

## Effect of the Quick Strength and Aerobic Endurance Trainings on Amateur Footballer's Blood Lipids

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**Abstract:** Football training is affected by many factors using scientific methods in terms of performance. We aimed to search the impact of quick strength and aerobic endurance trainings on forty male amateur footballer's some blood lipid parameters. Before the new season, first measurements were done by taking their bloods. Then quick strength training was applied a day in a week and other a day aerobics endurance training was applied to 40 footballers (mean=20.88 ± 2.68 years) with regular football training for 5 months. At the end of regular trainings for five months, second measurements were done by taking their blood samples to compare with the impacts of quick strength and aerobics endurance training on male amateur footballer's blood lipid profile. The statistical software package program was used to evaluation of statically analyses and received their modifications in the pre-test and post-test comparison of paired Student's t test in level of  $p < 0.01$ . Data are summarized by calculating the average standard deviation, t and p values. As a result, it had been shown that quick strength and aerobics endurance trainings for 20 weeks change footballer's blood lipid profiles and body compositions positively.

**Key words:** Football • Training • Quick strength • Aerobic endurance • Blood lipids

### INTRODUCTION

Football training has also a special place with scientific methods in both cases with regard to physical and physiological capacity. It affects the performance with many factors together of its high degree of coordination such as speed, strength, agility, flexibility, suppleness, balance, muscular endurance and cardio-respiratory, is a sports discipline [1, 2]. So today, football is becoming increasingly important in terms of scientific approach and various training methods [3].

Aerobic exercises have a positive change on lipid and lipoprotein profile that it is revealed widely to be effective in protecting against coronary risk factors on lipid profiles [4]. Also, exercise reduces the level of harmful blood fats such as triglycerides and lipoprotein and increases the level of High Density Lipoprotein (HDL). High triglycerides and low HDL diabetes are seen with increasing frequency of high blood pressure and coronary heart disease.

Such as other training methods, quick training depends on the adequacy and compliance of the blood circulation system. In many sports as in football, energy

requirement are covered by the use of all energy systems. More rapid force production and power generation is also faster [5].

Human body is to show an adaptation to the regular exercises, as physical and physiological such as endurance, strength and blood lipid metabolism. This adaptation needs specific performance, capacity and ability as a result of the special exercises which consist of loading, duration and frequency principles [6]. Football training is important from this respect.

The purpose of present study was to search the impact of quick strength and aerobic endurance trainings on forty male amateur footballer's some blood lipid parameters.

### MATERIALS AND METHODS

**Subjects:** 40 male amateur footballers in Diyarbakır, Turkey first Football league (Mean=20.88 years, age range: 18-28 years) were participated to this research. In all tests were done according to the principles of the Helsinki declaration. We searched the impacts of quick strength and aerobic endurance on male footballer's

blood lipids values as Cholesterol, Triglyceride, Glucose, Low Density Lipoprotein (LDL), High Density Lipoprotein (HDL) and Very Low Density Lipoprotein (VLDL) in this study.

**Training:** There are some general considerations that are important to our training program. Especially, warm-up and cool down activities are important in the overall safety and effectiveness of training programs. Training programs are available that develop primarily both the aerobic and anaerobic or all three energy systems. Before the new season, first measurements were done by taking their bloods. Quick strength training consisting of muscle strength, maximum strength, eccentric and plyometric was applied a day in a week and other a day aerobics endurance training consisting of slow fixed-tempo running and certain distance running was applied to 40 footballers with regular football training (basic football exercises (individual-team sets, dribbling, shooting, defending, offending and passing) for 5 months [5, 7]. At the end of regular training for five months, second measurements were done by taking their blood samples.

**Statistical Analyses:** The statistical analysis was used for evaluation of the subject's data who receive their modifications in the pre-test and post-test comparison of paired Student's t test in level of  $p < 0.01$ . Data are summarized by calculating the average standard deviation, t and p values.

## RESULTS

The mean weight values of footballers were  $72.73 \pm 3.86$  kg in pre-training and  $72.41 \pm 3.89$  kg in post-training. The average difference is 0.32 kg. A statistically significant negative difference was found in footballers' pre-training and post-training weight values ( $p < 0.01$ ) (Table 2).

Table 1. Distribution of footballers' age, sport age and height measurements.

Variables	N	Average±S.d
Age (year)	40	20.88±2.68
Sport age (year)	40	8.23±2.16
Height (cm)	40	175.40±0.55

Table 2: Distribution of footballers' pre-training and post-training weight values

Variables	N	Average±S.d	Mean differ.	t	p
Pre-Training Weight (kg)	40	72.73±3.86		2.10	0.042
Post-Training Weight (kg)	40	72.41±3.89	0.32		

A statistically significant negative difference was found in footballers' pre-training and post-training weight values ( $p < 0.01$ )

Table 3: Comparison of footballers' pre-training and post-training blood lipids values

Variables	N	Average±S.d	Mean differ.	t	p
Pre-Training Cholesterol (mg/dl)	40	186.02±17.39		9.28	<0.001
Post-Training Cholesterol (mg/dl)	40	160.65±15.7	25.37		
Pre-Training Triglyceride (mg/dl)	40	114.06±24.2		7.08	<0.001
Post-Training Triglyceride (mg/dl)	40	96.7±20.5	18.36		
Pre-Training Glucose (mg/dl)	40	88.4±9.99		5.25	<0.001
Post-Training Glucose (mg/dl)	40	80.5±7.58	7.9		
Pre-Training LDL (mg/dl)	40	105.3±16.8		6.95	<0.001
Post-Training LDL (mg/dl)	40	91.4±14.5	14.9		
Pre-Training HDL (mg/dl)	40	41.4±4.4		- 4.27	<0.001
Post-Training HDL (mg/dl)	40	45.1±6.6	4.1		
Pre-Training VLDL (mg/dl)	40	32.8±4.1		9.97	<0.001
Post-Training VLDL (mg/dl)	40	24.5±4.8	8.3		

Cholesterol, triglycerides, glucose, LDL and VLDL levels were found to be decreased in post-training measurements. On the other hand HDL values had an increased

Comparison of footballers' blood lipids parameters were found to be decreased in result of post-training measurements. After all, HDL values had an increased (Table 3). The mean of cholesterol was  $186.02 \pm 17.39$  mg/dl, in post-training was found  $160.65 \pm 15.7$ . The mean of triglyceride was  $114.06 \pm 24.2$  mg/dl, in post-training was found  $96.7 \pm 20.5$  mg/dl. The mean of glucose in pre-training was  $88.4 \pm 9.99$  mg/dl, in post-training was found  $80.5 \pm 7.58$  mg/dl. The mean of LDL in pre-training was  $105.3 \pm 16.8$  mg/dl, in post-training was found  $91.4 \pm 14.5$  mg/dl. The mean of HDL in pre-training was  $41.4 \pm 4.4$  mg/dl, in post-training was found  $45.5 \pm 6.6$  mg/dl. The mean of VLDL in pre-training was  $32.8 \pm 4.1$  mg/dl, in post-training was found  $24.5 \pm 4.8$  mg/dl.

As a result of this study, all parameters revealed a statistically significance after the quick strength and aerobic endurance trainings.

## DISCUSSIONS AND CONCLUSIONS

The results of the present study indicated that, trained footballers that perform high amount of the training shown lower blood lipid metabolism.

The excess body weight is an important sign of increased body fat and HDL cholesterol level. It would be responsible for the development of atherosclerosis and cardiovascular disease during his life [8]. For this reason aerobic activities have a positive effect on body

composition [9]. The excess fat ratio in football has a handicap either running or jumping off so it is necessary to be removed. In research, fat ratio was lower than normal in most of the players [2].

Further studies indicated that there has been a negative correlation between body weight and plasma HDL cholesterol levels. While a part of the study had a significant negative correlation, in part negative correlation was found a significant degree statistically the relationship between BMI and HDL cholesterol [10].

Intense exercise burns much fat, the caloric expenditure increases in the prolonged exercise. There has been a direct relation between the effect of exercise and body mass [11]. In our study, the average difference of weight was 0.32 kg. The data of a lot study confirm that subjects have decreased body weight significantly with various aerobic exercises [12-14], while showed a significant correlation of triglyceride levels and body weight in Lipid Research Clinics Prevalence Program Study, the relationship between plasma triglyceride levels and the body weight were found insignificantly in Brooks Base Study [12]. Siedel *et al.* [15] found no significant relationship between plasma triglyceride and BMI. In a screening study, a significant positive correlation was found statistically between BMI and triglycerides. Sedentary subjects had lower triglycerides, LDL and higher HDL-C than the exercised group [16].

Haigh *et al.* [17] examined serum lipid parameters in runners, compared total cholesterol and LDL levels with subjects of control group and found a significant decrease in triglyceride levels. Gasser *et al.* [18] found no significant change after 18-week exercise (low and high violence) on cholesterol. According to Williams *et al.* [19] is sufficient to increase above the baseline HDL cholesterol to run 10 miles in the nine weeks. Differences in HDL and LDL can be seen depending on the exercise duration and intensity. Long exercise programs provide a decrease in plasma concentration of LDL and triglycerides with exercise [20]. After long-term activities such as aerobic exercise, occurs a decrease in resting heart rate, economic integration of heart activity and increase in HDL aerobic capacity, increase in HDL cholesterol and LDL cholesterol [21, 22].

Triglycerides, LDL cholesterol and HDL cholesterol levels showed a positive acute effect in the speed of aerobic and anaerobic threshold of the different exercise program [23]. Some research also revealed differences in LDL values. Mertens *et al.* [14] did not find an increase in HDL level and a change in LDL levels as a result of 8-week endurance training. On the other hand, Leon *et al.*

[24] found a significant increase in HDL levels and decrease in LDL levels with aerobic exercise. In sub maximal cycling exercise for 30 minutes a decrease was seen in LDL cholesterol [25], at the end of intensive skiing in total cholesterol, triglycerides, LDL and HDL cholesterol a decrease was observed [26].

Çolak *et al.* [27] had implemented the walking and jogging programs found an increase in HDL cholesterol levels significantly ( $p < 0.01$ ) and decrease in LDL cholesterol levels meaningless. However, further studies have reported between the intensity and duration of exercise is important in terms of significant differences. One of these studies observed with the exercise continued for a long time to reduce in the level of LDL and increase in the level of HDL cholesterol (% 21) ( $p < 0.01$ ) [28]. Similarly, Thompson *et al.* [29] reported a decrease in LDL cholesterol levels and increase HDL cholesterol levels as a result of the intense exercise.

Tolfrey *et al.* [30] compared the exercise group to 20 non-exercising control groups and found significantly improved in LDL, HDL and TC / HDL and LDL / HDL ratio in a 12-week exercise program on 28 children. Also Karacan and Günay [31] found a decrease significantly ( $p < 0.05$ ) body weight, body fat percentage, body mass index, total cholesterol, LDL cholesterol, triglyceride levels at the end of eight weeks of exercise.

At the end of the program of various modes of training on the time-course of changes in lipoprotein-lipid profiles in the blood, cardiovascular fitness and body composition after 16 weeks of training and 6 weeks of detraining in young women, only the percentage of body fat and triglyceride levels of aerobic exercise group were lower, HDL cholesterol levels were higher significantly [32]. Some studies reported increase HDL cholesterol after 2-3 hours of intensive running activity [33], at the end of 30 minutes of submaximal cycling exercise reduce LDL cholesterol [25], at the end of the 7-8 hours of intensive skiing exercises a decrease in the level of total cholesterol triglyceride and LDL and an increase HDL cholesterol [34].

Aerobic capacity should not be neglected in football. However, various physiological aspects of aerobic capacity (such as quickness and endurance) should be considered in the development of soccer players [2].

Quick strength training programs in various ways are usually not taken into account in stages of the annual training plan. Whereas the quick strength exercises allows to take action the more nervous equipped and the muscle fibers into the practice and to increase the transmission speed of the motor nerves [5].

Secretion of lipoprotein lipase from fat tissue and muscles increased and plasma triglyceride concentrations were reduced as a result of exercise [35]. In changes of serum lipids, the most interesting is to investigate the effect of exercise to these changes. The most distinctive findings are to rise linking the HDL cholesterol. The mechanisms responsible for the increase HDL levels could not fully enlighten. Exercise may be directly responsible for increasing of HDL levels. Even before because it does not improve cardiovascular with exercise can be seen the increase in HDL levels [36]. Regular jogging for weeks raises the HDL levels. The equivalent of jogging 65-95 miles a week long exercise will create a peak increase in HDL levels. However, to do more exercise does not cause more increase in HDL levels [37].

HDL levels are rise due to the HDL catabolism delays much from HDL production in trained runners in the top levels. Increase of lipoprotein lipase activity in adipose tissue and serum by increasing the transfer of HDL lipid may play a role [38]. Regular exercise is effective both on the cardiovascular system and cardiac risk factors such as blood pressure and lipid profile and also it is known that reduces the level of total cholesterol, triglycerides, glucose, LDL cholesterol and VLDL cholesterol and increase the level of HDL cholesterol of long-term quick strength and aerobic endurance training also [38].

Our results were consistent with data previously published, show that low levels of TG and high levels of HDL characterizes the athletes who practice quick strength and aerobics endurance trainings; additionally, in male athletes we found that long-term exercise appears to reduce LDL-C plasma levels.

We may conclude that regular training including quick strength and aerobics endurance trainings for 20 weeks affect footballer's blood lipid profiles and body compositions positively. And we found better values in all parameters in the end of quick strength and aerobic endurance trainings.

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