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Original article

Risk factors for the emergence of frailty in elderly persons in Bosnia and Herzegovina

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Summary

Introduction. Frailty is common in elderly persons and carries a high risk of poor health outcomes, including increased mortality, institutionalization, falls, and hospitalization. The aim of the work was to determine the risk factors for frailty in elderly persons.

Methods. The research was conducted in Bijeljina and Foča, in the period from February to June 2022, and was approved by the Ethics Committee of the Faculty of Medicine in Foča. A total of 243 respondents over the age of 65 took part in the research. When it comes to the instruments, the sociodemographic questionnaire, the EQ-5D-5L health questionnaire, the general sarcopenia rapid screening questionnaire SARC-F and the Kessler scale for the assessment of psychological distress were used.

Results. There were 43.6% of males and 56.4% of females participating in the research. One quarter (25%) of respondents evaluated their health as weak. Sarcopenia was identified in 28% of respondents, while 18.1% had a moderate and 11.9% a serious disorder in the field of psychological distress.

Conclusion. The presence of psychological distress and sarcopenia in a high percentage, as well as weak health status in the people over 65, is evident, which represents potential risk factors for frailty.

Key words: frailty, sarcopenia, elderly people, assessment

Introduction

A specific characteristic of the geriatric population is their frailty. Frailty is common in elderly persons and carries the high risk of weak health outcomes, including increased mortality, institutionalization, falls, and hospitalization, which is a public health problem [1]. Experts indicate that early identification of risk factors could help delay or prevent the negative outcomes of frailty. Despite extensive research efforts, there are still debates about the nature, definition, prevalence, and characteristics of elderly persons in different "stages" of frailty [2].

Frailty is defined as a biological syndrome of reduced reserve and resistance to stressors, which is the result of cumulative loss in multiple physiological systems, leading to the aforementioned weak outcomes. Markers of frailty include age-related loss of body mass, strength, endurance, balance, gait performance, low activity, and multiple components must be clinically present to diagnose frailty. Frailty is often considered synonymous with disability, comorbidity, and other characteristics, but it is recognized that it may have a biological basis and represents a distinct clinical syndrome [3].

Numerous studies show that the prevalence of this problem increases with aging, and after the age of 65 it is present in 29% of persons living in the community, and up to 33% in hospitalized elderly persons [4, 5, 6, 7].

Three main approaches to the conceptualization of weakness or frailty are distinguished. One approach considers frailty as a decrease in physical functioning. The frailty phenotype, as described by Fried et al., is based on five predefined criteria of physical frailty, which are well known and most commonly used by researchers [8, 9]. These are: weight loss, exhaustion, low physical activity, sluggishness and weakness. Another approach is to view frailty as an accumulation of deficits in various domains (e.g., cognition, physical functioning, self-rated health, laboratory results). The frailty index, developed by Rockwood et al., is often used for this approach and is characterized by the use of a non-fixed set of clinical conditions and diseases [10, 11]. The third approach also indicates the fact that several domains (social, psychological, physical) are included in the concept of frailty, whereby researchers use a predefined set of questions related to each domain, and the Tilburg instrument for assessing frailty indicators is most often used - TFI: Tilburg Frailty Indicator [12]. Each approach has its advantages and disadvantages. Frailty can be assessed on the basis of short, quick and simple "frailty" tests or measurements [9, 13].

When we talk about this syndrome, we have to mention sarcopenia because it is mostly associated with malnutrition with the elderly people. Sarcopenia means a loss of skeletal muscle mass and muscle strength, with impaired functional status leading to collaborative problems (falls, fractures, with many negative effects on clinical outcomes, including longer hospital stay, remission after discharge, increased mortality). Sarcopenia and frailty overlap in three identical characteristics: low muscle strength, reduced walking speed, and muscle mass. A person with sarcopenia is always frailty, but not necessarily the other way around, while malnutrition can be associated with both of these conditions [14].

The lack of a single definition of frailty and the complexity of the pathophysiology of this syndrome lead to various researches in the field of biomarkers related to this condition, because it is known that frailty and sarcopenia can be comparators for numerous laboratory parameters. These biomarkers can be divided into: inflammatory, metabolic, hormonal and serum. Although the theoretical foundations of frailty syndrome are well established in the literature and the concept is almost universally accepted, its practical translation, especially in everyday clinical life, still remains controversial [15]. Various instruments have been developed over recent years to capture this geriatric "multidimensional syndrome characterized by reduced reserve and reduced resistance to stressors" and make it objectively measurable [3]. Some studies have found that different instruments result in different estimations of frailty and the gains in test accuracy and prediction are often modest [16, 17].

The aim of the work was to determine the risk factors for frailty in the elderly people.

Methods

The cross-sectional study was conducted in Bijeljina and Foča, in the period from February 14, 2022 to June 18, 2022 among elderly people. The sample in this research consisted of 243 respondents aged over 65. Respecting ethical requirements, all respondents were literately informed with the basic goals of the research and the information that the obtained data would be used exclusively for scientific purposes, as well as guaranteeing the anonymity of all obtained data and the identity of the respondents.

The sociodemographic questionnaire, the EQ-5D-5L health questionnaire, the general sarcopenia rapid screening questionnaire SARC-F and the Kessler scale for assessing psychological distress were used as research instruments.

The socio-demographic questionnaire was constructed for the needs of this research and consisted of questions obtaining data on the demographic characteristics of the respondents (gender, age, education of the respondents, place of residence, income, social activity and integration, cohabitation, socializing, hobby, use of glasses, hearing appliances or mobility aids). Based on these data, for research purposes, respondents were grouped into four age categories (65-70 years, 71-75 years, 76-80 years and >81 years), and respondents were also stratified by gender.

For screening and assessment of sarcopenia, a general questionnaire for rapid screening of sarcopenia - SARC-F: (English SARC-F: A Simple Questionnaire to Rapidly Diagnose Sarcopenia) was used, which was developed as a potential rapid screening test for sarcopenia [18]. This questionnaire in practice provides an opportunity to quickly and easily assess the risk of sarcopenia during a standard health consultation procedure in the ambulance of family medicine. The questionnaire contains five questions related to assessment of strength, assistance with walking, getting up from a chair, climbing stairs and assesses risk for falls. Each component is scored from 0 to 2 points, giving a global SARC-F score from 0 to 10 points. Obtained questionnaire results of ≥ 4 points predict sarcopenia and weak outcomes, which is an alarm or trigger for a more detailed assessment of sarcopenia.

The 10-item Kessler Psychological Distress Scale (K-10) was used to assess the psychological domain. The K10 scale includes 10 questions about emotional states, each with a five-level response scale. Questions are used to assess psychological stress or the presence of anxiety based on questions about anxiety and the presence of depressive symptoms identified in the elderly people in the last four weeks. This questionnaire consists of questions such as: "During the last four weeks, how often have you felt depressed?" The response scale in five categories ranged from "all the time" (score 5) to "never" (score 1). The higher score on the scale determines the higher level of psychological stress [19].

Statistical analysis

Descriptive statistical measures are presented for the basic characteristics of the respondents. To determine the difference between categorical variables, Pearson's hi-square test was applied, while in determining the difference between quantitative variables, due to the absence of normal data distribution, non-parametric statistical test methods, Mann-Whitey-U test and Kruskal-Wallis-H test were applied. Pearson's hi-square test was applied to determine the difference in the frequency of perceptual disturbances and mobility aids in relation to the sex of the respondents. All tests refer to two-way testing. The limit value for determining the existence of a statistically significant difference is $p \leq 0.05$.

Results

Research included 242 respondents, of which 105 (43.4%) were males, while 137 (56.6%) were females. The average age of male respondents was 73.16±5.67 years. Female respondents had the average age of 72.79±5.54 years. The youngest male respondent was 66, and the oldest was 94, while among the female respondents, the youngest was 65, and the oldest was 87. In relation to age, the respondents were divided into four categories. The first category consisted of respondents up to 70 years of age n=94 (38.84%), the second category consisted of respondents aged 71 to 75 n=78 (32.23%), the third category consisted of respondents aged from 76 to 80 n =41 (16.94%), while the fourth age category consisted of respondents older than 81 n=29 (11.98%).

Of all respondents, 36 (14.9%) declared that they used mobility aids. The statistically significant difference (U=985.0, p≤0.001) was observed in relation to the total score of the SARC-F questionnaire of those respondents (Med=7) compared to the group of respondents who did not use mobility aids (Med=2). The conducted research showed that 106 (43.8%) respondents had hearing problems, while 179 (74.0%) of them reported having vision problems. In relation to gender, frequencies for the variables of use of mobility aids, vision and hearing problems are shown in Table 1.

In the research, the SARC-F questionnaire was used to examine sarcopenia. The obtained results showed that the values of the total score of the SARC-F questionnaire differed according to gender as well as according to age categories. Females suffered from sarcopenia more often than males. Also, the research found the statistically significant difference regarding sarcopenia and the age of the respondents (Table 2). The statistically significant difference was found between the age category consisting of respondents under 70 and the category of respondents aged from 76 to 80 (U=1100.5, p≤0.001), as well as categories of respondents aged ≥81 (U=792.0, p=0.001). Also, the statistically significant difference was found between respondents aged 71 to 75 and the age category of 76 to 81 (U=850.0, p≤0.001) and the category ≥81 (U=609.5, p≤0.001). The statistically significant difference in the total values of the SARC-F questionnaire neither was found between the first two age categories (U=3479.5, P=0.556), nor between the last two age categories of respondents (U=541.0, p=0.520).

Table 1. Distribution of perceptual disturbances and use of mobility aids in relation to gender

		The gender of the respondent		
		Male	Female	P*
Use of mobility aids	Yes n (%)	20 (19.0)	16 (11.7)	0.110
	No n (%)	85 (81.0%)	121 (88.3)	
Hearing problems	Yes n (%)	56 (53.3)	50 (36.5)	**0.006**
	No n (%)	49 (46.7)	87 (63.5)	
Vision problems	Yes n (%)	72 (68.6)	107 (78.1)	0.064
	No n (%)	33 (31.4)	30 (21.9)	

*Hi-square test

Females had statistically significantly higher values of the total score of the Kessler scale of psychological distress compared to males. Also, in the research, the statistically significant difference was found regarding the total score of the Kessler scale and the age of the respondents. Respondents of younger age who were classified in the first two age categories had statistically significantly lower values of the total score of the Kessler scale, compared to respondents older than 75 (H = 11.558, df=3, p=0.009) (Table 3).

Table 2. Values of the SARC-F questionnaire according to gender and age of the respondents

SARC – F (total score)				
The gender of the respondents	x̄	SD	Med (min, max)	p
Male	2.3	±2.5	1 (0, 9)	**0.030***
Female	2.8	±2.4	2 (0, 9)	
Age of respondents (categories)				
≤70	2.03	±2.08	2 (0, 9)	
71 – 75	1.86	±1.97	2 (0, 8)	**≤0.001****
76 – 80	3.80	±2.46	3 (0, 9)	
≥81	4.31	±3.12	3 (0, 9)	

*Mann-Whitey-U test; **Kruskal-Wallis-H test

Table 3. Values of the Kessler scale according to gender and age of the respondents

Kessler (total score)				
The gender of the respondents	x̄	SD	Med (min, max)	P
Male	20.51	±6.40	19 (10, 38)	**0.010***
Female	22.64	±6.89	22 (10, 42)	
Age of respondents (categories)				
≤70	20.55	±6.64	20 (10, 38)	
71 – 75	21.12	±6.39	20 (10, 40)	**0.009****
76 – 80	23.66	±6.68	23 (10, 41)	
≥81	24.38	±7.19	23 (13, 42)	

*Mann-Whitey-U test; **Kruskal-Wallis-H test

The results shown in Table 4. show that respondents who had difficulties with movement, problems with hearing and vision had statistically significantly higher scores on the Kessler scale of psychological distress compared to people without the mentioned problems and difficulties.

Table 4. Kessler scale values in relation to the use of mobility aids and the presence of perceptual disorders

Kessler scale				
		N	Med (min/max)	P*
Use of mobility aids	Yes	36	27 (13,41)	≤0.001
	No	206	20 (10, 42)	
Hearing problems	Yes	106	22 (10, 41)	0.012
	No	136	20 (10, 42)	
Vision problems	Yes	179	21 (10, 41)	0.012
	No	63	20 (10, 42)	

*Mann-Whitey-U test

Discussion

In modern understanding of health and disease, functional capacity is emphasized as a set of different biological, psychological and social capacities that must be united so that an individual can perform activities that are necessary to ensure well-being [20]. Our research provided clear results that show the presence of psychological distress and sarcopenia in a high percentage, as well as weak health status in people over 65, representing potential risk factors for frailty. The results suggest that there is a statistically significant difference in frailty in relation to the gender and age of the respondents, but that there is the statistically significant difference in the expressiveness of all other used scales in relation to the sociodemographic characteristics of the respondents. The research shows that there are statistically significant differences in the expressiveness of the sarcopenia assessment scale in relation to the sex of the respondents, because women are more likely to suffer from sarcopenia than men. Also, respondents having vision and hearing problems and those using mobility aids have on average significantly higher scores for psychological distress and sarcopenia. The

presence of perceptual disturbances, and therefore numerous psychological problems, results in the need of older people for family and community support. Social support significantly reduces the experience of loneliness in the elderly people, and at the same time promotes greater satisfaction with life [21].

The primary treatment for sarcopenia is exercise, especially resistance or strength training, as this type of activity increases muscle strength and endurance, especially in the geriatric population, because maintaining physical activity is a cure for sarcopenia [22].

The condition of sarcopenia is a chronic disease followed by reduced muscle mass and strength, and an increased proportion of fatty tissue in the body with an increasing number of patients worldwide. However, due to the non-specificity of the symptoms, it often remains undiagnosed and unexpected [23, 24, 25]. The fact is that adaptation to old age does not depend only on internal factors, such as, for example, personality traits, but also about external factors such as social environment, family, housing conditions, profession, interpersonal relationships, financial situation, etc. Adaptation in old age is only one special example of adaptation during life [26, 27].

According to research, premorbid depression doubles the risk of late occurrence of dementia. In most cases, the signs of depression in the elderly people are not recognized on time. Symptoms to look out for are changes in appetite, weight gain or loss, anxiety, feelings of worthlessness, loneliness and guilt, loss of energy, confidence, self-esteem and interest or enjoyment in usual things, lack of concentration, and mood disorders lasting more than two weeks. In order to gain insight into whether the cognitive functions as well as the psychological stability of a person are in accordance with the expectations for the age, it is necessary to perform a detailed diagnostic examination and numerous neuropsychological tests [28].

Many older people have health conditions that do not require hospitalization but must be treated with medication, dietary changes, daily exercise, or other coping methods. Healthcare professionals help designing and explaining these health regimens to patients and their families. Collective fear and sense of vulnerability contributes to the neglect of communication, which becomes a luxury and an irrelevant part of the care process for another person. The conclusion is quickly and easily accepted that helpers do not have enough available resources for all the necessary job contents, so only those activities that are aimed at maintaining the basic life functions of the elderly people become important [29].

Serious frailty is significantly more pronounced with older subjects, while younger are significantly more without pronounced syndromes. The result can be correlated with psychological imbalance and reduced functional ability, which is of crucial importance for the geriatric population. In Bosnia and Herzegovina, there are no data on frailty in elderly people, because family medicine does not screen for this syndrome at all. This research indicates the importance of applying a multidisciplinary assessment of this syndrome, as well as the importance of conducting the analysis of currently available screening tools and the validation of a new instrument with high sensitivity and specificity for timely identification of this problem in the elderly people. Future research will contribute to the understanding of risk factors for the occurrence of frailty and its consequences.

Conclusion

The presence of psychological distress and sarcopenia in a high percentage, as well as weak health status in people over 65, is evident, representing potential risk factors for frailty. This research is the contribution to informing the public about the need for more adequate

health care, but also a forehand assessment of the overall quality of life of the elderly population. The main importance is the introduction of screening and diagnostic criteria for frailty into everyday clinical practice, while the next steps are measures to prevent deterioration.

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Ethics approval. The Ethics Committee of the Faculty of Medicine approved the study (No. 01-2-15), and all respondents gave their consent to participate in the study. The research was conducted in accordance with the Helsinki Declaration.

Conflict of interest. The authors declare that they have no conflict of interest.

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Faktori rizika za nastanak fragilnosti kod starih osoba u Bosni i Hercegovini

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Uvod. Fragilnost je učestala u populaciji starih osoba i sa sobom nosi visok rizik od loših zdravstvenih ishoda, uključujući povećanu smrtnost, institucionalizaciju, padove i hospitalizaciju. Cilj rada je bio utvrditi faktore rizika za nastanak fragilnosti kod starih osoba.

Metode. Istraživanje je sprovedeno u Bijeljini i Foči, u periodu od februara do juna mjeseca 2022. godine, a odobreno je od strane Etičkog komiteta Medicinskog fakulteta Foča. U istraživanju su učestvovala 243 ispitanika, starosti preko 65 godina. Od instrumenata korišćeni su sociodemografski upitnik, upitnik o zdravlju EQ-5D-5L, opšti upitnik za brzu provjeru sarkopenije SARC-F i Keslerova skala za procjenu psihološke uznemirenosti.

Rezultati. U istraživanju je učestvovalo 43,6% osoba muškog pola i 56,4% osoba ženskog pola. Jedna četvrtina (25%) ispitanika je procijenila svoje zdravlje kao loše. Kod 28% ispitanika je identifikovana sarkopenija, dok 18,1% ima umjeren i 11,9% ozbiljan poremećaj u domenu psihološke uznemirenosti.

Zaključak. Evidentno je prisustvo psihološke uznemirenosti i sarkopenije u visokom procentu, kao i loš zdravstveni status kod osoba starijih od 65 godina, što predstavlja potencijalne faktore rizika za nastanak fragilnosti.

Ključne riječi: fragilnost, sarkopenija, stare osobe, procjena