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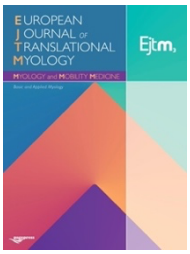

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Bibliometric study of scientific productivity in intervention programs that improve cognitive impairment in older adults

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Abstract

The aim of this study was to conduct a comprehensive bibliometric analysis of scientific productivity related to intervention programs that seek to improve cognitive function in Older Adults (OAs), according to journal, country and intervention topic in the pubmed database. A bibliometric study was conducted during the period 2018 to 2023. The literature search was performed in the PubMed database. The search terms were: cognitive impairment, cognitive impairment, exercise program, intervention program, physical exercise, older adult, elderly. Each article identified: year of publication, language of publication, country of publication, name of the journal and subject of the study. The guidelines established by PRISMA were used. Fifty-one scientific publications were included, analyzed in 34 journals. China leads with 14 studies (27.5%), followed by the United States with 5 articles (9.8%). Korea and Singapore are in third place with 4 studies each (7.8%), followed by Japan with 3 studies (5.9%). Regarding the language of publication, 96.1% (n=49) were published in English. Only 3.9% (n=2) were published in Spanish. The journal with the highest frequency of publications was Nutrients, with 6 articles published, representing 11.8% of the total and standing out as a leader in this field. It was followed by BMC Geriatrics with 3 published articles, representing 5.9% of the total. There was a notable increase in research on interventions for cognitive impairment in OAs,

mainly concentrated in the years 2020 and 2023. China leads the production of studies followed by the United States, Korea and Singapore. The most studied intervention programs include exercise and sport, followed by nutrition and computerized training. The journal “Nutrients” stands out with the highest number of articles, followed by “BMC Geriatrics”

Key words: bibliometrics, cognitive impairment, elderly, interventions, scientific journals.

Introduction

In recent decades, the aging of the population worldwide has emerged significant changes in its age structure, as life expectancy has increased. While fertility rates have declined and the need to develop effective strategies that promote healthy aging has been driven.[Errore. L'origine riferimento non è stata trovata.]

Overall, global population aging, which started in developed countries, has now become a demographic phenomenon characteristic of developing countries.[2] From this perspective, a central question arises in relation to this issue. Whether population aging will be accompanied by sustained or improved health, better quality of life and sufficient social and economic resources.[Errore. L'origine riferimento non è stata trovata.]

Therefore, among the many areas of interest, the preservation and improvement of cognitive function in OAs has been highlighted for its direct impact on the quality of life and independence of this population.

In that sense, intervention programs aimed at improving cognitive function have become a crucial tool in this area. Ranging from physical and cognitive activities involving a variety of enjoyable activities to pharmacological, nutritional and technological therapies that enable significant changes.[Errore. L'origine riferimento non è stata trovata.-6]

In fact, modifiable lifestyle factors, such as physical exercise, psychological well-being, social engagement, eating habits, can preserve and protect brain health.[8] Therefore, in recent years, researchers have placed particular emphasis on the development and

implementation of intervention programs aimed at promoting positive changes in cognitive function in OAs in various regions of the world.[5,9,10]

Consequently, to the best of our knowledge in the literature, there has been no evidence of comprehensive studies specifically addressing scientific productivity in intervention programs aimed at improving cognitive function in OAs between the years 2018 to 2023. Based on the significant increase in the implementation of such intervention programs in response to the growing problem of cognitive impairment in this population, it is plausible that in recent years there has been an increase in the number and diversity of topics in scientific research devoted to this topic.

Therefore, the main objective of this study is to perform an exhaustive bibliometric analysis of the scientific productivity related to intervention programs aimed at improving cognitive function in OAs, according to journal, country and intervention topic in the PubMed database.

Materials and Methods

Type of study and sample

A documentary study (bibliometric) of the scientific productivity of intervention programs aimed at improving cognitive function in OAs at the international level was carried out. The electronic search was performed in the PubMed database of the National Library of Medicine of the United States (https://pubmed.ncbi.nlm.nih.gov/). This database has a high coverage of biomedical and life sciences literature. In addition, it is one of the closest to the object of study of the work.

Search strategy

The search strategy was conducted during the period March 10-20, 2024. The relevant search terms for this bibliometric review were i) cognitive impairment, cognitive impairment, memory, cognitive deficit, ii) adult, older adult, elderly, old age, iii) exercise program, training. Boolean operators “AND” and “OR” were considered. Initially, all keywords were used together sorted with the Boolean operators. Then, a new search was performed by combining two or three [cognitive impairment and older adult].

Data management and extraction

The extraction of the scientific productivity indicators was recorded on an observation sheet. Each article identified: year of publication, language of publication, country of publication (defined as the country of affiliation of the first author), name of the journal and subject of study.

The terms indicated were searched for in the title, abstract and keywords of the manuscripts. As inclusion criteria, we considered i) articles that provided the required bibliometric indicators; ii) articles that were peer-reviewed and considered a sample of OAs; iii) articles published during 2018 and 2023. Studies whose topic was not related to intervention programs, cognitive impairment and OAs, or that involved animal research were excluded from the analysis.

The information extraction procedure was carried out by two of the authors (DS and TA), who separately identified the bibliometric indicators of each study. A third observer participated, checking the extraction process. If there was no match, the third observer made the pertinent corrections.

Subsequently, following the proposal of Moher, Liberati, Tetzla and Altman,**Errore. L'origine riferimento non è stata trovata.** the guidelines established by PRISMA were used, which allowed the identification and extraction of data for the review (Figure 1).

In the first stage, 655 articles were initially identified, and 343 studies were eliminated because they were not related to the research topic. Then, in the second stage, the titles and abstracts were read, taking into account the inclusion criteria, and 172 articles were eliminated. Of the 140 eligible studies, the third stage excluded literature reviews, systematic reviews and meta-analyses. In the last stage, 51 studies were included in the research, from which the general bibliometric matrix was generated.

Data analysis

The organization of the results was done through the data collected in the bibliometric matrix using Microsoft Excel spreadsheets. The data were presented in frequencies, ranges and percentages through tables and graphs.

Results

The distribution of scientific publications applying intervention programs to improve cognitive impairment in OAs in the last six years is shown in Table 1. Fifty-one articles have been identified and most of the articles have been published in the year 2020 (n=10, 19.6%) and in the year 2023 (n=12, 23.5%). It is also observed that China is the country that ranks first with 14 studies (27.5%), in second place, USA with 5 articles (9.8%), third place Korea and Singapore with 4 studies (7.8%) and Japan with 3 studies (5.9%). The other countries such as Spain, England, Israel, Portugal and Taiwan have published 2 articles, and the countries (Canada, Finland, South Korea, Cyprus, Thailand, Turkey and a multi-country study) have published 1 article each. In relation to the language of publication, it is observed that the vast majority of the articles, 96.1% (n=49), have been published in English, while only 3.9% (n=2) of the articles have been published in Spanish.
Table 2 shows the distribution of 51 scientific publications on interventions to improve cognitive impairment in OAs. The results were broken down into 34 journals that have published in the last six years (2018-2023). Overall, the journal with the highest frequency of publications was Nutrients, with 6 papers published, representing 11.8% of the total, being the journal with the most publications in this specific field. This was followed by BMC Geriatrics, in which 3 papers were published, representing 5.9% of the total. The other journals published from 1 to 2 papers, which shows a more dispersed and less concentrated distribution of research in other scientific publications.
Table 3 and Figure 2 show the results of the categories that were organized to determine the topics published in the intervention programs: exercise and sport; nutrition, computerized training and Art Therapy. In general, of the four categories organized, it was determined that 19 (37.7%) correspond to exercise and sport, 16 (31.4%) to nutrition topics, 13(25.5%) to computerized training and 03(5.9%) to art-therapy. In summary, exercise and sport programs, as well as nutrition and computerized training, are the most commonly applied in OAs to address cognitive impairment. In contrast, art therapy appears to have less interest in this area.

Discussion

The main objective of this study was to perform a comprehensive bibliometric analysis of scientific productivity related to intervention programs that seek to improve cognitive function in OAs, according to journal, country, and intervention topic.

The results show a concentration of publications in the years 2020 and 2023, suggesting a recent increase in research on interventions for cognitive impairment in OAs. China leads in the number of studies, followed by the United States, Korea, and Singapore.

China has the largest number of OAs in the world and the largest dementia patient population, accounting for almost 25% of global dementia cases and an annual increase of more than 0.36 million new cases.[11] This explains why China is at the forefront of research on interventions for cognitive impairment.

In the United States, the American Academy of Neurology reported in 2018 that the incidence of dementia is approximately 14.9% among patients with mild cognitive impairment in 65-year-old OAs.**Errore. L'origine riferimento non è stata trovata.** This data reflects the significance of the problem of cognitive impairment in the U.S. population and justifies the focus and research efforts in this country. Meanwhile, South Korea presents an aging population by 2019. Where it comprises about 15.5% population aged 65 years or older and is expected to be a super-aging society by 2060.[13]

In the case of Singapore, despite its size, it has state-of-the-art research facilities and an environment conducive to health technological innovation in OAs[15] has been reported in a cross-sectional survey of households OAs aged 60 years or older and revealed that the prevalence was 1.2%, lower than the global figures.[16]

These statistics from the bibliometric study highlight the differences in the prevalence of cognitive impairment globally and the challenges related to population aging in China, the United States, South Korea, and Singapore. They also highlight the approaches and resources devoted to research and care in each of these countries. However, countries such as Japan, Spain and Portugal, which have high prevalences of aging, have not yet developed specific intervention programs on cognitive impairment.

In relation to the number of articles published in the last six years, the vast majority of the articles have been published in English, which reflects the predominance in relation to the Spanish language. This is evidence that the main source of international scientific

dissemination is English. Only a small fraction of the studies have been published in Spanish, indicating a lower representation in this language.

In health sciences and medicine, most scientific journals require the submission of manuscripts in English, which highlights the predominance of English as the main academic language for scientific communication.[17] Thus, the predominance of English in scientific publications is due to accessibility, visibility, academic tradition and facilitation of scientific communication globally.

In fact, in recent decades, English has become the dominant language of science, with more than 90% of indexed scientific articles in the natural sciences published in this language are in English.[18] Although on the other hand, also the conceptualization of English terms in science journals could bring some limitations due to a restricted range of expressions that prevents clinicians, patients and researchers from providing accurate information.[19] Therefore, fully understanding the context and results may require advanced English skills. Which is impossible, since at least in non-English speaking countries, English proficiency may be limited for many health professionals and scientists.

Therefore, recently some publications have recognized the need for scientific material to be published in languages other than English,[20,21] in order to mitigate this relevant need.

On the other hand, the results indicate that most intervention programs focus on exercise and sport, followed by nutrition and computerized training. Art therapy is the least represented among the categories analyzed in this bibliometric study. Thus, there appears to be significant room for exploration and development of intervention programs that include art therapy (music, relaxation, dance, crafts) as a key component to address various health and wellness needs.

These findings suggest that there is considerable opportunity to expand research and implementation of intervention programs that deal with classic themes of physical exercise and sports[22-24] nutritional diets (such as the Mediterranean and low-fat diet)[25-27] and computer-based training (such as brain training programs and virtual simulators)[28,29].

Thus, it is crucial to diversify intervention strategies to more comprehensively address the health and wellness needs of the population in relation to cognitive impairment. Including

approaches such as art therapy, which can offer complementary benefits and promote better quality of life and ensure adherence of participants in intervention programs.

Art therapy, as a complementary medical therapy and non-pharmacological alternative, has been used as one of the medical interventions with good clinical effects in mental disorders, such as depression, anxiety and post-traumatic stress disorder.[30] Thus, its integration into treatment programs can offer significant benefits for patients.

Regarding the journals that publish these topics, the findings indicate that the journal 'Nutrients' stands out with the highest number of published articles, followed by the journal BMC Geriatrics. The presence of multiple journals with moderate to low numbers of publications suggests that the topic is of interest to a wide range of disciplines and academic audiences. Both journals highlight the topics of exercise, sport and nutrition intervention programs, reflecting the relevance and multidisciplinarity of these topics for academic research.

These findings underscore the multidisciplinary nature of research on cognitive impairment in OAs and the importance of diverse approaches and perspectives in this field. Hence, the importance of developing a bibliometric study, as it not only provides solid data support for current research, but also establishes a firm academic foundation to shape future research directions and strategies.[31] Thus it also enables researchers to discern predominant themes within a research domain, accurately represent scholarly trends, and anticipate future research frontiers.**Errore. L'origine riferimento non è stata trovata.**

This study presents some strengths, for example, it is one of the first studies to focus on analyzing the scientific productivity of intervention programs used to improve cognitive impairment. These findings can not only serve as a basis for projecting new studies, but also contribute to filling an important gap in the scientific literature on this emerging topic. It also provides relevant information on the journals that publish these cognitive impairment topics. This information can serve as a data bank for researchers and professionals interested in further developing the field of cognitive impairment research, facilitating the identification of the main journals and platforms where advances and relevant studies in this area are published.

It also presents some weaknesses, for example, only one database, PubMed, was explored and was limited to the analysis of the last six years (2018-2023). Therefore, future

bibliometric studies should consider including multiple databases for a more complete and extensive view of the landscape of publications on cognitive impairment intervention programs, spanning a longer time period to capture long-term trends and changes in research.

Conclusions

The results of this study indicate a growing recent interest in research on interventions for cognitive impairment in OAs, with a significant concentration of publications in the years 2020 and 2023. China leads in the production of studies, followed by the United States, Korea, and Singapore. In addition, there is a predominance of publications in English compared to Spanish. In terms of preferred topics, intervention programs focus mainly on exercise and sport, followed by nutrition and computerized training. In general, the journal "Nutrients" stands out with the highest number of articles, followed by "BMC Geriatrics". These results suggest a global and multidisciplinary interest in addressing cognitive impairment in OAs, reflecting the importance of diverse approaches and perspectives in this field.

List of abbreviations

OAs: older adults

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References

1. Bao J, Zhou L, Liu G, et al. Current state of care for the elderly in China in the context of an aging population. Biosci Trends 2022;16:107-18.
2. Ismail Z, Ahmad WIW, Hamjah SH, Astina IK. The Impact of Population Ageing: A Review. Iran J Public Health 2021;50:2451-60.
3. National Research Council (US) Panel on a Research Agenda and New Data for an Aging World. Preparing for an Aging World: The Case for Cross-National Research. Washington (DC): National Academies Press (US); 2001. PMID: 22787685.
4. Kivipelto M, Mangialasche F, Ngandu T. Lifestyle interventions to prevent cognitive impairment, dementia and Alzheimer disease. Nat Rev Neurol 2018;14:653-66.
5. García-Cordero J, Pino A, Cuevas C, et al. Neurocognitive Effects of Cocoa and Red-Berries Consumption in Healthy Adults. Nutrients 2021;14:1.
6. Ziegler DA, Anguera JA, Gallen CL, et al. Leveraging technology to personalize cognitive enhancement methods in aging. Nat Aging 2022;2:475-83
7. Woods B, Rai HK, Elliott E, et al. Cognitive stimulation to improve cognitive functioning in people with dementia. Cochrane Database Syst Rev 2023;2023:CD005562.
8. Dinius CJ, Pocknell CE, Caffrey MP, Roche RAP. Cognitive interventions for memory and psychological well-being in aging and dementias. Front Psychol 2023;14:1070012.
9. Innes KE, Selfe TK, Brundage K, et al. Effects of meditation and music-listening on blood biomarkers of cellular aging and Alzheimer's disease in adults with subjective cognitive decline: an exploratory randomized clinical trial. J Alzheimers Dis 2018;66:947-70.
10. Liao YY, Tseng HY, Lin YJ, et al. Using virtual reality-based training to improve cognitive function, instrumental activities of daily living and neural efficiency in older adults with mild cognitive impairment. Eur J Phys Rehabil Med 2020;56:47-57.
11. Moher D, Liberati A, Tetzlaff J, et al. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA Statement. Open Med 2009;3:e123-30.
12. Jiang Y, Cui M, Tian W, et al. Lifestyle, multi-omics features, and preclinical dementia among Chinese: The Taizhou Imaging Study. Alzheimers Dement 2021;17:18-28.

13. Petersen RC, Lopez O, Armstrong MJ, et al. Practice guideline update summary: Mild cognitive impairment: Report of the Guideline Development, Dissemination, and Implementation Subcommittee of the American Academy of Neurology. Neurology 2018;90:126-35.
14. Kang M, Lee I, Hong H, et al. Predictors of changes in cognitive function in Older Korean adults: the 2006-2018 Korean longitudinal study of aging. Int J Environ Res Public Health 2021;18:6345.
15. Spotlight on Singapore (SS). Nature 2011; https://doi.org/10.1038/nj0362
16. Teh WL, Abdin E, Vaingankar JA, et al. Prevalence, lifestyle correlates, and psychosocial functioning among multi-ethnic older adults with mild cognitive impairment in singapore: preliminary findings from a 10/66 population study. Yale J Biol Med 2021;94:73-83.
17. Gordin MD. Scientific babel: how science was done before and after global English. University of Chicago Press; Chicago, IL, USA: 2015
18. Hamel RE. El campo de las ciencias y la educación superior entre el monopolio del inglés y el plurilingüismo: Elementos para una política del leguaje en América Latina. Trabalhos em Linguística Aplicada 2013;52:321–84.
19. Pelicioni PHS, Michell A, Santos PCRD, Schulz JS. facilitating access to current, evidence-based health information for non-English speakers. Healthcare (Basel) 2023;11:1932.
20. Pakenham-Walsh N; Healthcare Information For All working group on multilingualism. Improving the availability of health research in languages other than English. Lancet Glob Health 2018;6:e1282.
21. The Lancet Global Health. The true meaning of leaving no one behind. Lancet Glob Health 2019;7:e533.
22. Choi W, Lee S. Ground kayak paddling exercise improves postural balance, muscle performance, and cognitive function in older adults with mild cognitive impairment: a randomized controlled trial. Med Sci Monit 2018;24:3909-3915.
23. Liao YY, Chen IH, Hsu WC, et al. Effect of exergaming versus combined exercise on cognitive function and brain activation in frail older adults: A randomised controlled trial. Ann Phys Rehabil Med 2021;64:101492.

24. Embon-Magal S, Krasovsky T, Doron I, et al. The effect of co-dependent (thinking in motion [TIM]) versus single-modality (CogniFit) interventions on cognition and gait among community-dwelling older adults with cognitive impairment: a randomized controlled study. BMC Geriatr 2022;22:720.
25. Voss MW, Sutterer M, Weng TB, et al. Nutritional supplementation boosts aerobic exercise effects on functional brain systems. J Appl Physiol (1985) 2019;126:77-87.
26. Kwok T, Wu Y, Lee J, et al. A randomized placebo-controlled trial of using B vitamins to prevent cognitive decline in older mild cognitive impairment patients. Clin Nutr 2020;39:2399-405.
27. Choi WY, Lee WK, Kim TH, et al. The effects of spirulina maxima extract on memory improvement in those with mild cognitive impairment: a randomized, double-blind, placebo-controlled clinical trial. Nutrients 2022;14:3714.
28. Djabelkhir L, Wu YH, Vidal JS, et al. Computerized cognitive stimulation and engagement programs in older adults with mild cognitive impairment: comparing feasibility, acceptability, and cognitive and psychosocial effects. Clin Interv Aging 2017;12:1967-75.
29. Sung CM, Lee TY, Chu H, et al. Efficacy of multi-domain cognitive function training on cognitive function, working memory, attention, and coordination in older adults with mild cognitive impairment and mild dementia: A one-year prospective randomised controlled trial. J Glob Health 2023;13:04069.
30. Hu J, Zhang J, Hu L, et al. Art therapy: a complementary treatment for mental disorders. Front Psychol 2021;12:686005.
31. Wang H, Chen X, Zheng M, et al. Research status and hotspots of social frailty in older adults: a bibliometric analysis from 2003 to 2022. Front Aging Neurosci 2024;16:1409155.
32. Chen C, Hu Z, Liu S, Tseng H. Emerging trends in regenerative medicine: a scientometric analysis in CiteSpace. Expert Opin Biol Ther 2012;12:593-608.

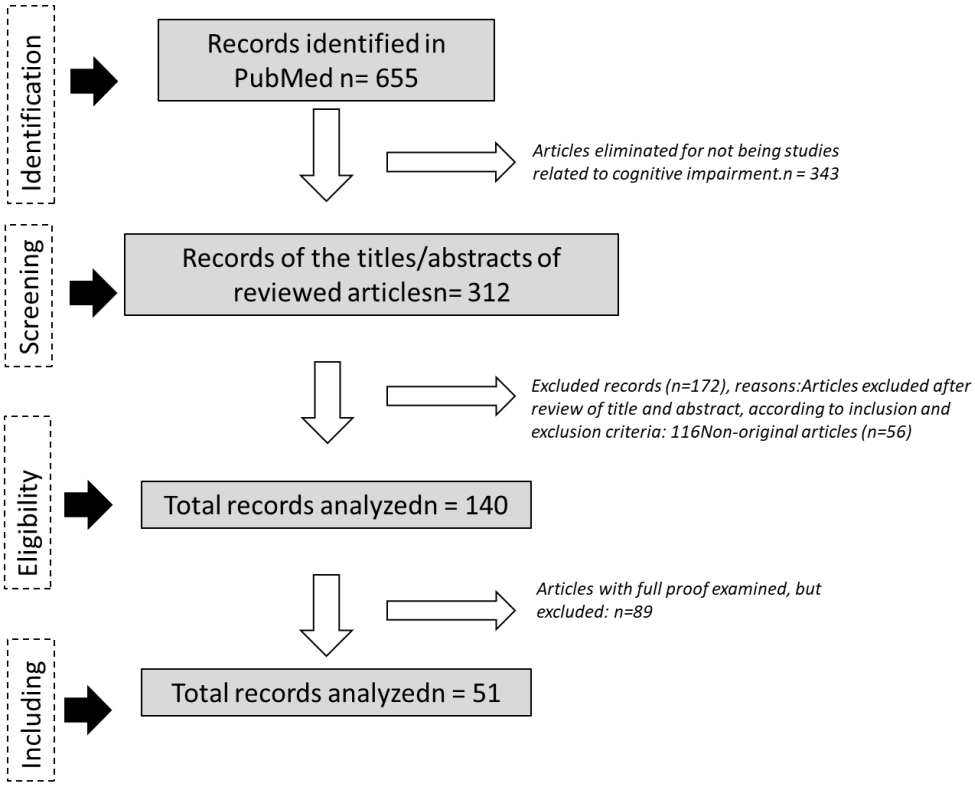

Figure 1. Screening and record selection process according to the PRISMA (Preferred Reporting Items for Reviews and Meta-Analyses) flowchart.

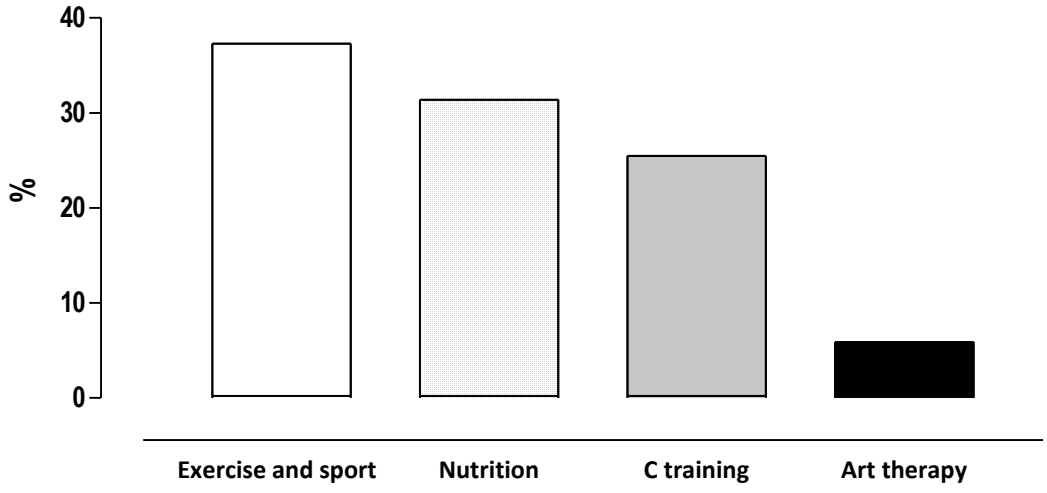

Figure 2. Prevalence of intervention programs that improve cognitive function in OAs.

Table 1. Bibliometric indicators used in the study, according to year, country and language.

Year	n	%
2018	6	11.8
2019	8	15.7
2020	10	19.6
2021	7	13.7
2022	8	15.7
2023	12	23.5
	51	100
Country		
China	14	27.5
United States	5	9.8
Korea	4	7.8
Not specified	4	7.8
Singapore	4	7.8
Japan	3	5.9
Spain	2	3.9
England	2	3.9
Israel	2	3.9
Portugal	2	3.9
Taiwan	2	3.9
Canada	1	2
Finland	1	2
South Korea	1	2
Cyprus	1	2
Thailand	1	2
Turkey	1	2
Multi-country	1	2
	51	100
Language		
English	49	96.1
Spanish	2	3.9
Total	**51**	**100**

Table 2. Distribution of scientific publications on interventions in the cognitive impairment of OAs by journal.

n	**Name of the magazine**	**f**	%
1	Nutrients	6	11.8
2	BMC Geriatrics	3	5.9
3	Alzheimer's Research and Therapy	2	3.9
4	Annals of Physical and Rehabilitation Medicine	2	3.9
5	BioMed Research International	2	3.9
6	Clinical Interventions in Aging	2	3.9
7	International Journal of Environmental Research and Public Health	2	3.9
8	Journal of Alzheimer's Disease Netherlands	2	3.9
9	Journal of Applied Physiology	2	3.9
10	Journal of Global Health	2	3.9
11	Journals of Gerontology - Series A Biological Sciences and Medical Sciences	2	3.9
12	Trials	2	3.9
13	Aging	1	2
14	Alzheimer's and Dementia	1	2
15	American Journal of Alzheimer's Disease and other Dementias	1	2
16	Atención Primaria	1	2
17	Biology of Sex Differences	1	2
18	BMJ, The	1	2
19	Clinical Nutrition	1	2
20	European Journal of Physical and Rehabilitation Medicine	1	2
21	Geriatric Nursing	1	2
22	*Human brain mapping*	1	2
23	International Journal of Methods in Psychiatric Research	1	2
24	International Journal of Psychophysiology	1	2
25	JAMA network open	1	2

26	Journal of Aging and Physical Activity	1	2
27	Journal of Health and Human Services Administration	1	2
28	Journal of Neuropsychiatry and Clinical Neurosciences	1	2
29	Medical Science Monitor	1	2
30	Multidisciplinary Digital Publishing Institute (MDPI)Nutrients	1	2
31	Neurodegenereative Disease Managment	1	2
32	PLoS ONE	1	2
33	Revista de Neurologia	1	2
34	Translational Psychiatry	1	2
	Total	51	100

Table 3. Scientific journals that publish intervention programs that improve cognitive function according to subject matter.

Name of the magazine	Exercise and sport	Nutrition	Computerized training	Art therapy	Total
Nutrients		5	1		6
BMC Geraitrics	1	1	1		3
Alzheimer's Research and Therapy	2				2
Annals of Physical and Rehabilitation Medicine	2				2
BioMed Research International			2		2
Clinical Interventions in Aging			1	1	2
International Journal of Environmental Research and Public Health	2				2
Journal of Alzheimer's Disease Netherlands	1	1			2
Journal of Applied Physiology		2			2
Journal of Global Health			2		2

Journals of Gerontology - Series A Biological Sciences and Medical Sciences		2			2
Trials		1		1	2
Aging	1				1
Alzheimer's and Dementia		1			1
American Journal of Alzheimer's Disease and other Dementias	1				1
Atención Primaria			1		1
Biology of Sex Differences	1				1
BMJ, The			1		1
Clinical Nutrition		1			1
European Journal of Physical and Rehabilitation Medicine 2020 February;56(1):47-57	1				1
Geriatric Nursing		1			1
Human brain mapping	1				1
International Journal of Methods in Psychiatric Research			1		1
International Journal of Psychophysiology			1		1
JAMA network open	1				1
Journal of Aging and Physical Activity	1				1
Journal of Health and Human Services Administration	1				1
Journal of Neuropsychiatry and Clinical Neurosciences	1				1
Medical Science Monitor	1				1
Multidisciplinary Digital Publishing Institute (MDPI)Nutrients		1			1
Neurodegenereative Disease Managment				1	1
PLoS ONE			1		1
Revista de Neurologia			1		1
Translational Psychiatry	1				1
Total	**19**	**16**	**13**	**3**	**51**