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FUNCTIONAL FITNESS STATUS ANALYSIS OF THIRD-AGE WOMEN IN BOSNIA AND HERZEGOVINA, DETERMINED BY USING THE SENIOR FITNESS TEST

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Abstract

The aim of this paper was to determine the functional fitness status and level of movement abilities in third age, females. The samples of respondents, in this study, were women of the third age 60-84 years old. All respondents are members of the Center for Healthy Aging Sarajevo. A sample of the variables of this research consists 10 variables, 6 of them are based on the Seniors Fitness Test. On the basis of statistical indicators, it was found that the results in three variables indicate that 95% of respondents satisfied or achieved a better result, in two variables 80%, while in one variable 32% satisfied or achieved a better result compared to the set norms from the U.S. It is also evident that there is a negative correlation between the age variable of the respondents and other variables, which indicates that the increase of the number of years leads to a decrease in the level of motor skills and functional fitness, with some exceptions based on fitness level.

Key words: healthy aging, movement ability

Introduction

The first World Assembly of the United Nations on aging was held in Vienna in 1982. and an International Action Plan on Aging was adopted. The UN General Assembly in 1991 passed the Principles of the United Nations for Older Persons, and the same year, the October 1st becomes the International Day of the Elderly (UN, 1991).

Marking the International Day of the Elderly emphasizes the necessity for the elderly to reduce the feeling of being isolated, forgotten and marginalized, and underlined that it is necessary to encourage measures against their neglect and poverty as they constitute a vulnerable group in our society.

Various scientific researches always re-testify how much physical activity and sports in the third age are important for the preservation of health, level of physical abilities and independence in everyday life (Deutscher Olympischer Sportbund, 2016).

The World Health Organization (WHO, 2010) emphasizes that regular physical activity brings enormous health benefits to people of third age and is closely related to functional health, reducing the risk of falls and better mental abilities.

Recognizing the need for a tool to determine the characteristics of functional fitness of third age people, researchers at the University of California have developed a new battery of tests specifically designed for elderly, Senior Fitness Test (Rikli and Jones, 2002). In order to this many authors from all over the world used this new tool to compare elderly`s functional fitness to the US norms (Al-Rahamneh, Yousef and Ismail, 2015; Langhammer and Stanghelle, 2011) and to exmine it`s validity (Langhammer and Stanghelle, 2015)

Functional fitness of third age persons involves the physical capacity to carry out daily activities safely and independently without unnecessary fatigue.

Senior Fitness Test is a test that determines the status of functional fitness and the level of movement abilities in third age, developed by professors Roberta Rikli and Jessie Jones in the United States and is standardized on a sample of over 7,000 respondents (Rikli, Jones, 1999a). The test battery, in addition to the age of the subjects and the determination of anthropometric

characteristics, body weight and body mass and their interrelated relationship shown through the Body mass index, consist 6 tests for the assessment of motor abilities: 30 Second Chair Stand, Arm Curl, 2 Minute Step Test, Chair Sit and Reach, Back Scratch and 8 Foot Up and Go test.

By comparing with US standards, we will gain insight into the status of functional fitness and the level of fitness of respondents from Bosnia and Herzegovina.

The aim of this study was to examine the level of functional fitness of elderly living in Sarajevo and compare them to US standards (Rikli, Jones, 1999a).

Methodology

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Sample of the examines

The sample of examines of this research consist 162 elderly female respondents, aged 60 to 84 years (mean 70,69). All respondents are members of the Center for Healthy Aging, municipality Center, Sarajevo. In addition, the investigation was in full compliance with the Helsinki Declaration of 1975, as revised in 1983.

Sample of the variables

The sample of the variables of this study consists of 10 variables based on the Senior Fitness Test, which determines the functional fitness status and the level of mobility skills in third aged persons.

Procedure

Testing was carried out by educated professionals, at the hall for the preventive corrective gymnastics in the Center for Healthy Aging. Respondents were classified into 8 groups and testing was carried out in the same time period, keeping in mind the pre-assembled sequence of tests in order to reduce the burden and fatigue to a minimum. All test stations were organized in a circuit. Prior to testing adequate conditions, were provided for the realization of the same good ventilation of the space, as well as a pleasant room temperature, so that the subjects would feel comfortable. Also, before testing started, the body was prepared using a few general warming up exercises 5 to 8 minutes for the efforts that followed. Before commencing the Senior Fitness Test, "subjects were instructed to do their best but never push themselves to a point of overexertion or beyond what they thought would be safe for them" (Rikli & Jones, 2001).

After measuring the body height (Martin Anthropometer) and weight (Tanita T6360), each respondent performed six tests based on the Senior Fitness Test (Rikli, Jones, 2001), which have been validated by Rikli and Jones (1999a). The tests were administered in accordance with the protocols described by Rikli and Jones (2001).

30-Second Chair Stand

The purpose of this test is to determine the strength of the lower extremities required for everyday activities such as: climbing stairs, walking, entering and leaving the car, home affairs, etc. Higher leg power reduces the risk of falls. This test determines the repetitive power of the lower extremities.

Description: Number of full stands that can be completed in 30 seconds with arms folded across chest. After a demonstration by the tester, a practice trial of two repetitions was completed, followed by one test trial. The score was the total number of stands executed correctly within 30 seconds.

Arm Curl

The purpose of this test is to determine the strength of the upper extremities needed in everyday life in the form of housekeeping, raising and carrying various items such as bags and suitcases, dressing up, as well as lifting up grandchildren. The repetitive power of the upper extremities is tested.

Description: Number of bicep curls that can be completed in 30 seconds holding a hand weight of 5 lbs (2.27 kg) for women; 8 lbs (3.63 kg) for men. After a demonstration by the tester, a practice trial of two repetitions was done, followed by one test trial. The score was the total number of hand-weight curls performed through the full range of motion in 30 seconds.

2-Minute Step Test

The purpose of this test is to determine the durability required to master and walk on longer stocks, overcome a number of stairs, perform shopping, excursions, hiking, etc.

Description: Number of full steps completed in 2 minutes, raising each knee to a point midway between the patella (kneecap) and iliac crest (top hip bone). Score is number of times right knee reaches the required height. After a demonstration by the tester, and the definition of the midway point, one test trial was done.

Chair Sit-and-Reach

The purpose of this test is to determine the level of mobility of the hips or lower body that is important for the good holding of the body, the normal walking pattern as well as the different mobility requirements such as climbing and cycling. The flexibility of the lower extremities and back is tested.
Description: From a sitting position at front of chair, with leg extended and hands reaching toward toes, the number of inches (cm) (+ or -) between extended fingers and tip of toe. After a demonstration by the tester, two practice trials were done, followed by two test trials.

Back Scratch

The purpose of this test is to evaluate the mobility of the upper part of the body, especially the shoulder, which is required in everyday activities such as combing hair, dressing the garment over the head, tying the seat belt in the car, taking the object from the height. This test determines the flexibility of the upper extremities and shoulder belts.

Description: Number of seconds required to get up from a seated position, walk 8 feet (2.44m), turn, and return to seated position. After a demonstration, one practice trial was done, followed by two test trials.

Data analysis method

Descriptive statistics and Pearson correlation analysis ($p < 0.01$) were used for data analysis, in terms of inter-correlation and cross-correlation of established parameters.
All analyses were performed using the SPSS for Windows (version 25.0) statistical package and Microsoft Excel software program

Results and Discussion

Table 1. Descriptive Statistics

	30 second chair stand		Arm curl		2 minute step test		Chair sit and reach		Back scratch		8 foot up and go	
	N	%	N	%	N	%	N	%	N	%	N	%
below range	10	6,2	6	3,7	110	67,9	30	18,5	31	19,1	8	4,9
above range	40	24,7	52	32,1	2	1,2	19	11,7	38	23,5	105	64,8
in the range	112	69,1	104	64,2	50	30,9	113	69,8	93	57,4	49	30,2

Table 2. Grouping data based on the U.S. norms

	N	Range	Minimum	Maximum	Mean		Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std
Age	162	24	60	84	70,69	0,446	5,671	32,165	0,269	0,191	-0,691	
Body height	162	33	145	178	161,35	0,495	6,294	39,619	-0,047	0,191	-0,099	
Body weight	162	70,60	50,40	121,00	76,2019	0,98014	12,47520	155,630	0,780	0,191	1,598	
Body mass index	162	27,79	20,50	48,29	29,3311	0,35542	4,52370	20,464	0,958	0,191	2,029	
30 second chair stand	162	21	5	26	14,23	0,247	3,146	9,895	0,481	0,191	2,080	
Arm curl	162	18	8	26	16,81	0,252	3,211	10,313	0,330	0,191	0,710	
2 minute step test	162	109	0	109	61,91	1,431	18,217	331,873	-0,631	0,191	1,777	
Chair sit and reach	162	50,0	-27,0	23,0	2,531	0,6799	8,6532	74,878	-0,676	0,191	1,325	
Back scratch	162	85,0	-59,0	26,0	-3,250	0,7969	10,1430	102,880	-1,293	0,191	5,599	
8 foot up and go	162	9,27	3,34	12,61	4,9517	0,09944	1,26571	1,602	2,512	0,191	9,490	

8-Foot Up-and-Go

The aim of this test is to determine the agility and dynamic balance that everyday needs in the timely departure of buses, tunnels or trains, quick response and avoidance of dangerous situations on the street, etc. This test determines agility and dynamic balance.

Description: With one hand reaching over the shoulder and one up the middle of the back, the number of inches (cm) between extended middle fingers (+ or -). After a demonstration by the examiner, two practice trials were done, followed by two test trials.

In Table 2, the analysis and comparison of the results obtained with the criteria and norms according to the Senior Fitness Test for age groups was noted:

30 Second Chair Stand - in this variable found that 6.2% of the examines did not satisfy the norm for this test according to the normative tables for their age, 69.1% of the respondents satisfied and are in the interval while 24.7% of the respondents achieved better results above the interval

Arm Curl - in this variable was found that 3.7% of the examines did not satisfy the norm for this test according to the normative tables for their age, 64.2% of the respondents satisfied and are in the interval while

Table 4. Correlation Analysis

	Age	Body height	Body weight	Body mass index	30 second chair stand	Arm curl	2 minute step test	Chair sit and reach	Back scratch	8 foot up and go
Age	1	-.174*	-.235**	-.168*	-.230**	-.177*	-.223**	-.194*	-0,119	.384**
Body height	-.174*	1	.374**	-0,113	-0,139	0,041	0,087	-0,004	0,061	-0,083
Body weight	-.235**	.374**	1	.877**	-0,149	0,103	-0,118	-.184*	-.330**	0,098
Body mass index	-.168*	-0,113	.877**	1	-0,087	0,087	-.175*	-.195*	-.390**	0,149
30 second chair stand	-.230**	-0,139	-0,149	-0,087	1	.548**	.517**	.374**	0,143	-.571**
Arm curl	-.177*	0,041	0,103	0,087	.548**	1	.421**	.334**	0,056	-.411**
2 minute step test	-.223**	0,087	-0,118	-.175*	.517**	.421**	1	.297**	.224**	-.640**
Chair sit and reach	-.194*	-0,004	-.184*	-.195*	.374**	.334**	.297**	1	.268**	-.290**
Back scratch	-0,119	0,061	-.330**	-.390**	0,143	0,056	.224**	.268**	1	-.270**
8 foot up and go	.384**	-0,083	0,098	0,149	-.571**	-.411**	-.640**	-.290**	-.270**	1

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

32.1% of the respondents achieved a better result above the interval

2 Minute Step Test - with this variable it was found that 67.9% of the examines did not satisfy the norm for this test according to the normative tables for their age, 30.9% of the respondents satisfied and are in the interval while 1.2% of the respondents achieved a better result above the interval

Chair Sit-and-Reach - the code of this variable has been established that 18.5% of the examines did not satisfy the norm for this test according to the normative tables for their years, 69.8% of the respondents satisfy and are in the interval while 11.7% of the respondents achieved better results above the interval

Back Scratch - in this variable has found that 19.1% of the examines did not satisfy the norm for this test according to the normative tables for their age, 57.4% of the respondents satisfied and are in the interval while 23.5% of the respondents achieved a better result above the interval

Table 3. Body mass index

		N	N %
BMI	normal body weight	28	17,3%
	overweight	65	40,1%
	class I obesity	54	33,3%
	class II obesity	11	6,8%
	class III obesity	4	2,5%

8 Foot Up and Go in this variable has found that 4.9% of the examines did not satisfy the norm for this test according to the normative tables for their age, 30.2% of the respondents satisfied and are in the interval while 64.8% of the respondents achieved better results above the interval.

By analyzing the data in Table 3, it was established that, according to WHO criteria for assessing nutrition, 17.3% of the subjects have normal weight, 40.1% have overweight, 33.3% of subjects are in the group of obese I, 6.8% in the group of obese II and 2.5% of the subjects are in the group of obese III. By analyzing the obtained correlation analysis data, the following correlations are most interesting:

Positive correlation between Age and 8 Foot Up and Go variables (r = .384, p <0.01) (the positive correlation shown in the result table, while that correlation is in reality negative, since the 8 Foot Up and Go variable is about the time required for the test, so if less time is needed the result is better and inversely)

Negative correlation between Body weight and Back Scratch variables (r = -.330, p <0.01)

Negative correlation between Body mass index and Back Scratch variables (r = -.390, p <0.01)

A negative correlation between variables 30 Second Chair Stand and 8 Foot Up and Go (r = -.571, p <0.01) (negative correlation shown in the table of results while this correlation in reality is positive because the variables 8 Foot Up and Go about the time required to perform the test, so if less time is needed the result is better and inversely)

Positive correlation between 30 Second Chair Stand and Arm Curl variables (r = .548, p <0.01); 30 Second Chair Stand and 2 Minute Step Test (r = .517, p <0.01); 30 Second Chair Stand and Chair sit and reach (r = .374, p <0.01);

A negative correlation between variables Arm Curl and 8 Foot Up and Go (r = -.411, p <0.01) (negative correlation shown in the table of results while this correlation in reality is positive because the variables 8 Foot Up and Go about the time required to perform the test, so if less time is needed the result is better and inversely)

Positive correlation between Arm Curl and 2 Minute Step Test variables (r = .421, p <0.01); Arm Curl and Chair sit and reach (r = .334, p <0.01)

A negative correlation between variables 2 Minute Step Test and 8 Foot Up and Go (r = -.640, p <0.01) (negative correlation shown in the table of results while this correlation in reality is positive because the variables 8 Foot Up and Go about the time required to perform the test, so if less time is needed the result is better and inversely)

Positive correlation between 2 Minute Step Test and Chair sit and reach variables (r = .297, p <0.01);

A negative correlation between variables Chair sit and reach and 8 Foot Up and Go (r = -.290, p <0.01) (negative correlation shown in the table of results while this correlation in reality is positive because the variables 8 Foot Up and Go about the time required to perform the test, so if less time is needed the result is better and inversely)

Conclusion

Based on the performed testing, processing and analysis of the obtained data, it was found that the functional fitness status of subjects from Sarajevo, Bosnia and Herzegovina, compared to the U.S. norms, is very good. Individual analysis of the variables revealed that the respondents achieved very positive results compared to the standards based on the Senior Fitness Test in the variables: 30 Second Chair Stand (93.8%) Arm Curl (96.3%) and 8 Foot Up and Go (95.0%) as in the Chair sit and reach variables (81.5%) Back Scratch (80.9%) while the lower results were achieved in the variable 2 Minute Step Test (32.1%). The cause of poorer results in the aforementioned variable can be found in the seasons (December) when testing was carried out and when the elderly respondents were less likely to move (walk) on slippery and difficult streets due to personal safety.

Using BMI coefficient, it was found that 57.4% of subjects were in the group of people with normal or higher body weight. Considering that the subjects are elderly, it can be concluded that this result is positive.

Based on the results of the correlation analysis, the negative correlation between the variable Back Scratch and the variables Body weight (r = -.330; p <0.01) and the Body Mass Index (r = -.390; p <0.01) was determined. Based on these data, it can be concluded that the increase in body weight and body mass index leads to a decrease in the mobility of the shoulders. In addition, there is a significant negative (substantially positive) correlation between the variable 8 Foot Up and Go and the variables 30 Second Chair Stand (r = -.571; p <0.01), Arm Curl (r = -.411; p <0.01), 2 Minute Step Test (r = -640; p <0.01) and Chair sit and reach (r = -.290; p <0.01). It can be concluded that the greater the durability, mobility of the hips, strength of the legs and arms, the better agility and the dynamic balance and it takes less time to perform the skill test. In addition, the positive correlation between the variable 2 Minute Step Test and the variables 30 Second Chair Stand (r = .517; p <0.01), Arm Curl (r = .421; p <0.01) and to a lesser extent Chair sit and reach (r =. 297; p <0.01) is evident, indicating that greater strength of the legs and arms, as well as better mobility of the hips, leads to an increase in endurance. Also, it is evident a positive correlation between the variable 30 Second Chair Stand and the variables Arm Curl (r = .548; p <0.01) and AMRPOK (r = .374; p <0.01) as well as the correlation between Arm Curl and Chair sit and reach (r = .334; p <0.01).

All previously shown indicates a connection and interdependence of individual motor abilities and their individual development and improvement leads to a general increase of movement abilities and a better functional fitness status.

Beside interesting individual correlations, it can be concluded that the level of motor skills decreases in proportion to the age of the respondents, with some exceptions based on fitness level.

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