Fear of falling and risk of falling: a systematic review and meta-analysis

Medo de cair e o risco de queda: revisão sistemática e metanálise

Miedo de caer y riesgo de caída: revisión sistemática y metanálisis

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Abstract
Objective: to verify if fear of falling is a risk factor in older people living in the community.

Methods: A systematic review was conducted with a meta-analysis based on the Preferred Reporting Items for Systematic Reviews and MetaAnalyses. The PECOS search strategy was used: Patient - elderly person aged 60 years or above, living in a community with a previous history of falls; Exposure - Fear of falling, Comparison - group without fear of falling, "Outcome" - fall outcome and "Studies" - included comparative observational studies. The searches were conducted in May 2018 in the following electronic databases CINAHL, Medline, Cochrane, Embase, Lilacs, PsycINFO and PEDro, through the following descriptors: "aged", "elderly", older adults, fear, fear of falling, accidental falls, fall, falls. Cross-references and gray literature were also searched. Two reviewers independently performed the identification, selection, eligibility and inclusion of the studies. The methodological quality of the studies was carried out by applying the STROBE tool. For the meta-analysis, the Review Mananger 5.3 Program was used®.

Results: Of 4,891 publications, five studies enabled a meta-analysis with 3,112 elderly. There was a chance of a fall of 12.15 times higher for the group of elderly people with fear of falling.

Conclusion: Fear of falling was identified as a risk factor for falling in the elderly population that lives in the community and that has a history of falling, it is necessary the investigation by health professionals in order to establish preventive measures.

Resumo
Objetivo: Verificar se o medo de cair é fator de risco em pessoas idosas que vivem na comunidade.

Métodos: Foi realizada uma revisão sistemática com metanálise baseada na Preferred Reporting Items for Systematic Reviews and MetaAnalyses. Utilizou-se a estratégia de busca PECOS: Paciente - pessoa idosa com 60 anos, ou mais, que vive em comunidade com história pregressa de quedas; Exposição- medo de cair, Comparação -grupo sem medo de cair, o "Outcome" - o desfecho queda e o "Studies"- foram incluídos os estudos observacionais comparativos. As buscas foram realizadas em maio de 2018 nos seguintes bancos de dados eletrônicos CINAHL, Medline, Cochrane, Embase, Lilacs, PsycINFO e PEDro, por meio dos seguinte descritores: "aged", "elderly", older adults, fear, fear of falling, accidental falls, fall, fallls. Foram também realizadas buscas de referências cruzadas e literatura cinzenta. Dois revisores realizaram a identificação, seleção, elegibilidade e inclusão dos estudos de maneira independente. A qualidade metodológica dos estudos foram efetuada pela aplicação do instrumento STROBE. Para a metanálise, utilizou-se o Programa ReviewMananger 5.3®.

Resultados: De 4.891 publicações, cinco estudos possibilitaram a metanálise com 3.112 idosos. Evidenciou-se uma chance de queda de 12,15 vezes maior para o grupo de idosos com medo de cair.

Conclusão: O medo de cair foi identificado como fator de risco de queda na população idosa que vive na comunidade e que possui história pregressa de queda, torna-se necessário a investigação pelos profissionais da ara da saúde afim de estabelecer medidas preventivas.

Resumen
Objetivo: verificar si el miedo de caer es factor de riesgo en personas mayores que viven en la comunidad.

Métodos: se realizó una revisión sistemática con metanálisis basada en la Preferred Reporting Items for Systematic Reviews and MetaAnalyses. Se utilizó la estrategia de búsqueda PECOS: Paciente (ancianos con 60 años o más, que viven en comunidad con historial anterior de caídas); Exposición (miedo de caer); Comparación (grupo sin miedo de caer); "Outcome" (el desenlace de la caída) y "Studies" (fueron incluidos los estudios observacionales comparativos). Las búsquedas fueron realizadas en mayo de 2018 en los siguientes bancos de datos electrónicos CINAHL, Medline, Cochrane, Embase, Lilacs, PsycINFO y PEDro, por medio de los siguientes descriptores: "aged", "elderly", older adults, fear, fear of falling, accidental falls, fall, fallls. También se realizaron búsquedas de referencias cruzadas y literatura gris. Dos revisores llevaron a cabo la identificación, selección, elegibilidad e inclusión de los estudios de manera independiente. La calidad metodológica de los estudios fue efectuada mediante la aplicación del instrumento STROBE. Para el metanálisis, se utilizó el programa ReviewMananger 5.3®.

Resultados: de 4.891 publicaciones, 5 estudios posibilitaron el metanálisis con 3.112 ancianos. Se observó una posibilidad de caída 12,15 veces mayor en el grupo de ancianos con miedo a caer.

Conclusión: el miedo a caer fue identificado como factor de riesgo de caída en personas mayores que viven en la comunidad y que poseen historial anterior de caída. Resulta necesaria la investigación por parte de profesionales del área de la salud a fin de establecer medidas preventivas.

Introduction

World population projections on aging are presented in the World Health Organization's (WHO) Global Report on Ageing and Health in 2015, and points out that the number of people over the age of 60 will double by the year 2050 in the world and in Brazil, it will almost triple. The elderly correspond to 12.5% of the Brazilian population and by the middle of the century may reach 30%, and Brazil is considered an "Aged Nation". This term is assigned by WHO to countries that are made up of more than 14% of older people. Another fact that is highlighted by the World Report on Ageing and Health is that, among the health problems of the elderly population, fall is one of them.[1]

Among the risk factors for falls in the elderly population, fear of falling has called attention, both in the findings of the national and international scientific literature as well as in the clinical practice of nurses and other health professionals.[2,3]

Fear of falling (ptophobia) has been described as the psychological and behavioral consequences of a fall suffered by an elderly person. In a study reported in literature, researchers followed 36 patients admitted to a hospital due to the fall and observed that, after four months of the event, they presented a set of signs and symptoms that make up the post-fall syndrome, being fear of falling the symptom most prevalent.[4]

Discussions about the concept of fear of falling and its recognition as a specific phobia, as well as the nature of fear of falling, has been referred to several reflections, mainly regarding the constructs associated with its occurrence. Thus, the fact that the elderly person who did not experience any falls develop fear of falling has strengthened the importance of the interrelationship of other factors associated with this fear, and can be considered as a multifactor phenomenon, not reduced to a fear of falling again and/or suffer the consequences of the fall.[5]

Another concept about fear of falling is made up of three different elements: the cognitive, the physiological, and the behavioral. These elements facilitate the understanding of fear of falling and a better estimate of the risk of falls. The same model suggests that fear of falling beyond the perception the elderly person has of their ability to maintain balance and deal with falls, along with other factors such as the occurrence of falls and beliefs about these events, but not in a causal way. The model assumes that fear of falling is strongly associated with the occurrence of falls, and is not an automatic result of the same, since people with a previous history of falls and those who have never fallen can develop this fear.[5]

The Brazilian Ministry of Health defines fear of falling as "a feeling of great concern at the notion of a real, apparent or imaginary danger of falls, that is, it may be present even in the elderly who never fell".[6]

There are studies in literature that used tools to identify fear of falling from a simple question "Are you afraid of falling? That often come accompanied by questions that assess the intensity or frequency of fear of falling down to the application of scale Falls Efficacy Scale (FES) which contains activities of daily living where it establishes a correlation of fall and self-efficacy, supported by the Cognitive Social Theory, defined as "perceived low self-efficacy to avoid falls during activities of daily living".[7] Also regarding this scale, the short version was developed: Short FES-I with seven questions and a score ranging from 7 to 28. If compared to the FES-I long version, it demonstrated a shorter response time, which was evidenced in studies through the assessment of psychometric properties, presenting high internal reliability with Cronbach's alpha of 0.92.[8]

The International Classification of Nursing Diagnoses of NANDA-I identifies the presence of the diagnosis of falls risk that is defined as "increased susceptibility to falls that can cause physical damage and compromise health", however, it is observed that, among the identified risk factors of this diagnosis fear of falling as a risk factor is not identified.[9]

Fear of falling on the elderly person can trigger activity restriction, physical capacity limitation and social isolation, thus identifying existing evidence in literature about fear of falling as a fall risk factor instrumentalizes the nurses and the multidisci-

plinary team for their recognition and implementation of interventions aimed at preventing falls.[10,11] Thus, the present study aimed to verify if fear of falling is a risk factor in elderly people living in the community.

Methods

A systematic review was performed with meta-analysis, based on the methodological guidelines: Systematic review and meta-analysis of comparative observational studies on risk factors and prognostics[12] guided by the following research question: "Is there scientific evidence in literature about fear of falling as a risk factor or protector for falls in the elderly with a previous history of falls?" based on the PECOS strategy: Patient - elderly person aged 60 years or above, who lives in a community with a history of falls; Exposure - Fear of falling, Comparison - group without fear of falling, "Outcome" - fall outcome and "Studies" - included comparative observational studies.

Exclusion criteria

Studies with elderly patients who suffered a fall and who presented comorbidities, such as Parkinson's, Alzheimer's, femoral fractures, frail elderly, claudication, cancer, among others, in order to reduce confounding variables.

Search and identification of articles

The electronic databases searched were CINAHL, Medline/PubMed, Embase, SPORTDISCUS, Lilacs, PsycINFO and PEDro. The search in literature was carried out in May 2018. Nonetheless, the year of publication and language were not delimited, according to the methodological guidelines of systematic review and meta-analysis.[12] Other sources of search were investigated through the gray literature and manual search: cross-referencing of included studies. For the search, descriptors controlled according to Health Sciences Descriptors (DeSC – *Descritores em Ciências da Saúde*), PubMed, Medical Subject Headings (MeSH) and Boolean operators "AND" and "OR". The following PubMed search

terms were used and the strategy was adapted to the other databases: "Aged" [Mesh] OR aged OR elderly OR "Aged, 80 and over" [Mesh] OR" Oldest Old" OR Nonagenarian* OR Octogenarian* OR Centenarian* OR "older adult" OR "older adults" OR older OR senior "Fear" [Mesh] OR fear OR fears OR "Phobic Disorders" [Mesh]OR "Disorder, Phobic" OR "Phobic Disorder" OR "Phobic Neuroses" OR "Neuroses, Phobic" OR Phobias OR Phobia OR "Panic" [Mesh] OR panic OR panics OR "fear of falling" "Accidental Falls" [Mesh] OR Falls OR fall OR Falling OR "Falls Accidental" OR "Accidental Fall" OR "Fall, Accidental"#1 AND #2 AND #3. The studies were selected using the Preferred Reporting Items for Systematic Reviews and Meta-Analyze (PRISMA) through the identification, selection and assessment of eligibility.[16] After selecting the studies, duplicate articles were excluded through the software EndNoteBasic® (Thomson Reuters, USA).

Study selection

The selection of studies was independently performed by two reviewers, using the Rayyan selection platform. Initially articles were selected after reading the title and abstract and those that met the eligibility criteria and that had consensus between the two reviewers were read in full for inclusion or exclusion in the review. Disagreements in the reading phase in full were resolved by consensus by a third reviewer.[12]

Data synthesis

The included studies had their data synthesized by two evaluators, using the modified data extraction form of the tool proposed by the Methodological Guidelines: systematic review and meta-analysis of comparative observational studies on risk factors and prognoses, identifying author and year of publication, country, type of study, age, sample size, tool to identify fear of falling and methodological quality of the study.[12]

Methodological quality assessment

The methodological quality of the included studies was assessed by using the STROBE (Strengthening

the Reporting of Observational Studies in Epidemiology).[12]

Results synthesis

For the meta-analysis, the ReviewMananger 5.3® Program was used. The measures of association of fall risk were analyzed by Odds Ratio (OR) calculation with 95% Confidence Interval and significance level of 5%. When possible, the association measures of the individual studies were combined in a forestplot metanalysis with Mantel-Haenszel statistical model to combine different ORs. The effect analysis model was determined according to the heterogeneity of the results assessed by the I^2 statistic. The presence of statistical heterogeneity was investigated by the inspection of the presentation of the charts of the meta-analysis and the funnelplot. The I-square (I^2) was also calculated for heterogeneity research, in which values of I^2 greater than or equal to 50% are considered as heterogeneous. In view of a high heterogeneity (I^2 greater than 50%), we used Cochrane Review Manager 5.3 software®.[12]

Figure 1. Flowchart of evidence selection based on PRISMA guidelines

Results

4,885 articles were identified in the electronic databases, six studies were identified by other sources, totaling 4,891 studies, of which 1,392 were excluded because they were duplicate references. After exclusion, 3,499 studies were read and assessed by title and abstract. After reading the title and abstract, 3,650 articles did not meet the eligibility criteria, and only 14 articles were read in full. After reading in full, seven articles were excluded for the following reasons: age less than or equal to 58 years,[13] descriptive study[14] elderly in a specific health condition[15-17], and lack of clarity of data.[18,19] Seven articles were then included in the review.[20-26] The total of included articles that met the inclusion criteria were seven, which allowed the qualitative analysis.[20-26] Quantitative analysis is possible only for five articles.[20-22,25,26] The reason for not including the two articles in the quantitative assessment was due to fear of falling being assessed by different scales (Figure 1).[23,24]
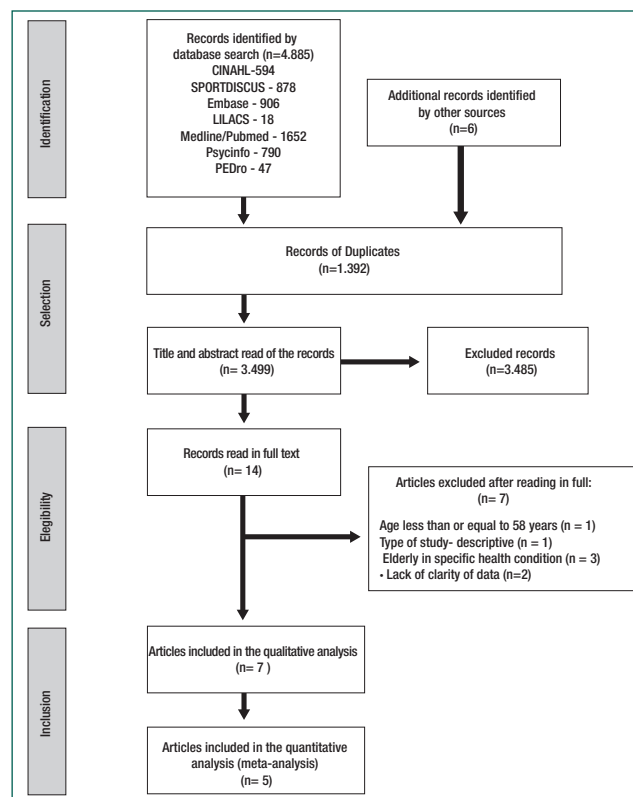
The synthesis of the general characteristics of the seven included studies[25,26] were four cross-sectional,[21-24] three longitudinal prospective.[20,25,26] The seven articles were from different countries, such as Spain,[26] Mexico,[25] India,[24] China,[23] Korea,[22] Canada,[21] and the United States.[20] All studies[20-26] were published between 2005 and 2018, age of the elderly was 60 years or above, the sample size of the studies ranged from 250 to 9033 elderly living in the community. The different tools used to identify fear of falling were simple and straightforward questions with dichotomous responses and with analogue scale of intensity and frequency found in five studies,[20-22,25,26] Two studies[23,24] applied different scales, such as the Chinese Fall Efficacy Scale-International-CFES-I[23] and the Short FES-I short version.[24] In assessing the methodological quality of the seven included studies,[20-26] it was observed that all met more than 80% of the STROBE criteria. Data synthesis is listed in chart 1.

Five studies[20-22,25,26] could be combined in a meta-analysis to analyze the odds ratio of fall among

Chart 1. Description of the characteristics of the included studies and assessment of methodological quality

Author /year od publication	Country	Type of study	Age	Sample size	Tool for Identify fear of falling	Strobe
Dierking MAL, 2016(25)	Mexico	Prospective Longitudinal Study	≥72 years	1.682 Elderly People	Simple question and scale of intensity of fear of falling. How scared are you to fall? Likert scale: without fear, some fear very afraid and extreme fear (severe fear of falling). Dicotomized in score: 0 = no fear and 1 = for other options.	A
Filiatrault J, Desrosiers J, 2011(21)	Canada	Cross-Sectional Study	≥65 years	288 Elderly People	Simple question and frequency scale of fear of falling. Are you afraid of falling? Categorized in: never, occasionally, often and very often. Dichotomized in score: 0 = never 1 = for other options.	A
Kim S, So WY,2013 (22)	Korea	Cross-Sectional Study	>60 years	9.033 Elderly People	Simple question and scale of intensity of fear of falling. Are you afraid of falling? (falling, slipping or falling while sitting) Categorized in: without fear, some fear and extreme fear. Dichotomized in score: 0 = without fear 1 = with some fear/fear	A
Lach H W, 2005(20)	United States	Prospective Longitudinal Study	≥ 60 years	890 Elderly People	Simple question and frequency scale of fear. At the moment, are you very afraid, some fear or not afraid to fall (fall again)? Dichotomized in score: 0 = not fear and 1 = some/very afraid.	A
Lavedán et al., 2018(26)	Spain	Prospective Longitudinal Study	≥75 years	640 Elderly People	Simple question: Are you afraid of falling? With dichotomous answers: yes/no.	A
Liu J YW, 2014(23)*	China	Cross-Sectional Study	≥ 65 years	445 Elderly People	CFES-I	A
Mane et al., 2014(24)*	India	Cross-Sectional Study	>60 years	250 Elderly People	Short FES-I	A

*CFES-I - Chinese Fall Efficacy Scale- International; * Short FES-I - Short Fall Efficacy Scale- International; Studies included in the qualitative analysis and excluded from the meta-analysis
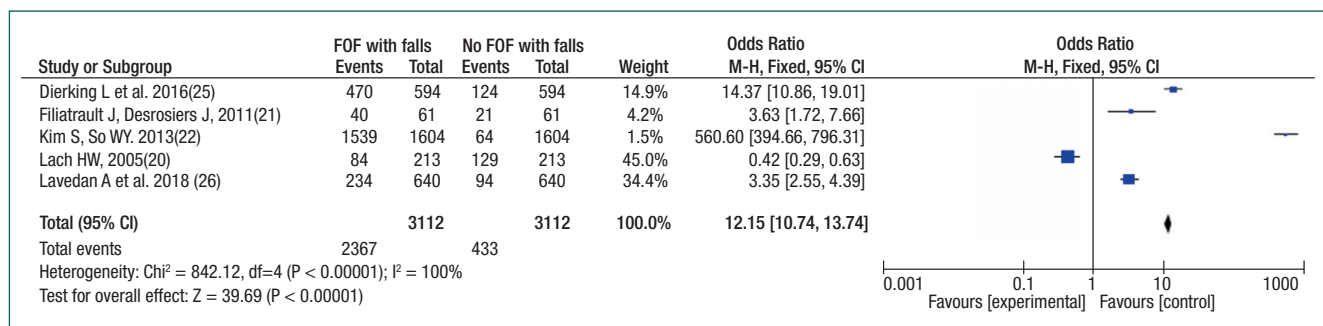

Figure 2. Ratio of chance of falling among elderly with and without fear of falling with previous history of fall

elderly with and without fear of falling who had a previous history of falls. Comparing the fall events for the elderly addressed with the simple and direct question with dichotomous answers and with analogue scale, it was observed that the group of elderly respondents who are afraid to fall had a drop chance ratio of 12.15 (CI = 10.74-13.74) in relation to the group without fear of falling. The heterogeneity among included studies was I2 = 100%, p <0.00001 (Figure 2).

Discussion

The studies included were mostly cross-sectional,[21-24] making it impossible to establish a cause and effect relationship. Regarding the year of publication, it

was observed that most of the included studies were published in the last five years,[23-26] which denotes a topic of growing interest in the health of the elderly. In a meta-analysis evidenced in literature[27,28] it was observed that fear of falling and falls are important public health problems affecting the elderly population, both in developed and developing countries, which was also evidenced in the studies of this review, these phenomena reach both developing countries[23-25] both those developed.[20-22,26]

The difference found in the studies regarding the age group to classify the individuals as elderly, in which some consider the elderly the individuals with 60 years or above[20,22,24] others[21,23,25,26] with equal or greater age that 65 years is due to the fact that in developing countries, according to the World Health Organization are identified as seniors

from 60 years, and in developed countries such as the United States and Canada, from 65 years. The study that assessed the elderly as being older than or equal to 72 years considered that this is a growing population and that needs to be studied.[29]

This review included seven studies, however, only five were included in the meta-analysis.[20-22,25,26] The justification for the exclusion of two studies,[23,24] was aimed at reducing the risk of bias, since they used different tools to assess fear of falling, thus interfering with the analysis of the studies. In this way, studies[20-22,25,26] were used that used the following assessment tools: a single question with dichotomous answers (yes/no) and analogue scale (intensity and frequency).

Four studies[21,22,25,26] presented a fall chance ratio, that is, an OR greater than 1 in the group of elderly people who answered that they are afraid of falling and had a previous history of fall, thus showing fear as a risk factor for falls. Nevertheless, the presence of only a single study[20] presented an OR of 0.42, demonstrating that fear of falling was a protective factor for falls.

Regarding heterogeneity, it was observed that it was higher than 50% in all the analyzes performed, which can be explained by the design of the included publications and a large discrepancy between the number and the age of the patients included in each one. A small sample size may lead to less accurate estimates between exposure and outcome. In addition, heterogeneity may increase when the characteristics of the patients, such as age and clinical conditions are not similar, as well as when they present differences in the design and statistical presentation of the results.[12]

The Global Report of the World Health Organization on the prevention of falls in old age, corroborates with the result of the present study highlighting that fear of falling increases the risk of falls among elderly people who have previously fallen, triggering a decline in functional capacity and partner) and to manage and avoid other falls.[30]

Regarding the tool used to assess fear of falling, it was observed that most of the included studies investigated fear of falling through a simple, direct question with analogue scale, and others assessed through the CFES-I and Short Scale FES-I.[23,24]

Literature indicates that the use of a single question initially has advantages, as it is direct and easy to generate estimates of the prevalence of fear of falling in the elderly population.[31] However, some authors[31,32] consider that this question presents a limited capacity to detect the variability of degrees of fear, since it can express a generalized state of fear that does not directly reflect fear of falling, and makes it difficult to compare with other scales. Some authors[33,34] have broadened the options of answers to this question to better reflect the degree of fear of falling like "not afraid", "fear", "a little fear", "very afraid". It is worth noting that, in addition to being used in several studies, this question is also adopted by the Ministry of Health of Brazil in the Health Record of the Elderly Person, deserving, therefore, to rethink this form of assessment of fear of falling in this population.[35, 36]

FES-I, in turn, is based on the Social Cognitive Theory, which presents excellent psychometric properties, with a 96% internal consistency.[37] This scale is widely used and has already been validated in several countries, such as Brazil,[38] Portugal,[39] Saudi Arabia,[40] Turkey[41] and Spain.[42] These authors point out that tools that measure fall self-efficacy are used to measure fear of falling and vice versa, besides that, there are tools that measure two distinct constructs (fall self-efficacy and fear of falling), as a single construct (fear of falling) in this way, it is still unclear what is the best scale to measure fear of falling.[27,33,34]

Having been identified as a risk factor for falls, fear of falling is not found in the risk factors of the Nursing Diagnosis risk of falls, as evidenced in the NANDA-I International Classification of Nursing Diagnoses, in this way, their inclusion contributes to the refinement of this diagnosis. It is suggested to carry out theoretical studies of concept of fear of falling, as they can support the construction of scales that will allow to assess this condition in this population, besides studies with more robust methodologies to establish the cause and effect relationship. It is recommended that this theme be addressed in the process of training health professionals, in health care services, public or private. Nurses, as well as the multidisciplinary team that work directly with

this population, should investigate the risk of falls to propose possible preventive measures.

Conclusion

The present study points out that fear of falling is a risk factor for falls in elderly people living in the community who have a previous history of falling, becoming the inclusion of this aspect in the assistance of nurses and multidisciplinary team to this population. Although few studies have been identified that establish a cause and effect relationship, it was possible to establish a 12 to 15-fold chance of falling for the group of elderly people with fear of falling when compared to the group of elderly without fear of falling living in the community. It is believed that new research with robust methods of assessing fear of falling should be developed in the elderly who have already had falls or not.

Acknowledgments

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