analyze keyword frequency to clarify the research trends on COVID-19 in older adults.

Statistical Analysis

We applied descriptive statistical methods using IBM SPSS Statistics for Windows, version 20.0 (IBM Corp., Armonk, NY, USA). All data are reported as numbers, percentages, and bar charts in the tables and figures.

RESULTS

We identified a total of 2,728 articles. After excluding articles that were not relevant to "COVID-19 and older adults," we analyzed 784 publications on COVID-19 and older adults indexed in the WoS database between December 1, 2019 and March 17, 2021, which included 350 (49.0%) original research articles, 58 (8.1%) review articles, 123 (17.3%) editorial materials, and 182 (25.5%) letters (Fig. 1). Among them, 63 (7.6%) papers were published in 2021 (through March 17), and the other 650 articles were published in 2020. No papers on COVID-19 and older adults were published in 2019. Almost all the publications (710, 99.6%) were written in English (two German and one French).

More than 1,200 institutions in 70 countries or regions have reported the results of COVID-19 research in older adults. The leading countries in the literature analyzed were the United States (291 reports, 40.8%), China (84 reports, 11.8%), Canada (62 reports, 8.7%), England (59 reports, 8.3%), and Italy (58 reports, 8.1%). The most cited countries were the United States (1,578), China (815), England (433), Canada (432), and Italy (340) (Table 1). The most active organizations were Harvard University (35,
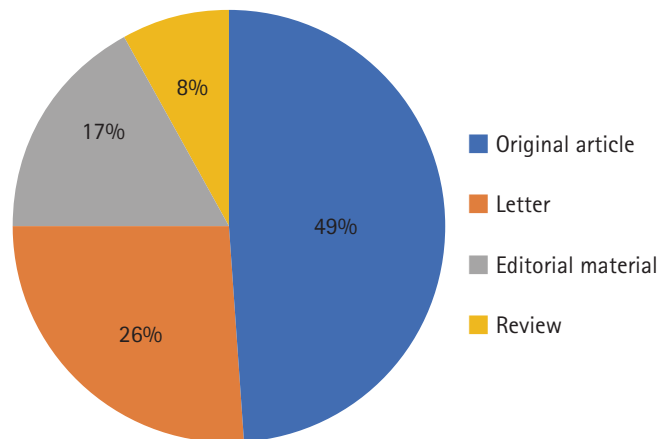

Fig. 1. Document types of publications on coronavirus disease 2019 (COVID-19) and older adults.

4.9%), US Veterans Health Administration (34, 4.8%), and University of California System (26, 4.6%), while the most cited organizations were Harvard University (245), University of London (237), and University of California (202) (Table 1).

The Journal of the American Geriatric Society had the highest number of publications (178, 22.7%), followed by the *Journal of Gerontological Social Work* (61, 7.8%) and *The American Journal of Geriatric Psychiatry* (57, 7.3%). The most cited journals were *The Journal of the American Geriatric Society* (947), *American Journal of Geriatric Psychiatry* (283), and *Journal of Nutrition, Health and Aging* (271) (Table 2).

The most highly researched areas were geriatrics-gerontology (599, 84.0%), psychiatry (143, 20.0%), and social work (58, 8.1%). The most cited research areas were geriatrics-gerontology (2,882), psychiatry (670), and nutrition dietetics (395) (Fig. 2). The most cited author was Joseph G. Ouslander from Florida Atlantic University/Charles E. Schmidt College of Medicine, with 10 articles and 159 citations (Table 2).

Keywords that were provided by the authors and that occurred more than five times in the WoS core database were enrolled in the final analysis. Among the 1,028 keywords, 49 met this threshold. The most common keywords were "COVID-19" (total link

strength 231) and "older adults" (total link strength 102), which were strongly linked to "social isolation," "dementia," "mortality," and "loneliness" (Fig. 3).

In addition to the analysis of 784 publications on COVID-19 and older adults, the top 50 most cited publications are listed in Supplementary Table S1. These 50 articles had a median of 46.8 citations (range, 18–312 citations).

DISCUSSION

This is the first bibliometric study to summarize the most relevant evidence on COVID-19 in older adults. Evidence is quickly accumulating because this is a vulnerable population with worse outcomes. The COVID-19 pandemic has affected the entire world in a short time. While vaccination is becoming widespread, some countries still cannot obtain the vaccine.[12] Although the efficiency of existing vaccines is expected to be high, confirmatory data are lacking.[13] Moreover, as shown in this bibliometric analysis, few studies have focused on vaccination in older adults. It is unclear whether these findings will remain consistent by the time the pandemic ends. Thus, it is essential to support older adults and protect them from both COVID-19 and pandemic-related social and psy-

Table 1. The most active countries and organizations associated to publications on COVID-19 and older adults

	Number of publications	Number of citations
Top 10 countries		
USA	291 (40.8)	1,578
China	84 (11.8)	815
Canada	62 (8.7)	432
England	59 (8.3)	433
Italy	58 (8.1)	340
France	38 (5.3)	173
Spain	37 (5.1)	86
Japan	27 (3.8)	98
Australia	19 (2.7)	137
Netherlands	17 (2.4)	93
Top 10 organizations		
Harvard University	35 (4.9)	245
US Veterans Health Administration	34 (4.8)	103
University of California System	26 (4.6)	202
University of London	26 (4.6)	237
Geriatric Research Education Clinical Center	24 (3.4)	102
Institut National de la Sante et de la Recherche Medicale	22 (3.1)	49
University of Toronto	20 (2.8)	196
Pennsylvania Commonwealth System of Higher Education	14 (2.0)	145
State University System of Florida	14 (2.0)	174
University of Michigan	14 (2.0)	133

Values are presented as number (%).
COVID-19, coronavirus disease 2019.

Table 2. The most active journals and authors of publications on COVID-19 and older adults

	Number of publications	Count of citations
Top 10 journals		
Journal of the American Geriatrics Society	178 (22.7)	947
Journal of Gerontological Social Work	61 (7.8)	87
American Journal of Geriatric Psychiatry	57 (7.3)	283
International Psychogeriatrics	48 (6.1)	161
Aging-US	43 (5.5)	174
Journal of Nutrition Health Aging	43 (5.5)	271
Age and Ageing	36 (4.6)	210
Frontiers in Psychiatry	35 (4.5)	26
Journal of Aging Social Policy	33 (4.2)	191
Geriatrics Gerontology International	31 (4.0)	65
Top 10 authors		
Ouslander, Joseph G.	10 (4 first author)	159
Annweiler, Cedric	7 (1 first author)	30
Arai, Hidenori	7 (0 first author)	48
Cesari, Matteo	7 (1 first author)	40
Rolland, Yves	6 (2 first author)	16
Lapid, Maria I.	5 (2 first author)	13
Morley, John E.	5 (3 first author)	99
Reynolds, Charles F.	5 (3 first author)	36
Rosen, Tony	5 (3 first author)	33
Sacco, Guillaume	5 (2 first author)	15

Values are presented as number (%).
COVID-19, coronavirus disease 2019.

chological problems. Knowledge of existing publications on older patients and COVID-19 may help researchers better understand issues that require further research.

The results of the current study showed that the United States had the highest number of publications on COVID-19 and older adults. This finding could be related to several factors such as its large population, its status as one of the countries most affected by the pandemic, its significant resources for medical research, and its well-developed and reliable data management systems. *The Journal of the American Geriatric Society*, one of the journals with a high impact factor, had the highest number of publications and citations on COVID-19 and older adults.

Most publications were in the fields of geriatrics-gerontology and psychiatry. Although there have been few studies on nutrition, it was the third most cited topic after geriatrics-gerontology and psychiatry. This result suggests that this topic is of interest, and further research is needed.

Among the top 50 cited publications of COVID-19 in older adults, the most cited articles were reviews. Seven articles were based on long-term care. Among these publications, Italy was the non-English-speaking and European country with the highest number of articles.

The results of the current study showed that "COVID-19" and "older adults," the two most prevalent keywords, were strongly linked to "social isolation," "dementia," "mortality," and "loneliness." These keywords were strongly linked likely because the disease mortality was the highest in older adults whose mental health is affected by restrictions and social isolation.

The most cited article was "Clinical features of COVID-19 in elderly patients: a comparison with young and middle-aged patients" published in *The Journal of Infection*. This article focused on factors associated with COVID-19 severity and mortality in older adults, such as the presence of malignancy, and also demonstrated higher COVID-19 mortality and severity in older adults compared to younger people.[14] Moreover, the 784 publications included in the present study mostly investigated factors affecting mortality in older adults and suggested the need for future research based on these factors (such as the presence of malignancy, symptoms of dyspnea, high neutrophil-to-lymphocyte ratio, C reactive protein level, lymphopenia, and basic biological mechanisms of aging).[15-18] The hotspots of future research on this subject may be prospective studies on reducing COVID-19 mortality in older adults.

The second most cited article, "Mental health services for older adults in China during the COVID-19 outbreak," published in *The*
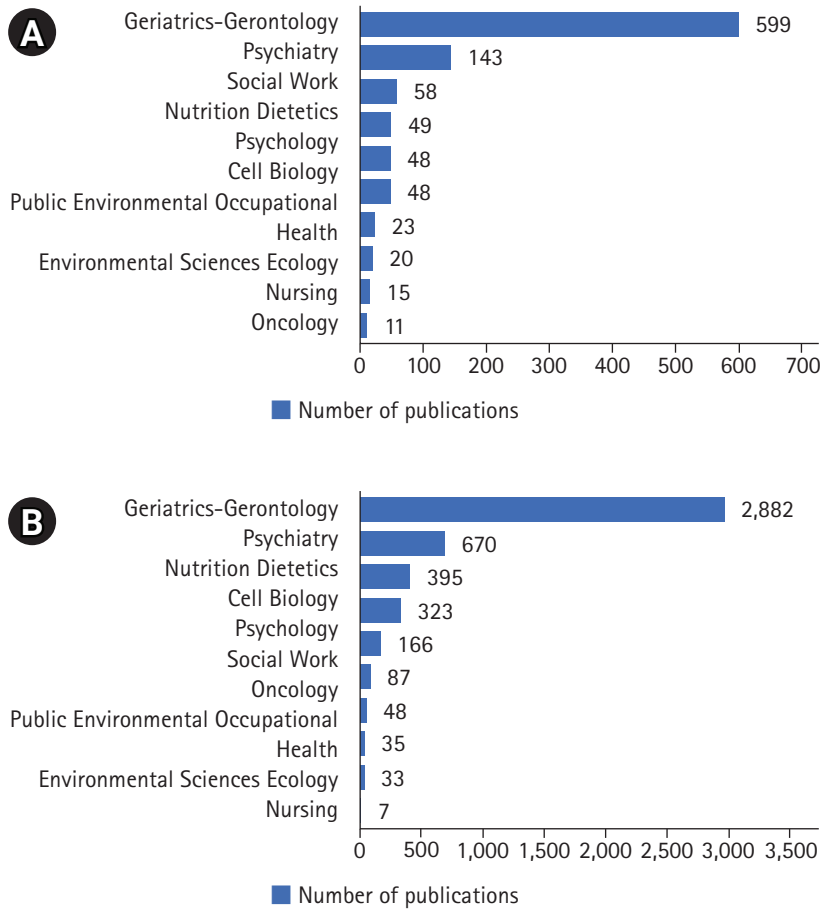
Fig. 2. Most active research areas related to coronavirus disease 2019 (COVID-19) and older adults. (A) Top 10 research areas with the highest numbers of publications on COVID-19 and older adults. (B) Top 10 research areas with the highest numbers of citations among publications on COVID-19 and older adults.

Lancet Psychiatry, emphasized the effects of the pandemic on mental health in older adults with increased depression. Along with increased depression, the study also reported decreased cognitive functions and consequently daily functionality. Therefore, there is a need for psychological services for older adults.[19] Retrospective studies reported increased suicide rates among older adults during the past SARS outbreak.[20] This situation highlights the importance of examining the impact of COVID-19 on mental health in older adults and finding solutions to prevent the pandemic from adversely affecting their mental health. Based on this identified need, *The American Journal of Geriatric Psychiatry* proposed to act as a forum for research on COVID-19 and mental health in older adults.[21] One study, which was among the 50 most cited articles, reported risk factors that may increase suicide and proposed solutions for prevention in older adults during COVID-19.[22] Future studies may include the implementation and results of these proposed solutions to protect mental health in older adults.

Dementia was strongly linked to the most prevalent keywords. A study examining the effect of the COVID-19 pandemic on Alzheimer's dementia (AD) reported that COVID-19 increases mortality and morbidity in patients with AD and may have affected AD

diagnosis and clinical management,[23] emphasizing that the clinical presentation of COVID-19 may be atypical in dementia patients and demonstrating that identifying symptoms in these patients may be challenging owing to cognitive dysfunction, resulting in potential delays in diagnosis and hospitalization.[24] Thus, many studies have been conducted on dementia and COVID-19, and there is a need for additional studies that provide recommendations and practices to allow close follow-up of patients with dementia.

Loneliness has become an increasing problem for older adults in recent years. Several group interventions have been described to help alleviate loneliness in older adults. Among these, "*Circle of Friends*" is an evidence-based intervention that has proven to be effective and sustainable for the socialization of older adults and has been adapted to telehealth during the pandemic.[25] Additional studies are needed to develop telehealth and online group interventions to help lonely and isolated older adults to connect. Among the 50 most cited articles, some included loneliness in older adults owing to social isolation and the importance of supporting older adults on these issues. Among these, some studies also proposed solutions, including staying connected with relatives; ex-

Fig. 3. Bibliometric analysis of the keywords in publications on coronavirus disease 2019 (COVID-19) and older adults.

ercising; practicing telehealth; and using digital resources, online tools, and social media.[26,27] The current data highlight the need to develop projects focusing on psychological services to support older adults during the pandemic. Furthermore, as technology advances, the importance of telemedicine has increased, which has been made obvious in the medical literature. It is essential to provide this service to older adults who cannot visit the hospital owing to the pandemic. As long as the pandemic continues, the need for research on telemedicine is likely to increase. Therefore, this may be an important future research topic.

The current study had strengths and limitations. The strengths of the study are that it provided quick access to the core of evidence around a topic and identified articles focused on older adults. One of the limitations was that it searched only one database (WoS Core Collection database); thus, it did not collect all available evidence. In addition, we did not analyze co-authorship and the relationships between publications and research groups. With changes in results over time and additional publications, future analyses could re-evaluate these findings at the end of the pandemic.

In conclusion, the results of the present bibliometric analysis revealed that most research has evaluated mortality, social isolation, dementia, and loneliness in COVID-19 and older adults. Most studies have been conducted to reveal these problems. Future hot research topics may include social and psychological support, vaccination, nutrition, and telemedicine, all of which could be the means to address the problems identified.

SUPPLEMENTARY MATERIALS

Supplementary materials can be found via https://doi.org/10.4235/agmr.21.0060.

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