# Fall risks in the elderly, an avoidable multifactorial event

*Paula Andrea Duque[1], Yeison Alberto Garcés Gómez[2], Doris Hincapié Ramirez[3],*
*Olga María Henao Trujillo[4]*

**Introduction**
Falls in the elderly represent important alterations in functionality and are given by intrinsic and extrinsic risk factors, which constitute an increase in morbidity and mortality, so a preventive care plan must be carried out.

**Objective**
To describe the risk factors associated with falls of the elderly in a vulnerable community.

**Materials and Methods**
Descriptive, quantitative, cross-sectional study. Population universe formed by N. 81 older adults who attend the community cafeteria in the San Sebastian neighborhood to receive food for lunch, and the sample obtained was n. 41. Simple random sampling with older adults of both sexes. The instrument that was applied was the Tinetti scale and Short Physical Performance Battery test (SPPB).

**Results**
The analysis of the Tinetti scale was observed balance and gait with an average of 24 points, meaning that older adults have little risk of having a fall, in the SPPB an average of 9 points was obtained, so there is minimal probability of suffering a fall.

**Key words:** Risk, Falls, Risk Assessment, Elderly People. (Source: DeCS Bireme)

1    Nurse Magister in education and human development, magister in pedagogy. Associate Professor Catho lic University of Manizales, Nursing program. paduque@ucm.edu.co  https://orcid.org/0000-0001-7237-6195. Manizales. Colombia.

2    Electronic Engineer, Magister and Doctor of Engineering. Associate Professor, Catholic University of Manizales. Academic Unit of Training in Natural Sciences and Mathematics. ygarces@ucm.edu.co, https://orcid.org/0000-0002-9409-3652, Manizales, Colombia.

3    Bacteriologist, Specialist in Microbiology, Master in Education, Coordinator of the Social Management Unit of the Catholic University of Manizales. dhincapie@ucm.edu.co  https://orcid.org/0000-0003-4158-9096, Manizales, Colombia.

4    Nurse, health administration specialist, teacher in pedagogy. Research Director of the Faculty of Health Sciences. Pereira Free University. olga.henao@unilibre.edu.co https://orcid.org/0000-0003-2472-9069. Pereira, Colombia.

# Riesgos de caídas en los ancianos, un evento multifactorial evitable.

**Resumen**

**Introducción**

Las caídas en personas mayores representan alteraciones importantes de la funcionalidad y vienen dadas por factores de riesgo intrínsecos y extrínsecos, que constituyen un aumento de la morbilidad y la mortalidad, por lo que se debe llevar a cabo un plan de cuidados preventivos.

**Objetivo**

Describir los factores de riesgo asociados a las caídas de las personas mayores en una comunidad vulnerable.

**Materiales y Métodos**

Estudio descriptivo, cuantitativo y transversal. Universo poblacional formado por N. 81 adultos mayores que acuden al comedor comunitario del barrio de San Sebastián para recibir alimentos para el almuerzo, y la muestra obtenida fue la n. 41. Muestreo aleatorio simple con adultos mayores de ambos sexos. El instrumento que se aplicó fue la escala Tinetti y la prueba SPPB de Baterías de Corto Rendimiento Físico.

**Resultados**

El análisis de la escala de Tinetti se observó en equilibrio y marcha con un promedio de 24 puntos, lo que significa que los adultos mayores tienen poco riesgo de sufrir una caída, en la SPPB se obtuvo un promedio de 9 puntos, por lo que hay una probabilidad mínima de sufrir una caída.

**Palabras clave:** Riesgo, Caídas, Evaluación de riesgos, Ancianos. (Fuente: DeCS Bireme)

## Introducción

Population aging has become a public health problem worldwide due to the population growth of this age group, in the demographic data there are records of population growth of older adults, which currently in the world there are 810 million people, or 11.8% of the world's total population. The World Health Organization (WHO. 2018) stated that the percentage of the world's elderly population would double from 12% to 22% between 2015 and 2050. It also ensures that each country faces key challenges in ensuring that health and social systems assume the projected demographic changes, responding assertively. (1)

Older adults experience a multidimensional process of heterogeneous, intrinsic and irreversible ageing. This process takes place during the course of life and ends with death, older adults are considered from the age of 60 and over. In Colombia, according to the Colombian Policy on Human Aging and Old Age, people over 50 years of age are included only in situations of extreme poverty, disability and/or because they are participants of indigenous communities. (2) Bearing in mind that they pass around the final stage of the course of life, which is why this concept is established for this population group, designating different definitions of aging, however the World Health Organization (WHO) defines it as:

*A physiological process that begins at conception and causes changes in the characteristics of species throughout the life cycle; these changes result in a limitation of the adaptability of the organism in relation to the environment. The rhythms at which these changes occur in the various organs of the same individual or in different individuals are not the same. (3)*

That is to say, aging is considered the set of changes that appear in the human being, and that bring about changes at the physiological, biochemical, morphological, social, psychological and functional levels.

The world report carried out by the WHO in 2015, on healthy ageing, proposes an integral action of public health in order to face ageing in a preventive way that focuses on the person, this report states that ageing does not imply lack of health, however, this population group is subject to different chronic-degenerative and non-transmissible diseases. (4)

Therefore, public health faces a great challenge with the aforementioned population because the health habits assumed throughout the life trajectory generate consequences and lead to situations of vulnerability for healthy aging. It is for this reason that, around old age and aging, different theories have been developed for the significant approach of the elderly, among them are the biological, psychological, social theories and the theory of activity, each of them is described from a scientific or social approach:

• Biological theories: ageing is designated from a clinical point of view, by the natural wear and tear of human organs and functional systems, as the natural process of living beings. In addition to the body's natural function to produce energy, which can be affected or damaged by a toxic environment.

• Psychological theories: they focus on cognitive aspects, personality and management strategies. Erikson (1950) in his theory of development

raises the stage of old age in a range of 65 years and more, this includes the individual and cultural factors of each person. (5)

- Social theories: they understand how adults adapt in a satisfactory way in society and how to withdraw little by little. Social interaction is a natural sequence of adaptation to old age. (6–8)

The development of different theories over the years has made it possible to understand the life-course approach of human beings, from a global perspective and with the importance of each of them in the journey to old age. Multiple genetic and environmental factors interfere with ageing and a relevant factor associated with ageing are lifestyles, which can be positive or negative on ageing, for example sedentary lifestyle, consumption of tobacco or alcohol, unbalanced diets, stress-generating work activity or with elements that contribute to physical deterioration, among others, can generate alterations in the ageing process.

In addition to theories, the Ministry of Social Protection in Colombia established the Colombian Policy on Human Aging and Old Age, which is aimed at recognizing the rights of citizens granted by the Political Constitution. This policy, *"recognizes and enforces rights, creates conditions to promote and guarantee comprehensive social protection for all older persons to participate as citizens in the construction of a collective project of an economic, political, social and just order"* in Colombia. (2)

It also seeks to promote, mobilize and guarantee the strategies proposed, in order to ensure that society has a healthy, active and satisfactory aging, especially in adults, with an emphasis on those who are vulnerable and are in poverty and / or social disadvantage.

Human ageing is a multigenerational phenomenon that poses fundamental challenges to countries' social protection systems and government policies. Public policies conducive to ensuring active ageing in contexts that enable people to lead satisfying and healthy lives. What the norm expresses shows interest in improving the living conditions of the elderly, however the policies, although well proposed, lack possibilities for action and sometimes do not seem to have the possibility of covering the entire population, so it is common to find communities in extreme vulnerability in addition to the processes of aging, Such is the case of a community of older adults living in a neighborhood called San Sebastian in the municipality of Manizales-Colombia, who face extreme poverty, as well as social alterations, nutritional deficits, cognitive and affective disorders, in addition to a precarious health system that does not allow for comprehensive care. These conditions not only affect healthy aging but are risk factors for triggering falls and the consequences they bring with them.

In old age it is very common for an elderly person to suffer a fall, the unfortunate thing about this is that few cases are properly attended, which causes the elderly person to end up bedridden or dead. It is estimated that around 35% of adults over 75 years of age suffer at least one fall a year and 50% in those over 80 years of age. Fatal falls increase exponentially with increasing age regardless of sex and occur in all racial groups over 75. (9,10) Ageing is related to the biological changes associated with falls,

one of which is postural stability, as well as precipitating causes that are beyond the control of the elderly such as gout, syncope and/or dizziness attacks. (11)

As a person ages, they lose their balance, which prevents them from being able to have a stable position. In most cases, older adults have difficulty standing up, which affects their quality of life with consequences such as a reduction in work or personal activities, causing risk situations such as fear of leaving, which leads to a less active and more sedentary life, which exposes the older adult to the geriatric syndrome of falls, due to the processes inherent in aging, which includes all those falls suffered by older adults. Falls may occur accidentally when an extrinsic factor acts on a person in a state of alertness and without any alteration, or they may occur due to a situation of sudden loss of consciousness, nutritional and metabolic conditions, depression generated by alteration in the quality of life or their clinical condition. A matter that needs to be objectively assessed in order to be prevented in a timely manner.

Falls in older adults have become a major public health problem, all the more so as the world's population is ageing precipitously. Another important feature about falls is that they represent in a significant way the cause of functional loss of the elderly, which constitutes an increase in morbidity and mortality. (12,13) The problem of this situation is aggravated when the older adult suffers a fall and acquires injuries to consider, in addition to the fact that two thirds of the people who suffer an accident will probably have it again in the next six months. The antecedents reveal that a fall is considered as a predictor factor of hip fracture in the future, according

to it, the falls are a risk factor that the majority of the older adults suffer, these are divided in two groups, intrinsic that are those psychosocial and those related to the changes of the human being and the extrinsic that can be the quality of the floor, inadequate illumination in the residence, type of footwear, and the type of road zone among others.(14,15) Factors of risk that given the conditions of poverty are difficult to control.

For this reason, it is recommended that comprehensive interpersonal care be carried out, including permanent balance tests with the elderly to assess risk,(16) observation of disorders and timely intervention of risk factors to avoid possible repercussions.(17) One of the recommended tests to assess balance and gait is the Tinetti Scale and Short Battery Physical Performance Test (SPPB), which is used to determine an older adult's risk of falling and the association between physical performance, mobility, and disability.

Therefore, the participation of nurses is fundamental in the promotion of the health of the elderly, through care provided in a conscious manner and from the patterns of disciplinary knowledge (empirical, ethical, aesthetic, socio-political, emancipatory) aimed at preventing the risk of falls and direct care for physical maintenance, balance and walking, around the maintenance of the quality of life of the elderly.

Since falls represent an adverse event that turns out to be catastrophic, given that the older adult tends to be bedridden, or with sequels both physical and mental for daily wandering, impacting on individual life, from the conditions of physical and mental health. Since the person loses contact with

the social environment, in addition the consequences involve the family nucleus, which translates into anxiety, uncertainty, protection or abandonment, generating disorders and bad living conditions in the elderly.

The objetive of this study was to describe the risk factors associated with falls of older adults in a vulnerable community by identifying the risk to balance and gait and evaluating the functioning of the lower extremities.

**Materials and Methods**

Quantitative study with descriptive cross-sectional design. The population was made up of 81 older adults attending a community dining room in a vulnerable population called San Sebastián de Betania in the city of Manizales (Caldas, Colombia). A probability sample was calculated by simple random sampling without replacement, made up of 41 older adults of both sexes. The rest of the older adults had difficulties with walking and balance due to foot diseases, heel disorders, chronic pain, which meant that they had to use some kind of walking support.

Initially a pilot test was carried out with 10 older adults, for the tuning of the instruments (Tinetti scale and short battery test for physical performance) applied and the correct parameterization to guarantee data reliability. We worked with an estimated error of 5% and a reliability of 95%. The inclusion criteria were: to be over 60 years of age, to be a member of the community canteen and to live in the community, not to use walking aids such as canes or crutches, and to have cognitive capacity to understand the actions to be performed. The instruments used were the Tinetti scale and

the short battery test for physical performance (SPPB or Guralnik test). The Tinetti scale evaluates the ability to balance and gait in older adults to determine the risk of falls through the variables of sitting balance, getting up, attempts to get up, immediate balance when getting up (5 seconds), foot balance, push, 360 degree turn, sitting, start of gait, step length and height, step symmetry, step continuity, gait, trunk and gait position. The score given by the Tinetti scale is a maximum of 16 for the balance test and for the 12 gait test, so the total is 28. The higher the final score, the better the patient's functionality and the lower the risk of suffering a fall, considering that below 19 points there is a clear risk of falling which increases as the score decreases.

Tinetti and collaborators, Kegelmeyer and Kloos, who validated the Tinetti scale for older adults with Parkinson's disease, developed the studies that allowed the validation of the scale. In Colombia a partial validation of the scale in the equilibrium domain was carried out by researchers from the University of Caldas, later Rodriguez validated the scale in terms of content, construct and criteria in the dimensions equilibrium and March for the Colombian territory. (18)

The Short Physical Performance Battery Test (SPPB) is an objective assessment tool for evaluating the functioning of the lower extremities in older people. It was developed by the National Institute on Aging in the USA and is available on the web: www.grc.nia.nih.gov/branches/leps/sppb/, consists of performing three tests: balance (in three positions: feet together, semi-tandem and tandem), walking speed, (about 2.4 or 4 meters) get up and sit in a chair five times. The total SPPB score and

score is the sum of the three sub-tests, and ranges from 0 (worst performance) to 12 (Best performance); Low SPPB scores have a high predictive value for the presence of falls, which constitutes health consequences including disability in activities of daily living, loss of mobility, disability and hospitalization. The reliability of PBPS for use with older adults is high and its sensitivity to changes in functional ability over time has been corroborated.

The data collection was carried out in the second semester of 2018, in the dining room of older adults where they were approached inviting to participate in the project under the explanation of objectives, benefits, risks and informed consent diligence, then proceeded to apply the tests individually, in a nearby field that corresponds to basketball court, which is a flat place, spacious, quiet and without obstacles of visual auditory order and / or elements that could be a stumbling block and prevent an objective performance of the tests. For the application of the assessment tests (Tinetti and SPPB), were conducted individually, initially Tinetti taking a specific time with each person, in several days of field work, then cited again and conducted the test SPPB.

The software Statistical Package for the Social Sciences (SPSS) version 23 was used for the analysis of the statistical data. Using descriptive statistical data by means of percentages and measures of central tendency, Association tests were also carried out using Pearson's Chi-square.

The Ethics Committee of the Catholic University of Manizales approved the research and the collection of information was done under prior authorization of the institution in agreement with social works Betania who are in front of the dining room to provide food to older adults. The autonomy of the elderly was respected and the confidentiality of the data was guaranteed. The study was considered a minimum risk study according to Resolution 8430 of 1993, so only data recording was carried out without interventions to modify the variables of the study.

**Results**

Sociodemographic aspects showed that the average age oscillates between 70 years in older adults. The minimum was 59 and the maximum age was 87 (Table N. 1).

**Table N. 1.** Distribution of the ages of the population studied (own source 2018)

|  | N | Minimum | Maximum | Medium | Standard deviation | Variance |
|---|---|---|---|---|---|---|
| **Age** | 41 | 59 | 87 | 70.76 | 7.176 | 51.489 |

The population was divided by two groups, of which it is found that the female gender is 68.3%, while the male gender is 31.7% (Fig N. 1).
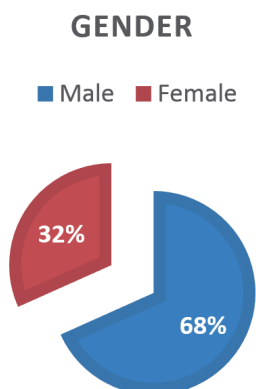
## GENDER

■ Male ■ Female



**Fig N. 1.** Gender distribution (Own source 2018)

In Table N. 2 and N. 3 two variables are shown; the equilibrium and 360° turn of the older adult of the commune of San Sebastian, where two hypotheses were raised: Hi: People who have balance can also rotate 360°.

H0: People who do not have balance cannot rotate 360°.

Formulas:

$$x^2 calc > x^2 tab \rightarrow H_0$$
$$x^2 calc < x^2 tab \rightarrow H_i$$

Significance, $\alpha = 0.05$

**Table N. 2.** Association between equilibrium and 360º turn of the older adult (own source 2018)

|  | Value | g | Asymptotic (bilateral) significance |
|---|---|---|---|
| Chi-square of Pearson | 8.773 | 4 | 0.067 |
| Reason for plausibility | 8.170 | 4 | 0.086 |
| Linear association by linear | 5.413 | 1 | 0.020 |

The result is 0.067, to say that people who have balance can also rotate 360°.

**Table N. 3.** Balance score, 360º lap (own source 2018)

|  |  | Complete tour Together | | Total |
|---|---|---|---|---|
|  |  | Unstable | Stable | |
|  | 0 | 1 | 0 | 1 |
|  | 1 | 0 | 1 | 1 |
| Balance Score | 2 | 2 | 5 | 7 |
|  | 3 | 3 | 8 | 11 |
|  | 4 | 1 | 20 | 21 |
| Total | | 7 | 34 | 41 |

**Standard deviation**

95% of older adults in San Sebastian had a walk with a score between 4.8% and 8.4%.

According to the balance and gait of the older adults evaluated, 95% of them show scores ranging from -16.9% to 23.1%.

99% of older adults in the San Sebastian neighborhood present scores ranging from 11.4% to 15.6% in the "Short Battery of Physical Performance" test. (Table 4)

**Table N. 4.** Analysis of the standard deviation

| | N | Range | Minimum | Maximum | Medium | Standard deviation | Variance |
|---|---|---|---|---|---|---|---|
| Gear | 41 | 6 | 6 | 12 | 10.10 | 1.841 | 3.390 |
| Balance and walking | 41 | 11 | 17 | 28 | 24.66 | 3.175 | 10.080 |
| Short battery for physical performance. | 41 | 10 | 2 | 12 | 9.83 | 2.132 | 4.545 |

According to the results analyzed, it is concluded:

**The SPPS showed an average of 9.8 (Table 5), so an average probability of suffering a fall is estimated.**

National Institute on Aging Score. (19)
0-3 severe limitation
4-6 moderate limitation
7-9 medium limitations
10-12 minimum limitation

The analysis of the Tinetti scale of older adults allows us to observe in the balance and gait variable that the mean gives as a result 24.6 (Table N.5) which means that older adults have less risk of falling.

Fall Risk Classification: (20)
20-22 High risk of falling
23-28 Lower fall risk

**Table N. 5.** SPPS Analysis and Tinetti Scale

| | N | Minimum | Maximum | Medium |
|---|---|---|---|---|
| Balance and walking | 41 | 17 | 28 | 24.66 |
| Short Physical Performance Battery (SPPB) | 41 | 2 | 12 | 9.83 |

**Discussions**

According to Bárcena et al. (21) In Colombia, social inequalities in old age are related to economic income, social security, education and gender, increasing risk factors in the area of ageing, although the Colombian Ministry of Health proposes as public policy (2015-2024) the accompaniment from the course of life to human ageing and old age, expressing the simultaneous commitment of the Colombian State, society and families, this policy is structured in 4 axes corresponding to the protection of human rights of the elderly, integral social protection, active, satisfactory and healthy ageing and research training.

But the significant approach of this policy is complex, bearing in mind that the inequalities are also related to the Colombian armed conflict, which has left thousands of victims for more than 50 consecutive years, which has caused pathological social aging, based on emotional and psychological affectations, leading to an increase in vulnerabilities in this case so that there are greater physical risks derived from the experiences, which can bring as consequences an increase in falls and greater disorders for an aging with quality of life.

Considering that according to the last census of the population in Colombia it was confirmed what the experts warned that the country ages faster than expected. In 2018, Colombia has 40.4 people over the age of 60 for every 100 people under the age of 15, a figure that in 2005 was 28.7, forcing the new government to take action to redesign a public policy that takes the phenomenon into account.

While population ageing is a global trend, estimates for this country are off track.

Thus, while the global estimates of World Population Prospects 2017. (22) They point out that the number of people over 60 will double in 2050 and triple in 2100, going from 962 million in 2017 to 2.1 billion in 2050 and 3.1 billion in 2100; According to *National Administrative Department of Statistics* (DANE) in Colombia could double that population in 30 years or less.

Therefore, the Colombian Association of Gerontology and Geriatrics (ACGG), assures that there is a lack of clear policies to serve this population that will be the main protagonist in the future, which requires a significant investment in social care, since current policies seem to be decontextualized, bearing in mind that eight out of ten older adults suffer from more than one disease, both organic and mental, which tend to increase, because every three out of 10 older people complain of being completely abandoned, which demonstrates the risk situations of older adults as they face situations that add to their life history and threaten their integrity.

Older adults in the community of San Sebastian have from their daily lives to face an environment with alterations of social and physical order, an environment of social violence and poverty in addition to environmental conditions, which can limit both biological and mental functions and structures, in addition to chronic diseases suffered by older adults as major factors that can alter functional capacity. (23,24)

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both biological and mental functions and structures, in addition to chronic diseases suffered by older adults as major factors that can alter functional capacity .

Although this study has highlighted the socio-demographic characteristics and intrinsic factors of the person related to balance, gait and physical performance, factors related to the environment must also be considered as they are added to the occurrence of falls. (25)

Despite the fact that the study showed a lower risk of falling with a medium limitation, it is important that, given the conditions of vulnerability to which the elderly are exposed, prevention is reinforced with measures of care since a fall can easily occur, given that they must face biological risks inherent to their circumstances of old age in addition to the socioeconomic component such as having to travel to the place where food is offered, However, attending the cafeteria has represented a protective factor, so in terms of going to meet with a social group, increasing the mood, exercise due to displacement and the activities carried out in the cafeteria, such as weekly physical activity days, have allowed the elderly to maintain adequate physical conditions and mitigate the risk of falls.

Falls are a serious and common problem in older adults. 30-40 percent of those over 65 fall at least once a year, according to the U.S. Preventive Services Task Force (USPSTF), but they are also known to be preventable and exercise is one way to do it. Falls are the leading cause of injury and death among older people in the United States, and this health threat is likely to grow as the population of older people increases. According to WHO, annually worldwide,

28-35% of older people (≥65 years) suffer falls, and their prevalence increases globally and with age. Falls are the leading cause of injury, injury-related disability, and death. In the elderly, the severity of the resulting injuries varies; 40-60% of falls result in major lacerations, fractures, or traumatic brain injury. (26)

In addition to trauma, falls can trigger fear of falling, leading to loss of independence, which leads to isolation and deterioration of daily activities such as bathing, dressing, generating immobility syndrome and aggravating morbidities to generate disability and permanent prostration. (27)

The comorbidities favor the appearance of falls since the prevalence of chronic diseases such as hypertension, arthritis. Osteoporotic states  increase the possibility of this event, in addition to drug interactions due to the use of multiple drugs added to intrinsic factors such as loss of visual and auditory acuity affecting the biopsychosocial and economic aspects of older adults and society, so it is important to prioritize the knowledge of risk factors and the impact of the occurrence of falls, in order to establish preventive measures. (28,29)

Other factors are related to moods, cognitive conditions, because they lead to depressive states that alter the daily routine of the task, causing muscle weakness, deterioration in mobility until the loss of basic functions. (30,31) Being a marker of fragility in the elderly person and a predictor of death.

### Conclusions

Caring for the adult population requires comprehensive actions to cope with ageing and thus ensure that it is healthy, regardless of the environment and level of socio-eco-

nomic development. It is necessary to direct the attention from preventive models and in the older adult the risk factors predisposing to falls must be identified because of what they represent for this population group, in order to carry out an individual care plan according to the co-morbidities presented.

According to the analysis of the data, it could be concluded that older adults have little risk of falls, due to the support network that covers them with specialized physical accompaniment once a week in which they are given physical rehabilitation and exercises to maintain their capacity and resistance, the instructor provides exercises and movements that older adults can perform without harming or damaging their health. However, due to the presence of intrinsic and extrinsic risk factors, a preventive care plan is required.

Older adults are faced with situations that they would probably not be able to cope with on their own, which is why for them, the support and help provided at the meeting site to receive food is of the utmost importance. The creation of civil associations and support networks of this magnitude are indispensable in the communities of older adults, since the health system shows weaknesses in some, but in spite of that they try to subsidize the population with basic questions. This is when health professionals from health outreach programs must organize themselves to respond to the most vulnerable communities.

## Conflict interests
The authors declare that there is no conflict of interests regarding the publication of this paper.

## Bibliographical references

1.  OMS. Informe mundial sobre el envejecimiento y la salud [Internet]. Vol. XXXIII, Organización Mundial de la Salud. 2015. Available from: http://www.ncbi.nlm.nih.gov/pubmed/15003161%5Cnhttp://cid.oxfordjournals.org/lookup/doi/10.1093/cid/cir991%5Cnhttp://www.scielo.cl/pdf/udecada/v15n26/art06.pdf%5Cnhttp://www.scopus.com/inward/record.url?eid=2-s2.0-84861150233&partnerID=tZOtx3y1

2.  Ministerio de Salud y de la Protección Social. Politica Colombiana de Envejecimiento Humano y Vejez 2015-2024 [Internet]. 2015. 54 p. Available from: https://www.minsalud.gov.co/sites/rid/Lists/BibliotecaDigital/RIDE/DE/PS/Política-colombiana-envejecimiento-humano-vejez-2015-2024.pdf

3.  Secretaria general politica social de Xunta de Galicia. Congreso internacional sobre el envejecimiento activo. 2013. 450 p.

4.  OMS. World report on ageing and health. Wordl Health Organization. 2015.

5.  Bordigon NA. El desarrollo psicosocial de Eric Erikson. El diagrama epigenético del adulto Revista. Rev Lasallista Investig [Internet]. 2005;2(2):50–63. Available from:

http://www.ub.edu/dppsed/fvillar/principal/pdf/proyecto/cap_04_modelos_iniciales.pdf.

6. Alvarado García AM, Salazar Maya ÁM. Aging concept analysis. Gerokomos. 2014;25(2):57–62.

7. Gustafsson S, Berglund H, Faronbi J, Barenfeld E, Ottenvall Hammar I. Minor positive effects of health-promoting senior meetings for older community-dwelling persons on loneliness, social network, and social support. Clin Interv Aging [Internet]. 2017;12:1867–77. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5683788/pdf/cia-12-1867.pdf

8. Routasalo PE, Tilvis RS, Kautiainen H, Pitkala KH. Effects of psychosocial group rehabilitation on social functioning, loneliness and well-being of lonely, older people: Randomized controlled trial. J Adv Nurs. 2009;65(2):297–305.

9. Rubenstein LZ, Josephson KR. The epidemiology of falls and syncope. Clin Geriatr Med. 2002;18(2):141–58.

10. Rubenstein LZ, Josephson KR. Fall risk assessment: step-by-step. In: Gait Disorders, Evaluation and Management. 1st ed. Boca Raton: CRC Press; 2005. p. 440.

11. Buendía P, Maldonado C. F. Caídas en el adulto mayor. 2003;

12. da Silva-Gama ZA, Gómez-Conesa A. Risk factors for falls in the elderly: systematic review. Rev Saúde Pública. 2008;42(5):946–56.

13. Molinuevo Sampedro J, Meléndez Ortega A, Ruiz Solano P. Comparative analysis of the relation between the number of falls annually and a battery of static balance and agility tests in elderly subjects. Retos Nuevas tendencias en Educ Física, Deport y Recreación. 2010;17:115–7.

14. de Azevedo Smith A, Oliveira Silva A, Partezani Rodirgues RA, Silva Paredes Moreira MA, de Almeida Nogueira J, Rangel Tura LF. Assessment of risk of falls in elderly living at home. Rev Latino-Am Enferm. 2018;25:1–9.

15. Zijlstra GAR, van Haastregt JCM, van Eijk JTM, van Rossum E, Stalenhoef PA, Kempen GIJM. Prevalence and correlates of fear of falling, and associated avoidance of activity in the general population of community-living older people. Age Ageing. 2007;36(3):304–9.

16. Muñoz-Mendoza CL, Cabañero-Martínez MJ, Millán-Calenti JC, Cabrero-García J, López-Sánchez R, Maseda-Rodríguez A. Reliability of 4-m and 6-m walking speed tests in elderly people with cognitive impairment. Arch Gerontol Geriatr. 2011;52(2):67–70.

17. Faraldo Garcia A, San Roman E, Soto Varela A. Evaluación del paciente con trastornos del equilibrio y de la marcha. Presbivertigo y caída en el anciano. In: Formación en Otorrinolaringología [Internet]. 2015. p. 1–25. Available from: http://seorl.net/PDF/Otologia/038 - EVALUACIÓN DEL PACIENTE CON TRASTORNOS DEL EQUILIBRIO Y DE LA MARCHA. PRESBIVÉRTIGO Y CAÍDA EN EL ANCIANO.pdf?boxtype=pdf&g=false&s=false&s2=false&r=wide

18. Rodríguez Guevara C, Lugo LH. Validez y confiabilidad de la Escala de Tinetti para población colombiana. Rev Colomb Reumatol [Internet].

2012;19(4):218–33. Available from: http://dx.doi.org/10.1016/S0121-8123(12)70017-8

19. Agin NI on. Short Physical Performance Battery (SPPB), Assessing Physical Performance in the Older Patient.

20. Gregori JÁ, Macías Núñez JF. Dependencia en Geriatría: definición, epidemiologia, diagnóstico. Dependencí. Universidad de Salamanca; 2009.

21. Bárcena A, Prado A, Jaspers_Faijer D, Pérez R. Tercera conferencia regional intergubernamental sobre envejecimiento en América Latina y el Caribe. CEPAL, Naciones Unidas. 2012.

22. UN. World Population Prospects, The 2017 Revision. Key Findings and Advance Tables. Vol. ESA/P/WP/2, Department of Economic and Social Affairs. Population Division. 2017.

23. Gutierrez Robledo LMF, García Peña M del C, Jiménez Bolón JE. Envejecimiento y dependencia. Realidades y prevención para los proximos años. Academia Nacional de Medicina (ANM). 2014.

24. Sousa RM, Ferri CP, Acosta D, Guerra M, Huang Y, Jacob K, et al. The contribution of chronic diseases to the prevalence of dependence among older people in Latin America, China and India: A 10/66 Dementia Research Group population-based survey. BMC Geriatr. 2010;10(53):12.

25. Melo de Pinho TA, Oliveira Silva A, Rangel Tura LF, Silva P Moreira MA, Nagaumi Gurgel S, de Azevedo Freitas Smith A, et al. Avaliação do risco de quedas em idosos atendidos em Unidade Básica de Saúde. Rev da Esc Enferm. 2012;46(2):320–7.

26. Vieira ER, Palmer RC, Chaves PHM. Prevention of falls in older people living in the community. BMJ. 2016;353.

27. Soares WJ de S, Moraes SA de, Ferrioli E, Perracini MR. Factors associated with falls and recurrent falls in elderly: a population-based study Wuber. Rev Bras Geriatr e Gerontol [Internet]. 2014;17(1):49–60. Available from: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1809-98232014000100049&lng=pt&tlng=pt

28. Pratt NL, Ramsay EN, Kalisch Ellett LM, Nguyen TA, Barratt JD, Roughead EE. Association between use of multiple psychoactive medicines and hospitalization for falls: Retrospective analysis of a large healthcare claim database. Drug Saf. 2014;37(7):529–35.

29. Terra Jonas L, Diniz Lima KV, Soares MI, Méndes MA, da Silva JV, Ribeiro PM. Assessing the risk of falls in older people: How to do it? GEROKOMOS [Internet]. 2014;25(1):13–6. Available from: http://onlinelibrary.wiley.com/doi/10.2193/0022-541X(2005)69[1691:HSBEBA]2.0.CO;2/abstract

30. Hamra A, Barbosa Ribeiro M, Ferreira Miguel O. Correlação Entre Fratura Por Queda Em Idosos E Uso Prévio De Medicamentos. Acta Ortop Bras [Internet]. 2007;15(3):143–5. Available from: http://www.scielo.br/pdf/aob/v15n3/a04v15n3

31. Landinez Parra NS, Contreras Valencia K, Castro Villamil Á. Aging, exercising and physical therapy. J Neuroophthalmol. 2012;38(4):562–80.