Biological Forum – An International Journal **7**(2): 282-285(2015)

ISSN No. (Print): 0975-1130
ISSN No. (Online): 2249-3239

Effects of Resistant Exercise on Artery Diameter in the Elderly Men

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(Received 29 May, 2015, Accepted 15 July, 2015)
(Published by Research Trend, Website: www.researchtrend.net)

ABSTRACT: Aging is a chronic phenomenon that can lead to atherosclerosis and blood pressure. Nowadays, it has been proved that the only reason for this disease is not aging, but lack of exercise is also one of the effective factors. The present research aims at the effects of resistant exercise on artery diameter in the elderly men. The present study is a semi-experimental one, including pre and posttests. 20 elderly men were randomly divided to two groups: Control group (n = 10, Age: 55± 5) and resistant exercise group (n = 10, Age: 55±5). The exercises continued for 3 months, three times a week, and each session lasted 30 minutes. The resistant exercise group did endurance exercises, 60 to 70 percent HRR, on treadmill. Before and after the exercises, the artery diameter of the subjects was measured. Results of the present research indicated that average resistant exercise leads to a significant increase (0.008) in artery diameter. The present research indicated that resistant exercise can lead to significant changes in artery diameter which can be regarded as a means for the better function of arteries and prevention from cardiovascular diseases.

Keywords: resistant exercises, artery diameter, the elderly men

INTRODUCTION

The process of aging changes some of the physiological bodily factors. For example, as the result of aging, the artery wall is affected, tightened and has weak function. Therefore, artery diameter, which is related to aging and stiffness of artery, is affected and narrows down (Marsh and Keyrouz, 2010, Roger *et al*, 2012). By now, about 30 percent of mortalities are due to cardiovascular diseases and it is the reason behind about 17 million deaths in the world. In Iran, based on the latest reports, the reason for more than 38 percent of mortalities is related to cardiovascular diseases. It has been predicted that by 2020, the reason for more than 50 percent of mortalities would be cardiovascular diseases. As aging happens, the structure of artery walls undergoes some changes which are different in different parts of body. The most normal one of these changes includes atherosclerosis which is signaled by thickness of intima, cellular expansion of muscular and connective tissue parts, cholesterol aggregation in muscular cells and macrophages in the lesion (Azizi, Fereidoon 2008, Baghrabadi, *et al.*, 2012).

In fact, endothelium plays the pivotal role of covering the whole system of arteries and endothelial disorder signals the start of atherosclerosis disease. Different stimuli on endothelium cells have harmful effects on artery function. The stimuli include exposure to lipoprotein oxidation, high hemocysteine, aggregation of advanced inflammation cytokines as the result of the end of glycation and aging. Not having exercise is one of the effective factors in advancing chronic diseases such as cardiovascular and metabolic diseases. Besides, not observing correct instructions in doing bodily activities increases the risk of such diseases (Blair *et al.*, 2001, Johannsen *et al.*, 2008). As aging happens, maintaining good body condition can have good effects on lifetime and physiological changes and utmost aerobic capacity. Aging leads to a decrease in functional capacity in the elderly and following that, the capacity of doing some physical works decreases in those individuals (Tanaka, *et al.*, 2003). As many researchers have stated that several risks threaten the elderly, therefore, some researchers have investigated the effects of exercise on inflammatory indices of the elderly (Dabidi *et al.*, 2009). Gnasso *et al.* (1997) maintained that both physical fitness and regular hard exercise lead to the build-up of nitrite oxidation in a healthy body. Results have indicated that physical fitness and NO composition and relaxation are positively related. Furthermore, one session of exercise leads to the high increase in NO composition. It has been observed that the positive relationship between physical fitness and NO composition may help explain the positive effect of physical exercises on the health of heart and arteries. The utmost consumed oxygen can be increased by means of aerobic exercises. However, these effects can be regulated and changed through different factors, including age, the preliminary level of aerobic fitness, intensity, frequency and length of the exercise (Atkinson, 2008).

Doing physical exercises leads to functional adaptability of the heart which is different from hepatological adaptability and leads to the better function of the heart. In a research aimed at investigating the effect of combinatory aerobics-resistive exercises on 16 individuals with type 2 diabetes, the exercises for whom lasted 8 weeks and started in the progressive mode from the second week on, the results have indicated that doing physical exercises leads to an improvement in controlling blood glucose level, tolerating aerobic exercise and increasing the resistance of endothelial vasodilators (Barton *et al.*, 2003). In another research, Vahdat Baghrabadi *et al.* (2011) investigated the effect of regular aerobic exercise on endothelin-1 level of arteries in the elderly women and found out that as aging happens, endothelial dysfunction occurs. On the other hand, doing exercise improves the function of endothelial cells of arteries. As most researches have focused on the positive effects of exercise on the function of arteries and less studies aimed at investigating the effect of aerobic exercises on artery diameter, therefore the present research, attempted to investigate the effect of aerobic exercises on artery diameter in the elderly men [4].

RESEARCH METHODOLOGY

Through convenience sampling, 20 individuals were selected among retired men, previously working at Foulad Mobarakeh, Siman Sepahan and Zoub Ahan of Isfahan province. The subjects were chosen based on general health questionnaire and did not previously suffer from any diseases. They were randomly divided to two groups: control group (n=10, heart rate: 82/6±7/1, age: 55±5) and aerobic exercise group (n=10, heart rate: 82/6±5/06, age: 55±5). After testing their bodily readiness, the experimental group went through 3 months exercise, three times a week and each session lasted 30 minutes. The exercises for the aerobics group included 10 minutes warm-up with stretch exercises, then a 30 minutes exercise on treadmill with 60 to 70 percent HRR. Artery diameter was measured 48 hours before the exercise and 48 hours after the last session of the exercise by means of Doppler sonography. To do so, each subject laid down on the bed, with arms beside the body which was done by a cardiologist using multi-linear frequency probe, ranging from 5 to 13 megahertz. **Statistical Method.** To describe the mentioned data, statistical indices such as mean, standard deviation, min, max and for referential analysis, Kolmogorov-Smirnov test and dependent t-test were used. The margin of error has been considered as 5 percent in all cases. All the statistical analysis have been done using SPSS18 software.

RESULTS

As seen in table 1, besides measuring artery diameter, in the present study some other physiological factors such as systole and diastole blood pressure and heart rate were measured.

Table 1: Description of mean and standard deviation of the right femoral hernia diameter, systole and diastole blood pressure and heart rate.

Variable	Group	SD	Scale
		Pretest	Posttest
Systole blood pressure (mmHg)	Control	12.7±1.4	12.5±1.2
	Resistant	12.9±0.87	10.7±0.82
Diastole blood pressure (mmHg)	Control	8.5±1.5	8.7±1.4
	Resistant	9.7±0.94	8.0±0.66
Heart rate (per min)	Control	82.6±57.1	82.5±7.2
	Resistant	82.6±5.06	76.2±3.2

As seen in table 1, it can be estimated that systole blood pressure in the control group was at first at the lowest level. Also, as far as diastole blood pressure and heart rate were concerned, the highest and lowest levels were respectively given to aerobics and control groups. For aerobic exercise group, artery diameter was first at the lowest level. Also, the final systole blood pressure in the control group was higher than the other groups and in the aerobic exercise group it was in the lowest level. As for diastole blood pressure and final heart rate, the control group had the highest level and aerobic exercise group had the lowest level.

Table 2 shows the mean difference between experimental and control groups. As it is seen, there is a significant difference between the pre and posttests of resistant exercise group, indicating the strength of aerobic exercises in improving the artery diameter condition in the elderly which has not been observed in the control group.

Table 2: Dependent t-test results on control and experimental groups.

	Group	Pretest	Posttest	t	P-Value
Femurdiameter (mm)	Control	0.6±8.45	0.64±8.4	-.349	.735
	Experimental	0.1±8.42	0.89±8.97	-3.365	.008

DISCUSSION

The results of the above research showed that exercise in general (resistive) leads to the widening of artery diameter in the elderly men which can be indicative of the positive effect of exercises on preventing cardiovascular diseases and its effects. The results were in line with the results of the studies done by Padilla *et al.* (2010) and Nohria *et al.* (2003). Probably the reason for such linearity lies in one of the following reasons: In the literature on this subject the following reasons have been mentioned: Widening artery diameter and high blood pressure on the wall of artery. When muscle exercises are done, high blood pressure is occurred that is in fact a liquid hydrostatic pressure on the walls and widens the diameter. Diameter widening and a narrowing of the thickness of the inner wall of arteries is one of the other reasons which happens because of the removal of mineral material and as the result of not having exercise sediments in the inner wall of arteries (Izuhara *et al.* 2008). The other one may be attributed to widening the vessel diameter and widening the size of endothelial cells. As blood circulation increases, more oxygen and nutrition is absorbed by the cells and in result, the cell size increases (Izzo and Mitchell (2007). Diameter widening is in fact an increase in the thickness level of nitrite oxidation which itself is a stimulus for diameter widening. Also, one of the other reasons is a decrease in endothelin-1 which itself is one of the factors that helps the arterial stiffness and following that, a decrease in artery diameter (Downing *et al.,* 2011). The results of this research do not conform to the results of the studies done by Tanaka *et al.* (1998), Taddei *et al.* (1999). The reason behind the inconformity of the present research with similar studies probably lies in the type of exercise protocols (Maiorana *et al.*, (2010). It might be claimed that the duration and intensity of the exercises have not been sufficient to be able to make necessary changes in artery walls and/or the subjects have not been of the same gender and of the same age and probably in those studies, the stand for measuring artery diameter have not been similar with that of ours (Tanaka *et al.* 1998).

CONCLUSION

The present research indicated that resistant exercise has a significant effect on increasing the artery diameter (0.001) in the elderly men. Therefore, regular exercise can have a positive effect on factors effective on cardiovascular diseases in preventing this disease. To prevent the elderly from cardiovascular diseases and their effects, they are recommended to participate in exercises with average intensity.

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