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THE EFFECTS OF THE APPLIED TABATA TRAINING MODEL ON THE PERFORMANCE OF MOUNTAIN BIKE ATHLETES

UČINKI VADBENEGA MODELA TABATE NA USPEŠNOST GORSKIH KOLESARJEV

ABSTRACT

The aim of this study was to examine the development of anaerobic (maximum strength), aerobic (endurance), and heart rate numbers with the six-week Tabata Training Model applied to mountain biking athletes between the ages 14-18. A total 20 mountain bike athletes with a mean age of 15.45 ± 1.15 years participated in the study. The participants were randomly divided into two groups. The Traditional Training Group (CG) consisted of nine people and they applied the traditional training program for six weeks. The Tabata Training Group (TTG) consisted of 10 participants, and they, unlike CG, performed Tabata Interval Training on three days of the Traditional Training Program. CG did interval, rest, tempo, and endurance training for six weeks. The pre-test and post-test results showed that, aerobic power values increased by 10,7% in TTG; and 5,6% in CG, and mean power values increased by 8,6% in TTG; and 5,5% in CG. VO2max values while increased by 5,3% in TTG, it increased by 3,9% in CG, mean pulse values decreased by 0,7% in TTG and 2,8% in CG. As a result, it was seen that the Tabata Interval Model, which includes Tabata Interval Trainings applied for six weeks to high trained mountain bikers, increased the performance. In light of these results, it can be said that the Tabata Training Model is an effective training model that can be used to improve performance in high-level mountain bikers.

Keywords: mountain bike, tabata training model, performance

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IZVLEČEK

Namen te študije je bil preučiti razvoj anaerobne in aerobne vzdržljivosti ter srčne frekvence s šesttedenskim vadbenim modelom tabata, ki so ga uporabljali gorski kolesarji, stari od 14 do 18 let. V raziskavi je sodelovalo 20 gorskih kolesarjev, povprečno starih 15,45 ± 1,15 let, ki so bili naključno razdeljeni v dve skupini. Skupino s tradicionalno vadbo (CG) je sestavljalo devet kolesarjev, ki so šest tednov uporabljali tradicionalni program vadbe. Skupino, ki je izvajala vadbo tabate (TTG), je sestavljalo deset kolesarjev, ki so za razliko od skupine CG tri dni tradicionalnega programa vadbe izvajali intervalno vadbo, imenovano tabata. Skupina CG je šest tednov izvajala intervalno vadbo, počitek, tempo in vzdržljivostno vadbo. Rezultati pred začetkom študije in po njej so pokazali, da so se vrednosti aerobne moči v skupini TTG povečale za 10,7 %, v skupini CG pa za 5,6 %, vrednosti povprečne moči pa za 8,6 % v skupini TTG in za 5,5 % v skupini CG. Vrednosti VO2max so se pri TTG povečale za 5,3 %, pri CG pa za 3,9 %, srednje vrednosti srčne frekvence pa so se pri TTG zmanjšale za 0,7 %, pri CG pa za 2,8 %. Ugotovljeno je bilo, da intervalna model vadbe, ki vključuje tabata intervalne treninge po štetih tednih izvajanja pri gorskih kolesarjih poveča zmogljivost bolj kot tradicionalna vadba. Glede na te rezultate lahko rečemo, da je vadbe tabate učinkovit model, ki se lahko uporablja za izboljšanje zmogljivosti pri vrhunskih gorskih kolesarjih.

Ključne besede: gorsko kolesarstvo, tabata vadbeni model, uspešnost

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https://doi.org/10.52165/kinsi.28.3.54-68

INTRODUCTION

Sports are activities that have their own rules and are based on rivalry which are done individually or in groups. Sports is a phenomenon performed by following certain rules and techniques, with or without equipment, for performance purposes or for leisure time. At the same time, is a cultural phenomenon that integrates society, socializes people and improves solidarity in society (Kılıcıgil, 1985).

In every period of history, the sport continues to exist. At the time when the foundations of the sport began to sports studies were carried out aimed at war techniques. Sports, 19. After the second half of the century, it started to develop in different fields. The importance of sports performed in this period for health is increasing day by day. The main purpose of these exercises is to optimally work the muscles, joints, bones, spine, and cardiovascular system and to make the individual feel better (Zorba, 1999).

The first bicycle in World history was built in 1818 by Baron Karl Von Drais de Sauerbrun. In 1839, Kirpatrick Macmillan of Scotland invented the bicycle pedal. In 1861, brothers Pierre and Ernest invented the pedals which rotate directly from the front wheel. After the brothers named their vehicles made of wood and iron as Velospid, they started to manufacture and put them on the market. The first bicycle race won by Englishman James Moore was held in France in 1868. The number of people who loved the sport of cycling started to increase day by day, and the French Cycling Federation was founded in 1881. In 1890, bicycle racing became one of the most popular branches throughout Europe. After the modern Olympic Games, cycling organizations started to be organized for entertainment and competition purposes. The sport of cycling has played an important role in improving performance and talent selection, with evolving technology and scientific work done. As we get closer to the present day, it has started to take on its present appearance with the technical developments on the bicycle (Süme and Özsoy, 2010; Morpa, 2005).

In international competitions organized by the cycling branch, the rules are regulated by the International Cycling Union (UCI). Bicycle races are divided into four main branches. These are road bike, veledrom (track) bike, mountain bike, and cyclo-cross bike races. (UCI, 2018).

Mountain bike racing is a branch of the sport of cycling. This branch contains ups and downs on rough terrain and athletes do not constantly load at the same level. Studies on mountain biking show that mountain biking is a high intensity endurance sport that has intermittent loads within the sport (Impellizzeri et al. 2002). Mountain biking needs higher efforts than other

branches because of the intensity and high intensity it has in it. The Tabata Training Protocol which has been popular in recent days aims to improve performance with intemittent loads. The principles of 1:1 or 1:2 loading is used in interval training which is traditionally done in mountain biking. For example, a 1- minute load followed by a 2- minute rest is done. But, in the Tabata Training Protocol, the 2:1 loading principle is applied. For example after 20 seconds of loading, 10 seconds of rest is done. When we look at the literature, it has been seen that short and high intensity intervals increase the performance more. (Stepto et al. 1999).

The aim of this study was to examine the development of anaerobic (maximum strength), aerobic (endurance), and heart rate numbers with the six-week Tabata Training Model applied to mountain biking athletes between the ages of 14-18. This development is important in terms of training science and performance. In this way, the success of the athletes will increase with the Tabata Training Model, and the Tabata Training Model can be an example for the coaches and athletes interested in mountain biking.

METHODS

The Scope of the Research

A total of 19 male mountain bikers who competed at senior level Cycling Team participated in the study. The participants ranged in age from 14 to 18. Cyclists are divided into two groups as a working protocol. The first group was composed of nine people, and they performed the traditional cycling training pattern for six weeks. The second group consisted of 10 people and continued their trainig with the Tabata Training Model for six weeks. The random draw method was used to create groups.

For the study, teh ethics committee report numbered 2011-KAEK-2 was obtained from Afyon Kocatepe University Clinical Research Ethics Committee.

Research Model

In this study, two different training models were applied to mountain biking athletes for six weeks. Pre-test and post-test measurements was obtained.

Data Collection Methods

In the study, an information a form was used to record the demographic characteristics of the participants, anaerobic power test, aerobic power test, leg strength test and 40-km time-trial cycling test data.

Applied Test Times and Protocols

The period of the study was between October and November 2017. Pre-test and post-test were conducted before and after the training process. The pre-test and post-test planning is shown in Table 1.

Table 1. Pre-test and post-test measurement planning.

	PRE-TEST		**POST-TEST**	
	1st Day	**4th Day**	**1st Day**	**4th Day**
MORNING It is 09:00	-Anthropometric Measurements -Leg Strength Test -Anaerobic Cycling Test	40-km time trial cycling test	-Anthropometric Measurements -Leg Strength Test -Anaerobic Cycling Test	40-km time trial cycling test
AFTER NOON It is 14:00	-Aerobic Cycling Test		-Aerobic Cycling Test	

Applied Tests

Measurement of Height and Body Weight

While the participants wore only cycling swimsuit for height and weight measurement, they were measured using the electronic scale they had on with bare feet. The data obtained were recorded in kilograms (kg). The brand name of the electronic scale is heritage RSP-0120. The heigh measurement was also fixed to the wall with bare feet, and made with Seka 220 brand device, and the data obtained were recorded in centimetres (cm).

Leg Strength Test Measurement

The measurements were made using a back and leg dynamometer a device called the Takei brand. After the warm-up, the participants stood on the dynamometer stand with their legs slightly bent. The participants were then asked to take a straight position with tense arms and back and to tilt their torso slightly forward. This position was shown to participants before. On the positioned dynamometer, the dynamometer bar grasped with the hands was pulled up

vertically with the help of the legs at the maximum level. The best data was recorded after three attempts (Gökhan et al. 2015).

Anaerobic Power Test

30 seconds test application;

First, the participants were given general information about the test protocol before sitting on Wattbike. The participants were asked to wear bicycle bathing suits and special locked bicycle shoes. At the beginning, the ergonometer was adjusted according to the participants physical charateristics (age, weight, and gender) After the adjustments were made, the participants' information was recorded on the computer on Wattbike, and resistance was calculated. After the warm up, the test was started. On the scren on the Wattbike ergometer, count backwards from five to Go! was started with the test command and the participants pedaled with maximum effort of 30 seconds. (Wattbike, 2017)

Aerobic Cycling Test

Application of aerobic cycling test;

First, the participants were given general information about the test protocol before sitting on Wattbike. They were asked to wear bicycle bathing suits and special locked bicycle shoes. The participants underwent a Maximal Ramp Test Protocol consisting of 12 stages. As in the anaerobic cycling test, the participants' –information was recorded on the computer on the ergometer after the adjustments were made to the participants' physical charateristics. The initial pedal speed and Watt (W) values found in the Wattbike test booklet were determined according to the demographic charateristics of the participants. The participants began testing after the warm-up. Each minute resistance is increased by 20w, and the test is terminated when the participants is unable to maintain the test (Wattbike Full Test Guide, 2017).

Forty Miles (Km) againist Time

The cyclists participated in this test with their own bikes. The participants were given general information about the test protocol. They were asked to wear bicycle bathing suits and special locked bicycle shoes. The participants were asked to complate the 40 km distance as soon as possible by placing their bikes on Tacx brand roles. Roller device is a device with three cylinders. Participants can place their bikes on this device and ride their own bikes on this device where they stand to conduct training an testing.

Statistical Analysis of Data

SPSS package program was used for statistical analysis of the study. The findings were primarily tested for normality. The Whitnet U and Wilcoxon tests were performed from the nonparametric tests as the data were not normally distributed. The Mann Whitney U test was used in comparison of Tabata Training Group-Traditional Training Group, and pre-test and post-tests between the groups. The Wilcoxon test was used to compare the differences between the Tabata Training and Traditional Training Groups. Significance levels were accepted as 0.05 and 0.001.

RESULTS

Table 2. Age, Height, and Body Weight Data of the Participants.

Parameters		**n**	Training Model	**Average (Avg.)**	**Standart Dev. (Sd)**	**% Change**	**p**
Age (Years)		10	Tabata Training Group	15.90	1.29	-	-
Body Height (cm)		10		171.30	15.9		
Age (Years)		9	Traditional Training Group	15.11	0.78	-	-
Body Height (cm)		9		174.89	8.61		
Body Weight (kg)	**Pre-Test**	10	Tabata Training Group	60.38	8.36	-2.60	**0.005****
	Post-Test	10		58.79	7.87		
Body Weight (kg)	**Pre-Test**	9	Traditional Training Group	59.53	10.99	-2.00	**0.007****
	Post-Test	9		58.34	11.06		

**P<0.01

Age, height, and body weight values of the athletes participating in the research are given above.

Table 3. Participants' Leg Strength Test Data.

Leg Strength Test Measurement	Tabata Training Group				Traditional Training Group				p
	n	Avg.	Sd.	% Change	n	Avg.	Sd.	% Change	
Pre-Test (kg)	10	152.75	39.52	16.10	9	113.33	12.20	11.40	**0.020***
Post-Test (kg)	10	181.00	40.95		9	126.30	14.03		**0.004****

*P<0,05 **P<0,01

In the table 3 showed that the leg strength test data of the Traditional Training Group increased by 11.4% after six weeks of the Traditional Training Method; while the leg strength test data of the Tabata Training Group increased by 16.1% after six weeks of the Tabata Training Method (p<0.01).

Table 4. Participants ' Anaerobic Cycling Test Data.

Anaerobic Cycling Test		Tabata Training Group				Traditional Training Group				p
		n	Avg.	SS	% Change	n	Avg.	SS	% Change	
Peak Power (Watt)	**Pre-Test**	10	889.00	106.51	10.40	9	773.33	89.72	6.30	**0.014***
Peak Power (Watt)	**Post-Test**	10	965.00	130.33		9	822.11	70.78		**0.005****
Avg.Power (Watt)	**Pre-Test**	10	492.50	73.84	10.20	9	458.67	66.35	4.00	**0.050*****
Avg.Power (Watt)	**Post-Test**	10	547.00	74.87		9	477.22	66.13		**0.011****

*P<0.05 **P<0.01 ***P=0.05

In table 4 showed that, while the peak power values of the traditional training group increased by 6.3% after six weeks of the traditional training method, their average power values increased by 4.0%. The peak power values of the Tabata Training Group increased by 10.4% after the six-week Tabata Training Method, while the average power values increased by 10.2%. There was a statistically signifiant difference between the peak power values of the two groups at p<0.01 and between the average power data at p<0.05.

Table 5. Participants' Aerobic Cycling Test Data.

Aerobic Cycling Test		Tabata Training Group				Traditional Training Group				p
		n	Avg.	SS	% Change	n	Avg.	SS	% Change	
Aerobic Power (Watt)	**Pre- Test**	10	252.25	48.81	10.70	9	225.24	26.01	5.60	0.094
Aerobic Power (Watt)	**Post- Test**	10	281.70	41.68		9	237.89	27.95		**0.007****
Avg. Power (Watt)	**Pre-Test**	10	198.45	35.19	8.60	9	177.33	19.99	5.50	**0.041***
Avg. Power (Watt)	**Post- Test**	10	218.70	38.01		9	187.16	19.35		**0.011***
MaxVo2 (ml.)	**Pre- Test**	10	58.80	6.75	5.30	9	56.23	5.94	3.90	0.253
MaxVo2 (ml.)	**Post Test**	10	60.90	5.56		9	58.44	5.11		0.270
Avg. Heart rate (beats/min)	**Pre- Test**	10	182.00	9.41	-3.10	9	178.44	6.97	-0.70	0.712
Avg. Heart rate (beats/min)	**Post- Test**	10	176.50	9.75		9	177.22	4.94		0.566

*P<0,05 **P<0,01

In table 5 showed that the aerobic peak power values of the Traditional Training Group increased by 5.6% after the six-week Traditional Training Method, while the average strength data increased by 5.5%. The aerobic peak power values of the Tabata Training Group increased by 10.7% after the six-week Tabata Training Method; while the average strength values increased by 8.6%. There is a statistically significant difference between the average p <0.01 and the average P <0.05 values in the aerobic power data of the two groups. There is no statistically significant difference in other values of both groups (p> 0.05).

Table 6. Participants' 40-km Time-Trial Tested Data.

40-Km Time- Trial	Tabata Training Group				Traditional Training Group				p
	n	Avg.	Sd.	% Change	n	Avg.	Sd.	% Change	
Pre-Test (min.)	10	70,3	4,68	-4,9	9	73,02	1,75	-2,2	**0,027***
Post- Test (min.)	10	66,95	4,31		9	71,38	2,48		**0,003****

*P<0,05 **P<0,01

In table 6 showed that the test times of the Traditional Training Group 40-km Time-Trial decreased by 2.2% after six weeks of traditional training; while the test times of the Tabata Training Group 40-km Time-Trial were reduced by 4.9% after six weeks of Tabata Training Method. A statistically significant difference was found between the test periods of the two groups 40-km Time-Trial ($p < 0.01$).

DISCUSSION

The aim of this study was examine the effect of the Tabata Training Model on the performance of mountain biking athletes. A total 19 mountain bikers with senior training in the 14-18 age range participated in the study. The Traditional Training Group applied the Traditional Training Program for seven days within the six-week training program. Differently, the Tabata Training Group applied the Tabata Training Model for four days and the Traditional Training Model for three days for six weeks.

The impact of the Tabata Training Model on peak power values for six weeks was examined, the peak power average of the pre-test was measured as 889W., and the peak power average value of the post-test was measured as 965W.. This difference was statistically significant ($p<0.01$). The pre-test peak value of the Traditional Training Group was 773.33W., and the post-test peak average value was measured as 822.11W. These values are also expressed statistically significance ($p<0.01$).

Statistically significant differences were observed between the pre-test and post-test measurements of both groups and between the pre-test and post-test measurement values between the groups. But, in the Tabata Training Group, this difference between the pre-test and post-test is %10,4. This difference between the pre-test and the post-test of the Traditional Training Group is 6.3%.

The reason for the statistically significant difference between the pre-test and post-test peak power values of both groups is thought to be the training of both groups. However, it is important that the rate of change in the peak power value of the Tabata Training Group (10.4%) was approximately twice the rate of change in the peak power value of the Traditional Training Group (6.3%). This shows that the Tabata Training Model is more effective than the Traditional Training Model at peak power.

Ocak et al. (2014) examined the effect of the eight-week basketball training on some physical and physiological parameters in their study. A total 12 basketball players with an average age of 26 participated in the study. They measured the anaerobic strength of the participants before and after eight weeks of basketball training. As a result of the measurements made, they found a statistically significant increase in the pre-test and post-test anaerobic power values. The results of this study are similar to those of ours.

In their study, Westgarth et al. (1997), investigated the effect of interval training on performance of eight cyclists. They practiced a total of 12 sessions of the interval training, two times a week for six weeks. The athletes loaded 6-8 repetitions in interval training, 5 minutes with 80% of their peak power values, and they took active rest for 1 minute. Westgarth et al. (1997) applied a peak power output test to measure cyclists' performance. As a result, peak power values increased from 404 W to 424 W. Compared to this study, peak power output values in our study increased in both groups but significantly increased in TTG. In the light of these results, short-term and high-intensity intervals can be said to improve performance more.

The effect of the Tabata Training Model on MaxVO2 values for six weeks was examined, the pre-test MaxVO2 average values was 58.80 ml. and the post-tested MaxVo2 average values was measured as 60.90 ml. This difference was statistically significant ($p<0,01$). The average value of MaxVO2 in the pre-test of the traditional training group is 56.23 ml., and the post-tested MaxVO2 average value is measured as 58.44 ml. These values is also statistically significant ($p<0,01$).

While there were statistically significant differences between the pre-test and post-test measurements of both groups, there were no statistically significant differences between the pre-test and post-test measurement values between the groups. Of the Tabata Training Group, this difference between the pre-test and the post-test is 5.3%. This difference between the pre-test and the post-test of the Traditional training group is 3.9%.

As shown in Table 5, it is important that the rate of change in MaxVO2 values of the Tabata Training Group (5.3%) is greater than the change rate or the Traditional Training Group (3.9%). Accordingly, the Tabata Training Model makes a more positive contribution to the MaxVO2 values of cyclists than the Traditional Training Model.

Tabata et al. (1996) decoupled 14 participants into two groups and investigated the effects of strength and high-intensity intermediate training on performance for six weeks, five days a week. The first group practiced moderate intensity endurance training with 70% of the MaxVo2

value for one hour a day. The second group of 7-8 sets with 170% of the MaxVo2 value had 20 seconds of loading and 10 seconds of rest. At the end of six weeks Maxvo2 values of the group practicing interval training increased by about 7 kg/min. In our study, the Tabata Training Method applied to cyclists with high level training increased MaxVo2 values by 5.3%.

Etxebarria et al. (2014) studied the effect of high-intensity interval training on cycling performance for three weeks, two days a week, in their study with 14 moderately trained triathlon athletes. Participants in this study were divided into two groups. The first group applied short-term, high-intensity interval training (9 to 11 sets, 10-20-40 Sec.) and the second group applied 6-8 sets of 5 minutes interval training. They performed an endurance test on a bicycle ergometer to measure participants' performance. MaxVo2 values in both groups increased by approximately 7% at the end of the training process. Compared to our study, the rate of increase in mid-level training athletes in this study and the rate of increase in high level training athletes in our study (5.3%) are very close. In the light of these results, the Tabata Training Method can be considered to be an effective method that can be used to improve performance.

Koçak et al. (2015) examined the impact on performance of endurance, climbing and interval training applied two days a week for six weeks to four mountain bikers. During interval training, loading was done at a maximum intensity of 85-96%. Ten sets of exercises and ten minutes of active rest between sets were applied. As a result, they found that high intensity interval training improved the athletes' mountain bike performance. In our study, a shorter rest was performed by applying similar intervals, and performance increase was achieved.

In the study of Ocak et al. (2014), they examined the effect of eight weeks of basketball practice applied to basketball players on some physical and physiological parameters. A total of 12 basketball players with an average age of 26 participated in the study. They performed a 20-meter shuttle run test to measure participants' aerobic strength before and after eight weeks of basketball training. As a result of the measurements, the pre-test and post-tests found a statistically significant increase in aerobic strength values. The results of this study are paralleled by the results of our study.

When the effect of the Tabata Training Model applied for six weeks on the test duration 40-km Time-Trial is examined, the average value of the Pre-test period is 70.30 minutes, the average value of the Post-test period is 66.95 minutes measured as. This difference is statistically significant ($p < 0.01$). The average values of the '40-km Time-Trial Test' time of the Traditional

Training Group were 73.02 minutes in the pre-test, and 71.38 minutes in the post-test measured as. These values are also statistically significant ($p < 0.05$).

The reason for the statistically significant difference between the pre-test and post-test values in the test period the 40-km Time-Trial Test time in both groups may be that both groups were trained. What is important at this point is that the change in 40-km Time-Trial Test is greater in the Tabata Training Group (-4.9%) compared to the traditional training group (-2.2%). This shows that the Tabata Training Model is more than twice as effective as the Conventional Training Model on the 40-km Time Trial Test.

Laursen et al. (2005) applied high-intensity interval training to 38 well-trained cyclists and measured its effect on performance. They divided the participants into four groups. Each of the three groups practiced a different interval training. The fourth group was determined as the Traditional Training Group and applied endurance training. Trainings were carried out for four weeks, two days a week. The first group performed eight sets of intervals with the Watt value at which they reached MaxVO2 values, and stopped loading when the pedal speed was below 60. They applied an active rest period of twice the load time. The load applied during active rest has been reduced by 60%. The second group applied the same load as the first group and rested with 65% of their maximum heartbeat count. The third group, on the other hand, loaded 12 sets of 30 seconds with 175% of the aerobic power output and rested for 4-5 minutes. The Traditional Training Group, on the other hand, applied endurance training in which they loaded up to 80% of the maximum number of heartbeats. In order to measure the performance of athletes, they applied a cycling 40-km Time Trial Test. After the training process, there was a significant increase in the 40-km Time-Trial Test data of the first three groups, while there was no significant difference in the Traditional Training Group. Considering the results, it is seen that unlike the interval training programs applied in this study, we achieved a greater increase in the 40-km Time-Trial Test data with the Tabata Training Model in our study.

Westgarth et al. (1997) investigated the effects of interval training applied to eight trained cyclists on performance. They applied a total of 12 sessions of interval training program, twice a week for six weeks. In interval training, athletes loaded 5 minutes with 80% of their peak power values, and did 6-8 repetitions with 1 minute of active rest. When our study is compared with this study, it is seen that the test time values 40-km Time Trial Test increased in both groups, but the increase in TTG was noticeably higher.

When the effect of the Tabata Training Model applied for six weeks on the leg strength measured by the leg dynamometer was examined, the pre-test mean value was 152.75 kg., the post-test average value was measured as 181 kg. This difference between them is statistically significant ($p < 0.01$). While the average values of leg strength measured by the leg dynamometer of the Traditional Training Group were measured as 113.33 kg in the pre-test, it was measured as 126.30 in the post-test. These values are also statistically significant ($p < 0.01$).

There were statistically significant differences between the pre-test and post-test measurements of both groups within the group, and between the pre-test and post-test measurements between the groups. However, this difference between the pre-test and post-test of the Tabata Training Group was 16.1%. This difference between the pre-test and the post-test of the Traditional Training Group is 11.4%.

The statistically significant difference between the pre-test and post-test leg strength values of both groups may be due to the training in both study groups. It is important that the rate of change in leg strength values measured by the leg dynamometer of the Tabata Training Group (16.1%) is higher than that of the Traditional Training Group (11.2%). This is an indication that the Tabata Training Model makes a more positive contribution to the leg strength values measured by the leg dynamometer of the cyclists compared to the traditional training.

In their study Martin et al. (1994) investigated the effect of high intensity interval training applied to 11 cyclists for six weeks on performance and Isokinetic leg strength. For four consecutive days, participants carried out 30-minute loads with 82% of Mkas intensity, 30-minute rest aerobic interval and 1-2-hour rides with 65-80% of Mkas intensity on four days per week. As a result, they found that participants had an increase in leg strength. In the same way, both leg strength and aerobic and anaerobic cycling performance were increased in our study. This suggests that leg strength is an important factor for cycling performance.

CONCLUSION

As a result, the Tabata Training Model applied to the mountain cyclists for six weeks significantly increased the aerobic and anaerobic performances of the athletes, their test performance and leg strength 40-km Time-Trial Test. The Traditional Training Group has also improved with its Traditional Training Program, but the Tabata Training Group has made more progress. In the light of these results, it can be said that the Tabata Training Model is an effective

training model that can be used to increase performance in high-level trained mountain bikers. It can be said that the Tabata Training Model can be an economical and effective metod; and it is easy to study in a short time for sports scientists and mountain bike athletes working in this field.

Authors' Contribution

This study was produced from a Master's thesis. İrem Aslan is a graduate student. Yücel Ocak as the thesis advisor and Hasan Toktaş as the second advisor contributed to the article.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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