Analysis of international scientific production on COVID-19 in older adults

Análise da produção científica internacional sobre a COVID-19 em pessoas idosas

Análisis de la producción científica internacional sobre COVID-19 en personas mayores

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Abstract

Objective: To analyze the international scientific production on COVID-19 in older adults. **Methods:** Bibliometric research was carried out in the ISI Web of Knowledge/Web of Science (WOS) database by exporting these data using the bibliometric analysis software HistCiteTM and VOSviewer software. **Results:** 218 publication records were identified, with the journal with the largest number of publications being BMC Geriatrics, with 52 publications indexed in the Web of Science. More than 722 institutions in 48 countries or regions reported the results of research on COVID-19 in older adults. The main countries in the literature analyzed were Türkiye (32 records), the United States (31 records), Japan (25 records), England (23 records), Italy (20 records), and China, the country where the first case of COVID-19 emerged, in sixth place, with 16 articles; however, it has the highest number of citations (695). **Conclusion:** The topic is presented in a broad and diversified manner, without demonstrating the existence of good articulation between studies and authors from around the world. There is a need to build knowledge networks in the area that will enable more studies capable of contributing to improving care for older adults with COVID-19 and other severe acute respiratory infections.

Descriptors: COVID-19; Older adult; Geriatrics.

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Whats is already known on this?
The mortality and comorbidity of COVID-19 related to the older adults shows an increase in hospitalization and higher fatality rates compared to the younger population.

What this study adds?
The bibliometric analysis of the studies presents positive indicators on the dynamics and evolution of scientific and technological information on the topic.

Resumo

Objetivo: *Analisar a produção científica internacional sobre a COVID-19 em pessoas idosas.* ***Métodos:*** *Pesquisa bibliométrica realizada na base de dados a ISI Web of Knowledge/Web of Science (WOS) a partir da exportação destes por meio do software de análise bibliométrica HistCiteTM e Programa VOSviewer.* ***Resultados:*** *Identificou-se 218 registros de publicações, tendo o periódico com maior registro de publicações o BMC Geriatrics com 52 publicações indexado na Web of Science. Mais de 722 instituições em 48 países ou regiões relataram os resultados da pesquisa de COVID-19 em pessoas idosas. Os principais países na literatura analisada foram Turquia (32 registros), Estados Unidos (31 registros), Japão (25 registros), Inglaterra (23 registros), Itália (20 registros) e China, país onde surgiu o primeiro caso da COVID-19, na sexta posição, com 16 artigos, entretanto, possui o maior número de citações (695).* ***Conclusão:*** *O tema é apresentado de forma ampla e diversificado, sem demonstrar a existência de boa articulação entre os estudos e autores de todo o mundo. Há necessidade de construção de redes de conhecimento na área que possibilitem mais estudos capazes de contribuir para melhoria da assistência à pessoa idosa com COVID-19 e outras infecções respiratórias agudas graves.*

Descritores: *COVID-19; Idoso; Geriatria.*

Resumén

Objetivo: *Analizar la producción científica internacional sobre COVID-19 en personas mayores.* ***Métodos:*** *Investigación bibliométrica realizada en la base de datos ISI Web of Knowledge/Web of Science (WOS), exportando estos datos utilizando el software de análisis bibliométrico HistCiteTM y el programa VOSviewer.* ***Resultados:*** *Se identificaron 218 registros de publicaciones, siendo la revista con mayor registro de publicaciones BMC Geriatrics con 52 publicaciones indexadas en Web of Science. Más de 722 instituciones en 48 países o regiones han informado los resultados de la investigación COVID-19 en personas mayores. Los principales países en la literatura analizada fueron Turquía (32 registros), Estados Unidos (31 registros), Japón (25 registros), Inglaterra (23 registros), Italia (20 registros) y China, país donde se registró el primer caso de COVID-19. Emergieron 19, en sexta posición, con 16 artículos, sin embargo, tiene el mayor número de citas (695).* ***Conclusión:*** *El tema se presenta de manera amplia y diversa, sin demostrar la existencia de buena articulación entre estudios y autores de todo el mundo. Es necesario construir redes de conocimiento en el área que permitan realizar más estudios capaces de contribuir a mejorar la atención a las personas mayores con COVID-19 y otras infecciones respiratorias agudas graves.*

Descriptores: *COVID-19; Anciano; Geriatría.*

INTRODUCTION

The coronavirus named as Severe Acute Respiratory Syndrome Coronavirus-2 (Sars-Cov-2), and as Corona Virus Disease-19 (COVID-19) for the disease, promotes acute infection, in 2 to 4 weeks, a period in which the virus is eliminated by the human body, ending the occurrence, if the etiological agent does not find a host.[1-2] The most common symptoms are temperature above 37 °C; cough; fatigue; shortness of breath; muscle and joint pain; sore throat; headache; nausea; decreased sense of smell and taste; among others.[3]

The advanced stage of the disease can lead the victim to severe pneumonia; acute respiratory failure syndrome; sepsis; septic shock and death. However, some infected individuals may be asymptomatic or develop some symptoms similar to those of the common flu.[4]

The incidence of severe forms and deaths among the older adults, especially those with comorbidities, was confirmed during the pandemic in Brazil, where studies reveal a higher prevalence in the age group of 50 to 59 years, the use of ventilatory support, hospitalization in the Intensive Care Unit and nosocomial cases were also significantly associated with a higher probability of Acute Respiratory Syndrome due to COVID-19 in this population.[3] Data from the Ministry of Health show that the risk of death among older men is twice as high as among women in Brazil.[5]

The data show that COVID-19 has a higher mortality rate among people aged 80 or over, in which 14.8% of those infected died, compared to 8.0% among older adults aged 70 to 79 years and 8.8% among those aged 60 to 69 years old (a rate 3.82 times higher than the general mean)[6], reinforcing concerns about the older population. The risk of dying from COVID-19 increases with age, since most deaths occurred in older adults, especially those with chronic diseases.[7] With immunosenescence, a natural deterioration of the immune system caused by aging, there is an increased vulnerability to infectious diseases and the prognosis for those with chronic diseases is unfavorable.[5]

Considering the magnitude of the coronavirus infection, the following questions emerged: what sources of value on COVID-19 are recognized through authorship and citation metrics? What is the analysis and how were the indicators on the dynamics and evolution of scientific and technological information on COVID-19 constructed? In view of the above, the objective was to analyze the international scientific production on COVID-19 in older adults.

METHODS

This is a descriptive bibliometric study, with a quantitative approach based on documents, which consists of quantifying scientific production and communication with the aim of disseminating publications, productivity of authors and institutions, with the aim of highlighting the growth of science and the impact of publications on the international scene.[8]

One of the first protagonists of the bibliometric technique described the approach as one that applies statistical and mathematical methods to the collection of content extracted from books, articles and other communications.[8] In this way, this technique provides a means of synthesizing the content of published work to determine general themes, the evolution of thought and metrics based on the most prolific authors, the frequency of citation and the published sources.[9]

This type of research has been growing in the health area, especially in nursing. In this sense, the following publications deserve to be highlighted: analysis of scientific production on the Zika virus and pregnancy;[10] bibliometric analysis on the new coronavirus and patient safety;[11] bibliometric analysis of scientific research on sexuality and dementia in the older adults;[12] and scientific production in online journals on the new coronavirus (Sars-Cov-2): bibliometric research.[13]

Data collection was carried out in November 2022, using the search period available in the database for complete years (1945-2020), in order to allow the replication or updating of this study without the need to carry it out again from the beginning. Because this is a recent topic, the search identified the first publication result in 2019, the year in which the first case of Covid-19 was recorded. For this reason, the time period evaluated was December 2019 to November 15, 2022.

There was no refinement filter for areas of knowledge, countries or languages of the studies, covering all publication records that had the descriptors related to the research in their scope.

Based on bibliometric studies, this study followed five stages: research objective, research protocol, data collection, data analysis and summary of results.

The ISI Web of Knowledge/Web of Science (WOS) database was chosen due to its academic recognition, as it is one of the most comprehensive databases in several areas of scientific knowledge, in addition to being important and a pioneer in bringing together journals from more than 100 areas of knowledge.[8]

The descriptors were defined based on the Descriptors in Health Sciences (DeCS) catalog and the Medical Subject Headings (MeSH), with the following search terms being selected: ("COVID-19" OR "covid 2019" OR "covid19" OR "corona virus 2019" OR "COVID-19 pandemic" OR "SARS-CoV-2") AND TS=("Aged" OR "Elderly") AND TS= ("Geriatrics"). The quotation marks indicate the exact representation of terms with more than one word, and the collection was carried out by searching for these terms in "all fields". Initially, 262 publications on the studied topic were found. After the search, the records found were refined by applying filters offered by the database's search engine; no refinement filter was adopted for areas of knowledge, countries or languages of study, covering all records of publications that had the terms in association. Finally, "letter", "editorial material" and "book chapters" were excluded, resulting in only "article" and "review article" and "early access". Thus, 218 articles were identified, which were used as a set of articles for bibliometric analyses.

The material was then analyzed by exporting the data to the HistCite™ bibliometric analysis software package in order to organize the information and facilitate the analyses. The following items were analyzed: the journals with the largest number of records and the number of articles distributed by country of origin of the authors. In addition to the data generated by the software, aspects of the 10 most cited articles in the entire WOS were clarified in order to identify the main contributions to the theme related to the older adult and COVID-19. Furthermore, the indicators on the dynamics and evolution of scientific and technological information on the topic were analyzed.

Using the VOSviewer software, the co-occurrence networks between the keywords were analyzed, determined by the number of articles in a document database, in which both occur together, whether in the title, abstract or keyword list.[14] By analyzing these networks, it is possible to map possible research themes on the older adults and COVID-19. The size of the knot indicates the frequency of occurrence of a keyword, and the relationship between knots is stronger the closer they are to each other.

Because this is a bibliometric study, it was not necessary to submit the project for this research to the Ethics Committee for Research involving human beings. However, the researchers committed to maintaining the ethical principles recommended for research of this nature, respecting the ideas, citations and referencing the authors and their respective publications.

RESULTS

The search strategy found 218 publications and an mean of 66.33 articles per year. The retrieved articles received 2,112 citations, a mean of 9.69 per item. Among them, 40 (23.62%) articles were published in 2020, 94 (52.76%) in 2021, and 84 (23.62%) in 2022 (up to November 2022). No articles on COVID-19 and older adults were published in 2019. Almost all publications (96.78%) were written in English (four in French and three in Spanish).

More than 722 institutions in 48 countries or regions have reported the results of research on COVID-19 in older adults. The main countries in the literature analyzed were Türkiye (32 records), the United States (31 records), Japan (25 records), England (23 records), Italy (20 records) and China, the country where the first case of COVID-19 emerged, in sixth place, with 16 articles; however, it has the highest number of citations (695).

The organizations highlighted were the Department of Veterans Affairs (12 records), Veterans Health Administration (12 records), University of London (10 records), National Center for Geriatrics Gerontology (9 records) and University of Cambridge (8 records). The list of the top 10 countries and organizations with the highest number of articles published in WOS can be seen in Table 1.

Table 1. Countries and organizations with the most productions associated with the number of citations on COVID-19 and older adults. Teresina, Piauí, Brazil, 2022.

Main Countries	Number of publications	Number of citations
Türkiye	32	85
United States	31	371
Japan	25	79
England	23	234
Italy	20	307
China	16	695
Spain	14	263
Canada	12	36
France	19	84
Australia	8	75
10 Main institutions		
Department of Veterans Affairs	12	167
Veterans Health Administration	12	167
University Of London	10	92
National Center for Geriatrics Gerontology	9	50
University of Cambridge	8	75
University of Toronto	8	25
King S College London	7	90
Catholic University of the Sacred Heart	6	24
Harvard University	6	30
IRCCS Policlinico Gemelli	6	90

Source: Web of Science.

The journals with the highest number of publication records were BMC Geriatrics with 52 publications, followed by Journal of The American Geriatrics Society (27) and Turkish Journal of Geriatrics (23). To identify those journals with the greatest impact, an index was defined by dividing the number of citations by the number of published works. The list of journals with the most scientific productions on the topic of COVID-19 and older adults is shown in Table 2.

In addition to the analysis of 218 publications on COVID-19 and older adults, the ten most cited articles are shown in Box 1. The hegemony of the geriatrics area is evident in relation to the clinical characteristics and factors associated with COVID-19 in older adults. The most cited article is a retrospective study prepared by Sun et al., 2020, as shown in Box 1.

Table 2. List of journals with the most productions on the topic of COVID-19 and older adults in WOS. Teresina, Piauí, Brazil, 2022.

	The 10 main journals	Number of publications	Impact Factor	Citation Index –CI
1°	BMC Geriatrics	52	4.07	10
2°	Journal of The American Geriatrics Society	27	7.538	11
3°	Turkish Journal of Geriatrics Turk Geriatri Dergisi	23	0.374	2
4º	Archives of Gerontology And Geriatrics	13	4.163	6
5°	Geriatrics	11	-	5
6°	Geriatrics Gerontology International	10	3.387	5
7°	Journal of Gerontology And Geriatrics	4	-	1
8º	Aging Clinical and Experimental Research	3	3.65	1
9º	Advances in Experimental Medicine and Biology	2	-	-
10°	Canadian Geriatrics Journal	2	3.269	2

Source: Web of Science.

Box 1. Top 10 most cited articles on the topic of COVID-19 and older adults in the WOS. Teresina, Piauí, Brazil, 2022.

N	Titles	Authors	Journals	Citations
1	Risk Factors for Mortality in 244 Older Adults With COVID-19 in Wuhan, China: A Retrospective Study	Sun, HY et al.,	Journal of The American Geriatrics Society	565
2	Social Isolation and Loneliness Among San Francisco Bay Area Older Adults During the COVID-19 Shelter-in-Place Orders	Kotwal, AA et al.,	Journal of The American Geriatrics Society	121
3	Clinical characteristics and prognostic factors in COVID-19 patients aged >= 80 years	Covino, M et al.,	Geriatrics & Gerontology International	86
4	Coronavirus, Ageism, and Twitter: An Evaluation of Tweets about Older Adults and COVID-19	Jimenez-Sotomayor, MR et al.,	Journal of The American Geriatrics Society	85
5	Age and frailty are independently associated with increased COVID-19 mortality and increased care needs in survivors: results of an international multi-centre study	Alsahab, B et al.,	Age and Ageing	56
6	Delirium and Adverse Outcomes in Hospitalized Patients with COVID-19	Garcez, FB et al.,	Journal of The American Geriatrics Society	55
7	Coronavirus: the geriatric emergency of 2020. Joint document of the Section on Geriatric Cardiology of the Spanish Society of Cardiology and the Spanish Society of Geriatrics and Gerontology	Bonanad et al.,	Revista Espanola de Cardiologia	51
8	Health-related quality of life, functional decline, and long-term mortality in older patients following hospitalization due to COVID-19	Walle-Hansen, MM et al.,	BMC Geriatrics	44
9	Clinical Characteristics and Outcomes of 821 Older Patients With SARS-Cov-2 Infection Admitted to Acute Care Geriatric Wards A Multicenter Retrospective Cohort Study	Zerah, L et al.,	Journals of Gerontology Series A-Biological Sciences and Medical Sciences	40
10	Predicting In-Hospital Mortality in COVID-19 Older Patients with Specifically Developed Scores	Van Dyck, LI et al.,	American Journal of Geriatric Psychiatry	36

Source: Web of Science.

Figure 1 shows the keyword co-occurrence networks for the 218 documents in the sample. To facilitate visualization, the network formation was restricted to keywords with five or more occurrences, which resulted in 58 knots, organized in six different colors: blue, red, green, lilac, yellow and turquoise (clusters). These are, therefore, the words with the highest frequency and that determine the central theme of a body of documents.
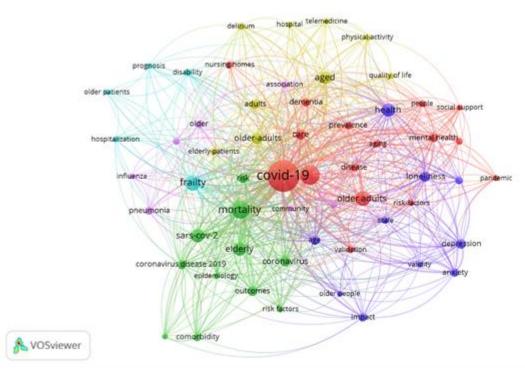
Figure 1. Co-occurrence networks of keywords related to the theme COVID-19 in older adults in the Web of Science (WOS) database. Teresina, Piauí, Brazil, 2022.

Source: Web of Science.

DISCUSSION

This study presents a bibliometric overview of the most relevant evidence on COVID-19 in older adults. The bibliometric analysis shows significant progress in publications on mental vulnerabilities related to COVID-19. There are consolidated research contributions in developed and developing countries, with the former contributing approximately 95% of the articles in the Web of Science retrieved for analysis.

In total, 48 countries contributed to the search for evidence on the topic studied and, among the journals that published the most, BMC Geriatrics stands out, with 52 publications (annual mean of 90.33 citations), presenting as the most cited article a study on quality of life, functional decline and mortality of older adults after hospitalization for COVID-19.[15]

The results of this study showed that more than half of the patients reported a negative change in quality of life in six months after hospitalization due to COVID-19, and one in three had persistently impaired mobility and ability to perform activities of daily living, in addition to a negative change in cognitive function compared to before hospitalization. The six-month mortality rate was 21% and increased with increasing age. This highlights the importance of preventing COVID-19 in older adults, as well as functional decline in older patients hospitalized due to this infection.

The majority of publications on the effects of the COVID-19 pandemic on older adults were from Türkiye, the United States, Japan, England, and Italy. The 218 research publications were published in 48 countries. This analysis illustrated that Türkiye, the United States, and Japan currently play a crucial role in research on older adults related to the COVID-19 outbreak. These three countries contributed approximately 40.72% of the publications, but the mean citation per year of Japanese publications (79 citations) was lower than that of publications from the United States (371 citations).

China ranks sixth as the country with the highest number of publications, considering that research on older adults related to outbreaks emerged in February 2020 in that country, due to the emergency fight against the pandemic.[6] China was the main research force in the early stage. Since April 2020, research on this topic during the COVID-19 pandemic has increased significantly.[16]

However, with the global spread of the COVID-19 pandemic, the United States has become the most productive country in terms of research and publications; this is attributed to the general strength of American academic research and the economy.[17]

Although the USA, the UK and other European countries are generally the most active countries in scientific research[18], three of the top ten countries with the most publications are Asia, namely Türkiye, Japan and China, which shows an improvement in the contribution of global research. Likewise, research shows that developing countries have great potential for research productivity in geriatrics.[19] It should be recognized that the United States, England, Italy, and Spain are also among the main countries with the highest cumulative number of confirmed cases currently.[20] This phenomenon shows that the production of publications during COVID-19 has a certain relationship with the severity of the pandemic situation.

The three journals with the most publications on COVID-19 in older adults are BMC – Geriatrics, Journal Of The American Geriatrics Society, and Turkish Journal Of Geriatrics Turk Geriatri Dergisi, which have a specific area of concentration in Geriatrics and Gerontology, thus making studies related to the topic more reliable and promoting the dissemination of academic evidence. However, journals face the dual challenge of balancing punctuality and scientific rigor, in addition to the dissemination of accurate and valid information.

The characteristics of the articles analyzed further consolidated the seriousness of the issues related to the COVID-19 pandemic in the older population. Among the most cited publications, it is worth noting that the main risk factors for mortality in older patients, age-related comorbidity, mainly affected the disease transmission cycle, in addition to the increase in hospitalization and higher fatality rates compared to the younger population.[21]

Keyword co-occurrence analysis can reveal research directions and critical points in a given topic. The analysis of documents related to COVID-19 in older adults indicated six focus areas. By analyzing these networks, it was possible to map possible research topics on the studied theme.

The results of the current study showed that "COVID-19" and "older adults", the two most prevalent keywords, were strongly linked to "frailty", "aging", "mortality" and "health". These keywords were potentially related, probably because mortality from diseases was higher in older adults whose mental health is affected by restrictions and social isolation caused by the pandemic. The size of the knot indicates the frequency of occurrence of a keyword, and the greater the proximity between them, the stronger the relationship.

The limitation of the study was that the data were obtained from only one database, WOS. Although this is a reference platform for scientific citations that was designed to support research with broad scope in the areas of science, it may be necessary to deepen the research in other databases, through new studies. The study presents contributions that focus on practices that can offer solutions to problems related to mental vulnerabilities of older adults with COVID-19 and methodological contributions that offer tools to conduct research through the presentation of new techniques or scientific methods, which in this study were expanded by knowledge of international production on COVID-19 in older adults, highlighting that there are positive indicators on the dynamics and evolution of scientific and technological information on the subject.

CONCLUSION

The sources of value on COVID-19 in older adults recognized through authorship and citation metrics were the 10 most cited studies, among 218 published articles, with the journals with the largest number of publication records being BMC Geriatrics with 52 publications, followed by Journal of The American Geriatrics Society (27) and Turkish Journal of Geriatrics (23) indexed in the Web of Science. More than 722 institutions in 48 countries or regions reported the results of research on COVID-19 in older adults. The main countries in the literature analyzed were Türkiye (32 records), the United States (31 records), Japan (25 records), England (23 records), Italy (20 records) and China, the country where the first case of COVID-19 emerged, in sixth place, with 16 articles; however, it has the highest number of citations (695). The topic is presented in a broad and diversified manner, without demonstrating the existence of good articulation between studies, authors and institutions from around the world. The analysis of the studies, according to the indicators on the dynamics and evolution of scientific and technological information, showed that there has been significant progress in publications on mental vulnerabilities related to COVID-19 in older adults and consolidated research contributions in developed and developing countries, such as Türkiye, the United States and Japan.

It is advisable to conduct future research on the topic of older adults' health, making it possible to measure the impact of the pandemic. Therefore, considering these aspects can guarantee reflective communication, capable of instrumentalizing the construction and dissemination of social practices that converge towards the prevention and containment of the coronavirus in the Brazilian scenario to improve care for older adults with COVID-19 and other severe acute respiratory infections.

CONTRIBUITIONS

Contributed to the conception or design of the study/research: Moura MEB. Contributed to data collection: Lopes KFAL. Contributed to the analysis and/or interpretation of data: Lopes KFAL. Contributed to article writing or critical review: Lopes KFAL. Final approval of the version to be published: Moura MEB, Duailibe AMC, Sousa OD.

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