
FRAILITY IN THE ELDERLY: CONCEPTUAL ANALYSIS¹

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ABSTRACT: In recent decades, it has been observed an increase in scientific production on frailty in the elderly. Nevertheless, there is no consensus on the definition and use of that concept. Thus, in view of the need to clarify it, the objective of this study was to analyze the concept frailty in elderly people, identifying antecedents, attributes and consequences of the phenomenon. The study was guided by the conceptual model of analysis proposed by Walker and Avant, being performed by the examination of 31 papers relevant to the subject, published in Portuguese, English and Spanish from 2001 to 2009. The results confirmed that frailty in the elderly is a multidimensional and multifactorial event, characterized by the vulnerability to the biopsychosocial and environmental stressors along with changes in the muscle-skeletal system, in the motor function, body composition and resulting in functional impairments and their outcomes.

DESCRIPTORS: Frail elderly. Elderly. Aging.

ANÁLISE DO CONCEITO FRAGILIDADE EM IDOSOS

RESUMO: Nas últimas décadas, observa-se um incremento da produção científica sobre fragilidade em idosos. Apesar disso, não há consenso sobre a definição e o uso desse conceito. Assim, tendo em vista a necessidade de clarificá-lo, objetivou-se neste estudo analisar o conceito fragilidade em idosos, identificando os antecedentes, os atributos e as consequências do fenômeno. O estudo foi guiado pelo modelo de análise conceitual proposto por Walker e Avant, sendo realizado por meio da análise de 31 artigos científicos pertinentes à temática, publicados nos idiomas português, inglês e espanhol, no período de 2001 a 2009. Os resultados permitiram confirmar que a fragilidade em idosos constitui um evento multidimensional e multideterminado, caracterizado por vulnerabilidade aos estressores biopsicossociais e ambientais e por alterações no sistema musculoesquelético, na função motora e na composição corporal, que resultam em prejuízos funcionais e seus desfechos.

DESCRIPTORES: Idoso fragilizado. Idoso. Envelhecimento.

ANÁLISIS CONCEPTUAL DE LA FRAGILIDAD EN ANCIANOS

RESUMEN: En las últimas décadas, se observa un incremento en la producción científica sobre fragilidad en ancianos. A pesar de esto, no hay consenso sobre la definición y uso de este concepto. Teniendo en vista la necesidad de clarificarlo, este estudio tuvo como objetivo analizar el concepto fragilidad en los ancianos, identificando los antecedentes, los atributos y las consecuencias. El estudio fue guiado por el modelo de análisis conceptual propuesto por Walker y Avant, que se llevó a cabo a través del análisis de 31 trabajos pertinentes a la temática, publicados en portugués, inglés y español, en el periodo de 2001-2009. Los resultados permitieron confirmar que la fragilidad en los ancianos constituye un evento multidimensional y multifactorial, caracterizado por la vulnerabilidad a los estresantes biopsicosociales y ambientales y por alteraciones en el sistema musculoesquelético, en la función motora y en la composición corporal, que resultan en prejuicios funcionales y sus consecuencias.

DESCRIPTORES: Anciano fragilizado. Anciano. Envejecimiento.

INTRODUCTION

Fragility is an emerging concept used in the field of geriatrics and gerontology in order to refer to unfavorable clinical conditions of the elderly,¹ and it calls the attention of professionals and researchers working with issues related to aging. Nevertheless, there is a deficit of information regarding the incidence and prevalence of frailty in the elderly, especially in our area, due to the lack of consensus about a definition that could be used as triage in different populations.²

Some scholars say, on this subject, that if there is a "clinical judgment" about the meaning of fragility and who really is the frail elderly there will be no agreement, no standard definition on the concept that might help in the early identification of high risk patients evidencing this phenomenon.² It also compromises to address the problem, particularly in our context, the fact that some health professionals consider the fragility as inherent condition of aging. Such attitude may lead to a late action, with minimal potential for prevention or reversal from adverse consequences related to that matter.³

This indicates the need for studies aimed at resolving ambiguities regarding the use of the concept and, consequently, the development of a consensual definition to the phenomenon. The concepts, which are considered symbols of what happens in the real world of phenomena and they are tools for researchers and professionals, need to be clarified and defined in the perspective of being used with greater understanding of their meanings and, then, contribute for a better quality on nursing care.⁴

Thereby, a consensual definition of frailty in elderly people will favor health professionals, mainly nurses, in the construction of instruments for concept measuring and hence the basis for planning and implementing a better quality to care for the elderly, especially for those ones aged eighty or more. In relation to this matter, the objective of this study was to analyze the concept of frailty in the elderly, identifying possible antecedents (or predictors), critical attributes and consequences of the phenomenon.

METHODOLOGY

It was performed the analysis of the concept frailty in the elderly, through the following

steps: selection of the concept, determination of the conceptual analysis goals, identification of possible uses of the concept; determination of critical or essential attributes (elements of differential diagnoses from the phenomenon), previous events (determinants of its occurrence) and concept consequences (events resulting from its presence).⁵

After selecting the concept to be analyzed and establishing the conceptual analysis goal (as expressed above), it was searched on health literature and through the website of the Health Virtual Library (BVS) studies published in the databases Latin American and Caribbean Literature on Health Sciences (LILACS), the Scientific Electronic Library Online (SciELO) and Medical Literature Analysis and Retrieval System Online (MEDLINE), in Portuguese, English and Spanish languages between 2000 and 2009. They addressed in their titles aspects related to frailty in the elderly, available in full and for free on Internet. This period was selected due to the increase in the number of publications in the last decade, especially in the last years.

In order to locate this literature, it was used the key word frail elderly in English and *anciano frágil* in Spanish. This search led to the identification of 122 articles in LILACS database, 12 in SciELO database (which were repeated in LILACS and, then, disregarded) and 3781 in MEDLINE. In view of the large number of articles checked in MEDLINE, it was held a refinement of publications through the frail elderly descriptor combined with the syndrome word (term also used to name the phenomenon), and resulting in 147 articles. Considering the sum of the items located in LILACS and MEDLINE, it was found 269 articles that could potentially meet the inclusion criteria established. Once the articles were available, two tests of relevance were used to the selection of those ones that might be included in the sample: the test of relevance I, applied to the abstracts and test of relevance II, applied to the articles read in full.

The test of relevance I looked for a careful review of the abstracts in order to identify whether they addressed somehow sufficient elements to the conceptual analysis desired. This triage allowed the exclusion of 178 articles dealing with other concepts in relation to the study, like functional disability, comorbidity and vulnerability. Later, it

was performed an objective and careful reading of the 91 remaining articles. It was applied the test of relevance II, which considered the criteria of relevance and content consistency, in a way of confirming the material focused on definitions, attributes, antecedent events and/or consequences of frailty in the elderly. After this procedure, 60 articles were excluded and the final number of 31 studies remained for analysis.

For identification of scientific relevance from the studies involved in conceptual analysis, it was decided to check the level of evidence from analyzed studies, by using the following classification⁶: level one: evidence from meta-analysis of randomized and controlled clinical studies; level two: obtained in studies of experimental design; level three: evidence of quasi-experimental studies, level four: evidence from descriptive studies or with qualitative approach; level five: evidence from cases reports or experience reports; and level six: evidence based on opinions from experts in the area.

After the material selection phase that formed the basis to the concept analysis, it was carried out a careful and objective reading of it. During that reading, some fragments of the text that referred to attributes, antecedents or consequences of frailty in the elderly were highlighted. After this procedure, all of the topics from articles found during the reading were typed, and then, through an inductive process, the possible attributes, antecedents and consequences of the concept were listed.

RESULTS AND DISCUSSION

Regarding literature characterization, it is noted in relation to the works language that there was a predominance of those ones published in English (50%), because it is in the context of the United States and Canada where takes place the highest number of publications relating to the subject. Concerning the area of knowledge, there was a predominance of studies developed in the multidisciplinary area (46%). Of these, 18% in Public Health, 28% in Gerontology, followed by medicine (40%), Nursing (8%) and Physiotherapy (6%). In the area of nursing, the small number of publications focusing on frailty in the elderly indicates the need for nurses

to engage more effectively with this issue, both in care and research.

Concerning the level of evidence from studies involved in the concept analysis on frailty in the elderly,⁶ it was found that 6% had evidence level one, 4% had evidence level two; 66% presented evidence level three, 20% presented evidence level four, and finally, 4% expressed evidence level six. These data reveal that most of the analyzed articles were characterized as quasi-experimental researches reports and descriptive studies. As for the aspects related to the analysis concept addressed in this literary *corpus*, the following findings were verified.

Use of the term

The theoretical definitions about frailty in the elderly are diverse, non-consensual and focus, in particular, the clinical aspect.⁷ The term elderly was used officially for the first time, in 1970, by members of the Federal Council on Aging (FCA) of the United States of America in order to describe the elderly that lived in unfavorable socioeconomic conditions, had physical weakness, cognitive deficit, advancing age and started to demand greater care. In the eighties, based on the concept of functionality, frailty in the elderly was understood mainly as a synonym of disability, presence of chronic disease or extreme aging. In 1990, the term frail elderly was first referenced in the index of the Journal of the American Geriatrics Society.

In 1991, it emerged two attempts to define operationally the concept of frailty in the elderly since the establishment of empirical indicators. The first one⁸ oriented that in order to classify an elder person as frail he should present the following conditions or risk factors: disabling chronic disease, state of mental confusion, depression, falls, incontinence, malnutrition, pressure ulcer and socioeconomic problems. The second definition⁹ stressed that frailty is present when there is evidence of four of the following aspects: eighty years or more, depression, instability in balance and march, use of sedatives, muscle strength reduction from shoulders and knees, instability in the lower limbs and visual function deficit.

Currently, two research groups have distinguished in the pursuit of consensus on the

definition of frailty in the elderly: one of them in the U.S., at the Johns Hopkins University, and the other one in Canada, the Canadian Initiative on Frailty and Aging (CIF-A). Taking into account the longitudinal study Cardiovascular Health Study, and based on physiological principles, the group of researchers from the Johns Hopkins University¹⁰ produced an operational definition of frailty in the elderly and proposed measurable and objective criteria to the phenomenon.

This operational definition starts from the hypothesis that the term is a geriatric syndrome and it can be identified by means of a phenotype that includes five measurable components: (1) unintended weight loss, greater than 4.5 kg or more than 5% of body weight in the last year, (2) self-reported fatigue, (3) reduction of the hand-grip strength measured with a dynamometer and adjusted by gender and body mass index, (4) low level of physical activity measured by weekly energy expenditure in kcal (based on self-reporting of activities and physical exercises) and adjusted by gender, (5) reduction of march activity in seconds: distance of 4.5 m adjusted by gender and height.¹⁰

On the other hand, the group of researchers from the Canadian Initiative on Frailty and Aging (CIF-A) has developed a multidimensional construct that defines frailty by using a more holistic approach. It emphasizes the complex etiology of the phenomenon that is understood as a non-optimal condition to the elderly, of multifactorial and dynamic nature and relating the elderly to their history or life trajectory.¹¹⁻¹² This trajectory can be determined or modified by biological, psychological and social factors, whose interactions result in individual resources and/or deficit in a given context. Considering this perspective, the researchers developed a new measure of frailty in the elderly, the Edmonton Frail Scale, covering nine areas: 1) cognition, 2) health general state, 3) functional independence, 4) social support, 5) use of medications, 6) nutrition, 7) mood, 8) continence and 9) functional performance. The authors consider this broader scale, especially for considering aspects of cognition, mood, and social support.¹³

Accordingly, it is possible to understand that the concept of frailty expressed in previous definitions indicates the difficulty on establishing

a consensual definition, but, it provides subsidies to the following considerations¹⁴: 1) frailty is a clinical phenomenon associated with age, however, it does not appear uniformly in the aging, (2) it represents a continuum that results from deficit impact in multiple systems, especially in the muscle-skeletal one, which causes alteration in homeostasis and, therefore, adverse effects such as decrease or inability in the functional capacity, institutionalization and death; (3) it is a progressive condition, but, there is potential for treatment and symptoms prevention.

Attributes of frailty in the elderly

The attributes of frailty in the elderly evidenced in literature are: vulnerability to biopsychosocial and environmental stressors, walking changes, fatigue self-report, muscle weakness and reduction of the handgrip strength (dominant hand).

The vulnerability to stressful events with less impact (biopsychosocial), represented by the inability of the elderly body in maintaining homeostasis, is an essential characteristic of frailty.^{2,7,15} Such evidence is accentuated as age advances, and thus, there is an increase of deleterious effects on various organic systems resulting from the aging process. This makes the elderly prone to deleterious effects, including a greater use of the health services, greater risk of immobility, disability, and death.^{13,16}

March alterations (slowness and instability) and muscle weakness also constitute features of frailty.¹⁷ March changes compatible with evidence of frailty comprises a reduction in the speed of one second for a distance of 4.5m adjusted to gender and height.¹⁸ In the operationalization of this measure, if a person spends more time to walk the route indicated the sign of frailty will be bigger. It is emphasized that march changes that are characteristics of physiological aging, such as stride shortening and support base increase, do not indicate frailty.¹⁷

March is an integral part of daily life activities, and it is defined as a form or style of walking. Its proper functionality depends on various organs, especially of the nervous, muscle-skeletal and cardiovascular systems. Nevertheless, proprioceptive and vestibular diseases (labyrinthopa-

thy) cause major changes in the march than normal aging modifications.¹⁹

Muscle frailty, which is an important fragility attribute, results from sarcopenia, neuroendocrine and immune dysfunction and lack of exercise.¹¹ Several authors^{3,7} indicate the existence of hierarchy between different manifestations of frailty. Considering this hierarchy, it is noteworthy that frail elderly present the possibility of developing muscle frailty and march modifications in a proportion of 3.7 and 1.7 more times, respectively, than the risk for developing weight loss.

The phenotype of frailty involves, among other things, a state of global losses in the physiological reserves, characterized by low physical activity, overall frailty, low muscle strength (particularly in the lower limbs), fatigue/exhaustion and march slowness.²⁰ The reduction of mass and muscle strength begins after the age of thirty. It accentuates gradually after fifty, resulting in a loss of 15% per decade in the sixth and seventh decades of life. After this period, decrease is estimated in 30% per decade. This loss, in turn, contributes to other changes such as bone density decrease, sensitivity reduction to insulin and lower aerobic capacity.²⁰

It is also verified, among attributes of frailty, the reduction of palmar or handgrip strength. The palmar grip strength is a test that represents an approximation of overall muscular strength, because it is related to the elbow flexion, extension force of leg and trunk, and being influenced by age and sex. Older elderly, women, and people with high levels of interleukin 6 (IL-6) present higher reduction of grip strength.^{12,17} Different studies indicate a relationship between the reduction of palmar or handgrip strength and difficulty in performing daily life activities.^{10,20}

Background of frailty in the elderly

The researched literature shows that frailty in the elderly results from different conditions that are correlated with each other in a complex way, highlighting psychosocial, biological or physical factors. Among the psychosocial events, the most relevant are low socioeconomic status and poor education because they affect especially the lifestyle and increase the elderly exposure to health risks.^{3,19-21} These variables are modifying factors

that indicate the possibility of syndrome reversibility through appropriate interventions.

The absence or shortage of social support (living alone, lack of a relative carer, abandonment from family, friends and society in general) can also favor the event occurrence by making the elderly less socially active.^{7,22} Then, it is possible to infer that the active participation of the elderly in society contributes to the prevention or delay of frailty.

Individuals with advanced age are more prone to frailty.²³ A research conducted in the United States found that from 3% to 7% of people over 65 years were fragile. This percentage increases from 20% to 26% in people over eighty years. In the elderly with more than ninety years, the index reaches 32%.³ This is due to the fact that the older elderly, in general, have greater possibility of decompensation on their homeostasis when the occurrence of physical, social or psychological acute events.²⁴

Considering the elderly population as a whole, it is observed that 55% consists of women.²⁵ Taking into consideration that advanced age is a major risk factor for frailty, it is observed that such condition are associated with other aspects highlighted more intensely by the elder women, as the lowest body mass index associated to the decrease of testosterone levels and secretion reduction of the growth hormone. So, elder women are more susceptible to develop frailty.^{16,26} This event is also corroborated by social and economic matters (gender inequalities) as repressed social life and little economic independence experienced by the majority of elder women.²⁶

As important as the health status, which is measured by objective assessments as a determinant of frailty, is the perceived health status. Elderly who negatively evaluate their health status are at increased risk of morbidity and mortality, in comparison with those ones who rate their health as good or excellent.²

With regard to the physical and biological backgrounds, the researched literature highlights cumulative decline in multiple organic systems, changes in body weight, malnutrition, inadequate nutritional intake (aging anorexia), comorbidities, depression and depressive symptoms, low levels of physical activity, cognitive deficit, sensory deficit and polypharmacy.

The decline in multiple organic systems of the elderly is represented, especially, by physiological reduction of neuroendocrine control, immune function, energy metabolism and muscle-skeletal loss: sarcopenia.²⁷ Sarcopenia causes a significant impact in the functional capacity of the person,² with consequences like decrease of muscle strength, low exercise tolerance, reduction on walking speed, fatigue and reduced ability to perform daily activities. Besides, it is also associated with metabolic changes such as imbalance in thermoregulation and increased resistance to insulin.⁷ It is noteworthy that sarcopenia is not necessarily associated with reduced body mass index, and it may be present in obese elderly, showing relationship between obesity and frailty.^{12,28}

The unintentional weight loss is also an antecedent of frailty in the elderly. A study, which aimed to identify the occurrence of frailty in this age group, identified a close association between negative nutritional status and evidence of frailty. In this study, it was found among frail elderly that 75.8% had malnutrition risk and 6.1% showed bad nutritional status.²¹

Among conditions that might contribute to the occurrence of "aging anorexia" and, consequently, malnutrition and/or weight loss in the elderly, it is highlighted the impaired oral health, chronic pain, varied use of medications, difficulty in swallowing, taste reduction (reduction of sensitivity for primary tastes, especially sweet and salty), smell, visual impairment, functional limitations restricting the preparation and consumption of food, dementia, poverty, dental problems, salivation decrease, depression and social isolation.^{3,23}

Comorbidity, which is the presence of two or more diseases identified from medical diagnosis, constitutes a frailty antecedent very referenced by the literature. Chronic morbidities, particularly those ones associated with pain and/or loss of function that are more often related to the elderly, and in turn, they are more commonly involved with the occurrence of frailty, include: hypertension, cardiac, renal and liver insufficiency, cancer, diabetes mellitus, arthritis, chronic obstructive pulmonary disease, osteoarthritis, stroke and atherosclerosis.

Considering morbidity as a predisposing factor to frailty, there seems to be a strong relationship between depressive symptoms and/or depression with the occurrence of the phenomenon, suggesting a possible psychosocial or psychological component of the syndrome.²⁹ This is a descriptive and cross-sectional study with a sample of 246 people considered frail elderly, and it found that 91 (37%) of the participants had depression.²¹

Low level of physical activity causes the loss of muscle strength in the elderly, and that provokes greater falls risk, fractures, frailty and incapacity.³ Among the factors associated with low level of physical activity in the elderly, it is verified cognitive deficit, diet, and the occurrence of anorexia or food intake reduction.

The loss of vision and hearing acuity has important influence in the communication process, interfering in the relation of the individual with others, inside the family environment or out of it. It contributes to losses in functional status, cognitive function, emotional, behavioral and social well being of the elderly that are aspects also involved in the occurrence of frailty.⁷

Polypharmacy is an important risk factor for frailty in the elderly, and it is defined as a daily prescription of four or more medications, administration or use of more medications than clinically indicated to the person.⁷ The relationship between polypharmacy and the development of frailty in the elderly occurs, in particular, because it involves the overlapping of multiple drugs effects that may cause, among other events, cardiovascular, neuromuscular and nervous alterations, changes in appetite and weight, tiredness/fatigue and cognitive deficit.²²

Consequences of frailty in the elderly

In the context of this analysis, it was found that the risk of falls is an important consequence of frailty in the elderly, and the fall may be involved in reduction of function, loss of independence, and even the elderly death.³⁰⁻³¹ Similarly, the fear of falling by the elderly (psychological trauma, evidenced especially after an episode of fall with serious injuries) may be a result of frailty. Fear of falling can lead the elderly to take cautious behaviors that aid in fall prevention, but in contrast, these behaviors may reduce trust and participation

in activities, favoring the functional decline (self-protective immobility), and thus, increase the risk of frailty or its worsening.²¹

It is worth mentioning that falls and fear of falling can be both causative agents and frailty outcomes. The fear of falling influence changes on the temporal-spatial parameters in the elderly, leading to a slower march (in this case, it is decisive).³⁰ The reduction of march speed, which is a frailty attribute, is a major risk of falls and, in this case, the fear of falling becomes a consequence. In this study, although these events are judged as frailty consequences, it is considered the aspects already mentioned.

Limitations in performing daily activities or those related to mobility, which are necessary for an independent life and with autonomy, comprise one of the consequences of frailty that produces greater impact on the lives of the elderly and their families.^{11,16,20,32} Although, in most cases, the functional is an outcome of frailty in the elderly, it can also be an antecedent event of the phenomenon, especially in circumstances it occurs abruptly, like the one resulting from a stroke.²⁰

Functional disability, which is usually considered as the final limit of frailty and most often without the possibility of reversal, results in a greater demand for family care, increased use of health services, both outpatients and hospitals as well as higher rates of institutionalization of the elderly. It also provokes urinary incontinence, pressure ulcers and the anticipation of death.^{17,28} From the psychological point of view, incontinence is also a risk factor for decompensation in the elderly, due to social inconvenience caused by the inability to stay clean, provoking sense of rejection, depression or its aggravation.

Finally, based on attributes analysis, antecedents and consequences on the concept of frailty in elderly people, which was carried out throughout this study, it was prepared the following conceptual definition to the phenomenon: frailty in the elderly is a multidimensional and multidetermined event, characterized by the vulnerability to biopsychosocial and environmental stressors, changes in the muscle-skeletal system, in the motor function and body composition that results in functional impairment and their outcomes.

FINAL CONSIDERATIONS

Despite the conceptual analysis model used in this study is simple and easy to apply, it is emphasized that the fact it only guides the conceptual analysis from the literature, implies a partial unveiling of the specific socio-cultural aspects of reality in which the concept is expressed. Therefore, it is noted the importance of analyzing this concept from a perspective that encourages an integration between theoretical and empirical data, such as the Hybrid Model of Concepts Development, given the importance of this procedure to enlarge the understanding of the concept, considering its dynamism and variations according to the context in which it is evidenced. Having this perspective in mind, the elements synthesis of the phenomenon developed in this study can serve as a guide or tool in order to measure frailty in elderly people, in the health care setting, enabling better clinical decision making regarding prevention and therapeutic intervention, especially at the primary care level.

In the Geriatric Nursing care, it is necessary to address all the elements involved in the frailty of the elderly. The background must support preventive care. The attributes favor early diagnosis and, in turn, treatment and rehabilitation of the elderly. The understanding of these elements, which was evoked by this study, favors the development of an operational definition, an instrument for measuring the phenomenon in different care settings, especially in the primary health care. It is also noteworthy that the identification of healthy elderly groups, both pre-frail and frail, might help to develop public policies and the implementation of multidisciplinary care programs focused on the treatment of frailty in elderly people, and allowing to adequate services for new demands related to aging.

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