Journal of Applied Pharmaceutical Science Vol. 5 (06), pp. 075-077, June, 2015
Available online at http://www.japsonline.com
DOI: 10.7324/JAPS.2015.50612
ISSN 2231-3354

Effect of 8 Weeks Endurance Training on Lipid Profile and Testosterone Levels in Young Judukas

Arshin A. Seidi, Hassan A. Mahdirejei , Sajedeh F. R. Abadei , Negar E. Gorji , Hamzeh A. Mahdirejei, Zabiholla Shahrestani

Department Of Exercise Physiology, Faculty of Physical Education & Sport Science, Azad University of Sari Sari, 48164, Iran.

ARTICLE INFO

Article history:
Received on: 24/01/2015
Revised on: 11/03/2015
Accepted on: 05/05/2015
Available online: 27/06/2015

Key words:
Endurance training, lipid profile, testosterone level, judokas.

ABSTRACT

The present study examined the effects of endurance training on the lipid profile and testosterone levels in young male judokas. 18 judokas aged 18 to 21 years old participated in the study and were randomly divided into two groups: Exercise (n=9) and control group (n=9). The levels of LDL-C, HDL-C, TC, TG, and TT were measured in the blood samples of the subjects. No significant difference was detected in serum LDL-C in three stages of measurement (i.e. pre-, mid-, and post-test) ($p=0.47$); however, a significant difference was obtained in serum HDL-C during the three stages ($p=0.03$). There were no significant differences in serum TC ($p=0.78$) and TG ($p=0.42$). In Exercise group, TT levels was 18.98 ± 12.45 in pre-test and it reached 20.56 ± 5.76, but, it again reduced to 19.23 ± 3.94 in Control group, TT levels was 18.76 ± 6.98 in pre-test and it reached 20.35 ± 14.87 while it dropped to 19.12 ± 4.63. There were no significant difference between the stages in both groups ($p>0.05$).

INTRODUCTION

Obesity, high Density Lipoprotein Cholesterol (LDL-C) and Tri Acyl Glycerol (TAG) are risk factors for cardiovascular diseases (CVDs). Systematic physical activity causes many effects on the risk factors for cardiovascular disease. Reduction of Total Cholesterol (TC), TAG, and LDL-C and elevation of High Density Lipoprotein Cholesterol (HDL-C) have been observed during various exercise programs (Blessing *et al.,* 1995; Durstine *et al.,* 1994). However, some studies have shown no significant difference in lipid and lipoprotein concentrations (Ghahramanloo *et al.,* 2009). Some studies showed that HDL-C increased during long-term endurance training in male (Marin *et al.,* 1995; Thaveeratitham *et al.,* 2007) and female (Lamon-Fava *et al.,* 1989) triathlon and marathon athletes. On the contrary, short-term and <2-h trainings have shown uncertain results, because effective variables were not controlled in order to achieve more definitive results (Durstine *et al.,* 1994). Studies also suggest that a lower concentration of TC and LDL-C along with high concentration of HDL-C reduces CVD risk (Grundy *et al.,* 1997; Vega *et al.,* 1997). HDL-C has antioxidant and anti-inflammatory properties and improves vascular reactions; therefore, it plays a major role in immune system and against infection (Thaveeratitham *et al.,* 2007).

In general, the higher concentration of triglyceride reduces concentration of HDL-C. Testosterone is one of the most important hormones in the body. It is an anabolic steroid (histogen) that stimulates protein synthesis. Testosterone can be found in two forms, i.e. Free Testosterone (FT) and Total Testosterone (TT); higher TT level provides a basis for high FT level. Some authors believe that acute endurance training is a powerful stimulator in order to increase concentrations of anabolic hormones in the circulation.

Authors have shown that acute strength training may increase testosterone level and muscle hypertrophy, while endurance training, especially long-term aerobic training, reduces plasma testosterone (Thompson *et al.,* 1980).

Considering the importance of testosterone and lipid profile and lack of investigations on effect of different methods of training on these factors in judokas, thus the aim of the present study is to investigate effect of 8 weeks of endurance training on testosterone level and lipid profile in young male judokas.

** Corresponding Author*
Negar Eshaghi Gorji , Department of Exercise Physiology, Faculty of Physical Education & Sport Science, Islamic Azad University Sari Branch, Sari, I.R. Iran. Email: negar.e.gorji [at] gmail.com

METHODS AND MATERIALS

Subjects

Eighteen judokas, aged 18-21 years voluntary participated in this study with a mutual printed participation agreement. They received medicine questionnaire and filled in their medicine and disease history. They were screened for not having any CVDs, hormonal disorders, injury, and drug and / or alcohol use history. They were not involved with tobacco/alcohol consumption neither treated with steroid drugs, nor planned with any special diets or regular exercise. After the investigation a written consent was obtained from subjects. The subjects were randomly divided into two groups: Exercise (n=9) and Control (n=9). Before and after 8 weeks of training period, blood sampling was taken from all the subjects to measure biochemistry, anthropometric characteristics. The study protocol was approved by the local ethical committee and conducted in accordance with the Helsinki Declaration (Hannula *et al.,* 2014). The physical and general characteristics of the subjects are shown in table 1. The Exercise group regularly performed judo training for 4 times a week while the control group hadn't any training activity.

Training protocol

Endurance training protocol for exercise group consisted of running on treadmill for 4 times a week during 8 weeks. Every training session was consisted of 7-10 min warm-up by a various stretching, limber, and jumping movements. They were asked to also run for 18 min in 65% HRmax in the first week which reached 28.30 min in 86% HRmax (1.30 min and 3% increase per week) (Table 2). At the end, the subjects performed slow running, stretching and limber through 7-10 min as cooling down movements. HRmax is estimated by the following formula:

$$HR_{max} = 220 - \text{age} \quad (1)$$

Blood sampling

Blood samples of the subjects, followed by 12 hours of fasting in both pre-and post-test (48 h after the last session), from the left brachial vein, were collected. To separate plasma, the blood samples were centrifuged for 10 min at a speed of 2500 rpm after being cast into tubes containing EDTA. The separated plasma was poured into microtubes and frozen down to -80 °C. Finally, LDL-C, HDL-C, TC, and TG levels were measured using Pars-Azmoon kits. Also Testosterone was measured by using A Total Testosterone ELISA Kit (Diagnostics Biochem Canada Inc., Ontario, Canada).

Statistical analysis

All data are expressed as mean ± and Standard Deviations (SD) and are analyzed using SPSS statistical program to calculate the means and SD of the values collected. The differences between two groups are examined by the analysis of variance between groups (ANOVA). Moreover, Kolmogorov-Smirnov Test (KS) was used for normalization of data. For $P < 0.05$ is considered statistically significant in the interpretation of our results.

RESULTS

TC level experienced a same method in both groups. It was increased from pre-test to mid-test while it was reduced from mid-test to post-test. There was no significant difference between two study groups ($p>0.05$). TG level decreased from pre-test to mid-test in both groups and again increased in post-test; neither here the difference was significant ($p>0.05$). LDL-C level had no significant change and it only gradually increased in both groups from pre-test to post-test and there were no significant difference between three stages in both groups ($p>0.05$). However, a considerable difference was found in HDL levels between the stages in both groups ($p<0.05$) where it was 44.87±5.56 in pre-test and it reached 53.45±8.76 and it again reduced to 40.29±3.76 in exercise group; a same trend was detected in Control group as well with minor variations. In the exercise group, TT was 18.98±12.45 in pre-test and it reached 20.56±5.76 in midtest but it again reduced to 19.23±3.94. In Control group, TT was 18.76±6.98 in pre-test and it reached 20.35±14.87 while it dropped to 19.12±4.63. Furthermore, no significant difference was detected between the stages in both groups ($p>0.05$).

Table 1: physical characteristics of the subjects.

	Study group (n=9)	**Control group (n=9)**
Age (years old)	20.42 ± 0.318	20.23 ± 0.075
Height (cm)	171 ± 2.206	170 ± 3.238
Weight (kg)	69 ± 4.038	69 ± 3.417
BMI (kg/cm^2)	23.57 ± 1.032	23.87 ± 0.734

Table 2: Aerobic training

Week	**1st**	**2nd**	**3rd**	**4th**	**5th**	**6th**	**7th**	**8th**
Intensity (HR_{max})	65%	68%	71%	74%	77%	80%	83%	86%
Time (min)	18	19.30	21	22.30	24	25.30	27	28.30

Table 3: Lipid profile in study and control groups.

	Endurance group			**Strength group**			**P**
	Pre-test	**Mid-test**	**Post-test**	**Pre-test**	**Mid-test**	**Post-test**	
TC (Mg/dl)	129.23±23.31	133.78±12.14	127.13±25.04	128.87±12.43	134.25±23.76	127.34±18.23	0.78
TG (Mg/dl)	88.89±4.46	85.83±3.86	89.43±3.54	89.34±2.93	86.12±4.23	89.39±3.32	0.42
LDL-C (Mg/dl)	67.54±2.21	67.76±4.56	67.98±7.23	67.92±6.29	68.12±7.24	68.28±2.71	0.47
HDL-C (Mg/dl)	44.87±5.56	53.45±8.76	40.29±3.76	43.13± 5.19	52.87±9.23	45.58±8.73	0.03*
TT (Nmol/l)	18.98±12.45	20.56±5.76	19.23±3.94	18.76±6.98	20.35±14.87	19.12±4.63	0.85

*significantly different at p≤0.05

DISCUSSION

The aim of the study was to determine the effects of eight weeks endurance training on the lipid profile and testosterone level of young male judokas. There was no significant difference in serum of LDL-C in three stages of measurement (i.e. pre-, mid-, and post-test) (p=0.47). However, a significant difference was found in serum of HDL-C during the three stages (p=0.03). Furthermore, there were no remarkable differences in TC (p=0.78) and TG (p=0.42) serum. This is in agreement with the results obtained by Gilliam et al. (1978) who observed considerable increase in HDL-C and with TC that remained unchanged [4]. Higher HDL-C can be regarded as a preventive factor for CVDs as lower level of HDL-C and higher level of TC and LDL-C have been seen in cardiovascular patients. Halverstadt et al, found that endurance training reduced LDL-C levels but significantly increased HDL-C levels in older men and women with body fat phenotypes (Halverstadt *et al.,* 2007). Abnormal blood lipids are an important cardiovascular health risk. Many evidences supports that physical activity and exercise have a positive influence on abnormal lipids and they are usually suggested as adjunctive interventions. Related studies to the effects of exercise on blood lipid levels are remarkable. Many studies have shown the effects of exercise with different intensities and durations on cholesterol. Exercise also effects on HDL-C maturation and composition. Positive effects of exercise are also seen in the blood triglycerides (TG), but little specific effect has been found on low-density (LDL-C) and (TC). Abundant evidence supports the benefits of exercise on levels of certain blood lipids (namely HDL-C and TG). Although standard management of abnormal blood lipids is drug therapy and diet, it seems prudent to combine the factors with aerobic exercise as an important component for a healthy lifestyle (Trejo-Gutierrez *et al.,* 2007; Gorji *et al*., 2015). Marlin et al. have shown that vein lipid dropped in obese men under testosterone treatment (Marin *et al.,* 2007). In contrast, Tan et al. reported that there is no correlation between low levels of testosterone and high level of cholesterol. Tan showed that testosterone might reduce HDL-C concentration (Tan *et al.,* 1998). A lower level of testosterone affects the HDL-C and also shows a pathogenic influence on CAD development. Some studies suggest that majority of CVD patients had high levels of androgens and atherosclerosis (Rosano *et al.,* 2007). Many studies have shown a positive relationship between testosterone and CAD (Vega *et al.,* 1996). In conclusion, both endurance and strength trainings may be considered effective to increase HDL-C level which has an antagonistic effect on testosterone level of blood. This may be attributable to lower cardiovascular risk.

REFERENCES

Blessing DL, Keith RE, Williford HN. Blood lipid and physiological responses to endurance training in adolescents. Pediatric Exercise Science, 1995; 7:192-202.

Durstine JL, Haskell W. Effects of exercise training on plasma lipids and lipoproteins. Exerc Sport Sci Rev, 1994; 22:477-521.

Ghahramanloo E, Midgley A, Bentley D. The Effect of Concurrent Training on Blood Lipid Profile and Anthropometrical Characteristics of Previously Untrained Men. Journal of Physical Activity and Health, J Phys Act Health. 2009; 6:760-6.

Gilliam TB, Burke MB. Effect of exercise on serum lipids and lipoprotseins in girls, ages 8 to 10 years. Artery, 1978; 4:203-213.

Gorji NE, Farzanegi P, Habibian M, Mahdirejei HA, Abadei SFR. Celery as an Effective Supplement for Pilates Exercise in Weight Loss Studies. International Medical Journal, 2015;22:1 - 4.

Grundy SM. Cholesterol and coronary heart disease Arch Intern Med. 1997; 157:1177–1184.

Halverstadt A, Phares A, Wilund K, Goldberg A, Hagberg J. Endurance exercise training raises high-density lipoprotein cholesterol and lowers small low-density lipoprotein and very low-density lipoprotein independent of body fat phenotypes in older men and women. Metabolism, 2007; 56: 444–450.

Hannula Leena S., Kaunonen Marja E., Puukka Pauli J. A study to promote breast feeding in the Helsinki Metropolitan area in Finland. Midwifery, 2014; 30(6):696-704.

Lamon-Fava S, McNamara JR, Farber H, et al. Acute changes in lipid, lipoprotein, a polipo protein and low density lipoprotein particle size after an endurance triathlon. Metabolism, 1989; 38:921-5.

Marin P. Testosterone and regional fat distribution. Obes Res, 1995; 4: 609–612.

Rosano GM, Sheiban I, Massaro R, Pagnotta P, Marazzi G, Vitale C, Mercuro G, Volterrani M, Aversa A, Fini M.. International Journal of Impotence Research, 2007;19:176–182.

Tan Kc, Shiu Sw, Pang Rw, Kung Aw. Effects of testosterone replacement on HDL subfractions and apolipoprotein A-I containing lipoproteins. Clin Endocrinol (Oxf), 1998; 48:187–194.

Thaveeratitham P, Plengpanich W, Naen-udorn W, Patumraj S, Khovidhunkit W. Effects of human apolipoprotein A-I on endotoxin induced leukocyte adhesion on endothelial cells in vivo and on the growth of Escherichia coli in vitro. J. Endotoxin Res, 2007; 13: 58-64.

Thompson PD, Cullinane E, Henderson LO, Herbert PN. Acute effects of prolonged exercise on serum lipids. Metabolism, 1980; 29:662-5.

Trejo-Gutierrez J, Fletcher G. Impact of exercise on blood lipids and lipoproteins: Review article. Journal of Clinical Lipidology, 2007; 1:175–181.

Vega GL, Sirtori C. Dyslipidemia and coronary heart disease. Curr Opin Lipidol. 1996; 7:179–182.

Wu Fc, von EA. Androgens and coronary artery disease. Endocr Rev, 2003; 24: 183–217.

How to cite this article:

Arshin Abbaspour Seidi, Hassan Amouzad Mahdirejei , Sajedeh Fadaei Reyhan Abadei , Negar Eshaghi Gorji , Hamzeh Amouzad Mahdirejei, Zabiholla Shahrestani. Effect of 8 Weeks Endurance Training on Lipid Profile and Testosterone Levels in Young Judukas. J App Pharm Sci, 2015; 5 (06): 075-077.