

POSTURAL INSTABILITY AND THE PHYSICAL FRAILTY CONDITION IN ELDERLY PEOPLE: INTEGRATIVE REVIEW¹

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ABSTRACT

The objective of this study was to conduct an integrative review in databases to verify the (inter)national scientific production on postural instability and the physical frailty condition in elderly people. This is an integrative review performed in the databases LILACS, MEDLINE, SciELO and PubMed in the period from 2001 to 2016. The study included original articles directly related to the theme, fully available, in Portuguese and English. The initial search resulted in 483 articles and, after pre-established inclusion and exclusion criteria, the review corpus consisted of 24 articles. The publications presented recent growth with an emphasis on the international literature. Three thematic categories emerged: postural instability associated to aging: causes and consequences; recognition of the physical fragility and postural instability: relations and associations; and interventions for the postural balance rehabilitation. The postural instability associates with the aging process, as a marker of physical fragility and health of the elderly person. The results offer grants to strengthen the management of preventive care of the progression of the frailty syndrome.

Keywords: Postural Balance. Frail Elder. Elder's Health. Dizziness.

INTRODUCTION

An American study⁽¹⁾ analyzed the prevalence and impact of dizziness and balance disorders in the elderly population. Among nine million interviewees over 65 years, two million reported problems with dizziness or balance in the last 12 months. The reported problems were instability, dizziness and fainting. Balance disorders prevented the participation in activities, such as physical exercise and participation in social events. For every five elders, one has dizziness or problems with the balance annually.

In Brazil, a research⁽²⁾ performed in Primary Health Care with 521 elderly people over 60 years associated the condition of fragility to geriatric syndromes, classifying 21.5% of the elders as fragile, 51.1% as pre-fragile and 27.4% as not fragile. The frequency of postural instability was 36.5%. The weakness associated with three of the five geriatric syndromes, and the postural instability was the third most prevalent ($p < 0.001$).

Physical frailty is defined as a “medical syndrome with multiple causes and contributions, characterized by decreased strength, endurance and reduced physiological function that increases the individual's vulnerability and develops greater dependence and/or death”^(3,1). It can be diagnosed after measuring five biological markers of elders: reduced gait speed, reduced handgrip strength, unintentional weight loss, decreased level of physical activity and self-report of fatigue/exhaustion⁽⁴⁾.

The postural balance involves reception, integration of sensory stimuli, planning and execution of movements to control the center of gravity over the support basis, conducted by the postural control system that integrates information from the vestibular system, visual receptors and somatosensory system⁽⁵⁾.

In aging, postural responses may become deficient, incapable of integrating sensory information and determining trunk oscillations in upright position, which characterizes the postural instability⁽⁶⁾. The feeling of disturbance in balance is called dizziness, and may be

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accompanied by disorientation of the rotatory type, known as vertigo⁽⁷⁾.

The postural instability is considered a geriatric syndrome and is associated with adverse outcomes⁽⁸⁾. Frail elderly people have a greater quantity of geriatric syndromes and implications in the provision of health care⁽⁹⁾. Identifying geriatric syndromes related to frailty favors the planning of geriatric care and strengthens the treatment plan under a specific approach.

Therefore, the objective of this study was to conduct an integrative review in databases to verify the (inter)national scientific production on postural instability and the physical frailty condition in elderly people.

METHODOLOGY

The objective of integrative reviews is to gather and synthesize results of researches on specific themes, in a systematic and orderly manner, in addition to contributing to the deepening of knowledge of the studied theme⁽¹⁰⁾.

This review was founded and followed five steps⁽¹⁰⁾: First step, identification of the theme and selection of the research question; Second step, search and selection of literature, establishment of inclusion/exclusion criteria; Third step, characterization of studies; Fourth step, assessment of studies included in the integrative review; Fifth step, interpretation of the results.

The first step allowed identifying as a problem the relationship between postural balance and physical frailty in elderly people and the following research question emerged: what is the current panorama of national and international scientific production about the postural balance and physical frailty in elderly people?

In the second step, the Descriptors in Health Sciences (DeCS) and Medical Subject Headings (MeSH) were used. The strategies for selecting scientific productions were: Boolean operators AND or OR to seek greater amount of publications in LILACS database. The study chose the allfields strategy in databases SciELO, PubMed and MEDLINE to broaden the search.

The specificities in each selected database, according to Boolean operator and strategies were: LILACS - through Virtual Health Library (VHL): ("frail elderly" [DeCS] and "postural balance" [DeCS]); ("frail elderly" [Words] and "postural balance" [Words]); ("postural balance" [Words] OR "dizziness" [Words] OR "Vertigo" [Words]). SciELO:

("frail elderly"[allfields] AND "postural balance"[allfields]); ("frail elderly"[allfields] AND "tontura"[allfields]); ("frail elderly"[allfields] AND "vertigo"[palavras]); ("frail elderly" [allfields] AND "balance"[allfields]). PubMed: ("frail elderly" [allfields] AND "postural balance" [allfields]). MEDLINE - Via BIREME: ("frail elderly" [allfields] AND "postural balance" [allfields]).

The inclusion criteria were: a) articles published in the period from January 2001 (year of creation of Fried's phenotype) to December 2016; b) original articles and reviews published in the selected databases; (c) articles fully available and directly related to the topic in Portuguese and English. The exclusion criteria were: a) editorials, book reviews, experience reports, theoretical reflections, dissertations, theses and monographs; (b) articles repeated in databases, keeping only the first version found.

For the third step, a spreadsheet in the computational program Microsoft Excel[®] 2010 was prepared to characterize the selected articles: knowledge area, background, title, authors, year, journal, language, objective, study method, sample/number of participants, study location, main results and observations.

In the fourth step, the studies were evaluated by reading all the included articles. The fifth step was completed with the interpretation of studies and transcription of the integrative review, followed by the presentation of the thematic categories that emerged.

To illustrate the selection of articles and the composition of the corpus of the integrative review, Preferred reporting items for systematic reviews and meta-analyses (PRISM) was used⁽¹¹⁾.

RESULTS

The initial search totaled 483 articles, of these, 182 were fully available, of which 13 were excluded due to repetition and 158 by not discussing the theme, the final sample consisted of 24 articles (Figure 1).

Of the 24 articles selected for the review corpus, publications from 2009 to 2016 stand out, with an increased number of articles from the year 2011 and the reduction of these publications after 2015.

The main language was English (83%), followed by Portuguese (17%). The countries of origin of the publications were the United States of America (20.8%), France and Spain (12.4%), Canada (8.3%) and England, Norway, Switzerland, India, China, Denmark and Ireland (4.1%).

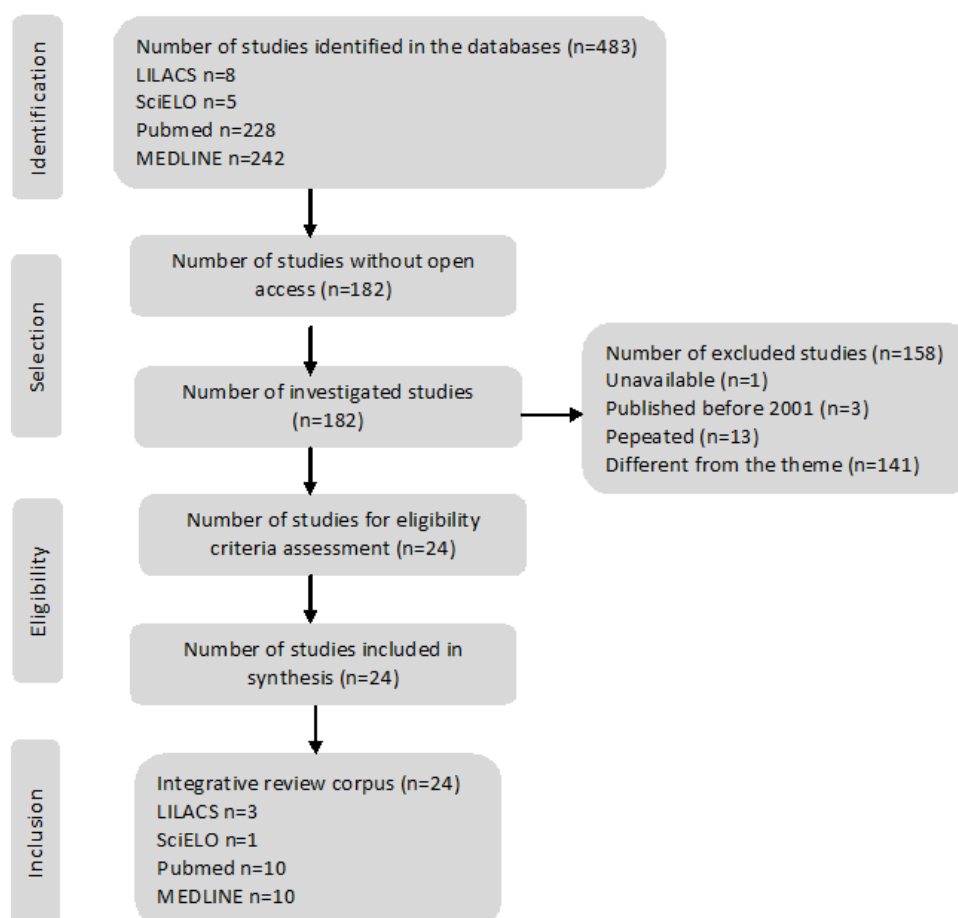


Figure 1. Flowchart of the selection of articles and composition of the integrative review corpus.

Regarding methodology, all studies included in the corpus of this integrative review were quantitative. Cross-sectional studies predominated (28.7%), followed by prospective cohort studies (24.6%), intervention (20.5%), experimental (16.4%), and randomized clinical trials (8.3%). Regarding the samples, 57.4% consisted of <100 elderly, 30.8% >100 elderly, 4.1% >500 elderly and 4.1% with sample >1000 elderly. Most publications were published in international journals (82%), followed by national journals (18%).

The articles were classified into three themes: postural instability associated with aging: causes and consequences; recognition of the physical frailty and postural instability: relations and associations; interventions for the postural balance rehabilitation.

DISCUSSION

Postural instability associated with aging: causes and consequences

The selected articles indicate that postural instability is associated with the aging process, since it represents structural, physiological and functional modifications in people's body. The decreased physiological reserves and physical changes caused by postural instability can cause adverse effects such as falls and fractures⁽¹²⁻¹⁴⁾, increased functional disability, morbidity, hospitalization and death⁽¹⁵⁾.

A cross-sectional study⁽¹²⁾ investigated the prevalence, causes and consequences related to the occurrence of falls among 15 elderly people of a Long-Term Care Facility (LTCF). Men and women aged over 79 years participated in the study. The results showed the prevalence of balance disorders and gait (45.7%), and pointed out serious injuries and fractures as the main consequences of falls.

A cross-sectional research⁽¹³⁾ developed with 145 elderly patients treated in the Geriatric Outpatient Clinic of a University Hospital identified the profile of this population according to sociodemographic, clinical, physical and functional variables related to

falls. The results showed that the imbalance associated with fall ($p<0.006$).

Authors⁽¹⁴⁾ analyzed the prevalence of falls in 240 frail elders, their consequences and associated demographic factors. The changes in the balance occurred in 55.9% of the sample as a causal factor of falls, and the consequences were excoriations and fear of falling again. The authors conclude that these consequences may cause psychosocial impacts and reduction of Activities of Daily Living (ADL) of elderly people.

A prospective cohort study⁽¹⁶⁾ confirms these findings when describing the changes and predictive variables for immobility in elders. During a nine-year follow-up, 113 elderly people participated in the study. The predictive variables for immobility were: Body Mass Index (BMI), decreased strength and balance disorders ($p<0.001$). The results suggest that a proper nutrition, strength and balance exercises decrease the immobility risks.

Another study⁽¹⁵⁾ evaluated the balance and mobility in the control of acute changes in the health of 409 hospitalized elderly people. The results showed that 48% of elderly patients with lower scores in the three areas of frailty, balance and mobility died. The mean hospital stay was 26 days and the mortality occurred in 5.6% of the elders. The hospitalization increased to 30 days in elders with mobility and balance impairment.

It corroborates the results of the op. cit study when affirming that the mobility and balance impairment are associated to mortality. A prospective cohort study⁽¹⁷⁾ with 1295 elderly people of the community related frailty, decreased balance and mobility to the risk of death. Frailty was associated with a reduced balance ($p<0.001$), mobility ($p<0.01$) and increased risk of death in the following five years.

Recognition of the physical frailty and postural instability: relations and associations

The postural instability is associated to aging and frailty⁽¹⁸⁻²⁰⁾. Postural balance in frail and non-frail elderly people of community. The control and experimental group consisted of elderly individuals of both sexes. The postural stability was lower in the experimental group compared to elderly patients in the control group ($p<0.05$). The postural instability is related to frailty, however, more studies are necessary to understand the balance of frail elders⁽¹⁸⁾.

The differences in the mechanisms of postural balance were analyzed in 122 elderly people of the community. Each participant held two trials of 15 seconds for the evaluation of balance: the first with eyes open and the second with eyes closed, both assays were performed with sensors adjusted to the body. The balance evaluation in the closed-eyes condition eyes showed greater variation, the average rate of balance oscillation was 164% and 66%, in frail and pre-frail elderly people, respectively, when compared to non-frail ($p<0.001$)⁽¹⁹⁾.

The gait, balance and physical activity were evaluated as frailty markers in 125 elderly people in the community. The gait speed (Area Under the Curve - AUC=0.802), hip oscillation (AUC=0.734) and steps/day (AUC=0.736) were the most sensitive parameters for identifying pre-frailty. The step length (AUC=0.857) and the use of support (AUC=0.841) were sensitive in pre-frail and frail elderly people⁽²⁰⁾.

A prospective cohort study⁽²¹⁾ analyzed the frailty and balance of elders during a protocol of dual task. He participants were 550 elderly individuals aged over 77 years participated in the study. The balance was evaluated by multiscale entropy and the condition of dual task reduced the dynamics of balance in the three groups ($p<0.001$).

A research⁽²²⁾ with 399 elderly people in the community stands out, in which the authors investigated a quick and effective method to evaluate frailty. The frailty classification showed an average of 75.2% accuracy in the use of sensors and the Timed Up and Go (TUG) test, accuracy of 71.8% stratified by gender. The study concluded that tests of mobility and balance could be quick and effective means to evaluate frailty and represent significant clinical benefits.

Interventions for the postural balance rehabilitation

The panorama on postural balance rehabilitation suggests various strategies for maintaining the balance, such as static equilibrium rehabilitation^(23,24), dynamic exercises with music therapy⁽²⁵⁾, simple and dual-task training⁽²⁶⁾, force training⁽²⁷⁾, use of magnetic sensors⁽²⁸⁾, and electric stimulation⁽²⁹⁾, in addition to strength training combining computer and/or videogame^(30,31), vibrating exercises^(32,33), and the use of vitamin D⁽³⁴⁾.

A randomized controlled trial⁽²³⁾ evaluated the efficacy of static equilibrium exercises in institutionalized falling elders. The participants were

50 elderly people, of both genders, randomly separated into control group and experimental group. The first group received 12-minute training per session, three times a week, during 12 weeks, and the control group received literature on prevention of falls. The intervention group showed a significant improvement of the static balance after 12 weeks ($p<0.01$).

An intervention study⁽²⁴⁾ found a similar result when investigating the effects of an exercise program of postural control in 26 hospitalized frail elders. After eight weeks of exercises, the support basis improved in relation to the static equilibrium ($p=0.006$).

A research⁽²⁵⁾ assessed the effects on physical performance and the risk of falls in elderly patients after exercise with music. A sample of 134 elderly people in the community aged over 75 years, with risk for falls, received the program of exercises and a four-year follow-up in an intervention study. The group showed improvement in gait speed ($p=0.006$) and balance ($p=0.015$), there was also improvement in tests of handgrip strength ($p<0.05$). The exercise program reduced the risk of falls ($p=0.008$).

The dual-task condition was observed in the control of static and dynamic balance of six pre-frail elderly people from the community. The results showed improvement in the maintenance of the balance after training on a treadmill. The dual task does not favor the improvement of balance maintenance⁽²⁶⁾.

A randomized controlled study⁽²⁷⁾ aimed to evaluate whether the efficacy of resistance training improves postural balance in elders. The sample consisted of institutionalized elderly people. The group of resistance strength training presented, during six months, constant improvement of postural balance ($p<0.001$). The other groups showed improvement only in the first three months.

This review highlights the use of electrical stimulation to improve postural balance. A research⁽²⁹⁾ evaluated the neuromuscular electrical stimulation on the improvement of postural balance in pre-frail elders. Sixteen elderly people participated in this study, separated into two groups, intervention and control groups. The first group consisted of nine pre-frail institutionalized elders and the second group, of seven elderly people from the community. For both groups, four weeks of training with electrical stimulation improved the postural instability in 26.8%⁽²⁹⁾.

It corroborates the results found, in which researchers used magnetic sensors along the body to evaluate elders' postural balance. The study included 14 frail elders, 18 pre-frail elders and 24 healthy people.

The group of frail elders presented worse postural balance ($p<0.05$)⁽²⁸⁾.

Researchers⁽³⁰⁾ evaluated the balance training with the aid of feedback on computer. The participants were 35 elders, randomized into two groups. Both received resistance training for progressive muscle strength and physical ability training, and one group received traditional balance training and the other, balance training with computer. The group of feedback computer training showed improvement in the balance of up to 400%.

The postural balance and muscle strength were also evaluated in elderly people in the community. The elderly were separated into intervention and control groups. Participants in the intervention group received training during ten weeks, and the control group used ethylene acetate insoles daily. The results showed that the intervention group showed better performance when compared to the control group ($p=0.001$)⁽³¹⁾.

Of the analyzed articles, two stress out trainings using vibration in postural balance recovery. A research⁽³³⁾ evaluated the effects of vibration exercises on the mobility and balance functions in the overall health status of frail elderly people. The 44 elderly participants were randomly assigned into the intervention group, which received an exercise of whole body vibration, and a control group, which received care and traditional exercises during eight weeks. The results showed that the balance and overall health status improved in both groups ($p<0.05$).

This response can also be observed in a randomized study⁽³²⁾ that investigated the effects of whole body vibration in elders. The participants were 38 elderly people in the group of vibration exercises and 39 in the group of traditional exercises. The intervention group was submitted to supervised exercises and vibration exercises. Balance, fear of falling and state of health improved significantly in both groups ($p<0.05$).

The effects of multicomponent training in increased muscle mass were evaluated. The 24 patients were randomized to intervention or control groups. The intervention group held a 12-week multicomponent exercise program, composed by training of muscle strength, balance and gait. The intervention group showed improvement of muscular strength ($p<0.01$)⁽³⁵⁾.

As intervention for postural balance rehabilitation, this integrative review pointed out the use of vitamin D. The researchers⁽³⁴⁾ analyzed if elderly patients with vitamin D levels exceeding 25 hydroxyvitamin (OH)

have better postural balance. Blood samples were collected and the balance was assessed by posturography. The serum concentration of 25 (OH) was inversely associated with imbalance ($p=0.02$), and elders with vitamin D levels of 55 ng/ml were associated with a better postural balance compared to elderly patients with levels between 30-35 ng/ml, values considered low in the literature.

Strategies for maintaining balance demand regular practice of physical exercises in the prevention and treatment of functional declines that may be associated with the aging process⁽³⁶⁾.

FINAL CONSIDERATIOS

The scientific production on postural instability and physical frailty, although of incipient, presents recent growth with an emphasis on the international literature.

Cross-sectional studies and with elderly people from the community predominated, thus reiterating the need for studies showing postural balance and physical frailty condition with other designs and in different research contexts.

Regarding postural instability, results of the studies suggest association with aging as a marker of physical frailty and health of the elderly person. Frail elders have lower postural stability and greater trunk oscillation in upright position. These results provide subsidies for the clinical practice, in the management of preventive care of the progression of the frailty syndrome.

The review showed a diversity in the designation of the term postural instability, as observed in several investigations, which hindered the identification of studies in current literature and during data discussions.

INSTABILIDADE POSTURAL E A CONDIÇÃO DE FRAGILIDADE FÍSICA EM IDOSOS: REVISÃO INTEGRATIVA

RESUMO

O objetivo do estudo foi realizar uma revisão integrativa em bases de dados para verificar a produção científica (inter)nacional sobre instabilidade postural e a condição de fragilidade física em idosos. Trata-se de uma revisão integrativa realizada nas bases de dados LILACS, MEDLINE, SciELO e PubMed, no período de 2001 a 2016. Incluíram-se artigos originais diretamente relacionados ao tema, disponíveis na íntegra, nos idiomas português e inglês. A busca inicial resultou em 483 artigos e, após critérios pré-estabelecidos de inclusão e exclusão, 24 artigos perfizeram o corpus da revisão. As publicações apresentaram crescimento recente com destaque para a literatura internacional. Emergiram três categorias temáticas: instabilidade postural associada ao envelhecimento: causas e consequências; reconhecimento da fragilidade física e instabilidade postural: relações e associações; e intervenções para a reabilitação do equilíbrio postural. A instabilidade postural associa-se ao processo de envelhecimento, como um marcador de fragilidade física e da saúde da pessoa idosa. Os resultados oferecem subsídios para fortalecer a gestão de cuidados preventivos da progressão da síndrome da fragilidade.

Palavras-chave: Equilíbrio Postural. Idoso Fragilizado. Saúde do Idoso. Tontura.

INESTABILIDAD POSTURAL Y LA CONDICIÓN DE DEBILIDAD FÍSICA EN ANCIANOS: REVISIÓN INTEGRADORA

RESUMEN

El objetivo del estudio fue realizar una revisión integradora en bases de datos para verificar la producción científica (inter)nacional sobre inestabilidad postural y la condición de debilidad física en ancianos. Se trata de una revisión integradora realizada en las bases de datos LILACS, MEDLINE, SciELO y PubMed, en el período de 2001 a 2016. Se incluyeron artículos originales directamente relacionados al tema, disponibles en su totalidad, en los idiomas portugués e inglés. La busca inicial resultó en 483 artículos y, tras criterios preestablecidos de inclusión y exclusión, 24 artículos concluyeron el corpus de la revisión. Las publicaciones presentaron crecimiento reciente con destaque para la literatura internacional. Surgieron tres categorías temáticas: inestabilidad postural asociada al envejecimiento: causas y consecuencias; reconocimiento de la debilidad física e inestabilidad postural: relaciones y asociaciones; e intervenciones para la rehabilitación del equilibrio postural. La inestabilidad postural se asocia al proceso de envejecimiento, como un marcador de debilidad física y de la salud de la persona anciana. Los resultados ofrecen subvención para fortalecer la gestión de cuidados preventivos de la progresión del síndrome de la debilidad.

Palabras clave: Equilíbrio Postural. Anciano Debilitado. Salud del Anciano. Mareo.

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