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ORIGINAL ARTICLE

Effects of Age on Liver Enzyme Levels of Obese Men following Moderate-intensity Interval Training

[1]Valizadeh Rohollah, [2]Karampour Sedigheh, [3]Mahmoudi Yadollah, [4]Khanmohammadi Rahmatollah, [2]Mosavi Mojtaba

[1]Department of Physical Education, Omidiyeh Branch, Islamic Azad University, Omidiyeh, Islamic Republic of Iran, [2]Young Researchers and Elite Club, Omidiyeh Branch, Islamic Azad University, Omidiyeh, Islamic Republic of Iran, [3]Department of Physical Education Arkavaz Branch, Payamenour University, Arkavaz, Islamic Republic of Iran, [4]Department of Physical Education, Behbahan Branch Islamic Azad University, Behbahan, Islamic Republic of Iran

ABSTRACT

The present study aims to consider the effects of age on liver enzyme levels of obese men following 15 weeks of moderate-intensity interval training (MIIT). Ten obese middle-aged persons (aged 55.2 ± 4.31 years; height 171.4 ± 3.59 cm; weight 95.7 ± 14.61 kg; and body mass index [BMI] 32.53 ± 4.59 kg/m^2) and 10 obese young adults (age 22.7 ± 1.25 years; height 177.4 ± 3.94 cm; weight 100.7 ± 8.04 kg; and BMI 32 ± 2.39 kg/m^2) were enrolled in this study. Interval training was followed by 65 to 75% of VO_2max, 1 set, 2 minutes and seven repetitions, 1 minute rest–relief interval with 50% of VO_2max. Blood sampling was carried out in order to measure aspartate aminotransferase (AST), alanine aminotransferase (ALT), and alkaline phosphatase (ALP). All analyses were conducted by Statistical Package for the Social Sciences (SPSS) software (version 16 for windows). A descriptive statistics including mean and standard deviation was obtained for all parameters. Analysis of covariance (ANCOVA) and test of normality (Shapiro–Wilk test) were used. Paired sample t-test was used to compare the pretest and posttest data in each group. Comparison between middle-aged and young adults has shown that MIIT causes significant increase of ALT levels in young adults. There is no significant difference between middle-aged and young adults on other variables. Also paired sample t-test shows that ALP was decreased in both groups.

Keywords: Liver enzymes, Moderate-intensity interval training, Obese.

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Conflict of interest: None

INTRODUCTION

The liver is the largest organ of the human body. It is located between the portal and the general circulation, between the organs of the gastrointestinal tract and the heart. The main and important role of the liver is to take up nutrients, in order to store them and also provide nutrients to the other organs. Almost all blood that enters the liver via the portal tract originates from the gastrointestinal tract as well as from the spleen, pancreas, and gallbladder. A second blood supply to the liver comes from the hepatic artery, branching directly from the celiac trunk and descending aorta.[1] The most common liver enzymes are alanine aminotransferase (ALT) and aspartate aminotransferase (AST). These enzymes, the most reliable markers of liver injury, are secreted into the bloodstream when liver cells are injured. Some studies show that ALT and AST are significantly increased after exercise.[2] The study has checked the influence of age on liver enzyme levels of obese men following 15 weeks of moderate-intensity interval training (MIIT).

MATERIALS AND METHODS

This research has been formulated after accomplishing pretest and posttest assessment in two experimental groups. The participants gave written consent to the study (10 middle-aged and 10 young adults). The study protocol has been approved by the Research Ethics Committee of Islamic Azad University Omidiyeh Branch, Omidiyeh, Islamic Republic of Iran. Interval training was followed by 65 to 75% of VO_2max, 1 set, 2 minutes and seven repetitions, 1 minute rest–relief

Address reprint requests to: Valizadeh Rohollah, Department of Physical Education, Omidiyeh Branch, Islamic Azad University Omidiyeh, Islamic Republic of Iran, e-mail: valizadeh8328@gmail.com

interval with 50% of VO_2max. Blood sampling has been done for the evaluation of ALT, AST, and alkaline phosphatase (ALP).

Statistical Analysis

All analyses were conducted by Statistical Package for the Social Sciences (SPSS) software (version 16 for windows). A descriptive statistics including mean and standard deviation was obtained for all parameters. Analysis of covariance, paired sample t-test, and test of normality (Shapiro–Wilk test) were used.

RESULTS

Table 1 shows all information about experimental groups.

Analysis of covariance of liver enzymes in young and middle-aged obese people shows that there is no difference between AST and ALP. However, there was a significant difference between ALT of two groups (Table 2). Also, the results showed that young obese adults have higher ALT compared with middle-aged groups (Table 3).

DISCUSSION AND CONCLUSION

The results of the present study show that there is a significant difference between ALT of young and middle-aged obese adults. Also, the results show that MIIT causes more increase in ALT of young adults compared with middle-aged obese adults. However, more studies are needed to conclude that this type of training may be cautiously recommended for young obese adults and also led to liver cells damage in this population. Also, investigations have shown that 10 weeks resistance training with intensity of 50 to 90% of 1Maximal repetition (1MR) can lead to significant

Table 1: Personal characteristics of young and middle-aged obese adults

Variables	*Groups*	*Number*	*Mean*	*Standard deviation*
Age	Young	10	22.7	1.25167
	Middle aged	10	55.2	4.31535
Height	Young	10	177.4	3.94968
	Middle aged	10	171.4	3.59629
Weight	Young	10	100.7	8.04225
	Middle aged	10	95.7	14.61392
BMI	Young	10	32	2.39827
	Middle aged	10	32.53	4.59696

Table 2: Analysis of covariance of liver enzymes in young and middle-aged obese adults

Variables	*Source*	*Sum of square*	*df*	*Mean of square*	*F*	*Sig*
AST	Covariance	1.681	1	1.681	0.068	0.797
	Between group	1.095	1	1.095	0.044	0.836
	Within group	420.319	17	24.725	–	–
	Total	429.200	19	–	–	–
ALT	Covariance	27.717	1	27.717	0.933	0.348
	Between group	1023.697	1	1023.697	34.449	0.001
	Within group	505.183	17	29.717	–	–
	Total	1828.950	19	–	–	–
ALP	Covariance	2187.315	1	2187.315	3.007	0.101
	Between group	586.221	1	586.221	0.806	0.382
	Within group	12365.985	17	727.411	–	–
	Total	15309.750	19	–	–	–

Table 3: Paired sample t-test of young and middle-aged obese adults

Variables	*Groups*	*Mean ± SD of pretest*	*Mean ± SD of posttest*	*df*	*t*	*Sig*
AST	Middle aged	19.30 ± 4.47	24.2 ± 6.69	9	–1.952	0.083
	Young	29.7 ± 6.78	25.4 ± 1.42	9	2.076	0.068
ALT	Middle aged	24.50 ± 7.56	26 ± 6.30	9	–0.487	0.638
	Young	35.1 ± 7.40	42.1 ± 4.40	9	–2.077	0.068
ALP	Middle aged	197.70 ± 19.27	174.10 ± 36.94	9	2.580	0.030
	Young	256.60 ± 21.06	186.40 ± 15.88	9	8.358	0.001

decrease in AST and ALT of middle-aged adults of fatty liver patients.[3] So, it can be concluded that type of exercise and age are two important variables that should be considered before recommendation of exercise in obese subjects.

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