

THE EFFECT OF AEROBIC EXERCISE PROGRAM ON CHOLESTEROL, BLOOD LIPIDS AND CIGARETTE WITHDRAWAL BEHAVIOR OF SMOKERS

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ABSTRACT

Purpose: Smoking is an important risk factor of many diseases and is serious threaten for human health. Therefore, the purpose of this research was to investigate the effects of 8- week aerobic exercise program on Cholesterol, Blood Lipids and cigarette withdrawal behavior of Smokers.

Methods: A quasi experimental with pre and posttest design were conducted in this study. 24 male smokers with mean age of 22.3 ± 3.2 participated in this study. Blood-lipids, cholesterol profile and withdrawal behavior of subjects was tested before and after intervention.

Results: The results suggested that exercise intervention not only improved the cigarette withdrawal behavior in depressed smokers, but also decreased LDL, TG and cholesterol ($p \leq 0.05$) while HDL was not influenced by exercise intervention ($p \geq 0.05$).

Conclusion: Conclusively, it was revealed that smokers can benefit from aerobic exercise. The exercise may increase the oxygen supply to the brain, and cause a better mood and mitigate the negative consequences of smoking and probably it can be the main reason for improving withdrawal symptoms of smoking. The positive effects of exercise on cholesterol and other lipids may be justified, by regulating the metabolism of all lipids in the blood. It must be noted that further research needed to understand the mechanisms involved in improved lipid profiles and withdrawal symptoms, such as stress reduction or neurobiological mechanisms.

Keywords: Aerobic Exercise, Cholesterol, Blood Lipids, Smokers.

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Introduction

Smoking and exercise are among those changeable behaviors with a great impact on health⁽¹⁾. Both of them are capable of producing the addictive behavior by producing the rewarding effect and stimulating the pleasure and reward pathways in the brain⁽¹⁾. There are some studies reporting the increased levels of dopamine which enhance mood in humans in smokers and those who regular exercises^(2,3). On the other hand, smoking and exercise can have direct adverse effect on arteries and blood vessels, lipid profiles and cholesterol plaque^(4,5,6,7,8).

Recent studies suggest that Cigarette smoking may be involved in the development of total cholesterol, triglyceride (TG), low-density lipoprotein (LDL), very low-density lipoprotein (VLDL) and also the decrease in high-density lipoprotein (HDL)^(9,10) while the positive effects of exercise has well been proven in the mentioned factors^(1,11). Since, interventions to reduce harmful effects of smoking have focused on the use of pharmaceutical drugs, thus, there is a need to expand the range of potentially effective strategies to reduce the harmful effects of tobacco in smokers who are unable or unwilling to quit.

In this regard, it is hypothesized that regular aerobic exercise is effective in the reduced symptoms of smoking desire and prevention of CVD by improving TG, LDL, VLDL and HDL.

Given the importance of smoking cessation in young smokers and preventing or slowing the progression of smoking-related disease and also Due to the joint action mechanisms of smoking and exercise (rewarding system as cited) , and their adverse mechanisms (for lipid profiles and cholesterol), It seems interesting to find the effects on cholesterol, blood lipids and smoking cessation among cigarette smokers.

Methodology

A quasi experimental with pre and posttest design were conducted in this study. Of Twenty-nine sedentary male smokers' (20-25 yr) from the general community of Qazvin (Iran), who volunteered to participate in this study, 24 subjects were eligible. The inclusive criteria the score 8 or over in Fagerström nicotine dependence test⁽¹¹⁾ (considered as highly dependent on nicotine), BMI ranging 20-25; TG (above 150 mg/DI); LDL (above 100 mg/DI), HDL (less than 35 mg/DI) and Cholesterol (above 185 mg/DI). The exclusion criteria included Presence of any kind of disease based on the medical history, which limited performing the exercise protocol. All subjects filled the written consent form and protocol was approved by the Research Ethics Committee of Imam Khomeini International University. Venous blood samples (antecubital vein) were taken in dry tubes under basal conditions (8 a.m.) in both pretest and posttest. Total cholesterol (TC), triglycerides (TG), and high-density lipoprotein cholesterol (HDL-C) were measured in all subjects after a 12-hour overnight fast using the standardized techniques described⁽⁷⁾.

All these measurements were performed by the same examiner in the Laboratory of Imam Khomeini International University to avoid methodological uncertainties. The Smokers habits for smoking were monitored during the research period. The exercise protocol was performed for 8 weeks and then posttest was performed. Subjects were admitted to the training protocol after approval of exercise physiologist. Experimental group trained for 60 min/session, three sessions a week for 2 months. The training protocol was divided into three phases: the warm up period (10 minutes), the main program (aerobic exercise; 40

minutes), and a cool down period (10 minutes). The aerobic regimen included the submaximal aerobic exercise program (50-60% of maximal heart rate reserve) on treadmill. Exercise intensity was calculated using karvonen formula by a polar device. Both groups were strictly instructed to maintain their prescribed Isocaloric diet and checked by 24-h recall questionnaire. A nutritionist monitored the nutritional program with visits every 2 weeks during the 2 month intervention. Normality distribution of variables was tested using Kolmogorov Smirnov test. Data was analyzed using independent t-test. and all values are reported as means \pm standard deviation (SD).

Results

The general characteristics of participants are shown in table 1. As suggested in the table 1, BMI and WHR were improved significantly after exercise intervention ($p \leq 0.05$).

	AEP		Control	
	Pre-test	Post-test	Pre-test	Post-test
Age (yr)	23.12 \pm 1.43		23.16 \pm 1.46	
Height (cm)	178.16 \pm 3.29		178.08 \pm 3.2	
Weight (kg)	80.7 \pm 3.38	79.25 \pm 3.62	80.8 \pm 4.36	80.5 \pm 4.18
BMI (kg/m ²)	25.42 \pm 0.45	24.9 \pm 0.59*	25.47 \pm 0.87	25.39 \pm 0.85
WHR (cm)	0.95 \pm 0.03	0.92 \pm 0.019**	0.95 \pm 0.038	0.954 \pm 0.034

Table 1: The General characteristics of subjects.

Data are expressed as mean \pm SD. ** $p < 0.01$; * $p < 0.05$

Abbreviations: AEG, Aerobic Exercise Program; BMI, Body Mass Index; WHR, Waist-Hip-Ratio

As shown in Fig 1, 2, 4, total cholesterol, TG and LDL were significantly improved after exercise intervention in smokers ($p \leq 0.05$). Although we did not find a statistically significant increase in HDL as a result of aerobic exercise (see Fig 3), there was a trend for statistical significance ($p = 0.07$).

Groups	Pretest (M \pm SD)	Posttest (M \pm SD)	t	p
Training	8.33 \pm 1.15	5.6 \pm 0.98	-5.8	0.001**
Control	8.41 \pm 1.16	8.4 \pm 1.31		

Table 2: Comparing the cigarette withdrawal behavior of Smokers.

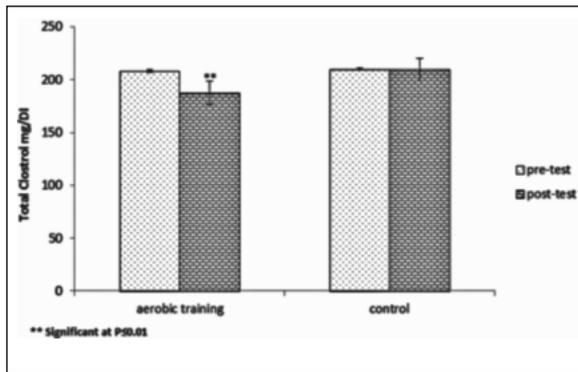


Figure 1: The effect of exercise on total cholesterol of smokers.

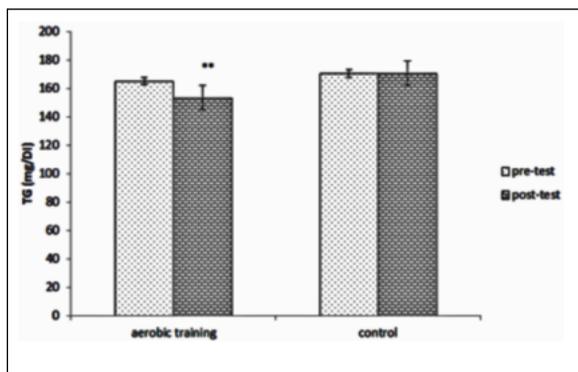


Figure 2: The effect of exercise on TG of smokers.

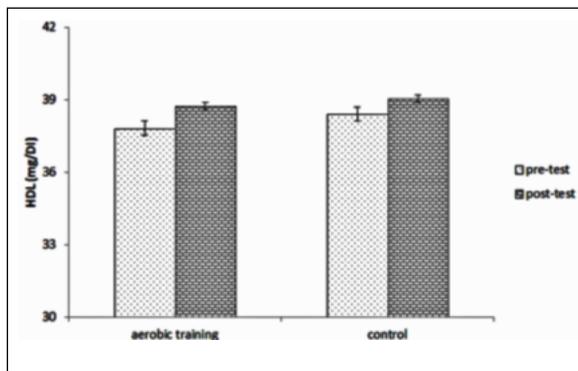


Figure 3: The effect of exercise on HDL of smokers.

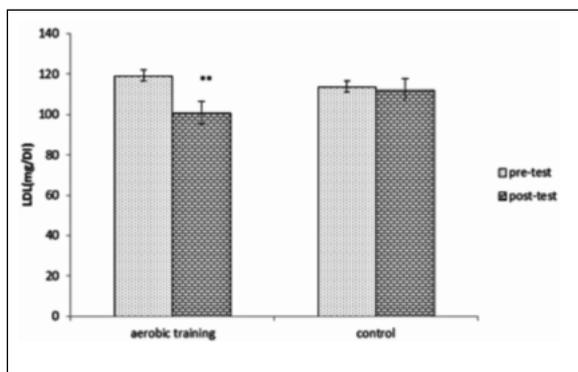


Figure 4: The effect of exercise on LDL of smokers.

Discussion

The beneficial effects of exercise on lipid profiles and lipoprotein of non-smokers are well established, but it is interesting if the smokers can respond to exercise program the same as non-smokers. So, this study examined the effect of Aerobic Exercise on Cholesterol, Blood Lipids and cigarette withdrawal behavior of Smokers. It was found that TG, LDL and Cholesterol were improved after exercise intervention while no significant change was observed for HDL. It must be noted that HDL is highly influenced by environmental factors except exercise which may justify the lack of significant change in HDL.

Moreover, It has been proven that smoking has a negative impact on both HDL quantity and function⁽¹²⁾. In contrast to our study, it was reported in a study, jogging for 15 to 20 miles per week elevated HDL level to 2 to 3 mg/dl. Different weekly energy expenditure of participant and variable diets may be a reason for different results. Therefore, strict monitoring the food programs of subjects in the experiment is needed.

The studies dealing with the effect of training on the lipid profiles of smokers showed controversial results. In contrast to our study, Koubaa, et. al⁽¹³⁾, Taifur, et. al⁽⁸⁾ reported that 8-week aerobic training program didn't improve significantly blood-lipids and cholesterol profile in smokers. One possible reason for the results diversity could be in part explained due to different kinds of protocols and methodologies. As shown, Exercise may have the potential to mitigate some of the negative consequences of smoking behavior and help smokers to cease it more comfortably. Neurobiological mechanisms can be considered as important factors for quitting smoking. The animal research has shown that both Nicotine and exercise stimulate the pleasure and reward pathways in the brain⁽¹⁾ produce the rewarding effect.

On the other hand, increased levels of dopamine which enhance mood in humans can be the same as rewarding effect of smoking⁽¹⁴⁾ as such, It has been reported that both smoking and exercise can induce a better mood which improves the oxygen supply to the brain, and cause a better cognitive performance⁽¹⁵⁾. This is a main reason for beneficial effects of exercise on smoking behavior. Consistent with our study, Everson, et. al⁽¹⁶⁾, and Street, et. al⁽¹⁷⁾ found that exercise can be considered a useful strategy for smoking cessation. Individual differences,

different methods, variable protocol duration, age of participants, smoking duration are of important factors which influence the study results.

Based on these differences, it seems that New Literature Concerning the Effects of exercise on smoking behavior besides lipid profiles among smokers is needed to make more crucial decisions. Notably, the exercise may increase the oxygen supply to the brain, and mitigate the negative consequences of smoking and probably it can be the main reason for improving withdrawal symptoms of smoking. On the other hand, the positive effects of exercise on cholesterol and other lipids may be justified, by regulating the metabolism of all lipids in the blood. It must be noted that further research needed to understand the mechanisms involved in improved lipid profiles and withdrawal symptoms, such as stress reduction or neurobiological mechanisms. These results could have important implications in prevention programs.

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