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RESEARCH ARTICLE
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Determining the Effect of Preparation Period Trainings on the Physical Parameters of Tennis Players

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ABSTRACT

This research was carried out to determine the effects of tennis training applied during the preparation period on some physical parameters of the athletes. The research group consists of 24 male volunteer athletes licensed in the tennis branch. Athletes in the research group were trained for endurance and tennis, three days a week and 85 minutes a day for eight weeks. Height, body weight, leg strength, hand grip strength, vertical jump, speed, flexibility and agility values were measured for the research group at the beginning and end of the training. SPSS statistical package program was used in the analysis of the data. Significance was accepted as $p>0.05$. As a result of the research, tennis players; It was determined that there was a statistically significant difference between the leg strength, hand grip strength, vertical jump, flexibility, agility, ten and thirty meters values ($p<0.05$). As a result, it has been seen that regular and planned tennis and endurance trainings during the preparation period affect the physical parameters of the athletes positively. In this context, it is thought that if the trainings to be applied at early ages are designed considering the physical characteristics of the athletes, they will positively affect the performance of the athletes.

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INTRODUCTION

Today, sports scientists, sports physicians and educators work together to make researches in many different fields in order for the athletes to be successful, and they are looking for ways to achieve maximum performance with minimum energy expenditure (Kasap, 1990: 36). Motoric features, which play an active role in reaching a high level of performance, are gaining intensity by directing many research subjects and becoming an area that has been studied in recent years (Sevim, 1997). Tennis, as it is known, is a sportive game played on a smooth and hard surface, aiming to hit the ball covered with felt with a tool called a racket, to pass the ball over a 91 cm high net in the middle of the field and finally to score. The field dimensions are 23.77 m long and 8.23 m wide, the shape of the field is a rectangular flat area. Field floors are; soil, concrete, grass, asphalt or synthetic form varies (Urartu, 1996).

The contributions of science to tennis have also increased the importance of technique and tactics. However, the creation of performance development, the teaching of the skill and the effect of training on performance should be properly analyzed. It requires a regular analysis for the training program after determining the condition, mental, technical-tactical level of the athlete according to certain measurements, what his deficiencies are, the reasons for failure, and the determination of this situation (Kandaz N., 2000). Successful and continuous performances in sports emerge as a result of meticulous evaluation of the data obtained in the accompaniment of scientific studies. If we take tennis as a base, laboratory studies and experimental findings will guide the coach and the athlete in terms of whether a tennis player is ready for the competition in every aspect. Athletes who do not meet the desired physical fitness criteria will have difficulties in applying the technique in very difficult conditions or will be exposed to serious injuries due to the application of more force (Chu et al., 1995). All physical fitness parameters must be in a very good condition for a tennis player to be able to hit effectively to put his opponent in trouble and to score as a result. In tennis, which is an individual sport where there is no physical contact with the opponent, rapid changes of direction, arm rotations, jumps and different moves are needed (Gullikson, 2003). Developing all these movements mentioned above with effective training will positively affect the success of the athlete and his performance status. In sports branches, the expectation of athletes after training is that their performance reaches the maximum level. Physical fitness, which includes the physical, physiological and anthropometric characteristics of the athletes, is very important in terms of the emergence of talent. In tennis, besides having good

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anaerobic and aerobic capacity, it is necessary to have strong muscles required for strength (Zorba, 1993). Athletes who play tennis and want to be successful in this branch should have as good flexibility, strength and endurance as possible. Athletes and trainers who want to improve the endurance and agility of the lower and upper extremities in the body can achieve this by repetitive training. A large part of the time on the tennis court should be spent on stretching and strengthening the appropriate muscle groups to develop agility. The development of these muscle groups will make them more advantageous than their competitors with the improvement of the athlete's conditional characteristics (Koçyiğit, 2018). Skill is a very important criterion in tennis. In addition to basic strokes, biomotoric features need to be developed in parallel. For coaches who want to achieve success, it is very important to discover the talents of the athletes and turn this talent into performance. Athletes' ability, coordination, speed and agility can be improved with training programs as a whole. Athletes with good biomotor features always have advantages over their competitors. Since these athletes can move and think faster than their competitors, and also have a quick recovery after a long period of time, they get tired less, take less risk, and also have less risk of injury and are advantageous compared to their competitors in terms of continuity of power. In other words, the difference between winning and losing depends on biomotoric characteristics (Çalışkan, 2014). Biomotoric features consist of motoric features such as speed, endurance, flexibility, agility and coordination. In gaming and combat sports (tennis, football, judo, boxing), techniques and tactics are used with conditional attributes. In order to develop these features, various trainings are applied in certain periods in special styles. Strength training does not cause an increase in endurance, strength and some speed characteristics of 12-14 year old male tennis players, but does not cause any change in flexibility and anaerobic power. (Harbili, 2002). In the light of this information, it is thought that this study, which aims to determine the effect of the training period training on the physical parameters of tennis players, will contribute to science.

METHOD

Research Group

24 male athletes who are licensed in the tennis branch, who participate in regular training, and took part in national and international tournaments voluntarily participated in the research group.

Measurements and Tests Applied in the Research

Body Weight and Height

Digital scales were used to determine the body weights of tennis players and the determined values were recorded in kilograms. In order to determine the height of the tennis players, it was determined with the help of a tape measure fixed on a flat wall surface and the measured values were recorded in centimeters.

Back-Leg Strength

The leg strength of the tennis players was determined by Takkei brand (Takei-Back&Lift, Japan) back and lift dynamometer. After placing their feet on the dynamometer bench with their knees slightly bent, the participants were asked to pull the dynamometer bar vertically up using their legs as much as possible by grasping it with their right-left hand, with their arms stretched, back straight and body slightly forward. Measurements were repeated twice and the best grade was recorded in kilograms (Erdoğan, 2020).

Hand Grip Force

The hand grip strength measurements of the research group were determined with a Takkei brand hand dynamo meter (Hand grip) with an accuracy of 0.100 kg. The hand grip strength measurements of the participants were determined in a way that they would not bend their arms and their hands would not touch the body. Measurements were repeated twice and the best result was recorded in kilograms (Gencer et al., 2019).

Vertical Jump Test

The vertical jump values of the tennis players were determined using the Smartspeed brand mat. Participants were asked to jump upwards when they felt ready, on the jump mat on the floor and by placing their hands on their waists. The measurements were repeated twice and the best grade was recorded in centimeters (Ayan et al., 2019).

Speed Test (10, 30 meters)

Before starting the speed tests of the research group, the athletes were given enough time to warm up. One by one, the athletes were placed on the starting line of the 10, 30-meter track, and after the exit signal was given to the athletes, they were asked to cross the finish line at maximum speed by crossing the starting line. The time taken by the participants to the start and finish line was determined with the help of photocell. The speed values of the athletes were measured twice and the best time was recorded in seconds.

Flexibility Test

The flexibility values of the research group were determined by the sit and reach test. To determine the flexibility values of the athletes; The participants were asked to sit on the floor and place their bare feet flat on the test bench, reach up to the last point where they could reach forward without bending their knees, and wait for a second or two in this way. Elasticity values measurements were repeated twice and the best result was recorded in centimeters (Bozkurt et al., 2021).

Pro-Agility Agility Test

The agility values of the research group were determined by the pro-agility agility test known as the 20 yard running test. The test area is determined by placing funnels 5 yards (4.57 m) right and left of the starting line. The agility values of the athletes are determined by placing the photocell door on the starting line and with repeated transition times. Before starting the agility test, the athlete takes his place at the starting line and the test is started with the start command, and the test is completed by touching the funnel on the right and then the funnel on the left and passing through the starting line. The agility test was repeated twice and the best degree was recorded in seconds (Erdogan et al., 2020).

Analysis of Data

SPSS statistical package program was used in the analysis of the data. ShapiroWilk-W normality test was applied for the normality analysis of the data and after it was determined that it showed normal distribution, Paired Samples T test was used to compare the pre-post test values of the research group. Significance was evaluated as $p<0.05$.

RESULTS

When Table 1 is evaluated, the demographic values of the research group; mean age, height, body weight and sports age are respectively 14.58±0.83 (years), 166.71±6.755(cm), 51.63±10.02(kg), 3.54±0.97 (years) was observed.

When Table 2 is examined; It was determined that there was a statistically significant difference between the leg strength, hand grip strength, vertical jump, flexibility, agility, ten and thirty meters values ($p<0.05$).

DISCUSSION AND CONCLUSION

The aim of this study; This study was conducted to determine the effects of tennis training applied during the preparation period on some physical parameters of the athletes. The research group consists of 24 male volunteer athletes licensed in the tennis branch. Athletes in the research group were trained for endurance and tennis, three days a week and 85 minutes a day for eight weeks. Height, body weight, leg strength, hand grip strength, vertical jump, speed, flexibility and agility values were measured for the research group at the beginning and end of the training. SPSS statistical package program was used in the analysis of the data. Significance was accepted as $p>0.05$. As a result of the research, tennis players; It was determined that there was a statistically significant difference between the leg strength, hand grip strength, vertical jump, flexibility, agility, ten and thirty meters values ($p<0.05$).

Table 1. Characteristics of Tennis Players Regarding their Demographic Status

	N	$\overline{X}$	*ss*
Age (year)	24	14,58	0,83
Size(cm)	24	166,71	6,75
Body wight (kg)	24	51,63	10,02
Sports year	24	3,54	0,97

In their study on the factors affecting the tennis skill of 10-14 year old athletes, Measurecu et al. (2010) found that there was a significant difference between the two groups in terms of flexibility, standing long jump coordination and tennis skill tests between the tennis training group and the non-trained group ($p<0$). ,05), reaction time, hand grip strength, agility, balance, and % fat measurements were not significantly different ($p>0.05$). The study supports our study in terms of the development of tennis skills of tennis players, but although there was a significant difference in the hand grip strength in our study, there was no significant difference at the $p>0.05$ level in the study of the measurer et al.

As a result of the research, the right hand grip strength of the tennis players was 33.28±4.69 kg in the pre-test, 36.82±5.40 kg in the post-training test, 36.82±5.40 kg in the left hand grip strength in the pre-test, 32.72±5.25 kg in the post-test 35. .12±4.38 kg was detected. It was determined that there was a statistical difference between dominant and non-dominant hand grip strengths of tennis players before and after training ($p<0.05$). In his study, Yüksel (2018) determined that badminton training applied for twelve weeks in summer sports schools improved the hand grip strength of the athletes. Turgut et al., (2019) found in their study that three-month cardio and idle exercises improved hand grip strength positively. Yıldız et al., (2016) determined that short-term training improves the hand grip strength of the athletes. Akyüz et al., (2017) found that short-term static and dynamic stretching exercises did not affect the dominant hand grip strength of the athletes, but positively affected the non-dominant hand grip strength. In their study, Erdoğan et al. (2020) determined that the training programs they applied during the competition period improved the hand grip strength of volleyball players in a positive way. Aykora et al., (2017) found in their study that twelve-week training improves the hand grip strength of sedentary students. All studies show parallelism with our study. Büyük and Gül (2013), in their study on the effect of 8-week general strength training applied to female tennis players in the 12-14 age group on tennis skills and some physical fitness characteristics, did not find a significant difference in ITN sensitivity power test averages ($p>0.05$). In this study, it was observed that the

Table 2: Physical Parameters of Tennis Players Pre-Post Test Analysis Results

				Post test			
Ölçümler	$\overline{X}$	*ss*		$\overline{X}$	*ss*	*t*	*p*
Leg force (kg)	69,70	16,56		80,68	15,48	-7,828	0,00*
Right hand grip force (kg)	33,28	4,69	36,82	5,40		-8,807	0,00*
Left hand grip force (kg)	32,72	5,25	35,12	4,38		-5,243	0,00*
Vertical jump (cm)	36,40	4,96	40,32	5,63		-9,793	0,00*
10 m speed (sn)	1,94	0,18	1,87	0,14		3,002	0,00*
30 mt Sürat(sec)	4,86	0,26	4,68	0,27		6,905	0,00*
Agility (sec)	5,78	0,23	5,66	0,23		3,595	0,00*
Flexibility (cm)	31,97	1,75	37,27	2,55		-15,426	0,00*

*p< 0.05

preparation period training of the athletes in the study created significant differences on the physical parameters of the tennis players, and a significant difference was determined as a result of the test values ($p<0.05$). The values obtained from Büyük's study do not support this study.

In our study, while the vertical jump values of the tennis players were 36.40±4.96 cm in the pre-test, the vertical jump values in the post-test were determined as 40.32±5.63 cm, and statistically significant differences were found between the vertical jump values ($p<0.05$). In Koçyiğit et al., (2018), the mean of vertical jump and right foot vertical jump of 12-14 year old handball and tennis players were 37.714±2.248 cm, 24.714±2.946 cm for handball players, while it was 34.142±6.268 cm and 20.142±5.201 cm for tennis players. they have stated. In the study conducted by Measurer et al., (2011) the vertical jump values of the 12-14 age group were respectively; It was found to be 44.7±5.0 cm and 41.7±5.3 cm. In a study conducted by Thissen (1991) on female volleyball players aged 12-14, the average vertical jump values were reported as 43.6±5.6 cm. Boreham et al. (1986) reported the vertical jump values of male subjects in the 12-14 age category as 33.0±5.8 cm. It is stated that the literature values related to vertical jump are in the range of 33.9-52.4 cm with an average of 44.4 cm (Zorba, 1995). Selçuk et al., (2018) stated in their study that 8-week plyometric exercises are important in improving vertical jump, hand grip strength, flexibility, 30 m sprint, situp, push-up and balance values. It is seen that the findings of our study are similar to the results of the research in the literature.

In our study, the pre-test was 31.97±1.75 cm in the measurement of flexibility, while the post-test was 37.27±2.55 cm. In line with these results, a significant difference was found. When the physical fitness characteristics of tennis players were examined in Gelen et al., (2009), the values related to flexibility were determined as 20.6±2.39 cm. Koçyiğit et al., (2018) investigated the anthropometric and motoric characteristics of a total of 28 male athletes aged 12-14, who actively train at the elite level, and stated that tennis players are (23,428±1,603) cm and handball players are 20,857±3,840 cm. Yet in another study; It was concluded that there was a significant difference in flexibility values as a result of 8-week training (Öztürk, 2008). In a similar study, a significant improvement was observed in the flexibility values of the athletes as a result of the 4-week training program (Alemdaroğlu et al., 2010). These studies support the research results.

In our study, the 30-meter sprint test values of the tennis players were found to be 4.86±5.12 seconds in the pre-test and 4.68±4.95 seconds in the post-test. As a result of 8 weeks of training, it was concluded that there was a significant difference in speed values. During football and tennis matches, they make frequent and short sprints, so speed is an important factor in tennis (Svensson and Drust 2005). In this study, it was observed that the 30 m and 10 m front and final sprint test values, which were performed to determine the effect of training on speed, decreased statistically significantly ($p<0.05$). When we look at the literature, in accordance with our study, there are studies reporting that strength, technique, endurance and speed training applied to football players positively affect 30 m sprint times (Christou et al. 2006, Okan 2009, Kobal 2016), as well as studies reporting that training does not affect sprint performance (Kartal et al. Günay 1994, Eniseler et al 1996).

As a result of the research, the leg strength of the tennis players was determined as 69.70±16.56 kg in the first test and 80.68±15.48 kg after the final test. It was observed that there was a statistical difference between the leg strength values of the tennis players before the first test and after the last test (at the end of 8 weeks). Cengizhan and Günay (2015) found in their study that quick strength training improves leg strength values. Karakuş et al., (2018) found that twelve-week swimming exercises positively increased the leg strength values in children. Carpes et al., (2008) stated in their study that regular exercises improve leg strength. Turna et al., (2019) determined that six-week Pap applications improved the leg strength of the athletes. Özdemir and Civan (2018) determined that the preparatory period training positively increased the leg strength of the athletes. Ozbay (2018) found in his study that high-intensity training improves the leg strength values of athletes. The findings obtained in the studies carried out support our study.

In the study, the agility values of tennis players were determined as 5.87±0.23 seconds in the pre-test and 5.66±0.23 seconds after the post-test. It was determined that there was a statistically significant difference in the agility values of tennis players after the pre-test and post-test ($p<0.05$). Srinivasan and Saikumar (2012) stated in their study that twelve-week training significantly improved the agility values of the athletes. Bayrakdar et al., (2019) determined that eight-week calisthenic exercises provided positive decreases in the agility values of the athletes. Milanović et al., (2013) stated in their study that twelve-week training positively improved agility values in the control group. Mathısen and Svein (2015) found that eight-week sprint training significantly improved agility performance. The studies carried out show parallelism with the results we obtained. Doğan, in his study in 2002, had male basketball players aged 13-15 undergo anaerobic endurance training during the preparation period and examined the physiological effects of endurance training with the tests he conducted at the end of the training. As a result of the study, it was seen that regular endurance training had a positive effect on the physiological characteristics of the athletes (Doğan, 2002). The findings obtained in the research support the study.

CONCLUSION

In the study, it can be said that the preparatory period training has positive effects on the physical parameters of tennis players. In this study, results close to the literature emerged. It has been observed that there is a statistically significant difference since the applied trainings are aimed at strengthening the back and arm muscles, leg strength, flexibility, speed, agility, hand claw strength, and thus allowing the physical capacity of tennis players to increase. As a result of the support of the tennis exercises for 8 weeks for the muscle groups used in tennis with technical training, it is thought that the development stems from the training program. As a result, it can be recommended to give more importance to the preparatory period training when the training programs are entered into the periodization, since it is thought that besides tennis technical and tactical training, the training period training will affect the physical

parameters of the tennis players and the development of the tennis player.

As a result; In tennis, it has been observed that both the training done in the preparation period and the training done in the other periods and the physical fitness and biomotoric features that are used intensively affect the physical conditions of the athletes positively when they are supported by tennis technical training. It can be said that it would be beneficial to train the biomotoric features of tennis players along with the technique. Based on the data obtained, it has been observed that the preparatory period training and tennis technical training programs applied to tennis players improve tennis performance and biomotoric properties. It can be thought that the applied training can create an exemplary model in similar studies. We think that the data obtained in this study will make important contributions to the coaches, athletes and sports science interested in tennis.

The data obtained at the end of the research were compared with similar studies and as a result of the comparison, it was seen that there was a similarity with the results of other studies. As a result of this study, regular endurance training can be recommended to increase the performance of athletes and delay fatigue. It can be recommended that the trainers who want to increase the physical capacity of tennis players should do endurance training 3-5 days a week. Considering that it is more fun and efficient to have endurance training in the form of a game for children, it can be recommended to have endurance training in the form of a game.

In line with these results, it has been revealed that the preparation period tennis training has an effect on the physical parameters (leg strength, hand grip strength, vertical jump, speed, flexibility and agility) of tennis players.

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