EFFECT OF STRENGTH ENDURANCE AND CONCURRENT TRAINING ON SELECTED LIPID PROFILE OF COLLEGE WOMEN PLAYERS

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ABSTRACT

The purpose of the study was to find out the e ffect of strength, endurance and concurrent training on lipid profile among college women players. In this study 60 women players were randomly selected from Govindammal Aditanar College for Women, Tiruchendur and divided into four groups as three experimental groups and one control group. Lipid profile namely High density lipoprotein cholesterol (HDL-C) and low density lipoprotein cholesterol (LDL-C) were measured in blood from each subject before and after training period. The collected data were statistically analysed by using dependent‘t’ test and ANCOVA. It was found that there was a significant improvement on HDL-C and decreased LDL-C in blood due to the influence of strength, endurance and concurrent training among college women.

Key Words: endurance training, strength training, concurrent training, LDL-C and HDL-C.

INTRODUCTION

The term ‘lipid profile’ describes the varying levels of lipids in the blood, the most commonly reported ones being low-density lipoprotein (LDL) cholesterol, high-density lipoprotein (HDL) cholesterol and triglycerides (Carroll, kit and Lacher, 2012). Low-density lipoproteins (LDL), the products of (very low density lipoproteins) VLDL and IDL (Intermediate-density lipoproteins) metabolism, are the most cholesterol-rich of all lipoproteins. About 40 to 60% of all LDL are cleared by the liver in a process mediated by apo B and hepatic LDL receptors. The rest are taken up by either hepatic LDL or nonhepatic non-LDL (scavenger) receptors. High-density lipoproteins (HDL) are initially cholesterol-free lipoproteins that are synthesized in both enterocytes and the liver. HDL metabolism is complex, but one role of HDL is to obtain cholesterol from peripheral tissues and other lipoproteins and transport it to where it is needed most other cells, other lipoproteins (using cholestery) ester transfer protein [CETP]), and the liver (for clearance) (http://www.merckmanuals.com/professional/endocrine-and-metabolic-disorders/lipid-disorders/overview-of-lipid-metabolism). In the context of cardiovascular disease risk, it is established that higher levels of HDL are associated with lower levels of heart disease, therefore higher levels of HDL are considered to be protective (Gould, Rossouw and Santanello, 1995). In contrast, it is now appreciated that other lipoproteins, including VLDL, IDL, LDL, and the remnant particles rendered in lipid processing, are highly atherogenic. To reflect this, the term "non-HDL cholesterol" has been invoked to describe this increased risk reflected in the lipid profile that may not be otherwise identified by simply examining the LDL alone (Bethesdam, 2001).

Aerobic exercise has proven to be modestly efficacious in increasing HDL-C while decreasing total cholesterol, LDL-C, and TG in women. In a recent meta-analysis of randomized controlled trials conducted between 1955 and 2003 in which aerobic exercise was used as the primary intervention in adult women >18 years (n = 1022 in exercise group, n = 633 in control group), an HDL-C increase of 3% was noted between experimental and control groups. No statistically significant differences were noted between pre and postmenopausal women, or those who were on pharmacotherapy affecting lipids and lipoprotein levels compared to participants who were not receiving treatment. A statistically significant and positive association was observed however between HDL-C and VO_2max, with greater increases in HDL-C associated with greater increases in VO_2max. Furthermore, TC, LDL-C, and TG were decreased by 2%, 3%, and 5%, respectively, with exercise (Kelly et al., 2004). Cross-sectional studies confirm that active women have higher HDL-C levels than their sedentary counterparts. Apparently, the duration and frequency of aerobic exercise may be more important in altering HDL-C than the intensity of the exercise. However, because of the confounding effects of diet, body composition, exogenous hormone use, contraceptive use, alcohol consumption, and age, the specific exercise recommendations for increasing HDL-C have yet to be determined (Taylor & Ward, 1993). Based on the above information, investigator made an attempt to find-out the effect of strength, endurance and concurrent training on selected lipid profiles among college women players.

OBJECTIVES

The following are the specific objectives of this study.

1. To find out the effect of endurance, strength and concurrent (i.e., combination of strength and endurance) training on HDL and LDL.
2. To find out the suitable training method to increase the HDL level and to decrease the LDL-C among college women.

METHODOLOGY

To achieve the purpose of this study, 60 women college students were selected from Govindammal Aditanar College for women, Tiruchendur, Tamilnadu, India, at random and their age ranged from 18 to 21 years. The selected subjects were divided into three experimental groups and a control group with 15 subjects (n=15) each. Group I (STG) underwent strength training, Group II (STG) underwent endurance training, Group III (CTG) underwent concurrent training (Combination of strength and endurance training). The training period was eight weeks with three days per week. Group IV (CG) served as control group. However, control group was not exposed to any specific training but they participated in the regular scheduled work. Strength, endurance and concurrent training group's women player's HDL and LDL were tested three days before and after the training period.

ANALYSIS OF DATA

The data pertaining to the variables in this study were examined by using dependent t-test to find out significant changes and analysis of covariance (ANCOVA) for each variable separately in order to determine the differences if any among the adjusted post test means. Whenever 'F' ratio for the adjusted post-test was found to be significant, the Scheffe's test was used as post-hoc test to determine the three paired mean differences. The level of significance was fixed at 0.05 level of confidence in all the cases.

Table-I: Summary of Mean Standard Deviation and Dependent 'T' Test for the Pre Post and Adjusted Post Tests on Selected Variables of Experimental And Control Groups

Variables	Test		Group			
			STG	ETG	CTG	CG
HDL-C	Pre Test	Mean	50.93	51.04	51.02	51.10
		SD	0.57	0.55	0.60	0.65
	Post Test	Mean	52.30	52.39	54.37	51.11
		SD	0.62	0.41	0.88	0.65
	't' Test		8.78*	7.55*	9.90*	1.61
LDL-C	Pre Test	Mean	51.71	51.78	51.83	51.79
		SD	0.27	0.28	0.39	0.52
	Post Test	Mean	50.30	50.39	49.14	51.69
		SD	0.62	0.41	0.65	0.36
	't' Test		8.61*	9.79*	15.72*	1.64

Significant at .05 level. The table value required for .05 level of significance with df 14 is 1.761.

Table-II: Analysis of Covariance on Selected Criterion Variables of Experimental and Control Groups

Variables	Adjusted Post-test Means				SOV	SS	df	MS	F-ratio
	STG	ETG	CTG	CG					
HDL	52.32	52.38	54.38	51.09	B	82.992	3	27.664	64.868*
					W	23.456	55	0.426	
LDL	50.331	50.386	49.117	51.686	B	49.475	3	16.492	64.642*
					W	14.032	55	0.255	

** Significant at 0.05 level.*
Table value required for 0.05 level of significance with df (3,55) is 2.78.

Table-III: Scheffe's Test on Criterion Variables of Experimental and Control Groups

Variable	STG vs ETG	STG vs CTG	STG vs CG	ETG vs CTG	ETG vs CG	CTG vs CG	CI Value
HDL	0.064	2.056*	1.228*	1.993*	1.291*	3.284*	0.689
LDL	0.055	1.214*	1.355*	1.269*	1.300*	2.569*	0.533

* Significant at 0.05 level.

RESULTS AND DISCUSSION

The results of the study indicates that significant difference exist among the post and adjusted post test means of experimental and control groups on high density lipoprotein (HDL) and low density lipoprotein (LDL) among college women players. The result of the study indicates that all the experimental groups significantly differed when compared to the control group on HDL and LDL level.

The results of the study confirmed by the following experts' way: The result showed that both groups Strength & Endurance (SE) and Endurance & Strength (ES) significantly improved lipid profile (significantly reduces in TC, TG, LDL-C, VLDL-C and significantly increased HDL-C) and body composition (significantly decreased in body fat, body weight and increased body fat free mass but no significant) when compared to control group. Also no significant difference found between SE and ES groups in the lipid profile and body composition. It can be concluded that both SE and ES protocols nearly identical effects in positive transformation of lipid profile and body composition (Ail-Mohamadi Maryam, et al., 2014). Although resistance training has become more popular with women the last several years, the effects of this type of training on blood lipid levels needs more research. Nevertheless, one recently published and well-designed study indicated that five months of sustained resistance training significantly decreased total cholesterol and LDL-C in women (Boyden et al., 1993). The concurrent training has on development of maximal aerobic capacity, muscle strength, growth and adaptation. In addition, concurrent training use for individuals interested in general fitness and reducing body fat. Nevertheless the researchers stress on combining of resistance training and aerobic trainings or performing these trainings simultaneously to achieving optimum adaptability (Faigenbaum, et al., 2009). Effects of endurance training and resistance training have caused distinct publish result on important health indexes and variables such as body fat weight and lipids profiles (LDL-C, HDL-C lipoprotein, triglycerides, total cholesterol) in different studies. For example, the 12-week regular concurrent training decreases significantly the fat mass, body mass index, fat control, and waist-hip ratio (Fazelifar, 2011). And the concurrent training and dietary intervention improved body composition, central adiposity, and lipid profile (Albuquerque Filho, et al., 2014). Versus (against), in other studies, simultaneously endurance and resistance training did not impress on lipids profiles in untrained people (Lee, 2005; LeMura et al., 2000). Dolezal, and Potteiger, (1998) study indicated that concurrent training can significantly increase basal metabolism and decrease body fat relative LDL to the obtained amounts in the before-training period. Restricting caloric intake and increasing caloric expenditure through physical activity and exercise are effective ways of reducing body weight and fatness while normalizing blood pressure and blood lipid profiles (Morrow et al., 2005).

CONCLUSIONS

The current study focuses on the effect of strength, endurance and concurrent training on selected lipid profile of college women players. The researchers investigated only women players, this designed only for Govindammal Aditanar College for Women Students. The current study highlights on strength, endurance and concurrent training among college women players. The present study revealed that strength, endurance and concurrent training had increase the HDL level and reduces LDL level. When comparing concurrent training had increased HDL and reduced LDL level better than the strength and endurance training. At the same time, that there was no significant difference exists between strength training and endurance training on HDL and LDL level among college women players.

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