



Relationship between the frequency of falls, fear of falling and functional abilities in women aged 65 and over

Povezanost učestalosti pada, straha od pada i funkcionalne sposobnosti kod žena starosti 65 godina i više

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Abstract

Background/Aim. An increased tendency to fall and subsequent occurrence of injuries due to decline in the functional abilities are some of the many problems in older persons. The aim of the study was to determine the differences in functional abilities and the expressiveness of fear of falling between the women aged 65 and over who experienced a fall in the past 12 months (G1) and those that did not (G2). **Methods.** In this cross-sectional study, 236 women aged 65 and over were included. Fall history was based on self-reporting, the fear of a fall was estimated based on The Falls Efficacy Scale International – FESI, while the functional ability was measured by The Lawton Instrumental Activities of Daily Living – IADL. **Results.** Just under half of the women in the sample reported that one or more falls occurred in the last 12 months. Through the connectivity analysis, in both groups (G1 and G2), coefficients of correlation achieved statistical significance between the functional ability and fear of falling. A strong and negative correlation between IADL and FESI score in both groups, G1 ($\rho = -0.695$; $p < 0.001$) and G2 ($\rho = -0.657$; $p < 0.001$), was confirmed. **Conclusion.** The improvement of functional ability in women aged 65 and over could lower the risk of falling in this population.

Key words:

nesrećni padovi; stare osobe; žene; strah; motorna aktivnost.

Apstrakt

Uvod/Cilj. Povećana tendencija ka padu s posledičnom pojavom povreda zbog smanjenja funkcionalne sposobnosti je jedan od mnogih problema koji se javljaju kod starijih osoba. Cilj rada je bio utvrditi razlike u funkcionalnim sposobnostima i izraženosti straha od pada između žena starosti 65 godina i više koje su doživele pad u poslednjih 12 meseci i onih koje to nisu. **Metode.** U ovu studiju preseka je bilo uključeno 236 žena starosti 65 godina i više. Istorija pada je dobijena na osnovu ankete, strah od pada procenjen je na osnovu Internacionalne skale za procenu zabrinutosti zbog pada (*Falls Efficacy Scale International* – FESI), dok je funkcionalna sposobnost merena preko Lotonove skale za procenu instrumentalnih aktivnosti svakodnevnog života (*The Lawton Instrumental Activities of Daily Living* – IADL). **Rezultati.** Nešto manje od polovine žena u uzorku prijavile su jedan ili više padova u poslednjih 12 meseci. Koeficijenti korelacije između funkcionalne sposobnosti i straha od pada, kod grupa G1 i G2, dostigli su statističku značajnost. Potvrđena je jaka i negativna korelacija između IADL i FESI skora za obe grupe, G1 ($\rho = -0.695$; $p < 0.001$) i G2 ($\rho = -0.657$; $p < 0.001$). **Zaključak.** Poboľšanje funkcionalnih sposobnosti kod žena starosti 65 godina i više mogao bi smanjiti rizik od pada u ovoj populaciji.

Ključne reči:

accidental falls; aged; women; fear; motor activity.

Introduction

In a person's developmental cycle, aging is a necessary and inevitable stage that brings a number of challenges. An increased tendency to fall and subsequent occurrence of injuries, all due to changes in the functional behavior and decline

in the functional abilities are some of the many problems for older persons. During the last decade, there has been a significant increase in life expectancy in the Republic of Serbia. Therefore, the percentage of people over 65 years of age has increased from 16.6% to 18.7%, thus representing a group of the population that has grown most in the country ¹. In this

statistic data, women are ahead of men, so the average life expectancy for men is 73 years and for women 78 years. Because of this demographic aging, it is predicted that the proportion of people older than 65 years of age will increase from 17% to 24% in the next 30 years. That means that almost one-fourth of the population would be older than 65 and that the demographic dependency rate of the older population would have increased from 25% to 39% during the projection period. "The oldest" is the Region of South and East Serbia, where as many as 27% of the population is older than 60 years¹. Old age is one of the key risk factors for falls. People of older age are at the highest risk of falling and getting severe injuries during a fall, some of which may end up with a fatal outcome². With the progress of medicine, modern society has succeeded in prolonging life expectancy but consequently accompanied by chronic diseases, weaknesses, and comorbidities. Therefore, the measurement of functional abilities gained significance³. The three components included in the assessment of functional abilities are the following: self-care, self-sufficiency, and the ability of older people to lead an active life^{4,5}.

A fall can cause concern about further falls, which could further lead to activity limitation or increased dependence. In addition, in the research, some authors point out that the presence of concerns over falling represents a link between falls and functional capacity⁶. The fear of falling is the main limiting factor of functional independence⁷.

In the Republic of Serbia, pioneering research on the identification of older people at risk of falling⁸, risk factors for falling and fear of falling⁹ were conducted. In all of these studies, female gender has proved to be a predictive risk factor for falling. In order to confirm the aforementioned facts we have conducted a research whose aim was to determine the differences in functional capabilities and expressiveness of fear of falling between women aged 65 and over by whether they have experienced a fall in the last 12 months or not.

Methods

Cross-sectional study was conducted through home visits of the patronage services of the Health Care Center in Niš, Serbia, by interviewing persons aged 65 and over from the general population. Participants were randomly selected from the register of patients in the Primary Health Center of Niš. Criteria for inclusion in the study were as follows: individuals aged 65 and over, female gender, living in a house or apartment, ambulatory, and a signed informed consent. The criteria for exclusion were as follows: immobile persons and persons who were unable to understand and follow instructions.

The sample consisted of 236 individuals aged 65 and over, female, living in the territory of the municipality of Niš. The sample size was calculated on the basis of the Cochran formula by Fisher, Laing and Stoeckel¹⁰. The total sample was divided into two groups. The first group (G1) consisted of participants with a positive history of falls thus they had an increased risk of falling, while participants who

did not report any previous falls were in the second group (G2). The study was performed in accordance with the formal demands contained in the national and international regulations standards for researches that include human beings.

Basic demographic data of participants was obtained (age, marital status, residence, level of education, pre-retirement occupation).

Fall history was determined based on self-reporting for the period of the last 12 months. The functional ability was measured by The Lawton Instrumental Activities of Daily Living – IADL¹¹. This scale is designed to measure the level of dependence in performing everyday activities. It consists of eight basic daily activities (ability to use the phone, going shopping, food preparation, housework, taking care of laundry, use of transportation, responsibility for own medicines, ability to take care of finances). Each answer ranges from 0 to 1, depending on the degree to which the problem has been identified. The highest level of functionality in this category is evaluated. The score ranges from 0 to 8 and shows the functional status of the person, where 0 points indicates a low level of functionality (the person is dependent in performing the instrumental activities of daily life), while the score of 8 indicates high functionality (the person is independent in performing these activities)¹¹.

Fear of falling was evaluated according to the Falls Efficacy Scale International – FESI¹². This scale consists of 16 items on daily activities performing: house cleaning, dressing and undressing, preparing simple meals, bathing or showering, going to a store, climbing or descending up/ down stairs, walk in the neighborhood, reaching things at or above head or on the floor, answering your phone in a timely manner (before it stops ringing), walking on a slippery surface (*eg* wet and icy), visiting a friend or relative, crowding, walking on uneven surfaces (*eg* rocky ground or damaged sidewalk), climbing or descending a slope, going to a social event (*eg* going to church for a family gathering or meeting). Each item is rated on a scale from 1 (not concerned at all) to 4 (very concerned), while the total score ranges from 16 (not concerned about falling) to 64 (very pronounced fear of falling)¹².

Descriptive data and inferential statistics are presented. Normal distribution was checked using the Kolmogorov-Smirnov test and data independence across variables by using χ^2 test (for categorical responses). As a measure of association, ϕ coefficient and Cramer's *V* were reported and interpreted as small (0.10), medium (0.30) or large (0.50) effect sizes¹³. The frequencies, percentages, mean and standard deviations are listed for comparison purposes only because none of the data was normally distributed. Differences in continuous variables between two groups were tested using the non-parametric Mann-Whitney *U*-test for two independent groups. The effect size was calculated using the formula $r = Z/\sqrt{N}$, where *N* is the total number of the sample and interpreted as small = 0.10–0.29, medium = 0.30–0.49, or large effect size = 0.50–1.00¹³. Statistically significant differences were found on two demographic variables (age and education level) with the effect sizes that were assessed as small. However, preliminary checks for ANCOVA (anal-

ysis of covariance) were conducted and several violations of the basic assumptions were noted, as well. Therefore, it was decided not to statistically remove the influence of age and education level as potentially confounding variables. Next, to test relationships between selected variables, Spearman's rank correlation test was used. All analyses were performed in SPSS, version 23 (IBM, Armonk, NY, USA), and a significance level of 0.05 was established to consider the results significant.

Results

The research included 236 women, with the average age of 75.19 years. The basic demographic characteristics of the patients are given in Table 1. Most of the respondents consisted of women that had not reported a fall in the past 12 months, that lived in the city, housewives with middle school education.

Of all the respondents included in the research, 105 (44.5%) was with a positive history of falls, that is, they have reported two or more falls in the last 12 months (Table 1).

Demographic characteristics of the patients included in the study

Comparison of groups in relation to functional abilities and fear of falling was carried out using the Mann-Whitney *U*-test for the planned group comparison with the subsequent calculation of the effect size *r*. The effect size was classified as small (0.10–0.29), moderate (0.30–0.49) or large (0.50–1.00) (Table 2).

Comparison of groups in relation to IADL and FESI scores

The instruments applied in this study, the IADL and the FESI, showed excellent internal consistency. The value of a Cronbach α coefficient for the IADL was 0.902 and 0.989 for the FESI.

Mann-Whitney *U*-test revealed a statistically significant difference in the IADL score with a small effect size between the two groups ($p = 0.001$, $r = 0.22$). More specifically, the median (Mdn) of the IADL score was lower in the group G1

Table 1
Demographic characteristics of female participants included in the study

Characteristics	G1	G2	<i>p</i>
Number (%)	105 (44.5)	131 (55.5)	
Age (years), mean	76.31	74.30	0.009
Place of living, n (%)			
urban	52 (49.5)	57 (43.5)	0.430
rural	53 (50.5)	74 (56.5)	
Level of education			
no formal education	57 (54.3)	57 (43.5)	0.0010
elementary school	35 (33.3)	34 (26)	
secondary school	10 (9.5)	36 (27.5)	
high school	1 (1)	3 (2.3)	
faculty	2 (1.9)	1 (0.8)	
Employment position			
farmer	13 (12.4)	14 (10.7)	0.173
administrative worker	3 (2.9)	14 (10.7)	
housewife	61 (58.1)	63 (48.1)	
production worker	19 (18.1)	19 (14.5)	
trader	0 (0)	1 (0.8)	
hairstylist	0 (0)	1 (0.8)	
waiter	1 (1)	1 (0.8)	
other	8 (7.6)	18 (13.7)	

G1 – participants with a positive history of falls; G2 – participants who did not report the history of falls.

Table 2
Comparison of groups in relation to the IADL and FESI scores

Score	Group	Descriptive value of score			Comparison			
		mean (SD)	median (IQR)	mean rank	<i>U</i>	<i>z</i>	<i>p</i>	<i>r</i>
IADL	G1	5.27 (2.97)	6.00 (5.00)	102.86	5235.00	-3.33	0.001	0.22
	G2	6.58 (2.08)	8.00 (2.00)	131.04				
FESI	G1	40.24 (14.70)	42.00 (18.00)	150.78	3488.00	-6.33	0.000	0.43
	G2	26.79 (13.10)	19.00 (16.00)	92.63				

IADL – Lawton Instrumental Activities of Daily Living; FESI – Falls Efficacy Scale International; G1 – participants with a positive history of falls ($n = 105$); G2 – participants who did not report the history of falls ($n = 131$); SD – standard deviation; IQR – interquartile range; *r* – effect size.

(Mdn = 6.00) compared to the group G2 (Mdn = 8.00). By comparing the basic descriptive values, it could also be noted that the mean (M) IADL score was lower in the G1 than in the G2 group (M = 5.27 vs M = 6.58).

Mann-Whitney *U*-test revealed a statistically significant difference in the FESI score with a moderate effect size between the two groups ($p < 0.001$; $r = 0.43$). Specifically, the median of FESI score was higher in the group G1 (Mdn = 42.00) compared to the group G2 (Mdn = 19.00). By comparing the basic descriptive values, it could also be noted that the mean FESI score was higher in the G1 than in the G2 group (M = 40.24 vs M = 26.79).

The statistical significance of the relationship between functional ability and fear of falling in the groups G1 and G2 was investigated using Spearman's Rank Order Correlation (Table 3).

Table 3

Correlation of functional ability (IADL score) and fear of falling (FASI score)

FESI score	Group	IADL score	
		ρ	<i>p</i>
	G1	-0.695	0.000
	G2	-0.657	0.000

IADL – Lawton Instrumental Activities of Daily Living; FESI - Falls Efficacy Scale International; G1 – participants with a positive history of falls ($n = 105$); G2 – participants who did not report the history of falls ($n = 131$).

ρ – coefficient of correlation.

Correlation of functional ability and fear of falling

According to the results of statistical analysis of the correlation between functional ability and fear of falling, in the group G1, as well as in the group G2, correlation coefficients reached statistical significance.

First, a strong and negative correlation between the IADL score and the FESI score was confirmed in the group G1 ($\rho = -0.695$; $p < 0.001$). The higher values of the IADL score were associated with lower levels of the FESI score in participants of the group G1, and *vice versa*.

Second, a strong and negative correlation between the IADL score and the FESI score was confirmed in the group ($\rho = -0.657$; $p < 0.001$). The higher values of the IADL score were associated with lower levels of the FESI score in participants of the group G2, and *vice versa*.

Discussion

The prevalence of falls in our study (44.5%) was higher than in other studies that have assessed the falls in older females (32.4%)¹¹, (29.1%)¹², (33.2%)¹⁴. The mean age of participants in our study (75.19 years) was higher than in other studies, which could explain the higher prevalence of falls that was found, as age is one of the main risk factors for falls, culminating in persons older than 80 years¹⁵⁻¹⁷. The results of our study also support the fact that it was confirmed that there was a statistically significant difference in the age

of the group of participants with a positive history of falls compared to the group of participants who did not report the history of falls ($p = 0.009$), with small effect size ($r = 0.17$). The participants from the group G1 were older than participants from the group G2 (Mdn = 77.00 vs Mdn = 74.00).

The authors of this study are not familiar with research conducted in the Republic of Serbia that evaluated the prevalence of falls along with the impact on the functional abilities of older persons, making it difficult to compare the data. The main reason for selecting the IADL is the decrease in functional performance of older persons in all IADL domains, which justifies interventions as well as further assessment, in order to prevent a continuous decline, promote safe living conditions for older persons and prolong their independence¹⁸.

This study showed that the functional abilities were significantly different between women who experienced a fall in the previous year and those who had no history of falls. Older persons who did not report a fall had a higher score than participants in the group with a positive history of falls (M = 5.27 vs M = 6.58). Our results are equivalent to studies that have shown a relationship between reduced functional abilities and increased risk of falling in persons over the age of 65¹⁹⁻²¹.

Responsibility for the occurrence of fear of falling in older persons is attributed to the positive history of falls²². After the fall, a person reduces its daily activities due to fear of falling or reduction of activity, as a protective measure, is even recommended by family and health care workers^{6, 23}. Some authors point out that the presence of fear of falling is the link between a fall and functional abilities⁶, and that the main limiting factor of functional independence in older people is a fear of falling⁷. Our research fully confirms the results of these studies. The results of our study showed that participants from the group with a positive history of falls experienced greater fear of falling ($\rho = -0.695$; $p < 0.001$) compared to the group of participants who did not experience a fall ($\rho = -0.657$; $p < 0.001$).

Pioneering research conducted in the Republic of Serbia on the identification of the elderly at risk of falling and the risk factor for falling⁸, and risk factors for the onset of fear of falling⁹ showed that age was a predictive risk factor for decline.

A limitation of our study is that the assessment of functional ability (execution of functional tasks) was performed by the respondents themselves, which other authors also cite as a limitation²⁴. It would be best to ask the participants to perform these tasks in a time interval in order to get the most accurate information on what a person can do, and in which situations a person really has a problem. Thus, the answers can overestimate or underestimate some of the given functional activities.

Conclusion

The results of this study indicate that older women with a positive history of falls showed less functional ability and had a more pronounced fear of falling.

In this regard, it is recommended that the enhancement of functional abilities in older women is included in fall prevention programs for reduction of risk factors for falls, which will also reduce the fear of falling.

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