Risk factors for developing fear of falling in the elderly in Serbia

Faktori rizika od nastanka straha od pada kod starih osoba u Srbiji

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Abstract

Background/Aim. After a fall, the elderly can develop a fear of falling which can be more frequent and more serious problem than the fall itself because it represents the main factor limiting an older person in his/her everyday functioning. The aim of this study was to identify and examine, in a more detailed way, risk factors for developing fear of falling triggered by the history of their falls over the previous year in the elderly in Serbia who live in houses or apartments. **Methods.** The cross-sectional study was conducted on 400 people, mean age 75.04 years (min. 65, max. 94), randomly selected from the register of patients in the Primary Health Center of Niš (164 men and 236 women), in the period January-June 2014. Socio-demographic questionnaire – Elderly Fall Screening Test (EFST), Multi-Factor Questionnaire Falls (MFQ) and Falls Efficacy Scale International (FESI) were used in this study. **Results.** After applying the multivariate binary logistic regression, it was found that significant predictors for developing fear of falling were as follows: female gender (OR = 2.599; $p = 0.009$), age 75–79 years (OR = 4.637; $p = 0.009$) and over 80 years (OR = 3.830; $p = 0.001$), increase in household members (OR = 1.206; $p = 0.033$), people who estimate their health as average (OR = 0.268; $p < 0.001$) and good (OR = 0.059; $p < 0.001$), number of falls higher than 2 (OR = 2.761; $p = 0.003$), presence of injuries during the fall (OR = 2.483; $p = 0.028$), periodical and repeating situations of "near-fall" (OR = 3.830; $p = 0.001$), limited activity (OR = 2.124; $p = 0.007$) problems with sight (OR = 3.006; $p < 0.001$), cognitive problems (OR = 2.296; $p = 0.005$) and problems with balance (OR = 3.809; $p < 0.001$). **Conclusion.** The results of this study can be used for planning promotional programs for falls and a fear of falling prevention, as well as prevention of their consequences.

Key words:
aged; aged, 80 and over; accidental falls; fear; risk factors; serbia.

Apstrakt

Uvod/Cilj. Nakon pada, stare osobe mogu da razviju strah od pada koji može biti učestaliji i ozbiljniji problem od pada jer postaje glavni faktor ograničavanja stare osobe u svakodnevnom funkcionisanju. Cilj ove studije bio je da se otkriju faktori rizika za nastanak straha od pada kod starih osoba u Srbiji koje žive u kući ili stanu u odnosu na istoriju pada u poslednjih godinu dana. **Metode.** Studija preseka sprovedena je na 400 osoba odabranih putem slučajnog uzorka iz registra Doma zdravlja Niš (164 muškaraca i 236 žena), prosečne starosti 75,04 godina (min. 65, maks. 94 godine) u periodu januar-jun 2014. godine. U istraživanju je korišćen: socio-demografski upitnik, Skrining test za pad kod starih osoba – *Elderly Fall Screening Test* (EFST), upitnik za procenu više faktora rizika za pad – *Multi-factor Falls Questionnaire* (MFQ), skala za procenu straha od pada – *Falls Efficacy Scale International* (FESI). **Rezultati.** Multivarijantnom binarnom logističkom regresijom kao značajni prediktori nastanka straha od pada izdvojili su se: ženski pol (OR = 2.599; $p = 0.009$), godine starosti od 75-79 (OR = 4.637; $p = 0.009$) i preko 80 godina (OR = 3.830; $p = 0.001$), porast broja članova domaćinstva (OR = 1.206; $p = 0.033$) osobe koje procenjuju svoje zdravlje kao prosečno (OR = 0.268; $p < 0.001$) i dobro (OR = 0.059; $p < 0.001$), broj padova veći od 2 (OR = 2.761; $p = 0.003$), prisutne povrede prilikom pada (OR = 2.483; $p = 0.028$), povremene i česte situacije „blizu" pada (OR = 3.830; $p = 0.001$), ograničenje aktivnosti (OR = 2.124; $p = 0.007$), problemi sa vidom (OR = 3.006; $p < 0.001$), kognitivni problemi (OR = 2.296; $p = 0.005$) i problemi sa ravnotežom (OR = 3.809; $p < 0.001$). **Zaključak.** Rezultati ove studije mogu da posluže za planirane promotivnih programa prevencije padova i straha od pada, a samim tim, i njihovih posledica.

Ključne reči:
stare osobe; stare osobe, 80 i više godina; padovi, slučajni; strah; faktori rizika; srbija.

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Introduction

Since the early 80s, researchers have believed that fear of falling is a result of psychological trauma due to a fall, which was known as "post-fall syndrome" or "ptophobia" (phobic reaction to standing or walking) [1]. A post-fall syndrome was first described in 1982 by researchers Murphy and Isaacs who noticed that the elderly developed intense fear and walking difficulties after the fall [2]. Since then, the fear of falling has been perceived as one of the main symptoms of falling occurences and considered a special health problem in the elderly [3]. Some studies showed that the fear of falling may also be present in the elderly who did not experience a fall itself [1, 3–5].

The presence of fear of falling in the elderly can cause serious emotional, psychological, medical and social changes such as reduced or limited functional activity, loss of autonomy and independence concerning the performance of daily living activities, reduced social activities as well as the feeling of weakness and insecurity [6, 7]. Moreover, a very old person, after the fall, may limit his/her everyday activities because of the fear of another fall and reduce the activities recommended as a protective measure by his/her family and health workers. In this way he/she can only cause a loss of independence and reduce social interactions, which, in turn, lead to physical inactivity and reduced quality of life [8–10]. Kang [11] also confirmed this in his work stating that the old people, who have experienced a fall, reported that they did not have the will to perform daily activities because of the presence of fear of falling. He further explained that limited mobility deteriorated sustainability of muscle strength, balance, and therefore increased a risk of fall, which eventually resulted in a vicious circle that was difficult to get out of.

That is to say, an old person who suffers fall may subsequently develop a fear of further falls [12]. On the other hand, the fear of falling was identified as an independent risk factor for reduced quality of life, limiting activities, loss of independence, the leading cause of falls and injury caused by falls, morbidity and mortality [13]. Thus, the development of one syndrome can initiate "cascading changes", where the accumulated effects lead to the spread of the effects on all levels of functioning [14] and result in the escalation of the risk of functional decline and other adverse outcomes [15]. Moreover, the fear of falling is more common in older people living in a house or apartment, with an assessment of the frequency of falls within the range between 29% and 77% [13]. Up to 55% of elderly people in the general population report they fear of falling and the prevalence is higher among the elderly female patients with previous history of falls as well as among people with certain comorbidity [16].

Fear of falling and fall are not directly related and they result from the action of basic common risk factors including socio-demographic factors [17], history of falls [14], medical conditions (e.g., arthritis [18], osteoporosis [19], the visual problems [20, 21], problems with urination [22], balance and walking disorders [10, 23] cognitive status [24], orthostatic hypotension [25]).

In this respect, if the fall and fear of falling share the risk factors listed, this means that old people with these characteristics are at an increased risk of fall and developement of fear of falling. This may be of a particular importance to the primary health care doctors and visiting nurses, so that they can identify the elderly with the aforementioned risk factors as well as to the implementation of targeted programs of prevention of falls and developing fear of falling.

Methods

Respondents

The sample represents 400 respondents aged 65 years or more (164 men and 236 women) who live in the city of Niš.

At the time of this research, there was no relevant information on the incidence we were examining to determine the maximum size of the sample. We started from the variability of occurrence of 50% [26]. Taking this into account as well as the fact that based on a comparative review for 2009 of Patronage service of the Primary Health Center of Niš, the total number of people on the territory of the city of Niš was 255,479 and 44,378 people were 65 years old, or more), we came to the information that the sample of 384 respondents was sufficient for the necessary research. The respondents were selected randomly, using a table of random numbers from the registry of patients in the Primary Health Center of Niš. The criteria for being involved into the study were: age 65 and over, living in a house or apartment, the ability to understand and follow instructions, being mobile with or without the aid. The criteria for exclusion from the study were: age under 65, inability to understand and to follow instructions and immobility. The criterion for exclusion of a patient from the study was the consent of a respondent to be excluded from the research.

Study design

This was the cross-sectional study in which data was collected by interviewing the respondents. Data collection was conducted by a researcher through home visits and in the presence of visiting nurses. The research was conducted in the period of January–June 2014.

Instruments

The general Socio-demographic questionnaire contains 8 questions which refer to age, gender, place of living, marital status, level of education, satisfaction with income, assessment of health and number of household members.

Fall screening test for the fall in the elderly over 65 years of age – Elderly Fall Screening Test (EFST) is designed to detect a risk level of a fall and it contains 5 items: history and the number of falls, injuries caused by falling, 'near-fall' experience and current walking function (estimation of gait and the form of walking) [27]. In a study done by Cwikel et al. [28], it was found that the sensitivity of this test reached 83% and specificity 69%. The values of each question (0 points – there is no risk of a fall or 1 point – there is a risk of a fall) were summed up giving a total score between 0

and 1 which categorized people as with no or low risk of fall while a score ≥ 2 categorized people as with moderate or high risk for fall. Fall Screening Test in this study showed satisfactory reliability of low intensity (Cronbach's $\alpha = 0.76$).

In order to get an insight into disorders of health conditions, the questionnaire for the assessment of multiple risk factors regarding a fall – Multi-factor Falls Questionnaire (MFQ) was used [28]. Total MFQ result was calculated as the sum of points obtained from each group of the risk factors with a fall involved. If the total score was ≤ 3, a respondent was categorized with the low risk of fall, and if the result was more than 3, it was considered that a person was at high risk of falling. In this study, MFQ did not show a satisfactory reliability (Cronbach's $\alpha = 0.48$).

For the assessment of fear of falling the International scale of concern regarding a fall – Falls Efficacy Scale International (FES-I) was used and its reliability was proved in studies conducted by Delbaere et al. [29]. Each item was evaluated on a scale from 1 (not at all concerned) to 4 (very concerned). In order to obtain a total score for the FES-I, the scores on all items were simply added up together and the total value ranged from 16 (no concern about falling) to 64 (seriously concerned about falling). In the examined sample, the FES-I showed satisfactory reliability of high intensity (Cronbach's $\alpha = 0.99$).

Independent variables

Socio-demographic data taken into consideration in this study were gender, age, marital status, place of residence, education level, income satisfaction, health assessment and community life. The four age groups were set as follows: a) 65 to 69, b) 70 to 74 c) 75–79 and d) 80 years and more. Based on the questions from the EFST about the history of falls, a variable "number of falls in the last 12 months: 0–1 and 2 or more injuries due to falls and 'near-fall' situations was constructed. Regarding health disorder condition, the following variables were assessed: limitation of activity due to falling, vision problems, symptoms of cognitive problems, balance problems, walking / mobility problems, arthritis, osteoporosis, orthostatic hypotension, the use of aids and micturition problems.

Ethics

This study by the Ethical Committee of the Faculty of Medicine, University of Novi Sad, Ethical Committee of Primary Health Center Niš, and the managing director of the Primary Health Center Niš.

Statistical analysis of the data

The obtained data was processed in the software package, Statistical Package for the Social Sciences 20.00, version 20 (SPSS). The Cronbach's α coefficient was used to determine the reliability of the tests. Descriptive statistics and statistics for conclusion were used to analyse the data. Techniques of descriptive statistics, that is, arithmetic mean and standard deviation were used to determine the severity of ba-

sic research variables. The logistic regression analysiswas used to identify predictors of fear and the results were presented as odds ratio (OR) with 95% confidence interval (95% CI) and *p*-value. All parameters were analyzed in the univariate model; the statistically significant ones were included in a multivariate analysis. Statistical significance was set on the level of 0.05.

Results

The study included 400 respondents, out of whom there were 41% of men and 59% women. The age of respondents was between 65 and 94 years, with an average 75.04 years (SD ± 5.85). The average age of men was 74.81 years (SD ± 5.77), while of the women was 75.20 years (SD ± 5.91). Most of the respondents were married (66%) and lived in the city (53.5%) while more than a half of the participants reported that they lived alone (52.8%). Depending on the education, the most frequent category of respondents had elementary education, and the fewest number of the respondents had university education. Assessment of health status ranged from poor – 38.8%, average – 45.8% and good –15.5%. More than a half of the participants (79%) said that they were not satisfied with the income, i.e., it did not meet their needs.

With the aim of determining independent socio-demographic risk factors for developing the fear of falling using the univariate logistics regression analysis, the following variables were identified as important: gender, age, marital status, permanent residence, place of living, level of education, number of household members, satisfaction with the income and health assessment (Table 1). Results showed that the probability for developing the fear of falling was 2.5 times greater in women (OR = 2.586; $p < 0.001$) and that it was significantly increasing with age: from 70–74 years of age the probability increased more than two times (OR = 2.438; $p = 0.005$), from 75–79 years (OR = 5.839; $p < 0.001$) and over 80 years (OR = 5.676; $p < 0.001$) even over 5 times. The probability for fear of falling was 1.7 times greater in the widowed (OR = 1.737; $p = 0.016$), in comparison to people who had a marital partner. Living in the countryside was predictors of developing the fear of falling (OR = 0.579; $p = 0.007$) as well as primary school education (OR = 0.289; $p < 0.001$). With every household member the probability of developing the fear of falling increased by 14.8% (OR = 1.148; $p = 0.048$). People who were not satisfied with their income feel 2.3 times greater fear of falling compared to those who were satisfied (OR = 2.307; $p = 0.007$). People who estimated their health as average (OR = 0.227; $p < 0.001$) and good (OR = 0.041; $p < 0.001$) were at a lower risk of falling than people who estimated their health as bad.

The listed independent socio-demographic variables were included in the multivariate logistics model with fear of falling as an dependent variable (Table 2). The whole model with all predictors was statistically significant ($\chi^2 = 148.56$, $p < 0.001$) and it explained, in whole, the variances of fear of falling between 31.0% (Cox and Snell R-Squared) and 41.6% (Nagelkerke R-Squared).

Table 1

Sumary of univariate regression for socio-demographic predictor variables

Variable	No fear n (%)	Fear n (%)	OR	95% CI	p
Gender					
[men]	95 (53.7)	69 (30.9)	/	/	/
women	82 (46.3)	154 (69.1)	2.586	1.716–3.895	< 0.001
Age (years)					
[65–69]	61 (34.5)	24 (10.8)	/	/	/
70–74	49 (27.7)	47 (21.1)	2.438	1.313–4.527	0.005
75–79	37 (20.9)	85 (38.1)	5.839	3.173–10.746	< 0.001
≤ 80	30 (16.9)	67 (30.0)	5.676	2.996–10.755	< 0.001
Marital status					
[married]	132 (74.6)	139 (62.3)	/	/	/
not married	0 (0.0)	1 (0.4)	1.369	0.005–3.658	0.965
divorced	4 (2.3)	8 (3.6)	1.899	0.559–6.475	0.304
widower/widow	41 (23.2)	75 (33.6)	1.737	1.109–2.5722	0.016
Residence					
country side	69 (39.0)	117 (52.5)	/	/	/
city	108 (61.0)	106 (47.5)	0.579	3.888–0.864	0.007
Place of living					
[house]	156 (88.1)	205 (91.9)		/	/
flat	21 (11.9)	18 (8.1)	0.652	0.336–1.266	0.207
Level of education					
[primary school]	92 (52.0)	176 (78.9)	/	/	/
> primary school	85 (48.0)	47 (21.1)	0.289	0.187–0.447	< 0.001
Number of household members, mean ± SD	2.35 ± 1.25	2.65 ± 1.67	1.148	1.002–1.316	0.047
Satisfaction with income					
[yes]	31 (17.5)	20 (9.0)	/	/	/
no	127 (71.8)	189 (84.8)	2.307	1.259–4.226	0.007
partially	19 (10.8)	14 (6.3)	1.142	0.469–2.782	0.770
Assessment of health					
[bad]	30 (16.9)	125 (56.1)	/	/	/
average	94 (53.1)	89 (39.9)	0.227	0.139–0.372	< 0.001
good	53 (29.9)	9 (4.0)	0.041	0.018–0.092	< 0.001

[] – reference group; SD – standard deviation; OR – odds ratio; CI – confidence interval.

Table 2

Sumary of multivariate regression for socio-demographic predictor variables

Variable	OR	95% CI	p
Gender			
female	2.093	1.716–3.895	0.009
Age (years)			
[65–69]	/	/	/
70 –74	1.823	1.313–4.527	0.099
75–79	4.637	3.173–10.746	< 0.001
≤ 80	3.830	2.996–10.755	0.001
Marital status			
widower/widow	1.223	1.109–2.5722	0.489
Permanent residence			
[countryside]	/	/	/
city	0.630	3.888–0.864	0.079
Place of living			
house	/	/	/
flat	0.652	0.336–1.266	0.207
Level of education			
[primary school]	/	/	/
> primary school	0.581	0.187–0.447	0.070
Number of household members	1.206	1.002–1.316	0.033
Satisfaction with income			
[yes]	/	/	/
no	1.159	1.259–4.226	0.653
Health assessment			
[bad]	/	/	/
average	0.268	0.139–0.372	< 0.001
good	0.059	0.018–0.092	< 0.001

[] – reference group; OR – odds ratio; CI – confidence interval.

The following variables gave a unique statistically significant contribution to the mode: female gender (OR = 2.599; p = 0.009), people older than 75–79 years (OR = 4.637; p = 0.009) and over 80 (OR = 3.830; p = 0.001), an increase in household members (OR = 1.206; p = 0.033), people who estimated their health as average (OR = 0.268; p < 0.001) and good (OR = 0.059; p < 0.001).

Results of the EFST showed that the entire population of 400 respondents was processed. One third of the respondents, that is, 149 (37.70%), reported that a fall occurred two or more times, 246 (61.50%) respondents had an injury after the fall while 271 (67.80%) respondents was periodically or frequently in a 'near-fall' situation.

With the univariate logistics regression analysis, with fear of falling as an dependent variable, the probability of potential independent risk factors from the EFST was analyzed: history of falls, number of falls, injuries during a fall and situations "near-fall" (Table 3). All tested variables showed high statistical significance: people with a positive history of falls were almost in 5 times greater risk of developing a fear of a new fall (OR = 4.637; p < 0.001) while people who had two or more falls fear had 6 times more higher risk for developing a fear of a new fall (OR = 6.365; p < 0001) than people who had a smaller amount of falls or did not have them at all. People who injured themselves during a fall were in 4 times greater risk of developing a fear of a new fall (OR = 6.365; p < 0.001) whereas people who were periodically or frequently in a 'near-fall' situation are in a 5 times greater risk for fear of a new fall (OR = 5.036; p < 0.001).

In the multivariate logistics model, all statistically significant individual variables for the development of fear of falling were included and analyzed from the univariate analysis (Table 4). The whole model with all predictors was statistically significant (χ^2 = 95.10, p < 0.001) and in whole explained variances of fear of falling between 21.2% (Cox and Snell R-Squared) and 28.3% (Nagelkerke R-Squared). The following variables gave a unique statistically significant contribution to the mode: number of falls higher than 2 (OR = 2.761; p = 0.003), presence of injuries during a fall (OR = 2.483; p = 0.028) and periodical and frequent situations of 'near-fall' (OR = 3.830; p = 0.001).

Results from the MFQ showed that the fear of falling was present in a high percentage of respondents who had limited their activities (64.80%), had problems with sight (54.40%), had indications of cognitive problems (72.60%), problems with balance (79%), gait (70.50%), arthritis (39.10%), osteoporosis (6.76%), orthostatic hypotension (77%), used walking aids (59%), and had problems with urination (50.20%).

Table 3

Sumary of univariate regression for predictor variables from the Elderly Fear Screening Test

Variable	No fear n (%)	Fear n (%)	OR	95% CI	p
History of falls					
[negative]	117 (66.1)	64 (28.7)	/	/	/
positive	60 (33.9)	159 (71.3)	4.845	3.166–7.414	< 0.001
Number of falls					
[0–1]	147 (83.1)	97 (43.5)	/	/	/
≥ 2	30 (16.9)	126 (56.5)	6.365	3.964–10.220	< 0.001
Injuries during a fall					
[no]	142 (80.2)	104 (46.6)	/	/	/
yes	35 (19.8)	119 (53.4)	4.205	1.984–8.914	< 0.001
Situations 'near-fall'					
[never or rarely]	90 (50.8)	38 (17.0)	/	/	/
periodically and often	87 (49.2)	185 (83.0)	5.036	3.189–7.953	< 0.001

[] – reference group; OR – odds ratio; CI – confidence interval.

Table 4

Sumary of multivariate regression for predictor variables from the Elderly Fear Screening Test

Variable	OR	95% CI	p
History of falls			
[negative]	/	/	/
positive	1.662	0.908–3.043	0.100
Number of falls			
[0–1]	/	/	/
≥ 2	2.761	1.422–5.363	0.003
Injuries during a fall			
yes	/	/	/
no	2.483	1.105–5.578	0.028
Situations 'near fall'			
[never or rarely]	/	/	/
periodically and often	2.683	1.616–4.457	< 0.001

[] –reference group; OR – odds ratio; CI – confidence interval.

Table 5

Sumary of univariate regression for predictor variables from the Multi-factor Falls Questionaire

Variable	No fear n (%)	Fear n (%)	OR	95% CI	p
Limitation of activities					
[no]	130 (73.4)	73 (32.7)	/	/	/
yes	47 (26.6)	(67.3)	5.683	3.677–8.784	< 0.001
Visual problems					
[no]	150 (84.7)	92 (41.3)	/	/	/
yes	27 (15.3)	131 (58.7)	7.911	4.852–12.898	< 0.001
Indication of cognitive problems					
[no]	103 (58.2)	56 (25.1)	/	/	/
yes	74 (41.8)	167 (74.9)	4.151	2.713–6.350	< 0.001
Balance problems					
[no]	141 (79.7)	53 (23.8)	/	/	/
yes	36 (20.3)	170 (76.2)	8.993	5.283–15.307	< 0.001
Walking problems					
[no]	150 (84.7)	102 (45.7)	/	/	/
yes	27 (15.3)	121 (54.3)	4.467	2.593–7.694	< 0.001
Arthritis					
[no]	131 (74.0)	123 (55.2)		/	/
yes	46 (26.0)	100 (44.8)	2.315	1.510–3.549	< 0.001
Osteoporosis					
[no]	168 (94.9)	182 (81.6)	/	/	/
yes	9 (5.1)	41 (18.4)	5.628	1.978–16.014	0.001
Orthostatic hypotension					
[no]	147 (83.1)	141 (63.2)	/	/	/
yes	30 (16.9)	82 (36.8)	2.850	1.767–4.595	< 0.001
Use of aids					
[no]	165 (93.2)	145 (65.0)	/	/	/
yes	12 (6.8)	78 (35.0)	4.151	2.713–6.350	< 0.001
Urination problems					
[no]	110 (62.1)	100 (4.8)	/	/	/
yes	67 (37.9)	123 (55.2)	2.019	1.350–3.020	0.001

[] –reference group; OR – odds ratio; CI – confidence interval.

Table 6

Summary of multivariate regression for predictor variables from the multi-factor falls questionaire

Variable	OR	95% CI	p
Limitation of activities			
[no]	/	/	/
yes	2.124	1.223–3.689	0.007
Visual problems			
[no]	/	/	/
yes	3.006	1.284–4.106	< 0.001
Indication of cognitive problems			
[no]	/	/	/
yes	2.296	2.080–6.976	0.005
Balance problems			
[no]	/	/	/
yes	3.809	0.913–3.352	< 0.001
Walking problems			
[no]	/	/	/
yes	1.749	0.691–2.197	0.092
Arthritis			
[no]		/	/
yes	1.224	0.913–3.352	0.488
Osteoporosis			
[no]	/	/	/
yes	2.194	0.837–5.753	0.110
Orthostatic hypotension			
[no]	/	/	/
yes	1.660	0.879–3.143	0.118
Use of aids			
[no]	/	/	/
yes	1.749	0.812–3.813	0.152
Urination problems			
[no]	/	/	/
yes	1.053	0.607–1.829	0.854

$p < 0.001$; [] –reference group; OR – odds ratio; CI – confidence interval.

In order to determine the risk factors for the development of fear of falling from the MFQ, the univariate analysis was applied first (Table 5). All analyzed variables of health conditions represented predictors for the fear of falling: limited activity (OR = 5.683; $p < 0.001$), problems with sight (OR = 7.911; $p < 0.001$), indications of cognitive problems (OR = 4.151; $p < 0.001$), problems with balance (OR = 8.993; $p < 0.001$), problems with gait (OR = 4.467; $p < 0.001$), arthritis (OR = 2.315; $p < 0.001$), osteoporosis (OR = 5.628; $p < 0.001$), orthostatic hypotension (OR = 2.850; $p < 0.001$), the use of walking aids (OR = 4.151; $p < 0.001$) and problems with urination (OR = 2.019; $p = 0.001$).

The listed variables from the MFQ were included in the multivariate logistics model with the fear of falling as a dependent variable (Table 6). The whole model with all predictors was statistically significant ($\chi^2 = 196.570$, $p < 0.001$) and explained, in whole, the variances of the fear of falling between 38.8% (Cox and Snell R-Squared) and 52.0% (Nagelkerke R-Squared). The following variables gave a unique statistically significant contribution to the mode: limited activity (OR = 2.124; $p = 0.007$), problems with sight (OR = 3.006; $p < 0.001$), cognitive problems (OR = 2.296; $p = 0.005$) and problems with balance (OR = 3.809; $p < 0.001$).

Discussion

The need for this research has emerged due to changes in the demographic structure of the population and growing number of old people in our population. The aging of popu-

lation, the growing prevalence of chronic diseases and limited financial resources for health care highlighted the importance and significance of health prevention and the need for longer independence of the elderly, because of the consequences which could lead to overburdened health care system, an increase of costs and the lack of resources [30]. The fear of falling was reported by the elderly in the general population as the most important concern, even more than the fear of being robbed, being in a financial difficulty, or the fear from a serious medical problem [31].

To our knowledge, there are no programs in our country for the prevention of falls and developing a fear of falling in the elderly based on scientific evidence and this was the reason for such a research. In this study the variables, for which it is established that are important predictors for the development of the fear of fall, support the results in literature in other cross-sectional studies. Models of the univariate binary logistic regression identified variables that could predict the development of fear of falling. Even though many risk factors are connected with the fear of falling, results of the multivariate binary logistic regression showed that only a few independent variables could be proven as predictors for the development of the fear of falling; in many studies, it was found that an increase of age was an important risk factor for the development of the fear of falling [8, 32–34]. The results of this study showed that the presence of the fear of falling increased with age and that it was, in its highest percentage (38.1%), present at the age of 75–79 years. A recent study conducted in Brazil showed similar values where the highest frequency of the fear of falling also appeared at the age of 70 to 79 years (47%) [35]. So, the age proved to be a significant predictor for the occurrence of developing the fear of falling at the age of 70–79 and in the group aged 80 years and more. When it comes to gender structure, in this study, across the overall population of those who feel the fear, a large percentage belonged to women (69%), which points out that women are at an increased risk to develop the fear of falling compared to men who were afraid of further falls – and these results match the results in many studies (24%) [9], (69%) [36], (26%) [37]. The increase in number of household members showed to be one of the risk factors for the development of fear of falling. These kind of results are at odds with the results achieved in the world where the elderly who live alone are at a higher risk of falling and developing the fear of falling [38]. The reason for obtaining such results lies in the fact that there are no studies which have included the number of household members in the analysis. Results of this study can be used in further research for several reasons. The Republic of Serbia is a country in transition and there still exists large families with traditional divison of household members roles. The existence of stereotypes about the elderly as "people who cannot work" and their disengagement has, as a consequence, the decrease in needs, withdrawal and decrease in contacts and interactions and all the way to social isolation [39]. The fear of falling and restrictions of activities make the elderly play a role in "transition towards physical weakness" [40]. The results of this study showed that the fear of falling was present in a high percentage in the respondents with limited activities (64.80%), but the role of an elderly person in a large family was not examined. Earlier studies also proved that there was a correlation among self-assessed health, mortality, morbidity, socio-demographic characteristics, chronic diseases and disabilities. It is confirmed in literature that for older people a positive perception of health means a better quality of life [40]. The results of this study showed that the assessment of health was an important risk factor for the development of fear of falling but only in people who estimated their health as bad. These results are in accordance with the results in relevant literature.

Many researchers have so far been consistently associating the history of falls with the occurrence of the fear of falling [8, 9, 37, 41]. Even though in this study the fear of falling was present in more than a half of the respondents with a positive history of falls, the analysis of the results showed that the history of falls was important issue for the development of the fear of falling only in two or more falls and these results were in accordance with the results appearing in most studies where history of falls was noted as an independent risk factor for the development of the fear of falling [42]. Except the number of falls, injuries during a fall in this study presented themselves as predictors for the development of the fear of falling. These results are in accordance with the facts that the older people who had experienced more falls and were injuried then, had a higher risk of developing the fear of falling compared to those who fell only once [37, 43]. When it comes to one fall, it is considered that many older people have this experience in their close surroundings but a history of more falls points out to some chronic problems and increases a risk of other numerous negative outcomes, including injuries and mortality [37]. The fear might not come right after the first fall, but it can begin after more falls [37]. Such is the case in "near-fall" situations that are described as independent factors of future falls and it was confirmed that older people who reported two or more similar situations, were in the twice higher risk for another fall [44]. In this study, older people who periodically or frequently had a "near-fall" situations were in the fear of falling and that means that their "near-fall" situations are predictors for developing the fear of falling. In a recently published research, it has been discovered that the fear of falling and falls themselves share similar set of risk factors [14].

Health conditions are another important predictor for the development of the fear of falling. Many health conditions (eg., arthritis [18], osteoporosis [19], sight problems [20, 21], problems with micturition [22], balance and gait disorders [10, 23], cognitive status [24] and orthostatic hypotension [25]) can increase the risk of falling and fear of falling. Results of this study, based on the MFQ, showed that in a high percentage, the fear of falling was present in the respondents who limited their activities, had problems with sight, showed indications of cognitive problems and problems with balance. In many researches, the achieved results pointed out that respondents with individual health conditions (eg., arthritis, osteoporosis, visual and cognitive damages) often felt fear of falling [14, 30, 41]. This research confirms the facts found in the literature, except in the presence of arthritis, osteoporosis, problems with micturition and orthostatic hypotension. A fear of falling is the main factor which limits older persons in their everyday functioning. They are socially isolated and who experience a loss of independence which, as a consequence, further influence their quality of life [45]. Besides, problems in balance can disrupt functional independence and they can even lead to tem-

porary accommodation in a nursing home. Fear of falling is connected to disorders in balance and can contribute to a high risk while walking, because of the feeling of instability which is, in turn, another important predictor for developing the fear of falling [37]. In this study, balance disorders was shown as a predictor of developing the fear of falling. When we take into account that other predictors for falling occurence and developing the fear of falling showed significance, there is an impression that planned preventive programs for falls and developing the fear of falling in the general population are necessary in public health. It is important to emphasize that planned preventive programs for intervention for the elderly are based on improving physical self-efficacy and the level of mobility obstructed by feeling a strong fear during the performance of activities, and not by reducing the fear of falling [46].

Conclusion

Even though further research on developing a fear of falling needed significant variables were referenced in this study and they point to certain characteristics which identify people who are at a risk of developing the fear of falling.

Observed together, these results suggest that older females, people in the age group of 75–79 and over 80 years, people that live in a household with more family members and assess their health as average or good are at an increased risk of developing a fear of falling. Also, older people that report more than two falls and inflicted injuries, occasional or often "near-fall" situations, people who limit their activities due to a fall, have problems with sight and people with indications of cognitive problems and those with problems with balance have increased risk for developing fear of folling.

The results provide an opportunity to health workers to prevent falls and developing a fear of falling as well as to future researches to clearly define the impact of a fear of falling not only to future falls, but also the impact of the fear on functioning and loss of independence, and, finally, the impact on quality of life of the elderly.

Health workers cannot influence the age of a person, but other risk factors may be influenced in order to prevent the development of the fear of falling.

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