IRANIAN JOURNAL of AGEING

Spring 2017. Vol 12. Num 1

Research Paper

Effect of 8-Week Lower Extremity Weight-Bearing Exercise Protocol and Acute Caffeine Consumption on Reaction Time in Postmenopausal Women

Morteza Taheri[1*], Khadije Irandoost[1], Samira Yousefi[1], Afsane Jamali[1]

1. Department of Physical Education and Sports Science, Faculty of Social Sciences, International University of Imam Khomeini, Qazvin, Iran.

Use your device to scan and read the article online

Citation: Taheri M, Irandoost Kh, Yousefi S, Jamali A. [Effect of 8-Week Lower Extremity Weight-Bearing Exercise Protocol and Acute Caffeine Consumption on Reaction Time in Postmenopausal Women (Persian)]. Iranian Journal of Ageing. 2017; 12(1):18-29. http://dx.doi.org/10.21859/sija-120116

DOI: http://dx.doi.org/10.21859/sija-120116

Received: 09 Oct. 2016

Accepted: 12 Jan. 2017

Key words:
Elderly, Reaction time, Caffeine, Weight-bearing exercise

ABSTRACT

Objectives The purpose of this research was to study the effect of eight weeks of weight-bearing exercise and acute caffeine supplementation on reaction time in elderly women.

Methods & Materials The research method was quasi-experimental with pretest-posttest design. The study subjects comprised 43 menopausal, inactive women with mean [SD] age of 55.69 [5.88] years who were randomly assigned into three groups of training (15 persons), caffeine (15 persons), and control (13 persons). The training protocol was performed over 8 weeks. The control group was not part of the exercise program. The body composition analyzer and simple and choice reaction time instrument were applied. Dependent t test and 1-way ANOVA test with post hoc Tukey test were applied to analyze the data.

Results The results suggested that weight-bearing exercises had a significant effect on simple reaction time (sound) while it was not significantly different in simple reaction time (voice) (P=0.003, P= 0.003, and P= 0.09, respectively). It was also found that caffeine intake (2 mg/kg) had no significant effect on reaction time (P=0.12).

Conclusion Weight-bearing training can be effective in improving the reaction time of the elderly.

Extended Abstract

1. Objectives

One of the most important objectives of public health is to decrease age-related disabilities among the elderly. In this regard, appropriate physical activity for the elderly can be used to prevent, delay, and or treat the problems caused by the aging. Therefore, this study aimed to examine the effect of an 8-week lower extremity weight-bearing exercise protocol and acute caffeine consumption on reaction time among postmenopausal women. It was attempted to provide the subjects with strength training by way of weight-bearing exercise, keeping in mind their age and physiological conditions (menopause period), physical state (muscle atrophy), and cognitive state (loss of reaction time) to observe the impact on reaction time. The subjects used their own body weight for training because of their menopausal condition and the possibility of bone fracture due to osteoporosis.

2. Methods & Materials

It was a quasi-experimental study with a pretest-posttest research design. The subjects were 43 menopausal, inactive women in the age group of 50-65 years. They were chosen randomly from those referred to weight management and health advice center. Inclusion criteria

* *Corresponding Author:*
Morteza Taheri, PhD
Address: Department of Physical Education and Sports Science, Faculty of Social Sciences, International University of Imam Khomeini, Qazvin, Iran.
Tel: +98 (912) 4070721
E-mail: taheri_morteza@yahoo.com

for the study were as follows: BMI >25, ratio of waist to hip >0.90, visceral fat >90 cm^2, healthy enough to perform the exercise protocol, no history of cardiovascular disease, auditory and visual problems. The subjects were randomly divided into 3 groups of active training group (n=15), caffeine consumers (n=15), and control group (n=13). They signed written consent forms prior to starting the training protocol. The subjects took part in afternoon training sessions under the supervision of fitness trainers, i.e., three sessions amounting to 75 minutes a week for 8 weeks. Each session comprised 4 steps: warm-up (10 minutes), very light aerobic exercise in order to be ready for weight-bearing exercises (10-15 minutes), strength and weight-bearing exercises (45 minutes), and cooling down and recovery (5 minutes). Weight-bearing exercises were at first general and then specific on muscles of the lower extremities (hips and legs). The project was approved by the Ethics Committee of Imam Khomeini International University, and all subjects signed written consent forms for participating in the research. At the pretest stage, all body variables (including percentage of body fat, ratio of waist to hip, the general amount of muscles, and lower part muscles) were measured using body composition analysis machine. Reaction time (simple and selective) was recorded on reaction detector device having a precision of 0.001 seconds.

3. Results

ANOVA at pretest stage did not show any significant difference in the total amount of muscles (F=0.77, P=0.33) and the amount of muscles in the lower extremities of the subjects (F=0.88, P=0.91). The correlation t test was, therefore, used to identify the possible changes of these two factors more precisely. The general amount of body muscles showed significant improvement in the group performing weight-bearing exercises (P=0.008, df=14, t=-2.68). The amount of lower extremity muscles improved significantly in the exercise group (P=0.003, df=14, t=-3.16). It should be mentioned that there was no significant difference between caffeine and control groups in pretest and posttest. The results of ANOVA at pretest stage showed no significant difference in simple and selective reaction time of subjects (P≥0.05). In calculating the effect size, the obtained amounts of Eta were 0.75 and 0.92, respectively. As it is seen in Table 1, the mean difference of pretest and posttest for simple (light) and selective reaction time was significant.

Weight-bearing exercises were significant for simple reaction time (sound) and selective reaction time during posttest but not for simple reaction time (sound) (P=0.09, P=0.003, P=0.003, respectively). It was also found that the group taking caffeine concentration of 2 mg/kg of body weight experienced no impact on reaction time (P=0.12). In calculating the effect size, the obtained amounts of Eta were 0.63 and 0.78, respectively.

4. Conclusion

The results showed that the variables for simple reaction time (light) and selective reaction time were significantly different after exercise interventions, but there was no difference for simple reaction time (sound). Our results are in agreement with those obtained by Khezri et al. (2014) and Goldstein et al. (2010), but our findings are in contrast to those of Panton et al. (1990), who reported that no exercise could improve reaction time. These differences might be because of the short exercise period, the nature of the protocol and the number of training sessions, differences in subjects' readiness, age, and gender. The reason for the existence of no significant difference in simple reaction time (sound) between active and caffeine groups in this

Table 1. The results of ANOVA analysis (mean difference of pre- and post-tests)

Variant	Group	Sum of Squares	df	Mean Squares	F	P
Simple reaction time (light)	Intergroup	2.22	2	1.15	6.39	0.04*
	In group	6.97	40	0.17		
Simple reaction time (sound)	Intergroup	7.96	2	3.98	57.76	0.07
	In group	2.75	40	0.06		
Selective reaction time	Intergroup	7.04	2	7.04	32.22	0.005**
	In group	4.36	40	4.36		

*P≤0.05, **P≤0.01

study might be related to inadequate concentration and the issue of loss of hearing affecting the elderly.

Acknowledgments

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflict of Interest

The authors declared no conflicts of interest.