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RESEARCH ARTICLE

THE EFFECT OF STRENGTH TRAINING IN YOUNG TENNIS PLAYERS ON PHYSICAL PERFORMANCE

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ABSTRACT

The aim of this study is to investigate the effect of strength training on motoric characteristics of young male tennis players. A total of 40 players of Tennis Club Sportsmen voluntarily participated in the study out of which n=20 were experimental group and n=20 were control group. The experimental group practiced 8 weeks of strength training in addition to tennis training. However, the control group practiced just tennis training. Tall stature, bodyweight, vertical jump, 10 meters sprint and grasping tests were applied to the experimental and control groups before and after the training period. The differences between some performance variables of the experimental and control groups are evaluated with independent samples t-test. Level of significance is taken as 0,05. The experimental group's posttest values of vertical jump, 10 meters sprint and grasping forces are found to be higher than the control group's posttest values ($p<0,05$). In conclusion it is seen that strength training, which is having made to young tennis players, plays an important role in the development of physical performances of players.

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INTRODUCTION

Tennis, which is a sports branch that compels the technical, tactical, physiological and psychological abilities of human, is one of the best sports branches that develops the physical, mental, emotional and developmental characteristics if it is done in a planned and a programmed way (Haşıl and Ataç 1998). Essentially, tennis is a sports branch that requires more striving, working and training than other sports branches. Those who are closely acquainted with tennis know that a 5-set tennis match between equal forces is tougher than a 90-minutes football match and a lot of other sports branches, and it is a sports branch that tires out the body and the mind more (Öztop 2006). Hence, tennis is a sport that requires high physical power. A special andwhole condition program should be prepared with respect to the necessities of the branch and to the individual player's musculoskeletal structure especially in young and professional age groups. Recreational tennis players can use the condition programs to increase their performance levels, but what is important for this group is to provide for the development of general physical fitness and to prevent the injuries. Tennis players of young age groups should start with a training program that will provide physical development. Physical fitness, flexibility, heart-cycle durability, general strength and muscle durability should be found in this program. After developing a strong physical fitness basis, players of young age group should pass on to the basic and special movements of tennis branch and to injury preventive workouts. Professional tennis players should have built a strong general physical fitness basis beforehand. After that, players at this level can spare most of their training times to athletic physical fitness workouts and special tennis techniques workouts. Of course injury preventive workouts should not be forgotten either. By appealing to each component of a whole body condition program, possibility of the individual tennis player to reach his peak performance is increased (Chandler 1995). As is known anaerobic capacity remains at the forefront in tennis, and coordination, agility, speed and power are the most important components of the body (Crespo and Miley 1998). Especially coordination, agility and speed characteristics should be developed at early ages (Sevim 1995). It is generally known that if the girls and boys of pre-adulthood period attend the strength workouts at a sufficient intensity and time, they will be more powerful. The mechanism which underlies here can be explained by muscle hypotrophy in adults and youngsters. However, hypotrophy approach is not possible in preadolescence. This situation stems from the fact that testosterone hormone that stimulates muscle hypotrophy is not sufficient in circulation in preadolescent children (Ramsay *et al.,* 1990).

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In their studies Faigenbaum *et al.,*(1999) found out that multiple repetition-low intensity and few repetition-high intensity training programs cause similar increases at maximal force. Although it is stated in different studies that strength training increases the maximal force in adolescent children (Weltman *et al.,*1986, Blimkie 1992, Faigenbaum *et al.,*1999) it is not clear whether or not neurologic adaptations of strength trainings in children are special to training parameters (volume, repetition number) unlike what is expected in adults.(Behm *et al.,*2008). The aim of this study is to determine the effect of 8-weeks strength training on the motoric characteristics of young male tennis players.

MATERIALS AND METHODS

Model of the research is experimental method with control group. A total of 40 players voluntarily participated in this study that actively play tennis in a Tennis club, that are aged between 12 and 24, and (n=20) of them are experimental group and other (n=20) of them are control group. The experimental and the control group have been informed in the study about all the measurements and trainings. The experimental group practiced strength trainings along with tennis trainings, but the control group practiced only tennis trainings. The strength training which lasted for 8 weeks was applied by two specialists. The pretests were taken before the trainings by 2 specialists from tennis courts. Performance measurement results of the experimental and the control groups are calculated as average (x) and as standard deviation (±SD). The pretest results of the experimental and the control groups are identified as variable in the univariate analysis of variance and the differences of the variables between the results of posttests are determined. The differences between some performance variables of the experimental and control groups are evaluated with independent samples t-test. Level of significance is taken as 0,05. The strength trainings are applied 3 days a week for 8 weeks and for about 30-35 minutes each. Repetition maximum (RM) is taken for each movement of each player and RM is determined once again every two weeks. The players are made to do general warm-up exercises before the strength trainings and they are made to do special warm-up exercises for strength after the strength trainings. 6 movements prepared by specialists are made to the children do who are aged from 12 to 24 from simple to complex in the way they can practice those. Strength training movements are shown on Figure 1.

Figure 1. Strength Training Program

Movements	Repetition Maximum Loadings			Repetition
Push-up	%50	%75	%100	3
Sit-up	%50	%75	%100	3
Burpee	%50	%75	%100	3
Kangaroo Jump	%50	%75	%100	3
Right Foot Jump	%50	%75	%100	3
Left Foot Jump	%50	%75	%100	3

Applied Measurements

Tall Stature and Bodyweight: The heights of the experimental and the control group are measured barefooted and by a pharmacy type height measurement device (0,5cms precision) and their weight are measured by a scale (100grs precision).

Vertical Jump Measurement: Vertical Jump Test is done by using "Jump Meter". The players jumped upwards all out without stepping and bouncing on a time and distance scaled sensitive ground and the distance they jumped is determined in terms of centimeters on the device. After the players jumped for 2 times their best degree is recorded as the vertical jump value (Tamer 2000).

10 Meters Speed Test: The subjects ran between two lines on a football pitch 10 meters apart from each other with their own will by using their maximal strength. Their degrees are confirmed by a Casio brand chronometer (Tamer 2000).

Grasping Strength: The tensiometer is adjusted according to the hand gauge of the subject while he is standing in upright position. Maximum claw force is measured starting first with the right hand while the arm of the subject is straight and on his side with a 10-15 degree angle from his shoulder. The subject does 4 repetitions with both of his hands and the best degree is recorded (Tamer 2000).

FINDINGS

Average and standard deviation values (x ±SD) of all the test results that evaluate the motoric characteristics are given on the tables in this study. Statistical evaluations between the experimental group and the control group are presented along with the related charts.

Table 1. Analysis results of age, tall stature and body mass of the experimental and the control group

Variables	n	Experimental Group (x ±SD)	Control Group (x ±SD)
Age	20	13,10 ±0,87	13,11 ±0,24
Tall Stature	20	151,90 ±3,22	152,35 ±4,74
Bodyweight	20	41,54 ±5,32	40,45 ±2,98

Table 2. Pretest measurement analysis results of some motoric parameters of the experimental and the control group

Variables	n	Experimental Group (x ±SD)	Control Group (x ±SD)	f	p
Vertical Jump	20	24,75 ±1,31	23,80 ±1,81	1,70	0,208
10 meters Sprint	20	1,86±0,07	1,87±0,06	,860	0,423
Left Hand Grasping	20	18,73±2,05	18,09±1,40	2,45	0,122
Right Hand Grasping	20	22,84±2,29	20,96±1,14	4,23	0,068

p<0.05*

No significant discrepancy can be found on the statistically chosen variables in the pretest comparison of the experimental and the control groups.

Table 3. Posttest measurement analysis results of some motoric parameters of the experimental and the control group

Variables	n	Experimental Group (x ±SD)	Control Group (x ±SD)	f	p
Vertical Jump	20	26,00 ±1,29	24,25 ±1,27	7,63	0,013
10 meters Sprint	20	1,80±0,07	1,85±0,05	0,55	0,031
Left Hand Grasping	20	19,34±2,05	18,12±1,36	9,09	0,008
Right Hand Grasping	20	24,56±2,67	21,14±1,47	9,31	0,007

p<0.05*

A significant discrepancy is determined on all of the statistically chosen variables in the posttest comparison of the experimental and the control groups.

DISCUSSION AND CONCLUSION

Sport branches such as handball and tennis that require maximal anaerobic strength development include short-term supramaximal sprints. This case can cause the children who are engaged in sport branches such as handball and tennis to display better performances in anaerobic tests (Bencke *et al.,* 2002). The effect of maturation on the development of anaerobic appropriateness is discussed since Eriksson, Karlsson and Saltin (1971) stated the intermediate relationship between testicular volume and maximal muscle lactate which proposes the effect of testosterone on maximal lactate in children aged 13 (Bencke *et al.,*2002). Latest study findings remain incapable in supporting this outcome. A few studies have shown that there is development in anaerobic strength and lactate levels throughout childhood, but these studies do not contain adolescence period. (Bencke *et al.,* 2002). Along with the fact that strength trainings increase anaerobic strength, as a result of this study significant discrepancy is found between relative average strength values and vertical jump which evaluates the anaerobic strength of the experimental group and the control group. However, no statistically significant discrepancies can be found between the results of peak strength, relative peak strength, average strength and fatigue index. Although the increase in vertical jump height in the experimental group supports the fact that anaerobic strength develops, peak strength results of Wingate test do not support this case. The increase seen in relative average strength shows that strength trainings applied to the experimental group provide for the development of the continuity characteristic of strength in terms of scope and intensity features. In another study in which Koçak *et al.,*(2003) researched the effect of 2-hours-a-week gym classes on the physical development of students, they found out that the vertical jump values of children aged from 9 to 12 are 20,6±4,8cms. These findings show parallelism with a lot of studies.

When sprint performances are analyzed it is found out that the 10 meters running performance of the experimental group is higher than the control group. It is thought that the reason of this increase observed in the performance stems from the fact that -as it is specific to tennis- the game mostly passes with 10 meter sprints. In the studyBozkurt (2000) carried out on football players aged from 13 to 14, he confirmed the 30 meter speeds of the players aged 13 as 5,34±0,30secs. 5 meters, 10 meters and 30 meters sprint feature is more closely related to quickness and quick power (strength) (Bompa 1998). The application of force in a short period of time has an extremely positive effect on acceleration. Therefore, although other sprint performances of the child tennis players in adolescence period -except the 10 meters sprint performances- do not increase depending on the strength training that is applied; it is understood that growing increases sprint performance from the drops in sprint values of both the experimental and the control group. Findings show parallelism with some studies. There are significant discrepancies in the right-left hand grasping posttests of the experimental and the control groups. In the studies that were conducted Uzuncan (1991) found the claw force values of male students aged 12, living in Konya as 16,17±3,14kgs. Yazarer *et al.,*(2004) found the claw force of 25 male players aged between 11 and 15 who joined the basketball workouts of summer sports school as 19,2±9,51kgs. Zorba *et al.* (1995) found the right claw force of volleyball players aged from 12 to 15 as 32,71±5,59kgs and their left claw force as 30,06±5,09kgs. İşleğen (1989) found the right claw force of football players aged from 12 to 14 as 34,12±7,41kgs and their left claw force as 32,12±5,63kgs. The claw force results found in this study are higher than the findings of Uzuncan and Yazarer, and lower than the findings of Zorba and İşleğen. Differences of training methods, growth periods, sports ages, sports branches and training periods can be shown as the reason for this situation. In conclusion, it can be said that the strength trainings that will be applied to young tennis players will have an impact on some motoric parameters.

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