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THE EFFECT OF LEG SIZE ON THE SPEED AND QUICKNESS SKILSS OF YOUNG FOOTBALL PLAYERS

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Abstract: This research was conducted to investigate the effects of upper leg circumference and leg length on speed, quickness and step frequency in young football players. This exercise was held with the participation of 190 people, who has the football player licensed in category of "U"(U15-U17) in Turkey Football Federation İstanbul Soma Aslangücü, Çeliktepe and Seyrantepe Of Sport Club. Information such as the demographics of the players, how many training sessions per week and how much football they played were recorded. The survey measurements were made during the first week of the pre-season. Measurements of 10-30 m sprint, pro-agility and 10-30 m sprint step frequency were performed to determine the relationship among upper limb circumference, leg length, speed and agility skills. In the analysis of the data, the SPSS 23.0 statistical program was used. The Kolmogorov Smirnov test was performed to determine whether the data were normal distributions. Relations between the data were determined by Pearson correlation test and studied at $p < 0.05$ significance level. As a result of the analysis of the data; statistically significant differences were found between the values of the upper leg circumference and leg lengths of the footballers and the results of the motoric test measurements ($p<0,05$). As a result; the suitability of athletes' body structures to sports has an effect of enhancing performance. Leg structure of the athletes can be considered as a talent selection parameter in terms of determining the tendencies of playing football.

Keywords: Agility, Leg Length, Soccer, Upper Leg

GENÇ FUTBOLCULARDA BACAK YAPISININ SÜRAT VE ÇABUKLUK BECERİLERİNE ETKİSİ

Öz: Bu araştırma; genç futbolcularda üst bacak çevresi ve bacak uzunluğu, sürat, çabukluk ve adım frekansı üzerindeki etkilerini incelemek amacıyla yapıldı. Çalışma, Türkiye Futbol Federasyonu İstanbul Soma Aslangücü, Çeliktepe ve Seyrantepe Of Spor kulüplerinin 15 yaş ve 17 yaş altı takımlarında lisanslı olarak futbol oynayan toplam 88 futbolcunun gönüllü katılımıyla yapıldı. Sporcuların demografik özellikleri, haftada kaç adet antrenman yaptıkları ve ne kadar süredir futbol oynadıkları gibi bilgileri kayıt edildi. Araştırmaya ait ölçümler sezonbaşı hazırlık döneminin ilk haftasında yapıldı. Tüm katılımcıların üst bacak çevresi ve bacak uzunluğu ölçümleri ile futbol branşı için önemli olduğu düşünülen sürat ve çabukluk becerilerini ölçmek amacıyla 10-30 m sürat, pro-agility çabukluk ve 10-30 m sprint adım frekansı ölçümleri yapıldı. Verilerin analizinde, SPSS 23.0 istatistik programı kullanıldı. Verilerin normal dağılım gösterip göstermediğini belirlemek için Kolmogorov Smirnov testi uygulandı ve veriler arasındaki ilişkiler Pearson korelasyon testi ile tespit edilip $p<0,05$ anlamlılık düzeyinde incelendi.Verilerin analizi sonucunda; futbolcuların, üst bacak çevresi ve bacak uzunluğu değerleri ile motorsal test sonuçları arasında istatistiksel olarak anlamlı ilişki bulundu ($p<0,05$). Sonuç olarak; sporcuların vücut yapılarının spor dalına uygun olması, performansı artırıcı bir etkiye sahiptir. Sporcuların bacak yapıları, futbola olan yatkınlıklarının tespit edilebilmesi açısından bir yetenek seçimi parametresi olarak düşünülebilir.

Anahtar kelimeler: Futbol, hız, çeviklik, üst bacak, bacak boyu

INTRODUCTION

Increasing scientific studies have caused the changing and improvement of scientific perception compared to past. The fact that the scientific facts presented by sports scientists are applied to the field coaches is the most important reason why the achievements achieved are the change of scientific perception and awareness.

The football structure collects a large number of people in a common payday. When considering the place in the world market, it is a great investment vehicle, and when you consider the humble place in recreational sense, it is an entertainment vehicle attracting seventy people from the seventies. The adventure of football, which started with the desire to hit the ball by a child who just started running, continues and continues as a big platform where the greatest investors and companies see it as an investment vehicle and head for big projects and in a professional sense, states and nations almost fight each other.

This struggle, of course, encourages sports to examine in detail the individual handling of all the elements of soccer and to change and strengthen the development of all parts physiologically and physically.

Today's football demands change and development in physical skills as well as physiological demands (Bush, et al., 2015). Football has a lot of motor skills in it. strength, speed, endurance, and their components are constantly increasing loads. Especially the ability to change of direction quickly, which is of great importance for maneuvers in short distances, and the ability to progress faster at longer distances, emphasize the concepts of speed and agility. In the studies done, the relation of the speed and agility skills of football has been determined (Coratella, et al., 2016). Speed and quickness are influenced positively by strength development. Previous studies have shown that muscle activation and force producing ability can affect performance (Bobbert, et al., 1996). The ability to get on the fast track, to reach the ball before the opponent, or to change direction with sudden movements can often determine the winner on the football. Surveys show the effects of lower extremity muscles on speed, quickness and other sports performance (Morin, et al., 2015; Brooks, etal., 2013; Comfort, et al., 2014; De Hoyoet al., 2015; Guler and Eniseler, 2018; Kellis and Katis, 2007; Aslan et al., 2011).

Increased performance in football; not only for elite athletes, but also for players under the age of 17. The complex structure of the surrogate formation, which is a common product of conditional, coordinative, and psychological features, has broadened the view that genetically the boundaries are a programmed motoric feature. (Muratli, et al., 2011). The choice of the right individual for football is of great importance at the point where it comes from overcoming the increasing training loads in the coming years, especially if the concept of movement, especially speed, quickness and the relevance of its components to skill, is considered. Scientific research to be done in order to determine the criteria for "talent selection", which should be done at an early age, will contribute to sports scientists, coaches and related literature in this field. This research, therefore, to examine the effects of young footballers' upper leg circumference and leg length on speed, quickness and step frequency, and to contribute to the establishment of relevant criteria and norms on talent selection.

METHOD

Study Group

In the study, Turkey Football Federation Istanbul AslanGücü (U15, U16, U17), Çeliktepe (U15, U16, U17) and Seyrantepe Of (U15, U16, U17) Sports Clubs "of" total playing licensed football category voluntary participation of 88 footballers was made in accordance with the written consent of their parents and the Helsinki Declaration principles (World Medical Association, 2008). Information such as the demographics of the players, how many training sessions per week and how much football they played were recorded.

Data Collection

All the measurements were performed in the Seyrantepe Soccer Stadium and faculty of sport science, Istanbul University New Facility Sports Hall in the first week of the pre-season (no-competition period) in two days between 10 a.m. and 5 p.m.

The height of the athletes was measured using a steel meter stick with a flat floor surface and a wall. Their weight was measured using a 0.1 kg-sensitive electronic scale with their light clothes on. Body mass index (BMI) was calculated by dividing body weight in kilograms by the square of height in meters (James et al, 2005).

The leg length measurements of the athletes were performed by measuring the distance between the ground and the trocarterion point on the trochanter major part of the femur bone; upper limb circumference measurements were performed by measuring the circumference of the widest part of the thigh with the bone graft (Akın, et al, 2013).

Prior to the motor skill measurements, all the athletes were subjected to a standard warm-up protocol that included approximately 5-7 minutes of jogging, stretching and short sprints at different levels. Before the tests, the researcher informed the participants orally and practically. The researcher also provided motivating feedback to the athletes to ensure their maximum productivity.

To determine the speed performance of the participants, 10 and 30-meter sprint tests were done using the NewTest Power Time 300 Brand Photocell (Newtest Oy, Finland) which allows multiple speed measurements. This test provides information about the participants' anaerobic power, explosive power, rapid strength, and acceleration ability (Wood, 2008). The participants were asked to run at their maximum speed after the go signal on a straight running area of 10 meters and 30 meters in length. The test was repeated twice for each participant, and their best results were recorded in second. The participants were allowed to rest completely between the two tests.

With the camera set up in the area measuring 10 and 30 meter sprint tests, the sprint performances of the athletes were recorded and then the step frequencies were determined by the slow motion of the athletes' sprint performances with the application named "Kinovia 0.7.10".

The study used the pro-agility (quickness) test to determine the athletes' quickness. A straight line was drawn 5 yards to the right and 5 yards to the left of the photocell. The test participants waited ready in front of the photocell with knees slightly bent, started the run when the light turned off and ran 15 yards between the right and left lines at their maximum speed. Both passes in front of the photocell were recorded as the first and second turning times. The test was repeated twice for each participant, and their best results were recorded in second. Five-minute rests were given between repetitions of the test (McGuigan, 2000).

Analysis of Data

SPSS 23.0 statistical program was used for statistical analysis of the obtained data. Firstly, the Kolmogorov-Smirnov normality test was used to check whether all the data showed a normal distribution. Descriptive statistics were used to determine the general characteristics of the

groups. The mean values and standard deviations of the measured parameters of all participants were calculated. The Pearson Correlation Test was used to determine the relationship between the anthropometric measurement results of football players and the motoric test measurement results.

RESULTS

In this chapter; Findings of demographic information and motoric test measurement and comparison analyzes are included in the 15-17 age group of 88 football players participating in the study.

Table 1. Physical and Demographic Characteristics Of The Study Group

n=88	**Ave ± sd.**	**Min.**	**Max.**
Age(year)	15,68±0,76	15	17
Height (cm)	1,66±10,58	134	185
Weight (kg)	58,47±10,84	35	80
BMI (kg/m$^{2)}$	20,78±2,10	16,65	26,12
Training Age	5,98±2,13	2	11
Number of Weekly Training	2,65±0,47	2	3,00
Weekly Training Time (hour)	4,19±0,60	3,00	4,50

Table 2. Findings Of Anthropometric and Motoric Measurement Results Of The Study Group

n=88	**Avg± sd.**	**Min.**	**Max.**
Leg Lenght (cm)	95,30±9,81	72,00	114,00
Upper Leg Circumference (cm)	48,46±6,59	33,00	63,00
Sprint 10 m Velocity (m/sn)	5,11±0,41	3,80	5,80
Sprint 10 m Time (sec)	2,01±1,88	1,69	2,65
Sprint 10 m step frequency (10m/step)	8,94±1,02	7,00	12,00
Sprint 30 m Velocity (m/sn)	7,20±0,74	5,00	8,68
Sprint 30 m Time (Sec)	4,92±2,14	4,12	6,45
Sprint 30 m Step Frequency (30m/step)	21,52±2,16	17,00	27,00
Pro Agility 1st Return Time (sec)	2,84±2,51	2,32	3,54
Pro Agility 2nd Return Time (sec)	5,48±2,11	4,68	6,89

Table 3. Relations BetweenThe Anthropometric Values Of The Study Group and The Results Of The Motoric Test Measurements

n=88		Leg Size (cm)	Sprint 10 m speed (m/sec	Sprint 10 m time (sec.)	Sprint 10 m number of steps	Sprint 30 m speed (m/sec.)	Sprint 30 m time (sec.)	Sprint 30 m number of steps
Leg Lenght (cm)	r		0,160	-0,785**	-0,730**	0,411**	-0,799**	-0,730**
	p		0,135	0,000	0,000	0,000	,000	0,000
Upper Leg Circumference (cm)	r	0,766**	0,150	-,0603**	-0,622*	,343**	-0,623**	-0,556**
	p	0,000	0,164	0,000	0,000	,001	0,000	0,000

*p<0,01 r: correlations

In the statistical evaluation made, there was not any level of correlation between athlete's leg lengths and sprint velocities of 10-30 m. A high level of opposition was found between 10-30

m sprint times and step frequencies (p <0.01). Between the upper leg circumference measurements of the athletes and the sprint velocities of 10-30 m and the leg length were found a relation moderate and same direction. At a speed of only 10meter and 30meters, no differences were found between leg size and leg length. It is found that there is a relationship between moderate and opposite direction between 10-30 m sprint times and step frequencies (p<0,01) (Tablo 3).

DISCUSSION AND CONCLUSION

Today, increasing scientific research is effective in shaping training plans and programs based on more accurate and scientific bases. The importance of scientific work is understood especially when considering the physical, mental, and psychomotor damage that can be caused by improper training practices on children. In our study, the effects of upper leg circumference and leg length parameters on the variables of speed and quickness of children and young footballers between the ages of 15-17 were examined. It is expected that our work will contribute to the literature when speed and speed are considered as a motoric feature.

In the study, the age, height, body weight, sports age, number of weekly training and duration of the athletes were determined (Table 1). Considering the age groups of the athletes, it can be said that body weights and height lengths are similar to those in other studies performed in this area (Yüksek, et. al., 2017a; Yüksek, et. al., 2017b; Göksu, et al., 2018, Güler and Eniseler 2017; Göksu and Yüksek, 2018; Aslan et al., 2011).

10-30 m sprint times, speeds and step frequencies and pro-agility quickness time of the athletes were determined (Table.2) Yüksek ve ark. (2017a). It is reported that in the group of 9-12 aged 18 elite swimmers, 50 m running times were 8,146 ± 0,64 sec for males and 9,03 ± 0,72 sec for females. the frequency of the steps; 29,7 ± 3,47 in males and 30,5 ± 3,03 in females. Göksu and Yüksek (2018), for athletes aged 10-13 and 14-17 years group, it is reported that 2.15 ± 0.16 sec of running time of 10 m of athletes in 10-13 age group, 5.34 ± 0.46 sec of running time of 30 m, pro-agility of 1st time of rotation 3.18 ± 0.28 sec. and 6.12 ± 0.57 sec of the 2nd turn times. For athletes aged 14-16 years, it is reported that 1.92 ± 0.13 sec for running times of 10 m, 4.66 ± 0.38 sec for running times of 30 m and 2.76 ± 0.22 sec for pro-agility 1 turn times. and 2.33 ± 0.39 sec for pro-agility 2. Turn times. Little et al. (2005). In their research with 106 professional football players aged 18-36, it is reported that the athletes' sprint times of 10 m were 1.83 ± 0.08 sec. Coratella et al. (2018), and 27 elite footballers aged between18-21 years, the athlete's 10 m sprint time 1.77 ± 0.10 sec. and 4.23 ± 0.19 sec of the 30 m sprint time.

In the study conducted, athletes' leg lengths were 94.17 ± 8.96 cm and sprint velocities of 10-30 m were found to have a high level of same direction relationship with each other. At the same time, it was found that there was a meaningful correlation between 10-30 m sprint times and step frequencies with high level of opposite direction (p <0,01). Singh (2018) found that athletes had leg lengths of 95.33 ± 5.65 cm when they were working with 150 softball players whose average age was 21.25 ± 2.66 years. Yüksek et al. (2017a) reported that in the group of 9-12 age of 18 elite swimmers, male swimmers had 88.1 ± 7.40 cm of leg lengths and 87.87 ± 9.39 cm of female swimmer leg lengths. In addition, they found that there was a significant correlation between the leg lengths and step frequencies of the athletes and the high level and the opposite direction between the 50 m speed conditions (p <0,05). In a different study, Yüksek et al. (2017b) found that athletes had a leg length of 97,88 ± 4,83 cm in their study of 16 swimmers in a group of 14 to 16 years-old. They reported that there was a meaningful

relationship between mid and reverse swimming performance with 50 m backstroke performance p <0.05).

In the study, the athlete's upper limb circumference measurements are 47.82 ± 5.77 cm and it is found that 10-30 m sprint speeds are moderately the same, 10-30 m sprint times and step frequencies are in a moderately opposite direction (p<0,01). Singh (2018), in his study, reported that athletes had an average of 53.07 ± 4.56 cm of upper leg circumference and 2% of softball performances. Özkoçak et al. (2018) found an average of 28,05 ± 4,32 cm for male athletes (n = 152) in their study with 260 athletes aged 5-14 years.

The findings of the investigated studies were similar to the findings obtained from our research and it was seen that they supported the our research.At the end of the measurement results obtained; It has been found that the values of leg length and upper leg circumference in the 15-17 age group footballers are advantageous to improve speed and quickness skills.In this case, an athlete's leg structures can be considered as a talent selection parameter in order to determine the tendencies of the athlete to soccer.As a result; it can be said that the fitness of the athletes to the sports field is a factor that enhances the performance.The data obtained from our work are expected to contribute to early childhood player selection and work carried out in this area, while determining the anthropometric structures and performance characteristics of children.It is also thought that the results of my work will help the concerned sportsmen and coaches in the mentioned sport branch preparation and organization of the training plan.

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