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The Response of the Neuromuscular System Function Passive and Active Elderly Women in a Morning Exercise

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ABSTRACT

Background: It seems, regular physical activity is as one of the most important ways for improvement of neuromuscular system function in elderly. According to the clearness of this issue, the aim of this study was The response of the neuromuscular system function passive and active elderly women in a morning exercise. **Methodology:** This was a reason- comparative (after the occurrence) research. 40 active elderly women (age 64 years, height 160 cm, weight 73kg) that regularly participated in morning exercise in previous year (5 days per week), and 8 sedentary elderly women (age 66 years, height 162cm, weight 77 kg) that have not experience of any regular physical activity, participated in this study. Timed Up & Go (TUG) and 5-Chair stand (5CS) tests, were used for evaluation of neuromuscular system function. Independent T-Test ($P \leq 0.05$) used for determination of differences of TUG and 5CS scores between groups. **Results:** Statically analyses showed that there was significant different in 5CS and TUG scores in elderly men that participated in morning exercise and sedentary elderly women. **Conclusion:** The results of this study showed that there was significant different in neuromuscular system function between older people that regularly participated in morning exercise and sedentary older people. According to the results of this study it seems regular participating in morning exercise causes improvement of neuromuscular system function in active older people comparison to sedentary older people. Possibility, this issue can prevents from many neuromuscular-related dysfunctions in older adults.

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INTRODUCTION

According scientific resources, adult age refers to life after 60 years old. World Health Organization has introduced 1st October each year as the International Day of Elderly. Accordingly, Week of Elders' Celebration and Promotion will be held in Iran from Sep. 28 to Oct. 4 annually. Religious teachings recommend respect for parents and elders as well as respect for pioneers. Providing services of preventing diseases for adult people can prevent appearance of sever and expensive diseases among them because they are exposed against severe damages. If they hospitalize, possibility of pharmaceutical troubles, bed wound and hospital infections will be increased, in addition to occupy sickbed, which it sustains many economic, social and health losses on family and society. Adult age is not the last phase of life. The aging process cannot be stopped but physical health can be maintained. In other words, adult age alone is not a disease.

Many studies have selected elderly population as their study cases because of rising average age in industrialized societies. One of visible changes in elderly people is deterioration of performing and learning skills, especially in skills that require balance. Today it has been proved that lack of balance is one of main risk factors for falls and injuries resulted by falls are main reasons limiting activity, disability and even death among elderly people. Studies indicate that approximately 30% elderly people over 65 years old experience once fall each year, while it reaches 50% in people older than 75 years old. Although, in many cases, falling can result to disability and even death, but it can affect self-confidence and quality of life among elderly people. The resulted changes by adult age include performance reduction of muscular nerve system, muscular mass reduction, reduction of power, resistance and range of motion. Performance of some physiological systems affecting height control is weakened such as skeletal, muscular, vestibular, somatosensory and visual systems.

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Heart attack is relatively common in elderly people, but early detection and identification of these diseases can reduce the risk and later problems seriously. However, important matter is that they may not know what the right way to start their efforts. Exercise, proper nutrition and checkups are matters that must be considered to prevent elderly people to old age diseases.

Scholars stated that cause of falls in elderly people can be related with internal factors (muscle weakness, loss of balance, etc) and external factors (such as environmental conditions, medicines, etc). Studies have shown that causes of falling elderly people are classified in internal factors (such as muscle weakness in lower limbs) and external factors (factors caused by environmental conditions including use of psychotropic and hypnotic drugs). Balance is one of basic needs for daily activities that play an important role in static and dynamic activities. Control position and balance system is a combined and complex mechanism that coordination of three systems (including visual system, vestibular system and somatosensory system) play an important role. In studies, it has been properly documented that the performed traditional exercise programs to increase balance result to improve balance, walking ability and aerobic resistance meaningfully, and in some cases, they have decreased falling elderly people.

Although performing traditional exercises is useful for many elderly people, but there are some medical conditions of the population (such as osteoporoses, arthritis, ictus and obesity) because of pain or decreasing motivation of joints and other physical limitations, which decrease their participate in such programs or prevent them to do the exercises.

By conducting a test about effect of vibration on balance of elderly people, Seif [11] showed that left leg balance was improved among elderly women because of a ten-day vibration exercise on them, but there was no significant effect on right leg balance. In their study about effect of vibration training, Reyes *et al* [12] and Kawanab *et al* [13] showed that static balance improves walking function and some postural control in elderly people. They believe that vibration increases balance and performance of lower limb by raising pain threshold, stimulating tendon organs, golgi and muscular spindles. Various studies have shown that mental exercise is a nerve mechanism, which activates brain structures that play role in cognitive control and motion planning. About relationship between role of mental-physical combination exercise on motion skills and abilities, Jackson *et al* [15] concluded that mental exercise had little effect on performance of their studied population, in comparison with physical and combination exercise. Perin *et al* [16] studied effects of light, middle and severe strength exercises on balance of elderly people and found that the light power exercises will result to more progress in their static balance.

Morning exercise is one of the most desirable form of physical activities with several thousand years history. Despite human inner desire to increase dynamic and activity, astounding expenses of sport facilities have been a great obstacle to implement this innate need. Therefore, human is always seeking a way satisfy this by the lowest possible cost. Undoubtedly, morning exercises can be considered as one of the procedures that have been completed by civilization. Studies have shown that morning exercises can have many positive physiological and psychological effects such as weight loss, improve control, higher bone density, prevent osteoporosis, lower resting heart rate, lower blood pressure, reducing risk of cardiovascular diseases, reducing risk of various diseases and preventing anxiety and depression in elderly people. However, effect of regular participate in morning exercise is no secret to anyone. Although, there are many advantages and contradictory results of the conducted studies, the purpose of the present research was to study reaction of nerve-muscular performance in active and inactive elderly women in morning exercises.

Methodology:

The present research was causal-comparative study after occurring. Statistical population of the research were 40 elderly women have participated in morning exercises regularly during previous year. Programs are performed regularly every morning from 6:30 to 7:30 (including basic exercises to warm up, stretching, using exercise facilities in health station and cooling body). Among them, 32 persons were healthy and had no history of disease (age: 64 ± 50.6 years old, height: 160.94 cm, weight: 73.3118 kg); they were selected as the considered sample. There were 8 patient persons who participated in the morning activities by order of their doctor (age: 66 ± 71.4 years old, height: 162.75 cm, weight: 77.6250 kg). There were used 5-Chair Stand (5-CS) and Time Up & Go (TUG) Tests to evaluate performance of neuromuscular system of the subjects. They were selected by available sampling, after signing letter of satisfaction to participate in the study. As a statistical sample, acceptance criteria included interesting and volunteer desire of the subjects to participate in the study. Health criteria to participate the subjects in the study included independence to do daily work, lack of vision problem, vertigo, chronic arthritis and every disorder preventing participation of a subject in a study. Firstly, there were explained purpose and methodology as well as ethical considerations to the subjects completely. By considering purpose of the research, there were removed those participants who could not perform cognitive tests and vestibular function; but no participated subjects in the research have such conditions. Data were analyzed by SPSS software (version 1.9). Covariance and independent samples' comparison tests were used to compare intergroup scores ($P \leq 0.5$).

Results:

Table 1 shows descriptive and physiological characteristics of the subjects.

Table 1: Descriptive and physiologic specifications of subjects (M±SD).

Variable	Groups	Number	Mean	SD
Age (year)	Active and healthy aged	8	66.250	4.713
	Inactive	32	64.375	6.504
Height (m)	Active and healthy aged	8	1.627	5.849
	Inactive	32	1.609	5.847
Weight (kg)	Active and healthy aged	8	77.625	8.140
	Inactive	32	73.718	12.821

Results of t-test on Time Up & Go (TUG) and 5-Chair Stand (5-CS) Tests showed there is a meaningful difference between elderly people participating in morning exercises in comparison with inactive ones. We used t-test to investigate this hypothesis (there is a meaningful difference between Time Up & Go time of active and inactive persons), which following Table presents its results:

Comparison quality	Hypothesis of variance equity	Covariance test		Test for comparing independent cases					
		F	Sig.	T	DF	Sig.	DM	Low	High
TUG	Equal	6.594	0.014	-3.194	38	0.003	-2.526	-4.1269	-0.9251
	Unequal			-3.194	28.589	0.003	-2.526	-4.1269	-0.9076

By considering the above Table, it can be said that there there is a meaningful difference between Time Up & Go time of active and inactive persons. This difference sig= 0.003 is benefit for active persons because of negative confidence interval.

Scores of Time Up & Go Test (s) (M±SD).

Group	Time
Healthy active aged women	5.90±52*
Healthy inactive aged women	7.42±52*

* shows statistical meaningfulness

We used t-test to investigate this hypothesis (there is a meaningful difference between 5-Chair Stand factor of active and inactive persons), which following Table presents its results:

Comparison quality	Hypothesis of variance equity	Covariance test		Test for comparing independent cases					
		F	Sig.	T	DF	Sig.	DM	Low	High
5-CS	Equal	5.32	0.027	-2.871	38	0.007	-2.6835	-4.5754	-0.7916
	Unequal			-2.871	28.392	0.008	-2.6835	-4.5966	-0.7704

By considering the above Table, it can be said that there there is a meaningful difference between 5-Chair Stand factor of active and inactive persons. This difference sig= 0.008 is benefit for active persons because of negative confidence interval.

Scores of Time 5-Chair Stand Test (s) (M±SD).

Group	Time
Healthy active aged women	9.3±68*
Healthy inactive aged women	13.19±68*

* shows statistical meaningfulness

Conclusion:

Results of the research showed that there is a meaningful difference between test scores of elderly women participating in morning exercise of TUG and CS-5 in comparison with inactive women ($P \leq 0.5$). This finding is consistent with results reported by Galvao *et al* [18], Elman and Reyes *et al* [11] who reported improving neuromuscular system because of regular participating in sport activities. It seems, regular participation in morning exercises, like regular participation in other physical activities, can improve nerve impulse transmission by efferent type 3 and 4 to motor control center in the brain with increasing number and sensitivity of different receptors in the nervous system such as deep, sensory and joint receptors. Consequently, this led to increase speed and electrical stimulation of efferent nerve to recall and simultaneous use of the impact in motor units. Regular participating in sport activities can prevent disorders in neuromuscular system and finally, it improves balance and decreases falling in elderly people. Suzuki *et al* [21], Dorisa *et al* and Norton *et al* showed that using Pilates on motor function of elderly people had significant increase to improve their flexibility. In another

research, Babijet *et al* showed positive effect of Pilates exercises on balance, reaction time, muscle strength and number of falling among Turkish women with 65 years old. Performing appropriate sport activities and creating proper physiologic compatibility can play an important role in learning skill, recalling motor units and improving muscular usage and consequently, preventing falling of elderly people with muscular atrophy. In the other hand, there are many elderly people in our country who cannot participate in morning exercises or they have no primary facilities or space to do such exercises. As morning exercises do not require high costs, it can create a healthier society for elderly people. Consequently, we can reduce therapeutic costs and help them to return daily activities. Undoubtedly, it will be achieved through participating the related organizations, employing the experienced and educated trainers and developing culture of public exercise.

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