

## SCIENTIFIC PRODUCTION ABOUT BALANCE AND FEAR OF FALLING INTO THE ELDERLY: BIBLIOMETRIC STUDY

Produção científica acerca do equilíbrio e medo de cair em idosos: estudo bibliométrico

Producción científica sobre el equilibrio y el miedo a caer en la vejez: estudio bibliométrico

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### ABSTRACT

**Objective:** verify the bibliometrics indicators regarding to the scientific production available in online journals related to balance and fear of falling in aged. **Method:** a bibliometric study, whose sample was composed by 51 articles, published between 2008 and 2018, written in English and/or Portuguese, available in national and international databases. **Results:** the peak of productions was verified in the year of 2016 (21.6%). It predominated publications written in English (96.1%). Journals categorized as QUALIS A1 (52.9%) were the majority. Regarding to the subject of the studies, it prevailed those related to accidents by fall; prevention and treatment; morbidities; and studies emphasizing the measures used in tests and evaluations. **Conclusion:** bibliometric indicators regarding the subject balance and fear of falling expresses a scientific production under development. This topic has been a recent focus of health researchers working in the care and rehabilitation of the elderly.

**DESCRIPTORS:** Postural balance; Accidental falls; Fear; Aged; Bibliometrics.

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## RESUMO

**Objetivo:** verificar os indicadores bibliométricos referentes à produção científica disponível em periódicos *online* acerca do tema equilíbrio e medo de cair em idosos. **Método:** estudo bibliométrico, cuja amostra foi de 51 artigos, publicados no período entre 2008 e 2018, nos idiomas inglês e/ou português, disponibilizados na íntegra em bases de dados nacionais e internacionais. **Resultados:** verificou-se maior pico de produções no ano de 2016 (21,6%). Predominaram publicações disponibilizadas no idioma inglês (96,1%). Revistas classificadas como Qualis A1 (52,9%) foram a maioria. Quanto ao enfoque dos estudos, predominou os temas acidentes por queda; medidas de prevenção e tratamento; medidas de testes e avaliação; e morbidades. **Conclusão:** os indicadores bibliométricos acerca do tema equilíbrio e medo de cair em idosos apontam uma produção científica em desenvolvimento. Esta temática tem sido foco recente de pesquisadores na área de saúde que atuam no cuidado e reabilitação do idoso.

**DESCRIPTORIOS:** Equilíbrio postural; Acidentes por quedas; Medo; Idoso; Bibliometria.

## RESUMEN

**Objetivo:** verificar los indicadores bibliométricos relacionados con la producción científica disponibles en revistas online sobre el tema del equilibrio y el miedo a caer en los ancianos. **Método:** estudio bibliométrico, cuya muestra fue de 51 artículos, publicados entre 2008 y 2018, en inglés y/o portugués, disponibles en su totalidad en bases de datos nacionales e internacionales. **Resultados:** el pico de producción más alto se observó en 2016 (21,6%). Las publicaciones disponibles en el idioma inglés (96,1%) fueron las predominantes. Las revistas clasificadas como Qualis A1 (52,9%) fueron la mayoría. En cuanto al enfoque de los estudios, se centraron en los accidentes de caída, las medidas de prevención y tratamiento, las medidas de prueba y evaluación y las morbilidades. **Conclusión:** los indicadores bibliométricos sobre el tema del equilibrio y el miedo a la caída en las personas mayores indican una producción científica en desarrollo. Este tema ha sido un foco reciente de los investigadores del área de la salud que trabajan en el cuidado y la rehabilitación de los ancianos.

**DESCRIPTORIOS:** Equilíbrio postural; Accidentes por caídas; Miedo; Anciano; Bibliometría.

## INTRODUCTION

Population aging is an important achievement of humanity, becoming an unprecedented global phenomenon resulting from demographic and epidemiological transitions.<sup>1</sup> However, this new scenario and transformation of the age structure of the population is accompanied by new demands and challenges, especially in the field of public health.<sup>2</sup>

As age advances, several organic and functional alterations appear in individuals, which, associated to the current way of living, working, and eating, lead to an increase in chronic diseases, which can be multiple and last for years, besides being complex and high-cost, demanding constant health care.<sup>3</sup>

Among the risk factors for elderly health, the occurrence of falls stands out, whose impact brings potentially serious results in the lives of these individuals.<sup>4</sup> The aging process can cause changes in the sensorial systems, which can cause a deficit in postural control. Therefore, some aspects, such as balance reduction, gait reduction, and frailty in the elderly may facilitate falls.<sup>5</sup>

Falls represent an important public health problem, given their high prevalence and repercussions on the health of the

elderly population in Brazil and worldwide.<sup>6</sup> It is considered as a fall episode the unexpected and unintentional change of position, which according to the American Geriatrics Society (AGS) and the British Geriatrics Society (BGS)<sup>7</sup> is defined as an unintentional contact with the support surface, resulting from the change in position of the individual to a level below his/her initial position, without there being an intrinsic determining factor or an unavoidable accident and without loss of consciousness.

It is possible that the decline in physical function following a fall event may affect the elderly's sense of their own abilities and effectiveness, bringing them the fear of falling. It is noteworthy that the fear of falling is as prevalent as falls, occurring in 30% to 73% of the elderly.<sup>8</sup> The fear of falling is related to low confidence and is characterized by anxiety while walking or excessive concern about falling.<sup>9,10</sup> Furthermore, it can be considered one of the most disabling sequels of falls, causing decreased mobility and increased disuse, which can lead to restriction of the elderly's daily activities, thus reducing their autonomy and independence.<sup>11</sup>

It is noteworthy that the "fear of falling" problem is a major concern not only for the elderly, but also for their families and health professionals. Therefore, it has been recognized as an important public health problem.<sup>12</sup>

Considering this concern, the interest in exploring the subject and giving visibility to the tendencies of the scientific production about balance and fear of falling in the elderly, using the bibliometric method, in the national and international literature, arose.

Given the above, the present study has as its guiding axis the following question: What is the scientific production about balance and fear of falling in the elderly in national and international online journals from 2008 to 2018? To this end, it was defined as an objective to verify the bibliometric indicators related to the scientific production available in online journals about the relationship between balance and fear of falling in the elderly.

## METHOD

This is a bibliometric study, whose method is a quantitative and statistical technique for measuring the indices of production and dissemination of scientific knowledge. Bibliometry arose due to the need to study and evaluate scientific production and communication activities<sup>13</sup> and has been adopted in various areas of knowledge in the search for an objective evaluation of scientific production, this being the essential difference in relation to traditional bibliographic studies.<sup>14</sup>

The bibliometric analysis method makes it possible to identify trends, growth, users and authors, verify journal coverage, measure information dissemination, and also formulate policies for a given area of scientific knowledge.<sup>15</sup>

For the best development of this study, the operational steps proposed by VANZ and STUMPF<sup>16</sup> were considered. Thus, initially, a bibliographic survey was carried out about the publications on balance and fear of falling in the elderly. For this, we carried out a virtual search through the Virtual Health

Library (VHL) operational platform, in the Latin American and Caribbean Literature (LILACS) and National Library of Medicine (MEDLINE) databases, and in the Scientific Electronic Library Online (SCIELO) digital library. This step occurred in the period from August to September 2019.

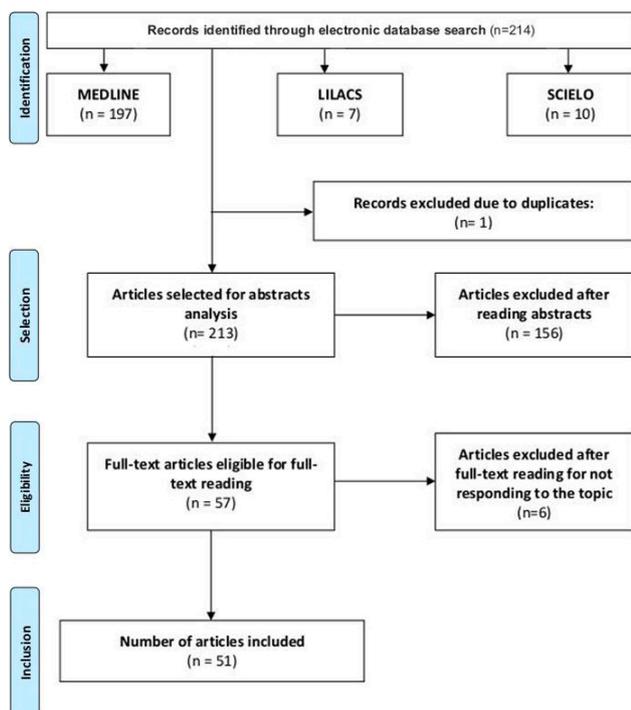
To search for articles in the databases, we used the descriptors defined from the search terms contained in the Descriptors in Health Sciences (DeCS), and the following search terms were selected: “Postural Balance”, “Elderly”, “Postural Balance” and “Aged”. These terms were associated with the Boolean operator “and” and the words “Fear of Falling” and “Fear of Falling”, in the strategy to locate the publications.

The following inclusion criteria were adopted for sample selection: publications available as full-text articles that addressed the theme, in the time frame between 2008 and 2018, in Portuguese and English.

For data collection, a form was prepared consisting of the following bibliometric indicators: journal name, Qualis and impact factor, database or virtual library, title, year and language of the article, academic background and authors’ degrees, geographic origin, institutional origin, number of authors per article, objectives and type of study, place of study, group participating in the research, and keywords. In order to facilitate the organization of this information, a table was prepared based on the aforementioned form.

After collection, the repeated articles were suppressed. Then, we carefully read all the abstracts, excluding the scientific productions that did not meet the proposed inclusion criteria, as well as the publications in the modalities of thesis, dissertation, and monograph. Thus, the final sample of the study consisted of 51 articles, identified and selected as presented in the Prism Flowchart (Figure 1).

**Figure 1** - PRISMA flowchart prepared for selection and collection of research data. João Pessoa, PB, Brazil, 2019



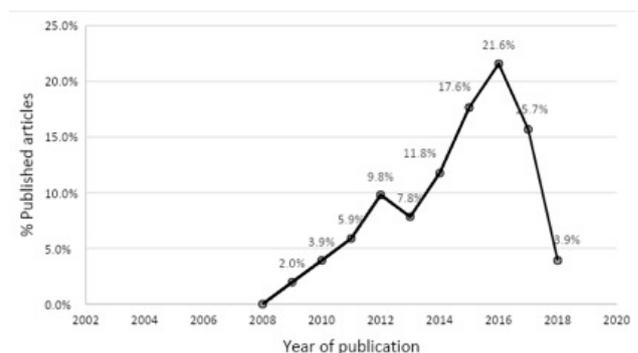
For the treatment and descriptive statistical analysis of the records, the Microsoft Excel® 2013 program was used as a tool, with which it was possible to calculate the distribution of frequency in absolute numbers (n) and relative frequency (%). After this procedure, the concept map methodology was used to organize the keywords of the analyzed studies and understand the relationship of the words with the thematic axes. It is noteworthy that concept maps are a didactic-pedagogical tool that enable the graphic representation and organization of knowledge, as well as the processing of information, perceiving and analyzing the relationship between concepts and words.<sup>17</sup> The CMap Tools software was used to construct the concept map.

## RESULTS AND DISCUSSION

After data collection and analysis, a final sample was obtained consisting of 51 scientific productions on the topic of balance and fear of falling in the elderly, which were published between 2008 and 2018, according to the established selection criteria.

Regarding the chronological distribution of publications, Figure 2 shows that in 2008 no reference of evidence was found in the researched literature; however, it was observed an increasing trend of productivity on the subject from 2009, with one publication (2%), highlighting that the year with the highest peak of productivity was 2016, with 11 publications (21.6%). The years 2017 and 2018 showed a decline in the records, despite this, in 2017 eight publications (15.7%) were found, being the third highest number of records on the subject in one year.

**Figure 2** - Distribution of articles by year of publication, in the period from 2008 to 2018. João Pessoa, PB, Brazil, 2019



In view of the findings, in the ten-year period selected for this study, it is evident the recognition by researchers of the relevance of the topic of balance and fear of falling in the elderly. This may be related to the increase in longevity, which is a growing global phenomenon. As well as, the impacts on the elderly health due to changes in locomotor performance, which can predispose these individuals to falls, changes in their functionality and quality of life.<sup>18</sup>

Regarding the databases of the virtual library in which the studies were disseminated, the National Library of Medicine (MEDLINE) prevailed in greater proportion, with 47 articles (92.2%), while only four publications (7.8%) were identified

in the Scientific Electronic Library Online (SCIELO) and, finally, no publication from the Latin American and Caribbean Health Sciences Literature (LILACS) database was identified.

It should be noted that MEDLINE is a relevant source of scientific dissemination and an important database of international literature in the medical and biomedical area, produced by the National Library of Medicine (NLM) in the United States of America, because it contains bibliographic references and abstracts of journals published in several countries.

For the classification of the journals, we used the Qualis/CAPES in the Interdisciplinary area. This indicator is one of the tools for evaluating graduate programs in Brazil and the quality of articles published in scientific journals. Therefore,

it is one of the fundamental instruments for the evaluation of intellectual production, adding the quantitative and qualitative aspects.<sup>20</sup>

As shown in Table 1, in the present study, 27 articles (52.9%) were published in journals with Qualis A1, five (9.8%) in A2 journals, two publications (3.9%) in a journal with Qualis A4, four manuscripts (7.8%) in B1 journals, seven articles (13.7%) in B2 journals, and only one publication (2.0%) was published in a B3 journal. In addition, it is noteworthy that three journals were not classified in Qualis/CAPES. It is noteworthy, therefore, that the predominance of articles in journals with Qualis A1 may be related to the greater number of publications in international journals.

**Table1** - Distribution of publications about balance and fear of falling in the elderly, according to Qualis/CAPES and publication journals, in the period from 2008 to 2018. João Pessoa, PB, Brazil, 2019

| QUALIS       | PERIODICALS   | N         | %            |
|--------------|---|-----------|--------------|
| A1           | Archives of Physical Medicine and Rehabilitation; American Journal of Geriatric Psychiatry; Journal of the American Geriatrics Society; Clinical Interventions in Aging; Disability and Rehabilitation; Clinical Rehabilitation; Journal of Physiotherapy; Archives of Gerontology and Geriatrics; Journal of Geriatric Physical Therapy; Geriatric Nursing; Journal of Aging and Physical Activity; Human Movement Science; Gait & Posture; Plos One; Physical Therapy; Journal of Alzheimer's Disease; Journal of the American Medical Directors Association. | 27        | 52,9         |
| A2           | Annals of Vascular Surgery; BMC Geriatrics; Journal of Aging and Health; Respiratory Medicine; Maturitas.   | 5         | 9,8          |
| A4           | Revista Brasileira de Geriatria e Gerontologia.   | 2         | 3,9          |
| B1           | Fisioterapia e Pesquisa; International Journal of Geriatric Psychiatry; Journal of Bodywork & Movement Therapies; Physiotherapy Research International.   | 4         | 7,8          |
| B2           | Acta scientiarum. Health sciences; Primary Health Care Research & Development; Annals of Otolaryngology, Rhinology & Laryngology; Psychogeriatrics; Journal of Clinical Nursing; The Journal of Alternative and Complementary Medicine; Revista Brasileira de Fisioterapia.   | 7         | 13,7         |
| B3           | Vascular and Endovascular Surgery.  | 1         | 2            |
| SQ           | Geriatrics & Gerontology International; Physical Medicine and Rehabilitation; Psychology and Aging.   | 5         | 9,8          |
| <b>TOTAL</b> |   | <b>51</b> | <b>100,0</b> |

Note: SQ = No Qualis CAPES

It was verified that the 51 publications of the sample were distributed in a total of 38 journals, national and international. It is noteworthy that 29 (76%) returned only one publication each; eight periodicals (21%) presented two publications each; and only one journal (3%) stood out with six publications on the investigated theme, this being "Clinical Rehabilitation", an English journal, multiprofessional, focused on the area

of rehabilitation, which acts as a forum for the international dissemination and exchange of information among the great number of professionals involved in rehabilitation.<sup>21</sup>

In table 2, it is possible to identify the data referring to the area of training, academic degree and geographic origin of the main authors, as well as the main methodological characteristics of the publications analyzed.

**Table 2** - Distribution of publications regarding the area of training, titles and geographical origin of the authors, types of methodological procedures of the studies and research scenarios, in the period from 2008 to 2018. João Pessoa, PB, Brazil, 2019

| <b>Educational area, titles and geographical origin of the main authors</b> | <b>N</b>  | <b>%</b>     |
|---|-----------|--------------|
| <b>Academic background</b>  |           |              |
| Bachelor of Applied Science (Biomechanics)                                  | 1         | 2,0          |
| Education   | 1         | 2,0          |
| Physical Education  | 6         | 11,8         |
| Nursing   | 3         | 5,9          |
| Physiotherapy   | 23        | 45,1         |
| Medicine  | 12        | 23,5         |
| Psychology  | 2         | 3,9          |
| Occupational Therapy  | 1         | 2,0          |
| Education not found   | 2         | 3,9          |
| <b>Title</b>  |           |              |
| Graduated   | 3         | 5,9          |
| Specialist  | 2         | 3,9          |
| Master  | 6         | 11,8         |
| Doctor  | 37        | 72,5         |
| Unspecified qualification   | 3         | 5,9          |
| <b>Geographic Origin</b>  |           |              |
| Brazil  | 12        | 23,5         |
| United States of America  | 11        | 21,6         |
| Sweden  | 6         | 11,8         |
| Spain   | 4         | 7,8          |
| United Kingdom  | 3         | 5,9          |
| Australia   | 3         | 5,9          |
| Germany   | 2         | 3,9          |
| Finland   | 2         | 3,9          |
| Canada  | 1         | 2,0          |
| Hong Kong   | 1         | 2,0          |
| Iran  | 1         | 2,0          |
| Ireland   | 1         | 2,0          |
| Japan   | 1         | 2,0          |
| Slovak Republic   | 1         | 2,0          |
| Serbia  | 1         | 2,0          |
| Vietnam   | 1         | 2,0          |
| <b>TOTAL</b>  | <b>51</b> | <b>100,0</b> |

| <b>Types of methodological procedures of the studies and research scenarios</b> | <b>N</b>  | <b>%</b>     |
|---|-----------|--------------|
| <b>Types of methodological procedures</b>                                       |           |              |
| Cross-Sectional Studies   | 23        | 45,1         |
| Intervention Studies  | 11        | 21,6         |
| Cohort Studies  | 6         | 11,8         |
| Controlled and Randomized Studies   | 6         | 11,8         |
| Prospective, Controlled and Randomized Study                                    | 2         | 3,9          |
| Descriptive Study   | 2         | 3,9          |
| Case Control Studies  | 1         | 2,0          |
| <b>Research Settings</b>  |           |              |
| Urban Community   | 13        | 25,5         |
| Higher Education Institution  | 13        | 25,5         |
| Hospital Geriatric Outpatient and Inpatient                                     | 5         | 9,8          |
| University Hospital   | 6         | 11,8         |
| Associations and reference centers for the elderly                              | 6         | 11,8         |
| Homes and nursing homes for the elderly   | 2         | 3,9          |
| Rural Community   | 1         | 2,0          |
| Home  | 1         | 2,0          |
| Clinic specializing in aging  | 2         | 3,9          |
| Not applicable  | 2         | 3,9          |
| <b>TOTAL</b>  | <b>51</b> | <b>100,0</b> |

Researchers from various fields of knowledge were identified, however, training in the health field was predominant, highlighting that the three main ones were Physical Therapy with 23 (45.1%); followed by Medicine with 12 (23.5%) and Physical Education, with six (11.8%) authorships. It is noteworthy that only two (3.9%) publications did not have the professional background of the main authors identified (Table 2).

Considering that, during aging, there is a decrease in both balance and functional mobility, which results in a greater propensity of falls and fear of falling in the elderly,<sup>22</sup> the areas of education that work in the maintenance and rehabilitation of the elderly functionality have a fundamental role, both in the health services that involve the integral care of the elderly person, and in the development of scientific research on the subject.

Regarding the title of the main authors, it was found that 37 (72.5%) researchers had a PhD, 6 (11.8%) had a Master's

degree, 2 (3.9%) were specialists, and 3 (5.9%) had a Bachelor's degree. It is noteworthy that in three (5.9%) publications the titles of the main authors were not found (Table 2).

Still regarding the main authors, it was possible to identify a total of 16 countries as geographical origin, among which Brazil stood out with the largest number of authors among the studies analyzed, with 12 (23.5%) publications. It is relevant to note that the states of São Paulo and Minas Gerais concentrated the largest number of studies produced nationally, with four (7.8%) and three (5.9) publications, respectively. Internationally, researchers from the United States, with authorship in eleven (21.6%) articles; and from Sweden with six (11.8%) identified publications, as shown in Table 2.

It is possible to relate the greater proportion of research developed by Brazilian authors to the increase in the elderly population in the country and the encouragement of research in the area. In addition, the evolution of Higher Education and Postgraduate Programs (PPG) in Brazil is highlighted. In the period between 1990 and 2017, there was a continuous growth of PPG and the Southeast Region maintained its predominance with half of the country's programs, although the percentage participation of the other Regions has increased appreciably.<sup>23</sup>

As for the type of approach of the studies, it was found that the 51 publications analyzed were research with a quantitative type approach. As seen in Table 2, it is noteworthy that, regarding the type of methodological procedures, 23(45.1%) articles were cross-sectional; 11(21.6%) were intervention studies; cohort articles and randomized controlled studies

were identified in six (11.8%) publications each; and only one (2.0%) case-control study was identified in the sample.

The option for conducting research with a quantitative approach reveals the researchers' intention to answer "how much", "in what proportion" and "which" variables interfere in balance and fear of falling in the elderly. Quantitative research is able to identify the deep nature of realities, their system of relationships, their dynamic structure, as well as to determine the strength of association or correlation between variables.<sup>24</sup>

With regard to research settings, studies that were conducted in urban communities and in Institutions of Higher Education predominated, with a total of 13 articles (25.5%), each. Other research sites were also identified in the analyzed studies, as can be seen in Table 2.

Regarding the language of the articles, English prevailed, present in 49 (96.1%) publications, while only two (3.9%) articles were written in Portuguese. Considering that the purpose of scientific research is the dissemination of knowledge, there is a progressive tendency to publish in English, which is justified by the fact that this language is currently seen as the "language of globalization" and, therefore, is mostly adopted by the journals indexed in the main databases.<sup>25</sup>

As for the keywords, a total of 293 terms were identified, distributed among the articles analyzed. The predominant keywords were "postural balance", mentioned in 38 (13%) publications; followed by the term "elderly", present in 36 (12.3%) papers; "fall accidents", mentioned in 24 (8.2%) articles; and the term "fear of falling", mentioned in 20 (6.8%) studies.

**Figure 3**-Conceptual map elaborated from the descriptors of the selected publications, in the period between 2008 and 2018. João Pessoa, PB, Brazil, 2019



After analyzing the keywords and grouping the similar terms, the concept map was elaborated, as shown in Figure 3. A concept map is a cognitive network, in which the concepts of a domain are the nodes, and the relations between them are indicated by ties, i.e., concepts with similar characteristics are gathered in the same category.<sup>26</sup>

The proposed map presents four thematic axes, which point to the relation of balance and fear of falling in the elderly with: fall accidents and risk factors; prevention and treatment measures; the performance of assessments and tests; and associated morbidities.

The thematic axis fall accidents grouped the terms related to risk factors for falls in the elderly, which involve aspects of balance and fear of falling, such as aging, frailty, mobility limitation, postural instability, confidence in balance, anxiety, and fear.

The second thematic group concerns the interventions aimed at preventing falls, improving balance, and treating the fear of falling in the elderly. The following were highlighted as prevention and treatment tools: balance training; the use of virtual reality interventions; cognitive behavioral therapy; exposure therapy; and exercises in different modalities.

In the group of descriptors related to evaluation measures and tests, the assessment of gait, functional mobility, fall self-efficacy, fear of falling, and postural balance in the elderly participants of the studies stood out. The main tests cited were: the Activities-specific Balance Confidence scale (ABC); Falls Efficacy Scale-International (FES-I); the five-minute sit and stand test; computerized dynamic posturography; and the Late-Life Function and Disability Instrument (LLFDI) functionality questionnaire.

It is noteworthy that by using scales, questionnaires, tests and intervention programs, it is possible to identify the factors related to balance, fear of falling, and falls in the elderly population. In this sense, scientific research becomes fundamental for the planning of care actions, both in the prevention and rehabilitation areas.

In the thematic axis about the morbidities associated with balance and fear of falling in the elderly, neurological diseases, vision diseases, osteoarticular diseases and, to a lesser extent, intermittent claudication, diabetic neuropathy and obstructive pulmonary disease (COPD) stood out.

From the concept map, the findings of the analyzed publications corroborate data regarding the profile of the elderly in relation to functionality and episodes of falls, associated with balance and fear of falling in this population. The profile of elderly people who fall includes the presence of morbidities, such as osteoporosis, reduced visual acuity, vestibular function alterations, decreased sensory motor function as a consequence of diabetes mellitus, neuromuscular and cognitive deficits, among other alterations.<sup>27</sup>

## CONCLUSION

The bibliometric indicators analyzed in the present study indicate that the scientific production available in online journals about balance and fear of falling in the elderly is under development both nationally and internationally, and the theme has been a recent focus of researchers in the health area, especially physiotherapists, physicians and physical education professionals. These have invested in publications, mainly in journals of the rehabilitation and gerontology areas.

Brazil stood out in the amount of scientific production in the analyzed period, showing that the investigation of

the theme in question is being increasingly addressed by Brazilian researchers, which is a reflection of the increased longevity in the country, as well as the growing number of graduate programs.

Considering the thematic axes identified from the concept map, it was evident both the importance of reflecting on the risk factors associated with falls, and the forms of assessment and intervention measures, which are directly related to balance and fear of falling in the elderly, as well as it was possible to verify a variety of comprehensiveness of the aspects inherent to the theme investigated by the authors.

It is also important to highlight the importance of developing bibliometric studies, as these studies point out research patterns and identify the tendencies on a given theme. Thus, it is expected that this study may contribute to the propagation of research on balance and fear of falling in the elderly and enable a better assistance to health professionals who work in the care and rehabilitation of elderly people's health.

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