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INVESTIGATION OF THE EFFECT OF TAEKWONDO TRAINING ON LIPID AND HORMONE METABOLISM OF ATHLETES

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ABSTRACT

This research was carried out to determine the effect of eight-week taekwondo training and studies to improve basic motoric features on the lipid metabolism and hormonal changes of athletes. The research group consisted of 30 male athletes licensed in taekwondo and participating in national competitions. Eighty-minute taekwondo training sessions were applied to the research group for eight weeks, four days a week, four days a week, and studies aiming to improve their basic motor skills. Blood samples were taken from the athletes in the research group twice, at the beginning and at the end of the training. Insulin, growth hormone (GH), TSH, total testosterone, HDL, LDL, cholesterol and triglyceride levels were determined in the samples taken from the athletes. SPSS package program was used in the analysis of the data and the significance was accepted as $p<0.05$. As a result of the research, it was determined that the pre-post test values of the athletes' insulin, GH, TSH, total testosterone hormone levels increased ($p<0.05$). It was observed that the pre-post-test values of the lipid metabolism parameters of the study group increased ($p<0.05$), and the pre-post-test values of cholesterol, LDL and triglyceride levels decreased ($p<0.05$). As a result, studies aimed at improving basic motoric features with eight-week taekwondo training have shown that athletes have positive changes in blood fats (HDL, LDL, cholesterol, triglyceride) and hormone metabolism (insulin, GH, TSH, total testosterone). In this context, we believe that designing training programs considering the competition and competition periods of the athletes will positively affect the athletic performance of the athletes.

Keywords: Taekwondo, Training, Hormones, Lipids.

INTRODUCTION

Today, technological developments have led to changes in the field of sports as well as in all areas of society. With these changes, trainers and trainers in the field of sports have started to work with scientists to protect or improve the performance of their athletes. As a result of this, they updated or re-planned the training methods they applied in the light of the data obtained as a result of the tests-measurements they had made. On the basis of all these modern and innovative changes, it is aimed at maintaining and improving the current performance of the athletes and achieving success (Erdoğan, 2020).

In the field of athletic performance and exercise, both athletes and non-athletes are constantly seeking innovative and competitive new ways to improve their health and optimize physical performance. To achieve this goal, even if different activities and thoughts interact, taking the athlete to the next level in terms of performance can be achieved with regular sleep, adequate rest, healthy nutrition and up-to-date and modern training strategies (Kerksick et al., 2018; Wax et al., 2021). . As a result of acute or chronic training, some physiological changes occur in the organism. Lipid and hormone metabolism are important physiological indicators of determining these changes in the organism.

Although the effect of acute and chronic training on physiological parameters in the organism is known, the general opinion is that regular training has a more positive effect on lipid and hormone metabolism (Wardyn et al., 2008; Jurimäe et al., 2018). Long-term training in the organism as cellular; causes some changes in muscle, cardiovascular system, body stockin levels, liver enzymes and lipid metabolism (Shin et al., 2016).

It is known that regular training causes changes in the hormonal level in the blood. With training or exercise, hormonal changes begin in the central nervous system. These changes differ according to the duration of the training, its intensity, metabolic status and environmental factors (Koz, 2016). In addition, as seen in the studies, it is known that regular training also affects lipid metabolism and causes changes in plasma lipid and lipoprotein levels. However, the positive changes in all these organisms affect different levels according to the gender, age and type of sport, as well as the training applied (Ağırbaş et al., 2009; Erdağı et al., 2018). In this context, the changes in the organism of the trainings to be applied are extremely important in terms of sportive performance.

In addition to the competitions and trainings that require performance, one of the factors that determine the sportive performance is the physiological responses in the organism. Physiological factors together with the competitive environment and developing technology have enabled researchers to focus on these issues in sportive performance. In line with this information, this study was conducted to determine the effect of eight-week taekwondo training and studies to improve basic motoric features on the lipid metabolism and hormonal changes of athletes.

Method

Research Group

The research group consisted of taekwondo licensed and regularly participating in training sessions with an average age of 16.70±0.79, an average height of 168.80±5.88, an average body weight of 64.73±10.12, and 30 volunteer male athletes participating in national competitions.

Training Program

Eighty-minute taekwondo training sessions were applied to the research group for eight weeks, four days a week, four days a week, and studies aiming to improve their basic motoric characteristics. Within the scope of the training, 10-15 minutes of warm-up exercises, 50-60

minutes of taekwondo training and studies aiming to improve basic motoric features were applied in a training unit, and 5-minute cooling exercises were applied at the end of the training.

Biochemical Measurements

From the athletes in the research group, 8 cc of blood was taken from the forearm elbow vein twice, before and after the training, by experts. The samples taken were analyzed in a private hospital laboratory and the athletes' insulin, growth hormone (GH), TSH, total testosterone, HDL, LDL, cholesterol and triglyceride levels were determined.

Analysis of Data

SPSS 22 package program was used in the analysis of the data. When the normality analysis of the data was evaluated, non-parametric tests were used in the analysis of the data that were determined not to show normal distribution. Wilcoxon test was used to compare the means of two independent groups and to test the significance between them. The significance level was accepted as $p< 0.05$.

Results

Table1. Hormonal Changes of Athletes Before and After Training

Variable	Pre-Test Post Test	N	Mean Rank	Sum of Rank	z	p
Insulin	**Negative**	0	,00	,00	-4,803	0,00*
	Positive	30	15,50	465,00		
	Ties	0				
Growth Hormone (GH)	**Negative**	2	7,00	14,00	-4,401	0,00*
	Positive	27	15,59	421,00		
	Ties	1				
TSH	**Negative**	8	8,81	70,50	-2,279	0,02*
	Positive	16	14,34	229,50		
	Ties	6				
Total Testosteron	**Negative**	1	10,00	10,00	-4,577	0,00*
	Positive	29	15,69	455,00		
	Ties	0				

*: p<0,05

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When Table 1 was examined, it was determined that there was a statistically significant difference between the insulin, GH, TSH and total testosterone pre-post test values of the research group ($p<0.05$).

Table2. Athletes' Pre- and Post-Training Lipid Metabolism Changes

Variable	Pre-Test Post Test	N	Mean Rank	Sum of Rank	z	p
HDL	**Negative**	0	,00	,00	-4,055	0,00*
	Positive	21	11,00	231,00		
	Ties	9				
LDL	**Negative**	27	16,22	438,00	-4,280	0,00*
	Positive	3	9,00	27,00		
	Ties	0				
Kolesterol	**Negative**	25	14,56	364,00	-3,704	0,36
	Positive	3	14,00	42,00		
	Ties	2				
Trigliserid	**Negative**	23	12,00	276,00	-4,300	0,00*
	Positive	0	,00	,00		
	Ties	7				

*: p<0,05

When the lipid metabolism of the research group was evaluated in Table 2, it was observed that there was a statistically significant difference between HDL, LDL, cholesterol and triglyceride pre-post test levels ($p<0.05$).

DISCUSSION AND CONCLUSION

Regular and long-term training affects metabolic and cellular events in the organism, increases oxidative stress, and affects lipid metabolism by creating hormonal changes (Medrano et al., 2018; Pillon Barcelos et al., 2017). The aim of this study was to determine the effect of the studies on the lipid metabolism and hormonal changes of the athletes.

Hormone metabolism is associated with many physiological events in the organism and triggers at the same time. For these reasons, hormonal changes are shaped by training and sportive performance. As a result of the trainings applied in our study, it was observed that there was a positive increase in insulin, GH, TSH and total testosterone levels. Ambroży et al. (2021) found

that eight weeks of high-intensity training increased the testosterone level of the participants and decreased the cortisol level. Collomp et al., (2008) determined that short-term training did not cause a decrease in ACTH, DHEA, PRL, GH, TSH levels, and no change in LH, insulin, lactate, pH or bicarbonate levels of athletes. Erdoğan (2020) determined that the twelve-week training program made a difference on the thyroid hormone metabolism and biochemical parameters of the athletes. Almási et al., (2021) reported that an acute swimming training applied at high intensity caused a decrease in the testosterone levels and an increase in the cortisol levels of the athletes, and that the training model they applied could affect the hormonal metabolism in the athletes. Tanner and Day (2017) found that the four-week training program did not cause any change in the testosterone levels of the athletes, but caused an increase in the cortisol level. Harbili et al., (2005) determined that six weeks of strength training did not cause any change in basal hormone levels in athletes. Socratis et al., (2016) determined that, in addition to school activities, a six-month rowing training program increased the testosterone levels of the participants and created a difference in GH levels. Sabri et al. (2012) determined that eight-week resistance exercises created differences in insulin, growth hormone and physical parameters of judokas. In a different study, Abedelmalek et al. (2013) determined that exercise after sleep restriction increased GH and testosterone concentrations, but did not affect cortisol responses.

Lipids are used as an energy source in the organism, and their excessive accumulation and increase is an indicator of the disease in the body, the problem as well as the negative impact on sportive performance (Moraes et al., 2017). According to the results of the research, it was observed that the trainings applied positively increased the HDL level of the athletes, and decreased LDL, cholesterol and triglyceride levels. When the studies are examined; Akın and Arıkan (2020) determined that the eight-week training program did not affect the irisin, BMI and MaxVO2 values of the participants, but significantly reduced the glucose, triglyceride, total cholesterol, HDL and LDL values. Ramezani et al., (2017) determined that regular training increased the HDL levels of adolescent individuals and decreased the cholesterol, LDL and triglyceride levels. Pons et al., (2018) found that a six-week exercise program increased HDL levels and decreased triglyceride cholesterol and LDL levels. Demiriz et al., (2015) determined that in interval trainings planned at different rest intervals of seven weeks, HDL, glucose and cholesterol levels decreased and triglyceride levels increased as a result of the exercises applied in the additional interval training group. Izanlu et al., (2020) stated that in a four-week training program, handball players who practiced HIIT reduced their cholesterol and triglyceride levels. Erdoğan (2021) determined that the three-month training program caused changes on the liver enzymes and lipid metabolism of the athletes. Kürkçü (2011) reported that triglyceride and LDL, which are cardiovascular risk factors for regular exercise, are lower in adolescent football players than sedentary individuals, and VDL levels are higher. In a different study, Koçyiğit et al. (2011) determined that vitamin C supplementation applied in addition to acute exercises increased HDL levels in football players and basketball players and decreased triglyceride and LDL levels.

As a result; Studies aimed at improving basic motoric features with eight-week taekwondo training have shown that athletes have positive changes in blood fats (HDL, LDL, cholesterol, triglyceride) and hormone metabolism (insulin, GH, TSH, total testosterone). In this context, we believe that

designing training programs considering the competition and competition periods of the athletes will positively affect the athletic performance of the athletes.

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