Research Article

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A Study Determining the Functional Fitness and Physical Activity Level and Assessing Correlation Between International Physical Activity Questionnaire and Senior Fitness Test in Older Age People

Yaşlı Bireylerde Fonksiyonel Uygunluk ve Fiziksel Aktivite Düzeyini Belirleyen Uluslararası Fiziksel Aktivite Anketi ile Yaşlılar için Fiziksel Uygunluk Testi Arasındaki Korelasyonu Değerlendiren Bir Çalışma

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ABSTRACT

The main purpose of this study is threefold: To determine the FF and PA levels, examine the differences of FF and PA, determine the correlation between International Physical Activity Questionnaire (IPAQ) and Senior Fitness Test (SFT) of older-age people living in Şırnak. Total of 134 participants' (63 were male; height 168.98±15.28cm; Body weight (BW) 79.40±13.10kg; 71 females; height 158.20±6.43cm; BW 76.01±13.55kg) level of physical activity (PA) was evaluated with IPAQ and functional fitness (FF) was estimated by using SFT. Kruskal Wallis test and Mann-Whitney U test were used for the analysis of data. In case of difference in Kruskal Wallis test, Mann Whitney-U test was used to determine which group caused the difference. In the comparison of female participants according to age groups there was only in 2min step test statistically significant difference (p=.022). There was a significant difference between 60-64 age males and females chair stand and arm curl tests in favor of males, however in back scratch test was statistically significant difference in 75-80 ages in favor of females. Chair stand, arm curl, 2min step and 8 Ft up-and-go tests was significantly difference between genders (p<.05). IPAQ energy consumption in both gender was dominant on minimal active and it was decreasing with aging. It is seen that a positive and moderate level correlation between IPAQ (MET-min/wk) and SFT (2min step test) (r=.426; p<.001). This study found that there is a continuous decline in PA and FF with aging for both of the genders. This situation accelerates after the age of 70 and age-related decrease of females stand out compared to males.
Keywords: *Aging, Functional fitness, Older adults, Physical activity*

ÖZ

Bu çalışmanın temel amacı üç yönlüdür: Şırnak ilinde yaşayan yaşlı bireylerin fonksiyonel uygunluk (FU) ve fiziksel aktivite (FA) düzeylerini belirlemek, yaş gruplarına ve cinsiyete göre FU ve FA farklılıklarını incelemek ve Uluslararası Fiziksel Aktivite Anketi (UFAA) ile Yaşlılar için Fiziksel Uygunluk Testi (YFUT) arasındaki ilişkiyi incelemektir. Toplam 134 katılımcının (63 erkek; boy 168.98±15.28 cm, vücut ağırlığı (VA) 79.40±13.10 kg; 71 kadın; boy 158.20±6.43 cm, VA 76.01±13.55 kg) FA seviyeleri UFAA ile FU seviyeleri ise YFUT kullanılarak belirlenmiştir. Verilerin analizinde Kruskal Wallis testi ve Mann-Whitney U testi kullanılmıştır. Kruskal Wallis testinde farklılık olması durumunda, farklılığın hangi gruptan kaynaklandığını belirlemek için Mann Whitney-U testi kullanılmıştır. Kadın katılımcıların yaş gruplarına göre karşılaştırılmasında sadece 2dk adım testinde istatistiksel olarak anlamlı farklılık bulunmuştur (p=.022). 60-64 yaş grubunda, sandalye otur ve kalk ve kol bükme testlerinde erkekler lehine anlamlı fark bulunurken, 75-80 yaş grubunda sırt kaşıma testinde kadınlar lehine istatistiksel olarak anlamlı fark bulunmuştur. Sandalye otur ve kalk, kol bükme, 2dk adım ve 8 adım kalk ve yürü testlerinde cinsiyetler arasında anlamlı fark bulunmuştur (p<.05). Her iki cinsiyette de UFAA ile belirlenen enerji tüketiminin minimal düzeyde olduğu ve artan yaş ile birlikte azaldığı saptanmıştır. IPAQ (MET-wk) ile SFT (2min step test) arasında pozitif ve orta düzeyde ilişki olduğu görülmüştür. (r=.426; p<.001). Bu çalışma sonucunda, her iki cinsiyet için de yaşlanmayla birlikte FA ve FU'da anlamlı bir azalma olduğu ve bu durumun 70 yaşından sonra artarak devam ettiği görülmektedir. Kadın katılımcılarda yaşa bağlı azalma erkeklere göre daha fazladır.
Anahtar Kelimeler: *Yaşlanma, Fonksiyonel uygunluk, Yaşlı birey, Fiziksel aktivite*

INTRODUCTION

It is estimated that the older-age population in the world is increasing rapidly day by day. For both economic and individual reasons, it is important for the older-age population to remain healthy and independent for as long as possible. According to official records of the United Nations report it is expected that the older-age population will increase to 22% of the total population by 2050 (Nations, 2017) and while the average age at mortality was 69.8 years for men and 77.5 years for women in 1980, it will be 75 years for men and 83.1 years for women in 2040 (Daley and Spinks, 2000). Physical inactivity in older adults is a major public health concern. It has been identified as the fourth leading risk factor for global mortality (WHO, 2010) and a major contributing factor for disability and poor health outcomes (Peterson et al., 2009). Lack of physical activity is related to approximately 3 million deaths per year and to 6–10% of the occurrence of major noncommunicable diseases (Lim et al., 2012). That is why there is an urgent need for effective approaches to help older peoples lead to a healty and active lifestyles.

According to the data of the Turkish Statistical Institute (TURKSTAT), while the ratio of the older-age population in the total population was 8.2% in 2015, it increased to 9.5% in 2020. According to TURKSTAT, it is predicted that the ratio of the older-age population will be 11.0% in 2025, 12.9% in 2030, 16.3% in 2040, 22.6% in 2060 and 25.6% in 2080. When the older-age population is analyzed by age group, it is seen that 63.8% of them are in the 65-74 age group, 27.9% are in the 75-84 age group, and 8.4% are in the 85 and over age group in Turkey (TÜİK, 2021). Additionally, in 2020, 44.2% of the older-age population were male and 55.8% were female. It is reported that in the province of Şırnak (centre), which was examined within the scope of the current study, the total population is 96,285 people, and the older-age population in the 60-80 age group is 21,655, which corresponds to 22.49% of the total population (TÜİK, 2021).

Considering the rapidly increasing older-age population, the importance of mobility and independent movement in the coming years should not be underestimated. The golden rule for being physically independent is to perform normal daily activities such as doing simple household chores, climbing stairs, lifting and carrying objects, doing their own shopping, thereby maintaining the required physical fitness capacity (Gomes et al., 2017; Macaluso and De Vito, 2004; Paterson and Warburton, 2010).

When used to describe older adults, the term functional fitness (FF) is used instead of "physical fitness". FF is defined as the level of physical fitness sufficient to manage activities of daily living effortlessly, confidently and independently (Daley and Spinks, 2000; Rikli and Jones, 1999a). Although physical activity (PA) is known to be important for independent living, prevention of chronic health problems, and quality of life, older adults tend to be less active in later life (Brill, 2004; Hardman and Stensel, 2009). In a 14-year longitudinal study, researchers found a significant relationship between physical activity and the current functional status of older-age females (Brach et al., 2003). Therefore, PA has an important role in maintaining FF. Although functional losses are related to aging, Brill stated that these damages are also affected by physical inactivity (Brill, 2004). In addition to age, the decrease in physical activity also causes a decrease in functional capacity. Therefore, it is difficult to distinguish the effects of age and PA on FF in older-age people (Hardman and Stensel, 2009; Onder et al., 2002).

As far as we know, this is the first study specially designed to determine the FF and PA levels of older-age people living in Şırnak province. The main purpose of this study is threefold: 1) To determine the FF and PA levels of older-age people living in Şırnak. 2) To examine the differences of FF and PA according to age and gender variables. 3) To determine the correlation between International Physical Activity Questionnaire (IPAQ) and Senior Fitness Test (SFT) in older-age people.

METHODS

Participants: The study group of our research consists of male and female participants between the ages of 60-80, living in Şırnak, Turkey, without any orthopedic disorders. In total, 134 participants (71 females and 63 males) distributed in four age groups (60-64, 65-69, 70-74 and 75-70 years) were evaluated. In this research age was classified considering the SFT battery evaluation criteria (Rikli and Jones, 2001).A cross-sectional design was used in this study. The demographic and clinical characteristics of the participants are shown in Table 1.

Table 1

Basic Descriptive Parameters

	Age groups	**N**	**Age (years)**	**Height (cm)**	**BW (kg)**	**BMI (kg/m^2)**
			Mean ± SD	**Mean ± SD**	**Mean ± SD**	**Mean ± SD**
Female	60-64	38	61.29 ± 1.31	158.58 ± 6.28	79.95 ± 12.48	31.83 ± 4.92*
	65-69	15	66.33 ± 1.63	157.47 ± 7.20	70.93 ± 12.02	28.69 ± 4.97
	70-74	9	70.89 ± 1.26	157.67 ± 7.00	73.78 ± 16.59	29.46 ± 5.01
	75-80	9	76.56 ± 2.06	158.33 ± 6.20	70.11 ± 13.83	27.88 ± 4.75
Total		71	65.51 ± 5.59	158.20 ± 6.43*	76.01 ± 13.55	30.37 ± 5.08*
Male	60-64	30	61.97 ± 1.40	170.63 ± 7.23	82.67 ± 13.13	28.30 ± 3.49*
	65-69	17	66.24 ± 1.39	170.63 ± 7.23	78.12 ± 14.48	26.88 ± 4.13
	70-74	9	72.33 ± 1.22	170.63 ± 7.23	74.44 ± 11.97	25.48 ± 3.32
	75-80	7	78.00 ± 1.91	170.63 ± 7.23	74.86 ± 8.51	25.95 ± 4.90
Total		63	66.38 ± 5.63	168.98 ± 15.28*	79.40 ± 13.10	27.25 ± 3.88*

*P < 0.05. BW: body weight; BMI: body mass index

Table 1. show that age, height, BW and BMI values of the participants according to gender and age group. In the comparison between the genders, it was determined that the BMI values of the male participants were statistically significantly lower than the female participants and their height was higher (p<.05). The participants were asked to fill in the demographic information form, prepared by the researcher. The PA levels of the participants with the IPAQ and the FF levels of the participants with the SFT battery were determined by trained researchers. The study was conducted between June and August 2021 by interviewing potential participants in their homes, gardens or public garden. Ethical approval was obtained from the University Ethics Committee for the current study, numbered 74546226-050.03-12131 which was conducted in accordance with the 1964 Helsinki declaration. All participants were informed about the aims of the study and written informed consent was obtained from each.

Anthropometric Measurements: The heights of the participants were measured with a stadiometer (Holtain, UK) which was fixed to the wall with an error of ±-0.1cm, while the heels, hips and shoulder blades were in contact with the backrest, while keeping their feet together and their heads upright. Body weights were measured with a Tanita body analyzer (A-401, Japan) while the participant was standing upright and immobile.

Senior fitness test: FF was assessed with the Senior Fitness Test (Rikli and Jones, 2001) (Table 2). The test battery includes four components (strength, aerobic endurance, flexibility and agility/dynamic balance) and six tests (chair stand, arm curl, 2min step, sit-and-reach, back scratch, and 8 Ft up-and-go tests). A detailed description of assessment procedures

such as equipment, procedures, scoring and safety precautions is included in the SFT manual (Jones and Rikli, 2002).). Estimates of validity for each of the FF tests have been previously reported by Rikli and Jones (Rikli and Jones, 1999a).

Table 2

Brief Descriptions of Senior Fitness Test Items

Assessment category	Test item	Test description
Lower body strength	30-s chair stand	Number of full stands in 30 s with arms folded across chest
Upper body strength	30-s arm curl	Number of bicep curls in 30 s holding hand weight (female 2.27 kg; male 3.63 kg)
Aerobic endurance	2min step test (alternate aerobic test)	Number of full steps completed in 2 min, raising each knee to point midway between patella and iliac crest (score is number of times right knee reaches target)
Lower body flexibility	Chair sit-and-reach	From sitting position at front of chair, with leg extended and hands reaching toward toes, number of inches (+or −) from extended fingers to tip of toe
Upper body flexibility	Back scratch	With one hand reaching over shoulder and one up middle of back, number of inches between extended middle fingers (+ or −)
Agility/dynamic balance	8-foot up-and-go	Number of seconds required to get up from seated position, walk 8 foot, turn, and return to seated position on chair

Full description of Senior Fitness Test items (Jones and Rikli, 2002).

International physical activity questionnaire (IPAQ) : The IPAQ short version, which was developed by Craig et al. in 2003 (Craig et al., 2003) and whose validity and reliability study was conducted in 2005 by Öztürk in Turkey (Öztürk, 2005) was used to determine the physical activity levels, energy expenditure and sitting times. In the evaluation of all activities, the criteria were that each activity is done for at least 10 minutes at a time. A score was obtained as "MET-min/wk" by multiplying the minute, day and MET values (Metabolic equivalent of task). PA levels were classified as physically inactive (<600 MET-min/wk), minimally active (600–3000 MET-min/wk), and very active (beneficial for health) (>3000 MET-min/wk). In calculating the energy consumption during PA, the weekly duration (minutes) of each activity was multiplied by the MET energy values generated for the IPAQ. Thus, the energy consumption of each individual for vigorous physical activity (VPA), moderate physical activity (MVPA), walking and total PA was obtained in the form of MET-min/wk (Craig et al., 2003).

Statistical Analysis: Descriptive statistics for the dependent variables used in the analysis of the data are shown as mean, standard deviation and percentage distribution. Normality tests of the variables were done with the Kolmogorov-Smirnov test and it was determined that the data did not show normal distribution. Kruskal Wallis test and Mann-Whitney U test were used for the analysis of data that did not show normal distribution. In case of difference in Kruskal Wallis test, Mann Whitney U test was used to determine which group caused the difference. Statistical significance level was accepted as $p<0.05$.

RESULTS

Participants in this study were 47% male and 53% female, which is similar to the ratio of older-age males and females in Şırnak province. Statistically significant differences between older-age females and older-age males were found for body height and BMI (Table 1). Also, BMI was significantly higher in the females compared to males. Average values of BMI showed that females were overweight (26.3 ± 13.23).

Tablo 3

Demographic Information of Participants

		Female n	**%**	**Male n**	**%**
Level of education	No education	52	73.2	16	25.3
	Primary school	17	16.9	33	52.3
	Secondary school	0	0	0	0
	High school	1	1.4	12	19.0
	University	1		2	3.1
Level of income	Less than 1500 TL	27	38.0	11	17.4
	1501 - 3000 TL	30	42.2	31	49.2
	3001- 4500 TL	12	16.9	16	25.3
	4501 TL and more	2	2.8	5	7.9
Working status	Working	6	8.4	15	23.8
	Not working	65	91.5	48	76.1
Marital status	Single	25	35.2	11	17.4
	Married	46	64.7	52	82.5
Previous job	Employee	3	4.2	26	41.2
	Freelancer	5	7.0	26	41.2
	Housewives	61	85.9	-	-
	Officer	2	2.8	11	17.4
Falls-history	Yes	22	30.9	15	23.8
	No	49	69.0	48	76.1
Giving birth	Yes	69	97.1	-	
	No	2	2.8	-	
Number of children	Average	6.18 ± 3.81	-	-	

Table 3 shows the percentage distributions of some demographic information of the participants by gender, such as level of education, level of income, working status, marital status, previous job, falls history, giving birth and number of children.

Table 4

Differences in the Senior Fitness Test Parameters in Males and Females Within Age Categories

	Age groups	Female			Male			Female-Male	
		Mean ± SD	χ^2	p	Mean ± SD	χ^2	p	Z	p
Chair stand (NR)	**60-64**	11.60 ± 5.58	4.80	.187	12.56 ± 3.53	.904	.824	-1.972	.049*
	65-69	12.80 ± 8.62			15.17 ± 9.97			-1.121	.262
	70-74	9.77 ± 3.45			11.33 ± 2.06			-1.744	.081
	75-80	8.88 ± 6.13			12.71 ± 7.13			-1.122	.262
	Total	11.28 ± 6.21			13.11 ± 6.22			-2.605	.009*
Arm curl (NR)	**60-64**	16.92 ± 6.07	.606	.895	21.46 ± 8.10	.859	.835	-2.394	.017*
	65-69	17.66 ± 11.70			22.29 ± 13.02			-1.306	.191
	70-74	16.77 ± 5.35			19.22 ± 4.49			-1.331	.183
	75-80	15.55 ± 4.30			18.42 ± 7.29			-743	.457
	Total	16.88 ± 7.25			21.03 ± 9.16			-3.081	.002*
2Min Step (NR)	**60-64**	117.8 ± 45.59	9.605	.022*	137. 26 ± 57.16	4.473	.215	-1.958	.050
	65-69	98.80 ± 46.90			130.76 ± 50.41			-1.794	.073
	70-74	98.11 ± 47.04			125.44 ± 31.27			-1458	.145
	75-80	60.66 ±46.31			99.42 ± 47.18			-1.535	.125
	Total	103.71 ±48.81			129.61 ± 51.57			-2.960	.003*
Chair Sit-and-Reach (cm)	**60-64**	-.16 ± 3.55	6.70	.082	-3.00 ± 9.64	3.062	.382	-.286	.775
	65-69	-1.32 ± 2.86			-3.23 ± 9.67			-.740	.459
	70-74	.22 ± 3.07			-.55 ± 6.63			-450	.652
	75-80	-2.89 ± 3.44			-7.00 ± 8.850			-910	363
	Total	-.705 ± 3.42			-3.16 ± 9.14			-.206	.836
Back Scratch (cm)	**60-64**	-10.66 ± 6.26	5.02	.170	-13.75 ± 9.43	3.951	.267	-.860	.390
	65-69	-12.04 ± 4.41			-14.42 ± 10.04			-.227	.820
	70-74	-14.26 ± 5.41			-15.33 ± 5.95			-.486	.627
	75-80	-13.31 ± 5.31			-20.85 ± 8.51			-2.231	.026*
	Total	-11.74 ± 5.74			-14.94 ± 9.16			-1.640	.101
8 Ft Up-and-Go (sec)	**60-64**	10.67 ± 6.69	7.08	.069	9.00 ± 3.88	4.240	.237	-1.881	.060
	65-69	10.53 ± 3.27			10.29 ± 5.93			-1.678	.093
	70-74	12.88 ± 4.53			11.11 ± 3.05			-.894	.371
	75-80	15.33 ± 7.31			11.57 ± 5.25			-.958	.338
	Total	11.51 ± 5.52			9.79 ± 4.55			-2.511	.012*

p<0.05; NR: The number of repetitions

In the comparison between female participants according to age groups, no statistically significant difference was found in chair stand, arm curl, chair sit-and-reach, back scratch, and 8 Ft up-and-go tests, whereas in the 2min step test, a statistically significant difference was found between the 60-64 / 70-74 age groups and the 75-80 age group in favor of younger ones. (female: pchairstand=.187; parmcurl=.895; p2minstep=.022; pchairsitandreach=.082; pbackscratch=.170;

p8ftupandgo=.069). In the comparison between male participants according to age groups, no statistically significant difference was found in any of the SFT components. (male: pchairstand=.824; parmcurl=.835; p2minstep=.215; pchairsitandreach=.382; pbackscratch=.267; p8ftupandgo=.237). When the genders according to age categories were compared, a statistically significant difference was found in favor of male in the chair stand and arm curl test components in the 60-64 age group, while a statistically significant difference was found in favor of females in the 75-80 age group in the back scratch test. (respectively pchairstand=.049; parmcurl=.017; pbackscratch=.026). A statistically significant difference was found in favor of male participants in chair stand, arm curl, 2min step and 8 Ft up-and-go tests in the comparison made between genders regardless of age. (pchairstand=.009; parmcurl=.002; p2minstep=.003; p8ftupandgo=.012) (Table 4).

Table 5

Difference in International Physical Activity Questionnaire Parameters in Males and Females Within Age Categories

	Age groups	Female			Male			Female-Male	
		Mean ± Sd	χ^2	P	Mean ± Sd	χ^2	P	Z	P
MET-min/wk	60-64	761.14 ± 714.07	6.911	.075	1040.35 ± 779.12	4.942	.176	-1.694	.090
	65-69	831.46 ± 721.33			1143.64 ± 739.08			-1.720	.085
	70-74	746.50 ± 419.10			842.16 ± 596			-.133	.894
	75-80	302.50 ± 218.89			596.35 ± 542.78			-.534	.593
Walking MET-min/wk	60-64	616.57 ± 586.22	5.027	.170	856.35 ± 712.32	4.068	.254	-1.717	0.86
	65-69	844.80 ± 993.61			1036.58 ± 737.05			-1.721	0.85
	70-74	713.16 ± 454.70			775.50 ± 607.70			-.133	.894
	75-80	302.50 ± 218.89			596.35 ± 542.78			-.534	.593
MVPA MET-min/wk	60-64	109.89 ± 254.42	7.789	.051	104.00 ± 202.49	4.222	.238	-.257	.797
	65-69	64.00 ± 247.87			104.70 ± 219.49			-1.470	.142
	70-74	33.33 ± 100.00			57.77 ± 158.88			-.612	.541
	75-80	.000 ± .000			.000 ± .000			.000	1.000
VPA MET-min/wk	60-64	6.31 ± 38.93	.868	.833	80.00 ± 216.30	2.529	.470	-2.034	.042*
	65-69	.000 ± .000			2.35± 9.70			-.939	.349
	70-74	.000 ± .000			8.88 ± 26.66			-1.000	.317
	75-80	.000 ± .000			.000 ± .000			.000	1.000
Sitting Time MET-min/wk	60-64	1026.71 ± 362.70*	13.64	.003*	1039.50 ± 409.09	4.523	.210	-.286	.775
	65-69	1188.00 ± 402.42			1000.58 ± 376.00			-1.485	.137
	70-74	1125.00 ± 447.74			1020.00 ± 203.74			-.314	.753
	75-80	1590.00 ± 307.68*			1330.71 ± 325.38			-1.607	.108

* p<.05; MET: metabolic equivalent; wk: week; MVPA: Moderate volume physical activity; VPA: Vigorous physical activity

A statistically significant difference was found between the 60-64 and 75-80 age groups in favor of younger groups in sitting-MET-min/wk values when compared with female participants according to age groups (p<.05). No statistically significant difference was found in the comparison between male participants according to age groups. A statistically

significant difference was found (p<.05) in favor of male participants in the METVPA values of the 60-64 age group in the comparison between the genders (Table 5).

Table 6.

Bivariate Correlations Between IPAQ and SFT in Different Domains

	Chair Stand		**Arm curl**		**2 Min step**		**chair sit-and-reach**		**Back scratch**		**8 Ft up-and-go**	
	r	**p**	**r**	**p**	**r**	**P**	**r**	**p**	**r**	**p**	**r**	**p**
MET-$_{min/wk}$	.214*	.013	.162	.061	.426**	<.001	.185*	.033	.063	.472	-.187*	.030
MET$_{wlk-min/wk}$	.239**	.005	.187*	.035	.361**	<.001	.131	.130	.018	.832	-.073	.404
MET$_{MVPA-min/wk}$	-.029	.743	-.043	.625	.168	.053	.154	.075	.120	.168	-.332**	<.001
MET$_{VPA--min/wk}$	.122	.160	.078	.371	.095	.275	.043	.624	-.037	.669	-.174*	.045
MET$_{st-min/wk}$	-.200*	.020	-.088	.313	-.298**	<.001	-.087	.317	-.021	.813	.236**	.006

*p<.05; ** p<.01; r: correlation coefficient; MET: metabolic equivalent wk: week; wlk: walking; MVPA: moderate physical activity; VPA: vigorous physical activity; st:sitting

According to Spearman's rank correlation coefficient analysis, while there was a positive and significant relationship between METmin/wk and SFT components chair stand, 2min step, chair sit-and-reach, a negative and significant relationship was determined between METmin/wk and 8 Ft up-and-go test (respectively rspearman=.214, p=.013; rspearman=.426, p<001; rspearman=.185, p=.033; rspearman=-.187, p=.030). A positive and significant relationship was found between walking-MET-min/wk and chair stand, arm curl, 2-min step test components (rspearman=.239, p=.005; rspearman=.187, p=.035; rspearman=.361, p<.001). A negative and statistically significant correlation was found between METMVPA and 8 Ft up-and-go test. (respectively rspearman=-.332, p<.001). A negative and significant correlation was found between METVPA and 8 Ft up-and-go test. (rspearman=-174, p=.045). A negative and significant relationship was found between sitting-MET-min/wk and chair stand and 2min step test components, and a positive and significant relationship was found with 8 Ft up-and-go. (respectively rspearman=-.200, p<.020; rspearman=-.298, p<.001; rspearman=.236, p=.006) (Table 6).

DISCUSSION

The aim of the current study is to compare the PA level and FF levels of older-age people living in Şırnak province according to gender and age category variables and to examine whether there is a relationship between IPAQ and SFT battery. The reason why Şırnak province was preferred in this study is that it is one of the two provinces where the population over 65 years of age is the most densely populated in urban settlements in Turkey (TÜİK, 2021).

The physical characteristics of the participants were examined, no difference was observed in the body weights of the males and females (p=.145), while the BMI values of the females were higher than the male participants, and this difference was statistically significant (p<.05). BMI values of the females participating in the study were examined, it was seen that they were obese (BMI=30.37±5.08) and the BMI of the male participants were in overweight category (BMI=27.25±3.88). When many studies conducted with the older-age population in different provinces of Turkey are examined, it is seen that the majority of the population over the age of 60 is overweight or obese (Çırak et al., 2015; Özdemir et al., 2005; Sayan Çevirme, Yıldız, Aygin, and Kavaklı, 2010; Tortumoğlu, Hacıhasanoğlu, Yılmaz, and Yazıcı,

2005; Yalınkılıç, Kılıçaslan, Uysal, Bilgin, and Enç, 2020). Age is an important factor affecting BMI for both genders in Turkey. However, the effect of age on BMI is greater in females than in males. The most important reason for this can be associated with females getting married at an early age (23.7 years old) and having children (TUİK, 2020). Another important factor may be that generally Turkish women are housewives which means they have lower PA level, compare to working Turkish men (Sağınç, Demirci, and Karaca, 2020). It is possible to see this case experienced throughout Turkey in the example of Şırnak province when Table 3 is examined. It is seen that 64.78% of the female participants are married and 85.91% are housewives, and the average number of children is 6±4.

Comparing current study results with results from other countries may not be realistic due to variables such as race/ethnicity, lifestyle, physical activity level, marital status, and number of children. However, with age, features such as strength, endurance, flexibility and agility decreased for both gender in Serbia (Milanović et al., 2013), Brazil (Vagetti et al., 2020), Portugal (Gouveia et al., 2013) and North America (Rikli and Jones, 1999b), similar to the current study, we can say that it has tent to decrease (Table 4). For the strength component of SFT (chair stand, arm curl), many studies report that males have higher values than females when comparing genders (Langhammer and Stanghelle, 2011; Marques et al., 2014; Milanović et al., 2013; Rikli and Jones, 1999b). While lower body muscle strength is important for performing daily activities such as climbing stairs, walking and getting up from a chair, upper body muscle strength is important for activities such as carrying bags, gardening and personal care (Rikli and Jones, 2001). It is estimated that arm strength is more likely to decrease with aging, as there are few activities in daily life that bring you to use the arms to the same extent as the legs (Langhammer and Stanghelle, 2011). When the results of the current study were examined, it was determined that the strength tended to decrease with age and the strength values (upper and lower body) of the male participants were higher than the females. Zatsiorsky and Kraemer (2006) reported that strength level decreases by about 15% in the period between the ages of 60 and 70, and by 30% in the later age period (Zatsiorsky and Kraemer, 2006). Therefore, it is extremely important to develop and maintain strength in the older-age people. Considering the studies mentioned above, it would not be wrong to say that our findings in line with many studies.

In our study, to measure aerobic endurance, which is one of the most important components of FF, the 2min step test, as an alternative method to the 6 min walking test, was applied. The fact that the aerobic endurance component of the SFT battery is particularly high ensures from cardiovascular or all other causes a low mortality rate (Kodama et al., 2009; Sui et al., 2007). When 2min step test results were examined, it was determined that the aerobic endurance of male participants did not show a significant difference (decrease) according to age categories ($p=.215$), while it showed a significant decrease in females ($p=.022$). The decrease in aerobic capacity can be explained as the decrease in PA level with age in both genders. In addition, when the aerobic endurance of males and females in all age groups is compared, it is possible to say that male participants have higher aerobic endurance than females. It has been reported that the age-related decline in maximum oxygen consumption (VO2max) accelerates significantly with each decade, and this decline is greater in males than females (Hollenberg, Yang, Haight, and Tager, 2006; Stathokostas, Jacob-Johnson, Petrella, and Paterson, 2004). However, looking at the current study data, it is seen that the age-related decline in aerobic endurance is change dramatically in females (60-64 years = 117.8 vs 75-80 years = 60.66 2min step). The demographic characteristics of female participants were examined, it was seen that 85.9% of them had no occupation all their life, 73.2% had no education and 38% had a very low income level. In a study conducted by Sağınç et al. in the province of Ankara, they determined the physical activity levels of housewives between the ages of 18-65, and as a result, they observed that highly educated and has high income levels women had higher PA level (Sağınç et al., 2020). In developing countries, it is

reported that the level of PA is parallel to the increase in education and income level (Bauman et al., 2011). It was seen that this dramatic age-related decrease in the aerobic endurance of the females in the study group was associated with socio-cultural characteristics and this result was consistent with the literature.

The SFT battery includes back scratching (upper body) and chair sit-and-reach (lower body) tests to determine the flexibility of older adults. In our study, although there was a decrease in upper and lower body flexibility tests depending on age categories in both gender, this decrease was not found to be statistically significant ($p>.05$). It is possible to say that females have better results than males for both tests in all age groups, although not statistically significant. In addition, it was observed that females have better back scratching results in the 75-80 age group and these results were statistically significantly different than males ($p=.026$). Stathokostas et al. reported that the decrease in both upper and lower body flexibility is quite critical, especially in the 70+ males (Stathokostas, McDonald, Little, ve Paterson, 2013). In a study indicate that changes in connective tissue elasticity, decreases in tissue and spinal fluid, that occur with advancing age, cause a decrease in flexibility and range of motion (Daley and Spinks, 2000). The majority of studies in the literature support that older females have better flexibility results than older males in all age groups (Tremblay et al., 2010; Van Herp, Rowe, Salter, and Paul, 2000).

When the 8 Ft up-and-go results used for the evaluation of agility and dynamic balance in our study are examined, it can be said that although there is no statistically significant difference, there is age-related decrease for both genders. When examined independently of age, it is seen that agility ability giving higher results in males compared to females ($p=.012$). In the study of Milanović et al., in which they used the SFT battery, it was reported that the agility of male and female participants tended to decrease with age, and the difference between age groups was statistically significant ($p<.05$) (Milanović et al., 2013). On the other hand, in other studies in which gender comparisons of older-age people were conducted, it was concluded that there was no difference between genders or older females were more agile than older males (Langhammer and Stanghelle, 2011; Sugimoto, Demura, and Nagasawa, 2014). Although it was not statistically significant in our study, it may be associated with males being more agile than females, having higher percentage of falls-history (female 30.9%; male 23.8%) and being obese (BMI:30.37).

PA level typically declines with age and associated with a decline in FF. The World Health Organization (WHO) reports that PA has positive and long-term effects in improving muscle strength, aerobic endurance, flexibility and balance performance in the older-age (WHO, 2010). In the current study, the IPAQ results used for the assessment of PA were analyzed in 5 sub-dimensions (MET-min/wk; walking-MET-min/wk; MVPA- MET-min/wk; VPA- MET-min/wk and sitting- MET-min/wk). Considering the weekly total MET, walking MET and MVPA, no difference was found between age category and gender ($p>.05$). In addition; It was determined that the weekly total MET, the MET values in walking and MVPA in all age groups in females and males were extremely low. Also, there was only few older-age people join VPA in both genders. In our study, it was also observed that the weekly total MET and weekly MET values spent in walking, in age 75-80 category for both genders, although not statistically significant, were quite low and included in the inactive category. This may be due to the fact that the weekly total MET values of this age category were obtained only by walking (female 75-80y MET-min/week= 302.5; male 75-80y MET/min/week = 596.35, respectively). In many studies using the IPAQ to determine the physical activity level of older-age people, it has been observed that in older age groups (75-85 years), the weekly total MET, the walking-MET-min/wk spent in walking, MVPA and VPA are relatively lower, and the females spend less weekly METs than males. (Gouveia et al., 2013; Grimm, Swartz, Hart, Miller, and Strath,

2012; Milanović et al., 2013; Tuna, Edeer, Malkoc, and Aksakoglu, 2009; Van Holle, De Bourdeaudhuij, Deforche, Van Cauwenberg, and Van Dyck, 2015).

Our results show a positive and moderate correlation between 2min step test with METmin/wk (r=.426; p<.001) and walking-MET-min/wk (r=.361; p<001). Weekly MET results were observed to be negatively correlated (r=-.187; p<0.30) only with the 8 Ft up-and-go test, which evaluates the agility component of the SFT battery. The reason for the negative correlation between agility test and PA may be due to the fact that the participants were rather minimally active or inactive. This research confirms the assumption that the level of PA decreases with the aging process, which in turn decreases the FF of males and females. It is seen that agility and balance test values improve as weekly MET increases. Increasing physical activity has produced a positive change in the 8ft-upandgo test results. The negative relationship between MET-min/wk and 8Ft-UpandGo is also supported by the negative relationship between MVPA-MET-min/wk and VPA-MET-min/wk. It is seen that there is a higher correlation especially in MVPA-MET-min/wk. In addition, the increase in sitting-MET-min/wk value for 8Ft-UpandGo also supports this result.

CONCLUSION and SUGGESTIONS

There is a continuous decline in PA and FF with aging. This situation accelerates after the age of 70. Especially the age-related decrease in PA and FF levels of females stand out compared to males. Studies with direct measurements such as accelerometer will provide clearer information on this issue, especially in the 70+ older-age and larger populations. For healthy and active aging, there is need for initiatives that will improve public awareness and increase the participation of the older-age to PA. Exercise programs to support the health and independence of older adults should consider gender and age-related differences in FF and PA. In future studies which will cover the whole of Turkey will help to compare the functional fitness and physical activity level of the older-age population with different countries and thus to determine the place of Turkey in the active aging process. The limitation of the study is that the physician's report or a measurement tool was not used to determine the mental disorders of the participants in the current study.

Author's Contribution:

1. **Azize Bingöl Diedhiou:** Idea, Design, Supervision, Data Collection and Processing, Analysis/Comment, Writing, Critical Review
2. **Hülya André:** Idea, Design, Supervision, Data Collection and Processing, Analysis/Comment, Writing, Critical Review

Research Ethics Committee Approval

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KAYNAKÇA

1. **Atalağ, O., Kurt, C., Solyomvari, E., Sands, J., ve Cline, C. (2020).** Post-activation potentiation effects of back squat and barbell hip thrust exercise on vertical jump and sprinting performance. *The Journal of Sports Medicine and Physical Fitness*.
2. **Barbalho, M., Coswig, V., Souza, D., Serrao, J. C., Campos, M. H., ve Gentil, P. (2020).** Back squat vs. hip thrust resistance-training programs in well-trained women. *International journal of sports medicine*, *41*(05), 306-310.
3. **Bauer, P., Sansone, P., Mitter, B., Makivic, B., Seitz, L. B., ve Tschan, H. (2019).** Acute effects of back squats on countermovement jump performance across multiple sets of a contrast training protocol in resistance-trained men. *The Journal of Strength & Conditioning Research*, *33*(4), 995-1000.
4. **Bevan, H. R., Cunningham, D. J., Tooley, E. P., Owen, N. J., Cook, C. J., ve Kilduff, L. P. (2010).** Influence of postactivation potentiation on sprinting performance in professional rugby players. *The Journal of Strength & Conditioning Research*, *24*(3), 701-705.
5. **Blazevich, A. J., ve Babault, N. (2019).** Post-activation potentiation versus post-activation performance enhancement in humans: historical perspective, underlying mechanisms, and current issues. *Frontiers in Physiology*, *10*, 1359.
6. **Boullosa, D. A., Abreu, L., Beltrame, L. G., ve Behm, D. G. (2013).** The acute effect of different half squat set configurations on jump potentiation. *The Journal of Strength & Conditioning Research*, *27*(8), 2059-2066.
7. **Caterisano, A., Moss, R. E., Pellinger, T. K., Woodruff, K., Lewis, V. C., Booth, W., ve Khadra, T. (2002).** The effect of back squat depth on the EMG activity of 4 superficial hip and thigh muscles. *The Journal of Strength & Conditioning Research*, *16*(3), 428-432.
8. **Chatzopoulos, D. E., Michailidis, C. J., Giannakos, A. K., Alexiou, K. C., Patikas, D. A., Antonopoulos, C. B., ve Kotzamanidis, C. M. (2007).** Postactivation potentiation effects after heavy resistance exercise on running speed. *The Journal of Strength & Conditioning Research*, *21*(4), 1278-1281.
9. **Crewther, B. T., Kilduff, L. P., Cook, C. J., Middleton, M. K., Bunce, P. J., ve Yang, G. Z. (2011).** The acute potentiating effects of back squats on athlete performance. *The Journal of Strength & Conditioning Research*, *25*(12), 3319-3325.
10. **Esformes, J. I., ve Bampouras, T. M. (2013).** Effect of back squat depth on lower-body postactivation potentiation. *The Journal of Strength & Conditioning Research*, *27*(11), 2997-3000.
11. **Gambetta, V. (2007).** Sport specific game analysis. *Athletic Development. Champaign, IL: Human Kinetics*, (pp. 56-58).
12. **Gheller, R. G., Dal Pupo, J., Ache-Dias, J., Detanico, D., Padulo, J., ve dos Santos, S. G. (2015).** Effect of different knee starting angles on intersegmental coordination and performance in vertical jumps. *Human movement science*, *42*, 71-80.
13. **González-García, J., Morencos, E., Balsalobre-Fernández, C., Cuéllar-Rayo, Á., ve Romero-Moraleda, B. (2019).** Effects of 7-week hip thrust versus back squat resistance training on performance in adolescent female soccer players. *Sports*, *7*(4), 80.
14. **Kilduff, L. P., Owen, N., Bevan, H., Bennett, M., Kingsley, M. I.,ve Cunningham, D. (2008).** Influence of recovery time on post-activation potentiation in professional rugby players. *Journal of sports sciences*, *26*(8), 795-802.
15. **Linder, E. E., Prins, J. H., Murata, N. M., Derenne, C., Morgan, C. F., ve Solomon, J. R. (2010).** Effects of preload 4 repetition maximum on 100-m sprint times in collegiate women. *The Journal of Strength & Conditioning Research*, *24*(5), 1184-1190.
16. **Matthews, M. J., Matthews, H. P., ve Snook, B. (2004).** The acute effects of a resistance training warmup on sprint performance. *Research in Sports Medicine*, *12*(2), 151-159.
17. **Okuno, N. M., Tricoli, V., Silva, S. B., Bertuzzi, R., Moreira, A., ve Kiss, M. A. (2013).** Postactivation potentiation on repeated-sprint ability in elite handball players. *The Journal of Strength & Conditioning Research*, *27*(3), 662-668.
18. **Pescatello, L. S., Riebe, D., ve Thompson, P. D. (Eds.). (2014).** *ACSM's guidelines for exercise testing and prescription* (9th ed., pp. 96–99). Lippincott Williams & Wilkins.
19. **Prieske, O., Behrens, M., Chaabene, H., Granacher, U., ve Maffiuletti, N. A. (2020).** Time to differentiate postactivation "potentiation" from "performance enhancement" in the strength and conditioning community. *Sports Med*, 50, 1559–1565. https://doi.org/10.1007/s40279-020-01300-0
20. **Seitz, L.B., ve Haff, G.G. (2016).** Factors modulating post-activation potentiation of jump, sprint, throw, and upper-body ballistic performances: a systematic review with meta-analysis. *Sports Med*, 46(2), 231-40. doi: 10.1007/s40279-015-0415-7
21. **Wassertheil, S., ve Cohen, J. (1970).** Statistical Power Analysis for the Behavioral Sciences. *Biometrics*, *26*(3), 588. https://doi.org/10.2307/2529115
22. **Wilson, J. M., Duncan, N. M., Marin, P. J., Brown, L. E., Loenneke, J. P., Wilson, S. M., ... ve Ugrinowitsch, C. (2013).** Meta-analysis of postactivation potentiation and power: effects of conditioning activity, volume, gender, rest periods, and training status. *The Journal of Strength & Conditioning Research*, *27*(3), 854-859.

23. **Young, W. B. (2006).** Transfer of strength and power training to sports performance. *International journal of sports physiology and performance, 1*(2), 74-83.