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Description of the status of strength muscle, endurance muscle, balance and flexibility in elderly people

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ABSTRACT

The aim of this study was to describe some components of physical fitness such as muscle strength, muscle endurance, balance and flexibility in sedentary older people. 40 elderly women and 36 elderly men between 60 and 80 years old from an Iranian local pension in Isfahan voluntarily participated in present study. Using Romberg's test, their static balance was evaluated in closed & opened eyes conditions. Their endurance muscle and muscle strength in the lower limbs were also evaluated by Wall Sit and pushing the scale, respectively. A standard goniometry was also used to measure their joints' flexibility in knee, femur and ankle. Data are presented as mean and standard deviation (±SD). The independent t-test was used to compare the variables of the two groups. Muscle strength ($p<0.02$), muscle endurance ($p<0.001$) and balance ($p<0.001$) in men were significantly stronger than those of the women. But flexibility was significantly higher in women than the men ($p<0.02$). The status of physical fitness of elderly people who live in local pension was very weak. It is suggested to use physical exercise to improve the sedentary older people.

Keywords: Muscle Strength, Muscle Endurance, Balance, Flexibility, Elderly

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INTRODUCTION

Recently, the number of elderly people is increasing. There are currently 33 million Americans aged ≥65 living in the United States; over the next century, that number will more than double, with the greatest increase occurring among individuals aged ≥85 (Seguin, 2003). The implications of extended years of life often involve increased incidence of chronic disease as well as the development of functional limitations. Despite the recent reduced prevalence of disability, 7 million older adults still are chronically disabled. Ageing causes changes in physiological, biomechanical and physical parameters (Singh, 2006; Rogers, Rogers, Takeshima, & Isam, 2003) such as reduction in physical fitness, with loss of muscular force and endurance (Hautiera & Bonnefoy, 2007), Balance, Flexiblity

(Foldvari, Clark, Laviolette & et al, 2000; Chakravarthy, Joyner, Booth, 2002) and etc. The age related reduction in muscular skeletal function effects individuals' ability to perform even day-to-day activities and their quality of life (Cayley, Com, Dip, 2008) and promotes dependency on others (Hautiera & Bonnefoy, 2007). The primary components of physical fitness are cardiorespiratory endurance, flexibility, body composition, power, balance, coordination, muscular endurance, and muscular strength. Each component has a important role in preserving function, decrease risk for chronic health conditions, and prevent disability with age (Foldvari, Clark, Laviolette & et al, 2000; Chakravarthy, Joyner, Booth, 2002). It is important for health and fitness professionals to be aware of the effects of aging on muscular and how to maintain and improve the components of physical fitness. Therefore, the aim of present study was to describe the status of components of physical fitness such as muscle strength, muscle endurance, balance and flexibility in sedentary elderly people.

MATERIALS AND METHODS

40 elderly women (age: 72.3 ± 10.2, height: 142.2 ± 18.2 and weight: 51.2 ± 11.7) and 36 elderly men (age 70.5±9.8 yrs, height 159.2±10.3 cm, and body mass 60.2±11.3 kg) from an Iranian local pension in Isfahan voluntarily participated in present study.

Assessments

Static Balance: Static balance was evaluated using Romberg test, a One-Leg Balance with open and close eyes tests. The participant stands on the preferred foot while resting the hands at waist level and then raises the other foot approximately 10 cm off the floor. Balance is scored by the number of seconds for which the foot is kept raised or until balance is lost. Each leg can be tested with each condition. Timing is terminated with touch the floor by the free foot, take hands away from the hips, move the support foot from the initial place, hook the free foot behind the supporting foot, and open the eyes for the evaluation the eyes closed trial (Rogers, Rogers, Takeshima, & Isam, 2003).

Muscle Endurance: Using Wall Scott (or Wall- Sit) test, the endurance of the lower extremities' muscles was measured. The participant sits in chair-like position with his back against the wall. Hands are hanging beside the body. To avoid any possible knee injury, the proper angle for knee joints is set by the trainer based on the best suitable position for every participant. Endurance was scored as the length of time (sec.) which the participants were able to keep the mentioned situation or until stand up.

Muscle Strength: Muscle Strength was evaluated by pushing the scale that was fixed on the wall (about 20 cm from the floor). Participants sit on the floor while their sole of their feet touch the scale on the wall with 60^0 flexed knee joint and then push the scale with their maximum force. The number that was observed on the scale recorded in Kilogram (Kg).

Flexibility: A standard goniometry was also used to measure their joints' flexibility in knee (flexion and extension), femur (flexion, extension, abduction and adduction) and ankle (abduction and adduction) (Lin, Davey, Cochrane, 2000).

Data Analysis

Data are presented as mean and standard deviation (±SD). The independent t-test was used to compare the variables of the two groups. Statistical significance was set at $p<0.05$. The data were analyzed using the statistical package SPSS, PC program, version 18.0 (SPSS Inc., USA).

RESULTS

Balance: The data of balance in elderly men and women were shown in table 1. The ability of older men in controlling of balance on one leg (open and close eyes) were significantly better than women ($p<0.001$).

Table 1. Data (Mean±SD) in Static balance (One-Leg stance with open and close eyes).

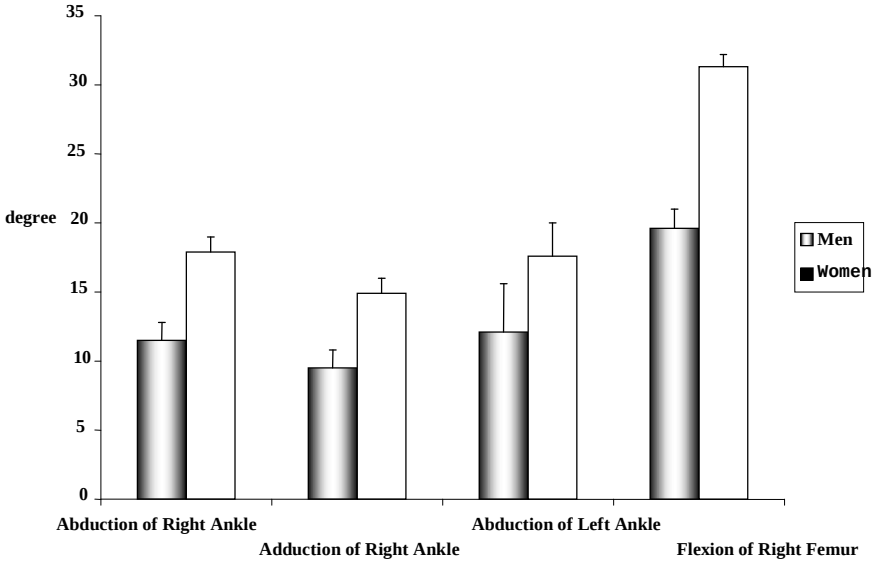
Foot Group	Right Foot (Second)		Left Foot (Second)	
	Open-eyes	Close-eyes	Open-eyes	Close-eyes
Men	3.8±1.8	0.6±0.1	4.1±2	0.8±0.2
Women	1.2±1	0.3±0.2	0.8±0.5	0.2±0.1

Muscle Strength: There was a significant difference in the maximum force in pushing the scale between elderly men and women (11.9±5.3Kg Vs. 8.6±5.7kg) respectively ($p<0.02$).

Muscle Endurance: Elderly men and women could keep the position of Wall-Sit test in 35.9±20.7 seconds and 13.2±9.2 seconds respectively. In the other words, muscle endurance in elderly men was significantly better than the elderly women ($p<0.001$).

Flexibility: according to figure 1, the flexibility of right ankle (adduction and abduction), left ankle (abduction) and right femur (flexion) in elderly women was significantly better than men ($p<0.02$). There were no significant difference in the other anatomical direction between men and women.

Figure 1. Data (Mean±SD) in Flexibility of lower joints in elderly men and women (Degree)



CONCLUSION

Aging is associated with a reduction in physical fitness, with loss of muscular force, muscle endurance, cardiorespiratory endurance, flexibility, body composition, power, balance and coordination (Hautiera & Bonnefoy, 2007). As each component has a role in health and safety of older people, the aim of present study was to describe the status of components of physical fitness in sedentary elderly people. Although the status of physical fitness in elderly men was approximately better than women, according to the results it seems both groups are in very poor status of physical fitness. It appears the difference between elderly men and women is because of primarily difference in gender differences. Generally, flexibility in female is more than male. But, the strength muscle, Endurance muscle and Balance is further in men than those of the women (Rajabi & Gaini, 2008). Studies indicated that approximately 1% of muscle mass is lost per year after the fourth decade of life (Baumgartner, Koehler, Gallagher & et al, 1998; Janssen, Heymsfield, Wang, Ross, 2000). This age-related loss of muscle mass is known as sarcopenia (Rosenberg, 1989; Roubenoff R., 2001). Aging impairs the mechanisms such as sense (visual), proprioceptive and somatio-vestibular systems which control balance function (Alfieri & et al., 2010). Moreover, sarcopenia cause to decrease in balance and muscle endurance too. Furthermore, Aging accompanies with stiffness in joints and decrease in joint mobility and flexibility (Laurence, Rubenstein, Peggy & Trueblood, 2004). It is recommended that older adults do regular physical activity to improve and preserve their physical fitness.

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