Functional capacity and risk of falls in the elderly

Capacidade funcional e o risco de quedas em pessoas idosas

Raquel Janyne de Lima[1], Cláudia Jeane Lopes Pimenta[1], Thaíse Alves Bezerra[1], Lia Raquel Carvalho Viana[1], Gerlania Rodrigues Salviano Ferreira[1], Kátia Neyla de Freitas Macedo Costa[1]

Objective: to evaluate the functional capacity and the risk of falls in elderly people. **Methods:** cross-sectional study with 122 elderly subjects. Data collection was done through an interview with aid of the instruments *Fall Risck Score* and Functional Independence Measure. The Pearson's Chi-square test and Fisher's exact test were used to analyze the data for association of variables. **Results:** a total of 72.1% of elderly had already suffered a fall and 96.7% had a Functional Independence Measure greater than 104, being functionally independent. **Conclusion:** the elderly presented complete independence in most of the items related to daily life activities; however, they are at risk of falls related to other factors, such as possible previous history of this event. According to the Functional Independence Measure, the main points of dependence are directly related to poor social conditions. Communication, problem solving and memory were the most affected aspects.
Descriptors: Nursing; Aging; Health of the Elderly; Accidental Falls; Activities of Daily Living.

Objetivo: avaliar a capacidade funcional e o risco de quedas em pessoas idosas. **Métodos:** pesquisa transversal com 122 idosos. A coleta de dados ocorreu por meio de entrevista com os instrumentos *Fall Risck Score* e Medida de Independência Funcional. Para análise dos dados foram utilizados os testes Qui-quadrado de Pearson e Exato de Fisher para associação das variáveis. **Resultados:** 72,1% dos idosos já sofreram alguma queda e 96,7% apresentaram Medida de Independência Funcional superior a 104, sendo independentes funcionalmente. **Conclusão:** os idosos apresentaram independência completa na maioria dos itens referentes às atividades de vida diária, no entanto, possuem risco de quedas relacionado a outros fatores, como possível histórico anterior deste evento. De acordo com a Medida de Independência Funcional, os principais pontos de dependência estão relacionados diretamente às más condições sociais. Comunicação, Resolução de Problemas e Memória foram os requisitos mais afetados.
Descritores: Enfermagem; Envelhecimento; Saúde do Idoso; Acidentes por Quedas; Atividades Cotidianas.

[1]Universidade Federal da Paraíba. João Pessoa, PB, Brazil.

Corresponding author: Cláudia Jeane Lopes Pimenta
Rua Capitão Severino Cesarino da Nóbrega, 431, Jardim São Paulo. CEP: 58051-220. João Pessoa, PB, Brazil. E-mail: claudinhajeane8@hotmail.com

Introduction

In recent years, there has been a considerable increase in life expectancy and, consequently, in the elderly population[1]. Between 2004 and 2014, the percentage of elderly in Brazil increased from 9.7% to 13.7%, representing the population group that has grown the most in the country. By 2030, it will probably represent 18.6% of the nation and, in 2060, 33.7%[2].

Population aging is a phenomenon of great repercussion in Brazil, as it is related to the increase of chronic diseases, decrease of functional capacity and a higher incidence of falls[3]. In this sense, falls aggravate extant health conditions/illnesses of the elderly, and are considered as a relevant cause of deterioration of the functional disability of this population. It is the first cause of accidents and the third largest cause of death in people aged 60 and over[4].

Impaired functional capacity of the elderly has significant implications for their families, for the community, and the health systems. It affects their own lives, because incapacity implies greater vulnerability and dependence, and contribute to decreased well--being and lower quality of life[5].

In this context, nurses need to be attentive to identify the changes generated by the aging process, and perceive the needs that may be expressed or not, to determine actions for better quality of life of the elderly. This can be achieved through individualized care, reducing the risk of falls and maintaining the elderly's independence and autonomy[6]. In this perspective, the present study aimed to evaluate the functional capacity and the risk of falls in elderly people.

Methods

This is a cross-sectional study carried out in a specialized care service for the elderly, located in the city of João Pessoa, PB, Brazil. The collection was performed from April to June 2015 and participants were approached at the scheduling or while waiting for consultations.

The population investigated corresponded to people seeking assistance by spontaneous demand. The inclusion criteria were: elderly individuals aged sixty years and over and of both sexes. The exclusion criteria were: elderly individuals who did not present the psychological or physical capacity to properly answer the questionnaires at the moment of data collection. The sample size was defined through statistical calculation considering the number of consultations performed during the last three months of 2014, totaling 16,495 individuals. In order to estimate the prevalence of risk of falls in the population, a pilot test was performed with 25 elderly people, of whom 23 (p=92.0%) were found to be at high risk of falls according to the Fall Risk Score[7]. The calculation for finite populations with known ratio was used to establish the sample of 122 elderly.

The profile of the participants was collected using a semi-structured instrument with information on the demographic characteristics (sex, age, marital status, income, schooling, history of falls), housing aspects (type of residence, presence paved street, stairs, good lighting) and clinical aspects (presence of disease, use of aid devices, recent ophthalmologic evaluation) of the elderly. The risk of falls was assessed through the Fall Risk Score. This scale has five criteria with scores ranging from zero to 11. The elderly are classified as being at high risk of falls when they score three or more[7].

Functional capacity was evaluated through the Functional Independence Measure, which aims to measure the degree of dependence on others to perform daily activities. This instrument is composed of 18 items distributed in subscales of motor and cognitive/social domains. The motor domain has 13 items: food, personal hygiene, bathing, dressing above the waist, dressing down the waist, use of toilet (regarding self--care); sphincter control of urine and feces; mobility in bed, chair and wheelchair, in the toilet and in the shower/tub (regarding mobility); locomotion/gait and stairs (regarding locomotion). The cognitive/social domain has five items: two related to cognition

(comprehension and expression) and three to social communication (social interaction, problem solving, and memory).

The collected data were compiled, stored and analyzed in Statistical Package for the Social Sciences version 22.0. After typing and checking the consistency of the data, measures of dispersion were calculated, such as absolute and relative frequency, and measures of central tendency, and a descriptive analysis of the variables was performed. The Pearson's Chi-square and Fisher's exact tests were used to associate the results with the Fall Risk Score and the Functional Independence Measure.

The study complied with the formal requirements contained in the national and international regulatory standards for research involving human beings.

Results

Of the 123 elderly people interviewed, 77.9% were female, 49.2% were between 60-69 years old, 45.9% were married, 38.5% had four to five years of schooling, 84.4% % had income equivalent to up to three minimum wages (reference salary for 2014) and 63.9% were retired. Regarding the event of fall, 72.1% had experienced at least one episode.

Table 1 - Risk of falls and aspects related to type of residence of the elderly

Variables	Risk of falls			p*
	Low	High	Total	
	n (%)	n (%)	n (%)	
Type of residence				
House	66 (58.4)	47 (41.6)	113 (92.6)	0.012
Apartment	9 (100.0)	-	9 (7.4)	
Paved street				
Yes	49 (66.2)	25 (33.8)	74 (60.7)	0.182
No	26 (54.2)	22 (45.8)	48 (39.3)	
Stairs				
Yes	24 (61.5)	15 (38.5)	39 (32.0)	0.992
No	51 (61.4)	32 (38.6)	83 (68.0)	
Slippery surfaces				
Yes	22 (56.4)	17 (43.6)	39 (32.0)	0.431
No	53 (63.9)	30 (36.1)	83 (68.0)	
Good lighting				
Yes	70 (60.9)	45 (39.1)	115 (94.3)	0.706
No	5 (71.4)	2 (28.6)	7 (5.7)	
High or low shelves				
Yes	20 (60.6)	13 (39.4)	33 (27.0)	0.904
No	55 (61.8)	34 (38.2)	89 (73.0)	
Total	75 (100.0)	47 (100.0)	122 (100.0)	

*Pearson's Chi-square test and Fisher's exact test

Table 1 shows that the only statistically significant variable (p≤0.05) was the type of residence of the elderly. Among the individuals who reported living in houses, the majority presented low risk of falling (58.4%).

There was no statistical significance in the correlation of clinical aspects of the elderly and the risk of falls. However, the majority of elderly people who had some kind of disease had a low risk of falls (62.2%) (Table 2).

Table 2 - Risk of falls and clinical aspects of the elderly

Variables	Risk of falls			p*
	Low	High	Total	
	n (%)	n (%)	n (%)	
Diseases				
Yes	74 (62.2)	45 (37.8)	119 (97.5)	0.558
No	1 (33.3)	2 (66.7)	3 (2.5)	
Gait assist device				
Yes	7 (58.3)	5 (41.7)	12 (9.8)	1.000
No	68 (61.8)	42 (38.2)	110 (90.2)	
Type of assist device				
Walking stick	3 (42.9)	4 (57.1)	7 (5.7)	
Cane	3 (75.0)	1 (25.0)	4 (3.3)	0.580
Walker	1 (100.0)	-	1 (0.8)	
None	68 (61.8)	42 (38.2)	110 (90.2)	
Alcoholic beverages				
Yes	1 (33.3)	2 (66.7)	3 (2.5)	0.558
No	74 (62.2)	45 (37.8)	119 (97.5)	
Recent ophthalmologic evaluation				0.325
Yes	53 (58.9)	37 (41.1)	90 (73.8)	
No	22 (68.8)	10 (31.1)	32 (26.2)	
Total	75 (100.0)	47 (100.0)	122 (100.0)	

* Pearson's Chi-square test and Fisher's exact test

Among the elderly in this study, 96.7% were classified as independent. Complete independence was present in most of the interviewees in relation to the following variables: feeding, morning and bath hygiene (97.5%); dressing above and below the waist (95.9%); self-care related to the use of the toilet (86.1%); control of bowel and bladder sphincters (98.2% each); mobility in the bed, chair and wheelchair (96.7%), in the toilet (84.4%), and in the shower (91.8%); locomotion and gait (88.5%); comprehension (61.5%); expression (87.7%) and social interaction (85.2%).

Regarding locomotion on stairs, most of the elderly had a need for supervision (29.5%), followed by minimal help (28.7%) and moderate help (21.3%). The majority of the elderly (68.9%) needed some sort of help for problem solving (minimum, moderate and maximum help). Regarding memory, 65.6% needed some assistance, 31.1% supervision and 3.3% had modified independence.

There was no statistically significant correlation between functional capacity and risk of falls (p≥0.05). However, it is important to highlight that the independent elderly presented a low risk for falls in all dimensions of the Functional Independence Measure (Table 3).

Table 3 - Risk of falls and functional capacity of the elderly assisted at a Center for Comprehensive Health Care for the Elderly

Functional Independence Measure	Risk of falls			p*
	Low	High	Total	
	n (%)	n (%)	n (%)	
Self-care				
Dependence	1 (100.0)	-	1 (0.8)	1.000
Independence	74 (61.2)	47 (38.8)	121 (99.2)	
Sphincter control				
Dependence	-	-	-	-
Independence	75 (61.5)	47 (38.5)	122 (100.0)	
Mobility				
Dependence	3 (75.0)	1 (25.0)	4 (3.3)	1.000
Independence	72 (61.0)	46 (39.0)	118 (96.7)	
Locomotion				
Dependence	40 (57.1)	30 (42.9)	70 (57.4)	0.254
Independence	35 (67.3)	17 (32.7)	52 (42.6)	
Cognition				
Dependence	24 (72.7)	9 (27.3)	33 (27.0)	0.120
Independence	51 (57.3)	38 (42.7)	89 (73.0)	
Social communication				
Dependence	53 (58.9)	37 (41.1)	90 (73.8)	0.325
Independence	22 (68.8)	10 (31.1)	32 (26.2)	
Total	75 (100.0)	47 (100.0)	122 (100.0)	

* Pearson's Chi-square test and Fisher's exact test

Discussion

For the interpretation of the results, the limitations related to the method used should be considered; the cross-sectional design does not allow the establishment of cause and effect relationships between functional capacity and risk of falls.

The majority of participants interviewed were women, what is in line with the general picture of the elderly population in Brazil[3]. Current statistics show that aging has a strong gender component, characterizing what is called "feminization of old age"[8-9]. Regarding the age group, the presence of young adults was observed. This is once again in accordance with the Brazilian profile, in which the most prevalent age group is 60-69 years, making up 54.4% of the elderly in the country[2].

There was a high incidence of falls among participants. The event of fall can bring several consequences to the elderly, such as bruises, contusions, fractures, immobility, Fear of Falling syndrome, loss of self-confidence, restriction of activities and health declines that can culminate in death[10-11]. Fear of falling is usually associated with anxiety, depression, previous history of falls, changes in gait and balance, use of walking aids, reduced functional activities, and reduced quality of life[12].

The type of residence had a statistically significant influence on the risk of falls, which was lower in the elderly living in houses. This can be explained by the less frequent presence of some elements such as stairs and elevators, which are commonly present in apartments. The literature states that falls are responsible for one of the greatest fears in geriatrics. Fear come from postural instability and may be related to the sudden insufficiency of the neural and osteoarticular mechanisms involved in maintaining the posture. It is still characterized as a geriatric syndrome, because it is considered a multifactorial and heterogeneous event[11-12].

One of the most relevant aspects of falls is the association between intrinsic factors (decreased func-

tional capacity, onset of chronic diseases, altered balance, osteoarticular diseases, inactivity, altered vision and hearing, and vertigo) and extrinsic factors (stairs, illumination, uneven surfaces, carpets, slippery flooring, inadequate footwear and lack of adaptations in the bathroom) that make the elderly population even more vulnerable to this type of accident[4].

In this perspective, the six international goals of patient safety include fall prevention, with multi-professional and multifactorial actions carried out at all levels of care, starting from home, up to services of greater complexity[12]. Nursing should plan integral actions contemplating gait and fall risk assessment of the elderly, as well as the raising of awareness of these and of their relatives about the forms of prevention.

The majority of elderly people with some type of disease presented low risk of falls (62.2%). However, these elderly also need to receive guidance on fall prevention, because many of these elderly use various medications[9] to treat diseases, such as hypotensive and anxiolytic agents, that pose additional risk factors for falls[4].

Regarding functionality, it was verified that the majority of the interviewed elderly were independent (96.7%). This result is very similar to that found for the elderly in Brazil (93.2%) and in the Northeast Region of the country (91.6%)[2]. There was complete independence in activities of self-care, sphincter control, mobility, locomotion, gait, cognition and social interaction. A study found a very similar result, reporting that 72.4% of the elderly were also independent for bed/chair/wheelchair mobility, 71.6% for use of toilet, and 81.0% for shower/tub[13].

Independence for activities of daily living is essential to improve the quality of life of the elderly, because that helps them carry out tasks that are very particular to the human being, such as sphincter control, without assistance. This contributes positively to their self-esteem and encourages overcoming processes of adversity. On the other hand, it was observed that the elderly were dependent on others in the ac-

tivities of locomotion on stairs, problem solving and memory, either with a minimal, moderate or maximum need for supervision from caregivers, relatives or friends. Dependence to climb stairs can be explained by the possible presence of joint diseases common in this age group that impair locomotion, cause discomfort and limit the execution of more complex movements.

A study of low-income elderly identified that higher levels of pain and risk of developing depression were more frequent among people with high functional impairment, which has negative impacts on the quality of life and increases expenditures with health services. In such cases, health professionals in the area may need to use interdisciplinary interventions[14].

Problem solving may be hampered by memory impairment. If the elderly person does not have enough clarity remembering something, he will need some degree of help to solve bureaucratic, financial, and even personal problems. The difficulty with memory may also be linked to neurological problems, and it is up to health professionals, especially nurses, to list interventions specifically targeted to damages related to this aspect. This nursing diagnosis represents a risk for falls in the elderly[6].

There was no statistically significant correlation between functional capacity and risk of falls. However, some studies have identified that functional incapacity was the main factor associated with the risk of falls[5,15]. Conversely, falls are also important causal factors for increased dependence among the elderly, with consequent damage to their functionality[15]. It should be noted that independent elderly people in all dimensions of the Functional Independence Measure presented a low risk for falls, a positive situation that should be maintained, in view of their well-being and quality of life.

Disabling events and the need to maintain the autonomy and independence of the elderly are important points to be discussed in the creation of public policies[10]. In this context, it is imperative that nurses

identify the priority needs of this clientele to prevent disabilities and cognitive problems, factors that influence the risk of falls, as well as other iatrogenies common in this age group. By doing so, they will be able to offer subsidies to the development of actions, bearing in mind that the elderly are biopsychosocial beings inserted in a family and community scopes with unique sociocultural context.

Conclusion

The elderly presented complete independence in most of the items related to daily life activities. However, they are at risk of falls related to other factors, such as possible previous history of this event. According to the Functional Independence Measure, the main points of dependence are directly related to poor social conditions. Communication, problem solving and memory were the most affected aspects.

Collaborations

Lima RJ and Pimenta CJL contributed to the conception and design, analysis and interpretation of data. Viana LRC and Ferreira GRS contributed to the writing of the article. Bezerra TA and Costa KNFM contributed to the relevant critical review of the intellectual content and final approval of the version to be published.

References

1. Araújo EC, Martins KP, Lima RJ, Costa KNFM. Concern with falls in elderly people attended in Integral Attention Center. Rev Eletr Enf. 2016; 18:e1186. doi: http://dx.doi.org/10.5216/ree.v18.39899

2. Instituto Brasileiro de Geografia e Estatística (IBGE). Coordenação de População e Indicadores Sociais. Síntese de indicadores sociais: uma análise das condições de vida da população brasileira. Rio de Janeiro: IBGE; 2016.

3. Freitas CV, Sarges ESNF, Moreira KECS, Carneiro SR. Evaluation of frailty, functional capacity and quality of life of the elderly in geriatric outpatient clinic of a university hospital. Rer Bras Geriatr Gerontol. 2016; 19(1):119-28. doi: http://dx.doi.org/10.1590/1809-9823.2016.14244

4. Gautério DP, Zortea B, Santos SSC, Tarouco BS, Lopes MJ, Fonseca CJ. Risk factors for new accidental falls in elderly patients at Traumatology Ambulatory Center. Invest Educ Enferm [Internet]. 2015 [cited 2017 Jun 12]; 33(1):35-43. Available from: https://www.ncbi.nlm.nih.gov/pubmed/26148154

5. Brito TA, Fernandes MH, Coqueiro RS, Jesus CS. Falls and functional capacity in the oldest old dwelling in the community. Texto Contexto Enferm. 2013; 22(1):43-51. doi: http://dx.doi.org/10.1590/S0104-07072013000100006

6. Valcarenghi RV, Santos SSC, Hammerschmidt KSA, Barlem ELD, Gomes GC, Silva BT. Institutional actions based on nursing diagnoses for preventing falls in the elderly. Rev Rene. 2014; 15(2):224-32. doi: http://dx.doi.org/10.15253/2175-6783.2014000200006

7. Reis LA, Nunes NSO, Flôres CMR. Risco de quedas em idosos: comparação entre a Fall Risk Score de Dowton e o teste Time Upand Go Test. Rev InterScientia [Internet]. 2013 [citado 2017 jun. 12]; 1(3):28-38. Disponível em: https://periodicos.unipe.br/index.php/interscientia/article/view/45/42

8. Bezerra TA, Brito MAA, Costa KNFM. Characterization of medication use among elderly people attended at a Family Health Care Service. Cogitare Enferm [Internet]. 2016 [cited 2017 Jun 21]; 21(1):1-11. Available from: http://www.saude.ufpr.br/portal/revistacogitare/wp-content/uploads/sites/28/2016/10/43011-173407-1-PB.pdf

9. Sales JCS, Júnior FJGS, Vieira CPB, Figueiredo MLF, Luz MHBA, Monteiro CFS. Feminization of old age and its interface with depression: integrative review. Rev Enferm UFPE on line [Internet]. 2016 [cited 2017 Jun 13]; 10(5):1840-6. Available from: http://www.revista.ufpe.br/revistaenfermagem/index.php/revista/article/view/8871/pdf_10248

10. Caberlon IC, Bós AJG. Diferenças sazonais de quedas e fraturas em idosos gaúchos. Ciênc Saúde Coletiva. 2015; 20(12):3743-52. doi: http://dx.doi.org/10.1590/1413-812320152012.20602014

11. Rosa TSM, Moraes AB, Peripolli A, Santos Filha VAVS. Perfil epidemiológico de idosos que foram a óbito por queda no Rio Grande do Sul. Rev Bras Geriatria Gerontol. 2015; 18(1):59-69. doi: http://dx.doi.org/10.1590/1809-9823.2015.14017

12. Antes DL, Schneider IJC, Benedetti TRB, D'Orsi E. Medo de queda recorrente e fatores associados em idosos de Florianópolis, Santa Catarina, Brasil. Cad Saúde Pública. 2013; 29(4):758-68. doi: http://dx.doi.org/10.1590/S0102-311X2013000400013

13. Lourenço TM, Lenardt MH, Kletemberg DF, Seima MD, Carneiro NHK. Functional independence of long-living elderly at hospital admission. Texto Contexto Enferm. 2014; 23(3):673-9. doi: http://dx.doi.org/10.1590/0104-07072014001500013

14. Smith PD, Becker K, Roberts L, Walker J, Szanton SL. Associations among pain, depression, and functional limitation in low-income, home-dwelling older adults: an analysis of baseline data from CAPABLE. Geriatr Nurs. 2016; 37(5):348-52. doi: http://dx.doi.org/10.1016/j.gerinurse.2016.04.016

15. Marques WV, Cruz VA, Rego J, Silva AS. The influence of physical function on the risk of falls among adults with rheumatoid arthritis. Rev Bras Reumatol. 2014; 54(5):404-8. doi: http://dx.doi.org/10.1016/j.rbre.2014.03.019