

Effect of Calisthenics Exercise Program on Some Liver Enzyme Values and Blood Lipids

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Abstract: *The purpose of this study is to research the effect of the eight week calisthenics exercise, applied to sedentary males, on some liver enzymes. 20 volunteer males, the age average of whom is $29,40 \pm 3$, 47 years and height average of whom is $177,45 \pm 4$, 89 cm, participated in the research.*

The body weight, fat percentage and fasting blood sample were taken by the expert persons in the suitable laboratory environment in the healthcare institutions, determined, before and after the application of the exercise program. SPSS 22. 0 package program was used for analyzing the data obtained and independent groups test (Wilcoxon Test) was applied for comparing the descriptive statistics and the values before and after the exercise.

As a result of the findings we obtained, it was found out that there is a significant difference between the blood lipids, triglyceride, HDL, LDL, and total cholesterol levels before and after the calisthenics exercise program applied ($p > 0. 05$). Similarly, it was determined that there is also a significant change between the pre-test-post-test liver enzyme values (AST, ALT) ($p > 0. 05$).

In conclusion, it is understood that the calisthenics exercise program, we applied, provides a significant and efficient change on sedentary males physiologically from the results of the study. Starting from these findings, not needing upper level materials for applying the calisthenics exercises suggests that it is efficient to guide the sedentary males to exercise. At the same time, this exercise program being easily applicable home is important because it is thought that obtaining a healthy body mass index can also protect from cardiovascular diseases, caused by sedentary life style and the risk factors causing these diseases.

Keywords: *Calisthenics exercise; lipid and liver enzymes.*

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1. Introduction

In today's conditions, the attraction of the technological development took people hostage and made them the prisoners of sedentary life. That being the case, people of all ages is in a situation using the technological means excessively and have become dealing with all activities, which they can perform via their physical power, via the technological tools. This situation also brings the problems caused by inadequate physical activity with it.

Physical activity may be defined as the bodily movements resulting in energy consumption in the skeletal muscles (Neiman, 1950, pp. 31-33). Exercise was defined as physical activities planned for increasing the physical performance and improving the mental health, like swimming, running, and riding (Wikkerink, 2016). The purpose of exercise is to fasten the metabolism, to strengthen the muscles, to burn fat, and to increase the flexibility of the joints (Tarhan, 2019). It is not necessary to go to gym in order to exercise; it makes exercise attractive that some exercises are done home and performed with less materials. One of these exercise types is the calisthenics exercise.

The calisthenics exercises were designed by aiming to provide optimal balanced, adequate and high efficiency such that daily walking applications are completed. Calisthenics exercises consist of movements increasing the flexibility and strength of the body (Bozlak, 2019). It is a type of exercise consisting of various movements applied without an equipment and apparatus, using your own body weight (Srivastava 2016). Such exercises are the short muscle contractions happening by using the body mass together with the movement in order to increase the strength and flexibility of the body and contain all body movements, therefore require that big muscle groups are contracted. The calisthenics exercises focus on big muscles and can be combined with breathing exercises and applied rhythmically (Aydin et al., 2014). They can be adapted depending on the physical suitability levels of the people (Rus et al., 2019). They are suitable for using in sedentary and elderly people (Akyol, Arslan & Çolak, 2016).

It is a fact proven today that regular exercising and being physically active provide an apparent increase in the metabolic parameters (Penedo & Dahn, 2005; Talaghir et al., 2018). It is known that the liver enzymes, which enable us to have an idea on the liver functions, one of the metabolic events occupying a place with respect to the health, have a close relationship with the exercise. Human organism needs that the inner balance is ensured in order to continue its life. The changes created by the exercise on the enzyme

activity, are being able to preserve the inner balance and the natural reactions to the stressor. Alanine aminotransferase (ALT) and aspartate aminotransferase (AST) enzymes are the enzymes present in this reactional process and connected with the liver damage because they are in most of the livers even though it is in a specialized place of the body (Hyder, Hasan & Mohieldein, 2013). It was indicated as a result of the researches that an increase occurs in the ALT and AST enzymes after exercise (Kim, Lee & Kim 2007). General opinion is that there is not any inconvenience in the increase of these enzymes with medium and high intensity exercise. Also, the benefits of regular exercise are not limited with the balancing of liver enzymes, it is known that it has effects on positive direction on the lipid metabolism too (triglyceride, cholesterol, HDL, and LDL) (Arslan et al., 2001; Yalın & Gök, 2001). It was reported that many exercise programs effect the fat and carbohydrate metabolism and cause moderate decreases in the body weight, total cholesterol and triglyceride in fat depots (Özer, Bozdağ & Pancar 2017; Tran & Weltman, 1985).

Starting from the existing information and considering the healthy life, exercise has an important place on the lipid mechanism and liver enzymes. Because of this, in our research, the purpose is to determine the changes to be indicated on the lipid metabolism and liver enzyme levels by the regular calisthenics exercises, applied for eight weeks, on sedentary males.

2. Material and Method

2.1. Subjects

In this research, the pre-test – post-test model was used. The participants were asked whether they have any health problem or not before the research. To the research, 20 volunteer sedentary males, without health problem, with an average age of $29,40 \pm 3$, 47 years, who not attending any sports center in the Zonguldak Province. Bioelectric impedance analyzer (TANITA, TC-418, USA) was used for determining the weight and fat percentage measurements of the participants. No diet program was applied to the participants during the research

2.2. Procedure

2.2.1. Blood Lipid Measurement Tests:

The participants went to the healthcare institution, determined, on an empty stomach, before the calisthenics exercises, lasted 60 minutes for 4 days in a week, and after the exercise for 8 weeks and made their whole

blood count measurements by the expert people in suitable laboratory environment. The blood values; the whole blood count measurements were done with Abbott C16200 device and LDL, HDL, total cholesterol, triglyceride, and AST and ALT values were obtained.

2.2.2. Body mass index (BMI)

The participants went to the healthcare institution, determined, on an empty stomach, before the calisthenics exercises, lasted 60 minutes for 4 days in a week, and after the exercise for 8 weeks and made their whole blood count measurements by the expert people in suitable laboratory environment. The blood values; the whole blood count measurements were done with Abbott C16200 device and LDL, HDL, total cholesterol, triglyceride, and AST and ALT values were obtained.

2.2.3. Exercise and Workout Program

The workout schedule lasted for 8 weeks was consisted of medium intensity calisthenics exercises of 60 minutes for 4 days in a week. The intensity was held at the pace in which the participants felt themselves comfortable (such that the heart pulse number was between 130 and 150). In each workout period, after 10 minutes of warm up, the exercises in the Table 1 were done. Every workout was completed with 5 minutes cooling exercises.

Table 1- Exercises, Method and Durations:

Exercises	Duration/number	Exercises	duration/number/s
Pistol Squat	3Set/8 repetitions	Leg Raise	3Set/8 repetitions
Lunge Stop	3Set/8 repetitions	Russian Twist	3Set/8 repetitions
Shoulder tabs	3Set/8 repetitions	Inverse pull-up	3Set/8 repetitions
Dips	3Set/8 repetitions	Superman exercise	3Set/8 repetitions
Crunch	3Set/8 repetitions	Plank	3 Set/30 s

2.4. Data Analysis

The data obtained in the research was analyzed by using SPSS 22.0 package software. In order to reveal the difference between the pre-test and post-test values of the research group, of the non-parametric tests, the dependent groups t test (Wilcoxon test) was used.

3. Results

Table 2- Physical characteristics of the participants

N	Age (years) (Mean±SD)	Standing height (cm) (Mean±SD)
20	29,40 ±3, 47	177,45±4, 89

In the table, considering the physical characteristics of the participants, the average ages and standing lengths were determined as 29,40 ±3,47 years and 177,45±4,89 cm respectively.

Table 3- Comparison related with the pre-test – post-test results of some lipid profile values of the participants

Measurement (cm)	Sequences	N	Sequence average	Sequence total	Z	p
Weight pre-test – post-test	Negative lines	20 ^a	10, 50	210, 00	-3, 92**	, 000**
	Positive lines	0 ^b	, 00	, 00		
	Equal	0 ^c				
Total cholesterol mg/dL Pre-test – post-test	Negative lines	17 ^d	10, 24	174, 00	-2, 57**	, 010*
	Positive lines	3 ^e	12, 00	7, 00		
	Equal	0 ^f				
TRIG mg/dL pre- test – post-test	Negative lines	20 ^g	10, 50	210, 00	-3, 92**	, 000**
	Positive lines	0 ^h	, 00	, 00		
	Equal	0 ⁱ				
HDL mg/dL pre-test – post-test	Negative lines	0 ^j	, 00	, 00	-3, 92**	, 000**
	Positive lines	20 ^k	10, 50	210, 00		
	Equal	0 ^l				
LDL mg/dL pre-test – post-test	Negative lines	19 ^m	10, 68	203, 00	-3, 65**	, 000**
	Positive lines	1 ⁿ	7, 00	7, 00		
	Equal	0 ^o				
Fat percentage % pre-test – post-test	Negative lines	20 ^p	10, 50	210, 00	-3, 92**	, 000**
	Positive lines	0 ^q	, 00	, 00		
	Equal	0 ^r				

p<0,01**, p<0,05*

According to the Table 3, it was observed that a significant decrease occurred in the body weight, cholesterol, triglyceride, HDL, LDL, and VYY values of the participants in the research group of the eight week calisthenics exercises ($p<0,01$). This result indicates that the exercise program we applied is efficient on the blood lipids.

Table 4- Comparison related with the pre-test – post-test results of some liver enzyme values of the participants

Measurement (cm)	Sequences	N	Sequence average	Sequence total	Z	p
AST U/L pre- test – post-test	Negative lines	5 ^a 15 ^b	10, 10 10, 63	50, 50 159, 50	-2,02*	-, 042*
	Positive lines	0 ^c				
	Equal					
ALT U/L pre- test – post-test	Negative lines	2 ^d 17 ^e	10, 09 9, 25	171, 50 18, 50	- 3,08**	, 002**
	Positive lines	1 ^f				
	Equal					

$p<0,01^{**}$, $p<0,05^{*}$

According to the Table 4, it was found out that the 8 week aerobic calisthenics exercises had significantly changed the AST and ALT liver enzyme values of the participants in the research group ($p<0,01$).

4. Discussion

Our research was performed in order to determine the eight week calisthenics exercise program, applied to the sedentary males, on some physiological parameters and according to the research results, it was found out that it effected in the positive direction on both the VYY (body fat percentage) and blood lipids (triglyceride, cholesterol, HDL and LDL) levels and liver enzyme (AST, ALT) levels of the sedentary males who did calisthenics exercises regularly for eight weeks.

Wang et al. (2020) researched the randomized clinic researches of physical activity interventions done on NAFLD patients until April 20th, 2019. In the research, it was found out that physical activity is correlated with the small decreases in the liver enzyme parameters (AST-ALT). At the same time, in this research, it was asserted that in the serum lipid parameters and both aerobic exercise and strength exercise alone can improve most of the liver functions and longer exercise duration usually has a better

improvement effect. As it can be understood from the result of this research, it suggests that physical activity alone can improve the hepatic enzyme levels, most of the serum lipid levels for non-diabetic NAFLD patients.

In another research, in the research where Li et al. (2020) applied aerobic and strength exercise of 10 weeks on 24 male obese students; they found out that these exercises may prevent the diseases caused by obesity by increasing the energy consumption and insulin sensitivity, by triggering positive changes in the glucose and lipid mechanism (cholesterol, triglyceride, HDL, and LDL). The result of this research indicates similarity with our research result. In the research performed by Gonulates, Saygın and İrez (2010), it was found out that 8 week regular walking program provides positive developments in the blood lipids (HDL, LDL, TG, and TK parameters) on 40 sedentary women, between 40 and 55 years old.

In another research too, González et al. (2017) reported that exercise has a preventive effect in the progress of liver disease by targeting the lipid composition and fat tissue and especially aerobic exercises support the existing recommendation. In another research too, in a research where Çınar et al. (2017, 2019) researched the effect of the fitness exercises which overweight women applied for 60 minutes a day, 4 days a week for eight weeks on the AST, ALT and LDH metabolism they revealed that eight week fitness exercises substantially effect the liver enzyme levels. Uadia et al. (2016) determined that the physical and flexibility exercises applied 2 days in a week for 6 weeks creates increases in AST, ALT and LDH levels in the research which the effects of the regular exercise was researched. Petterson et al. (2008) found out that ALT and ASL values increases after exercise in the research which they researched the chemical levels of these values of intense muscle exercises. Starting from these researches, it can be said that the increase occurred in ALT and AST may keep the levels of these enzymes in a certain interval raised ALT and AST values may be decreased with regular exercise. There are studies indicating that the increase in the liver enzymes depending on the duration and intensity of the exercise is not an abnormal situation and it is balanced in the process afterwards.

5. Conclusion

In conclusion, the calisthenics exercise program, we applied, caused significant decreases in the body weight, cholesterol, triglyceride, HDL, LDL, and VYY values in sedentary males and the applied exercise program is efficient and it is important for being a healthier society that it is conveyed

to the people that this calisthenics exercise program which the individuals can easily apply in home too how to do it. On the other hand, we can say that a liver running according to its purpose is important for having a healthy body with respect to the human health. We think that, especially while it is emphasized that the increase in the liver enzymes, seen in the ones who newly starts regular exercise, results different from the results of our study can be obtained with another exercise program to be applied by taking the duration and intensity of the exercise as the basis and these results would be normal.

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