Journal of Humanities Insights *5(3): 08-11, 2021*

Research Paper

The association between physical activity and motor function in the elderly

Tayebeh BaniAsadi[1*] , Parinaz Ghanati[2]

[1]Assist. Prof., Department of Physical Education, Roudehen Branch, Islamic Azad University, Roudehen, Iran
[2]Department of Motor Behavior, University of Tehran, Iran

Received: 15 June 2021 Accepted: 05 July 2021 Published: 02 September 2021

Abstract

This study examines the relationship between physical activity and motor function in the elderly. The research method was descriptive-correlational, and 40 over 60 years sedentary men were randomly selected. A questionnaire was used to collect data. Data were analyzed using Pearson correlation and regression. Findings showed a significant relationship between physical activity and static and dynamic balance in the elderly. According to the results, participation in physical activities is considered as one of the variables that impacts motor function.

Keywords: Physical activity, Elderly, Physical fitness, Balance, Growth

How to cite the article:
T. BaniAsadi, P. Ghanati, The association between physical activity and motor function in the elderly, J. Hum. Ins. 2021; 5(3): 08-11.

1. Introduction

For everyone, Aging is considered a natural stage in human life. The onset of old age coincides with the onset of changes in the musculoskeletal, atrial, sensory, and visual systems, all of which are physiological balance conflicts (1). Even without pathological disorders, the physiological decline of balance that occurs with aging and due to the deterioration of various body systems (visual, vestibular, and proprioceptive) (2) is another factor that leads to falls (3). In particular, accidental falls in people are a significant public health problem from a clinical and economic perspective (4). Almost one-third of all people who fall three or more times a year are hospitalized, stay at home, or die (5). Frequent falls are, therefore, a more significant prognostic factor for mortality (6). Falls also have significant social and psychological consequences; Because patients lose self-confidence and limit their physical activity for fear of falling again (7).

The effect of physical activity on reducing falls and improving balance is well documented and is a critical component of general fall prevention guidelines (8). One of the solutions that can be suggested for aging is to make lifestyle changes, which can be weight loss by increasing physical activity and following a special diet. In addition, physical activity is one of the influential variables in different periods of life (9) that reduces the rate of aging-related disorders (10). for example, Gadding (2007) reported that participating in an appropriate physical activity program may prevent the development of risk factors for cardiovascular disease such as hypertension, obesity, and weight gain (11). Also, vestibular exercises have a significant effect on the balance function in the elderly (12). Furthermore, active lifestyles had more positive psychological variables such as depression, satisfaction, social interaction, and trusting relationships than inactive and sedentary people. Therefore, this study investigates the effect of vestibular exercises on static and dynamic balance in sedentary elderly.

2. Research Methodology

This study was descriptive correlational. After the advertisement was distributed in the Retirement Centers of government offices and public places, 40

Corresponging author: Asadi_M840@yahoo.com

sedentary elderly (over 60 years old) were examined for general/physical health. After obtaining the consent form, they were asked to complete a physical activity level questionnaire and perform static and dynamic balance tests. To collect static and dynamic balance data, the Persian version of the Sharpened Romberg test (reliability 0.91 with eyes open and 0.77 with eyes closed) with closed eyes and Berg balance Scale was used. The Sharpened Romberg test is used to measure static balance. To perform this test, the barefoot subject stands on a flat surface, placing the dominant foot in front of the non-dominant foot so that the front foot's heel touches the toe of the back foot. The arms are crossed on the chest, and the palms are on the shoulders of the opposite side. This test is performed with the eyes open and closed. As long as each subject is able to maintain this time with his eyes open and closed, his score is considered.

Also, to measure the dynamic balance, a 4m*10cm*10cm length Balance beam was used; In this way, the subject was placed at one end of the balance beam at the beginning of the movement and started to move with the sign "Go." After finishing one round, he put his foot on the ground and came back. The criterion is the amount of time a person gains balance on a stick once going back and forth. The reliability of this test for the elderly is reported 0.79 (13). The subjects used the Beck inventory to examine the physical activity. The questions have a Likert scale with three components of the workplace, leisure, and sports, and Beck's physical activity inventory's internal reliability was 83%, which confirmed the internal correlation of the questions (14). The collected data were described by calculating the mean and standard deviation and plotting the classification table. Kolmogorov-Smirnov test and Pearson correlation and regression were used to analyze the data and test the research hypotheses.

3. Results

The results of the Kolmogorov-Smirnov test showed that the data distribution was normal ($p > 0.05$). Pearson correlation was used to investigate the relationship between variables. The results are presented in Table 1. It is observed that there is a positive and significant relationship between physical activity and static and dynamic balance function.

Table 1. Correlation between research variables

		Static balance	Dynamic balance
Physical activity	r	0.51	0.48
	p	0.00	0.00

Regression was used to predict static and dynamic balance from physical activity. The results of regression analysis are presented in Table 2. According to this table, the regression models of static balance ($p < 0.001$, $t = 3.75$) and dynamic balance ($p < 0.001$, $t = 3.404$) are statistically significant.

Table 2. Summary of regression model results

Model - Predictive variables	F	R	R2	B (S.E.)	β	t
Model 1: Static balance	5.331**	0.51	0.26			
Constant				3.284(4.89)		0.663
Level of physical activity				0.7(0.177)	0.286	3.75***
Model 2: Dynamic balance	4.262**	0.48	0.23			
Constant				8.592(5.869)		1.464
physical activity				0.721(0.212)	0.246	3.404***

4. Discussion

Age has been shown to have a significant effect on balance, and aging with atrial dysfunction exacerbates this effect (15). The over 60 years Elderly have the most atrial disorders, complaints of dizziness, and balance disorders (16). These conditions are the consequences of various neural structures aging, including central vestibular receptors, proprioceptive, cerebellum, and visual pathways. In addition, a decrease in the number of hair cells in the vestibular organs and the number of fibers in the upper and lower vestibular nerves is observed in the elderly (17). this study examined the relationship between physical activity and static and dynamic balance in the sedentary elderly. In this regard, the findings showed a significant relationship between physical activity and static and dynamic balance in the elderly. In addition, research has shown that vestibular rehabilitation has significantly improved the functional, physical, and psychological dimensions and quality of life of

the elderly (18). However, few studies have examined the effect of vestibular exercises on balance. The present findings are consistent with the studies of Ribeiro et al. (19), Reisi et al. (20), Chango et al. (21). For example, aerobic exercise has improved the cognitive and metacognitive status of the elderly (10). Furthermore, atrial exercise has improved the quality of life and physical fitness components of the elderly (22).

Inadequate physical activity is one of the most critical risk factors for global mortality and is on the rise in many countries, adding to the pressures of heart disease and affecting public health worldwide. People who are not active enough have a 20 to 30 percent increased risk of dying than those who are active enough. The close Neuroanatomical association of systems involved in physical activity with other sensory-motor function regulators is well documented. Numerous researchers have proposed hypotheses that consider the facilitative effect of the vestibular system on human growth (23). Preliminary research in functional neuroanatomy has shown the relationship between vestibular systems and proprioceptive regulation of muscle tone and postural reflex functions (24). Improvement in participants' dynamic and static balance performance can be attributed to the type of vestibular exercise. This protocol promotes visual stabilization of head movements, improves postural stability in cases of sensory conflict, minimizes sensitivity to head movements, and thus improves the static and dynamic balance of the body (25). Therefore, according to the present study results, it is recommended to families, care centers, and caregivers of the elderly to increase the level of physical activity of the elderly to improve balance function and prevent falls and accidents that may cause imbalance.

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