

# Examination of children's body composition and biomotoric features which attended summer football schools

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## Abstract

The purpose of the study is to examine body composition and biomotoric specifications of subjects who attended the football program for 8 weeks, 3 days a week. In the applied study, 50 subjects were chosen occasionally and voluntarily out of 125 football players. This study was applied on 8-13 aged male football players who attended summer football school in city of Gaziantep. Pre examination of the group was 1 week before 8 week training program, and post examination was 1 week after 8 week training program. Acquired data were analyzed with SPSS for Windows 16.0 Package software. According to pre and post training program physical and physiological examination, height, weight, Body Mass Index (BMI), body fat ratio, hand length, total arm length, head circumference, shoulder circumference, waist circumference, hip circumference, biceps circumference, front arm circumference, calf circumference, shoulder width, elbow width, hip width, knee width, flexibility measures, hand grip strength (right and left hand) measures, standing long jump, 1 minute shuttle test measures, resting hearth rate (RHR), maximal oxygen consumption (VO<sub>2</sub> Max) and anaerobic power measures were found  $p < 0.05$  level significance. As a result; there were advancements on physical, anthropometric and physiological values of subjects who attended 8 week summer football school.

**Keywords:** Football, body composition, biomotoric specifications, anthropometry.

## Yaz Spor Okulları Futbol Programına Katılan Çocukların Vücut Kompozisyonu ve Biyomotorik Özelliklerinin İncelenmesi

### Özet

Bu çalışmanın amacı, haftada 3 gün olmak üzere toplam 8 hafta süren futbol programına katılan deneklerin vücut kompozisyonu ve biyomotorik özelliklerinin incelenmesidir. Denek grubuna uygulanan çalışmada, 125 futbolcudan tesadüfi yöntemle ve gönüllü olarak 50 kişi seçildi. Bu çalışma; Gaziantep ilinde 8-13 yaş grubu yaz futbol okullarına katılan erkek futbolcular üzerinde uygulandı. Denek grubunun ilk ölçümü 8 hafta süre ile yapılan futbol antrenmanlarından bir hafta önce, son ölçümü ise 8 haftalık antrenman programı bittikten bir hafta sonra yapıldı. Elde edilen veriler SPSS for Windows 16.0 paket programında analiz edildi. Denek grubunun antrenman öncesi ve sonrası yapılan fiziksel ve fizyolojik parametrelerin ölçümlerine göre denek grubu futbolcularının boy, vücut ağırlığı, vücut kitle indeksi VKİ, vücut yağ oranı, el uzunluğu, toplam kol uzunluğu, baş çevresi, omuz çevresi, bel çevresi, kalça çevresi, biceps çevresi, ön kol çevresi, calf çevresi, omuz genişliği, dirsek genişliği, kalça genişliği, diz genişliği, esneklik ölçümleri, pençe kuvveti (sağ ve sol el) ölçümleri, durarak uzun atlama ölçümleri, 1 dakika mekik testi ölçümleri, istirahat kalp atım sayısı (İKAS), maksimal oksijen tüketim kapasitesi (VO<sub>2</sub>Max) ve anaerobik güç değerlerinde  $P < 0.05$  düzeyinde anlamlılık bulundu. 30 metre sürat testi değerlerinde  $p < 0.05$  düzeyinde anlamlılık bulunamadı. Sonuç olarak; 8 hafta süre ile yaz futbol okuluna katılan deneklerin fiziksel, antropometrik ve fizyolojik değerlerinde gelişim gözlenmiştir.

**Anahtar Kelimeler:** Futbol, vücut kompozisyonu, biyomotorik özellikler, antropometri.

## INTRODUCTION

Football is one of most widely played sports in the world (5,18). This sport characterized by short sprints, rapid acceleration or deceleration, turning, jumping, kicking and tackling (8, 40).

As it is on all around the World, football, which got more widespread especially mid 1990s in Turkey, did not only take attention, but it also got big mass to come along. As a result of this change in football, there was a serious increase in society's expectations of football and this caused an upswing in importance of youth training. In such a time period when science penetrated life this much, the use of new scientific methods on football has become inevitable.

Despite the fact that 15-20 years ago families were forbidding sports, in other words football to their kids, nowadays sports has become an industrial sector and it is being encouraged by parents. Now instead of inhibiting, families are encouraging their kids to play football. As a result of increase in these demands, public institutions that manage football and sport clubs put their youth system in more scientific and organized state.

What is the efficiency of summer football schools organized by both Youth Services and Provincial Directorate of Sports and Sport Clubs and Individuals on children's physical specifications and football training? Are these summer football school studies planned by experts who take physical, physiological and psychological of children into consideration and do they contributed to development?

The purpose of the study is to examine body composition and bio motoric specifications of subjects who attended the football program for 8 weeks, 3 days a week.

## MATERIAL & METHOD

For this study, required consent was taken from Gaziantep University Clinical Researches Ethics committee. This study was applied to 8-13 male football players who attended summer football schools. 50 individuals out of 125 were chosen occasionally and voluntarily.

### Training Protocols

Individuals attending the research joined 8 week training program with 90 minutes a day, 3

days a week. Also a diet was applied to subjects. It was secured that the subject did not attend any other training program other than the suggested one.

### Data Collection

Training program and test measurements were carried out on Gaziantep University Football field. Pre measurements of the subjects were taken 1 week before and post measurements were taken 1 week after the 8 weeks training program. It was secured that the subjects did not take any vitamins or antioxidants and they did not do any other heavy trainings during the program.

### Age, Height and Weight Measurements

Ages of children were detected in years. Weight was taken with weigh-bridge and a metal rod on this weigh-bridge with 0.1 kg sensitivity. Height was taken with Charder HM-200D branded digital height meter with 0.01 cm sensitivity. Subjects were asked to attend the measurements with shorts or swim wears. Subjects attended the measurements with bare foot or with only socks on their feet. It was secured that in measurements subjects met these specifications; face looking forward, foot palm stepping on weigh-bridge straight, knees tight, ankles adjacent, and standing tall (4, 41, 43).

### Body Fat Ratio Measurement

Holtain skinfold caliper, which applied 10g/sq. pressure in every angle, was used during Skinfold measurements. Determined previously; body fat ratio of subjects was calculated with values obtained from skinfold measurements of belly (abdomen), suprailiac, triceps and subscapula areas. Yuhasz formula was used for this determination. Measurements were taken from right side of every subject (4, 20, 41).

### Hand Grip Strength Test

Hand dynamometer (Takei Scientific Instruments Co. Japan) was used for both right and left hand grip strength measurement. Subjects were asked to clasp dynamometer lever with tense arm, highest value from 3 attempts for each hand was taken (4, 20, 41).

### RHR Measurements

RHR measurements were done by using Erka Erkameter Precise branded stethoscope for 15 seconds on subject and multiplying the result with 4

(beat/second) after subjects sat down and rested for 5 minutes. Measurement was done twice and lowest value was taken (4, 20, 41).

### Flexibility Test

Subjects sat down on ground, reaching test table by bare foot with straight foot palm and without twisting knees. With hands in front of their body, they reached as far as they can. Longest distance reached on the ruler on flexibility table was recorded (4, 41).

### 1 Minute Shuttle Test

Twisted leg sit-up test was applied to children in order to measure force and continuity of force. The method of test was told the children before the test (22).

### Standing Long Jump Test

Standing long jump test was applied in order to guess student's jump power and anaerobic power. Sportsmen were informed before test, 2 measurements were made and the one with higher value was recorded (28).

### 30 Meter Speed Test

Subjects ran voluntarily with max power between 2 lines, equivalent to 30 meters, on a tartan path of a football field. Their degrees were detected in seconds by Casio branded chronometer (4, 20, 41).

### 1 Mile Run-and-Walk Test and VO<sub>2</sub>Max

Subjects walked 1 mile (1609 m.) in line one by one on a 400 meter athletics field as fast as possible. Heart rate was inspected continuously and taken into record at each quarter mile.

1 mile run time: T1 4. Quarter heart rate: HR-4

Age (years), weight (lb.), sex (male: 1, female: 0)

VO<sub>2</sub>Max:  $6.9652 + (0.0091 \times \text{weight}) - (0.0257 \times \text{age}) + (0.5955 \times \text{sex}) - (0.2240 \times \text{T1}) - (0.0115 \times \text{HR-4})$  (4, 20, 41).

### Diameter Measurements

Subjects wore shorts before measurements. Measurements were made by Harpenden branded slippery sliding caliper. Measurements were taken from shoulder, elbow, hip and knee (19).

### Length Measurements

Subjects wore shorts before measurements. Measurements were made with measuring tape which had no flexibility. Total arm length and hand length were measured while the subjects were standing. (19).

### Circumference Measurements

Subjects wore shorts before measurements. Measurements were made with measuring tape which had no flexibility. Head, shoulder, waist, hip, biceps, and forearm and calf circumferences were measured. Results were noted with 0.1 cm sensitivity. (19).

### Calculating BMI

Following formula was used to calculate Body Mass Index;

$\text{BMI (kg/m}^2\text{)} = \text{Body Weight (kg)} / \text{Height}^2 \text{ (m)}$  (19).

### Statistical Analyzes

Statistical analyzes of this study was made using SPSS statistics software. Statistical results were evaluated in %95 confidence interval with significance level of  $p < 0.05$ . Before statistical processes it was observed whether the values were dispersed normally or not. In order to evaluate the significance happened because of parameters between the pre and the post measurements of subjects, Paired Samples T test was applied.

### RESULTS

According to pre and post training program physical and physiological examination, height, weight, BMI, body fat ratio, hand length, total arm length, head circumference, shoulder circumference, waist circumference, hip circumference, biceps circumference, forearm circumference, calf circumference, shoulder width, elbow width, hip width, hip width, knee width, flexibility, hand grip strength, standing long jump, 1 minute shuttle test, RHR, VO<sub>2</sub>Max and anaerobic power measures were found  $P < 0.05$  level significance (Table 1).

**Table 1.** Comparison of physical and anthropometric features of subjects.

Variable	Mean $\pm$ STD	SD	SE	t	p
Height (pre test)	140.11 $\pm$ 10.91	1.46	0.20	-6.36	0,000*
Height (post test)	141.43 $\pm$ 10.71				
Weight (pre test)	35.30 $\pm$ 11.30	0.61	0.08	-11.52	0,000*
Weight (post test)	36.31 $\pm$ 11.29				
BMI (pre test)	17.60 $\pm$ 3.59	0.42	0.06	-3.18	0,002*
BMI (post test)	17.80 $\pm$ 3.60				
Body Fat Ratio (pre test)	11.47 $\pm$ 2.15	0.39	0.55	3.39	0.001*
Body Fat Ratio (post test)	11.28 $\pm$ 1.96				
Hand Length (pre test)	15.30 $\pm$ 1.28	0.45	0.06	-4.36	0,000*
Hand Length (post test)	15.58 $\pm$ 1.16				
Total Arm Length (pre test)	60.40 $\pm$ 2.90	0.57	0.08	-5.16	0,000*
Total Arm Length (post test)	60.82 $\pm$ 2.86				
Head Circumference (pre test)	50.66 $\pm$ 2.25	0.54	0.07	-6.24	0,000*
Head Circumference (post test)	51.14 $\pm$ 2.11				
Shoulder Circumference(pre test)	76.44 $\pm$ 4.48	0.69	0.09	-4.04	0,000*
Shoulder Circumference(post test)	76.84 $\pm$ 4.44				
Waist Circumference (pre test)	59.66 $\pm$ 6.19	1.71	0.24	2.47	0,017*
Waist Circumference (post test)	59.06 $\pm$ 5.84				
Hip Circumference (pre test)	70.86 $\pm$ 7.20	1.23	0.17	-2.14	0.020*
Hip Circumference (post test)	71.28 $\pm$ 6.90				
Biceps Circumference (pre test)	19.26 $\pm$ 2.95	0.78	0.11	-4.66	0,000*
Biceps Circumference (post test)	19.78 $\pm$ 2.79				
Forearm Circumference (pre test)	16.86 $\pm$ 2.38	0.71	0.10	-2.37	0.022*
Forearm Circumference (post test)	17.10 $\pm$ 2.35				
Calf Circumference (pre test)	26.52 $\pm$ 3.20	0.64	0.09	-3.09	0,003*
Calf Circumference (post test)	26.80 $\pm$ 3.09				
Shoulder Width (pre test)	8.15 $\pm$ 1.22	0.29	0.04	-6.76	0,000*
Shoulder Width (post test)	8.44 $\pm$ 1.23				
Elbow Width (pre test)	5.53 $\pm$ 0.84	0.41	0.05	-3.65	0,001*
Elbow Width (post test)	5.75 $\pm$ 0.94				
Hip Width (pre test)	11.96 $\pm$ 2.23	0.26	0.03	-4.35	0,000*
Hip Width (post test)	12.13 $\pm$ 2.08				
Knee Width (pre test)	8.67 $\pm$ 0.89	0.07	0.01	-9.45	0,000*
Knee Width (post test)	8.77 $\pm$ 0.89				
Reach and Touch (pre test)	8.10 $\pm$ 4.42	1.39	0.19	-9.09	0,000*
Reach and Touch (post test)	9.90 $\pm$ 4.26				
Hand grip strength Left (pre test)	12.65 $\pm$ 3.18	0.78	0.11	-4.56	0,000*
Hand grip strength Left (post test)	13.15 $\pm$ 3.09				
Hand grip strength Right (pre test)	13.22 $\pm$ 4.08	0.81	0.11	-6.50	0,000*
Hand grip strength Right (post test)	13.97 $\pm$ 4.36				
St. Long Jump (pre test)	147.66 $\pm$ 25.89	6.48	0.91	-4.64	0.001*
St. Long Jump (post test)	151.92 $\pm$ 23.54				
30 Meter Speed (pre test)	5.66 $\pm$ 0.98	0.56	0.07	0.87	0,388
30 Meter Speed (post test)	5.60 $\pm$ 0.85				
1 min. Shuttle (pre test)	37.08 $\pm$ 7.61	4.64	0.65	-3.50	0,001*
1 min. Shuttle (post test)	39.38 $\pm$ 6.70				
RHR (pre test)	79.82 $\pm$ 11.28	3.90	0.55	5.93	0,000*
RHR (post test)	76.04 $\pm$ 9.47				
VO <sub>2</sub> Max (pre test)	35.90 $\pm$ 5.05	2.51	0.35	-23.53	0,001*
VO <sub>2</sub> Max (post test)	37.17 $\pm$ 4.43				
Anaerobic Power (pre test)	33.06 $\pm$ 10.38	1.96	0.27	-6.28	0,000*
Anaerobic Power (post test)	34.81 $\pm$ 10.76				

\*p<0.05

## DISCUSSION

Height measurements of 50, 8-13 aged male football players were made after 8 weeks of training and an important increase in height is found in the study. Height of subjects was found 140.11 cm in pre measurement and 141.43 cm in post measurement.

Significance level of  $p < 0.05$  was obtained. Iri and Eker in their research based on the 16-week training found a statistical ( $p < 0.01$ ) increase between pre-training and post-training heights of the athletes participated to the study. It increased from 153.25 cm to 154.25 cm (19) Sahin also reported a similar

remarkable increase between control and experimental groups after his investigation on the aerobic training which including endurance, speed and strength work (32). This study, with similar results to previous studies, supports the litterateur.

It is thought that this increase is also due to; positive effect of sport on children's bone development, physical environment, nutrition and heredity.

Body weights of subjects were measured and a significant increase was found in the study. Weight of subjects was found 35.30 kg in pre measurement and 36.31 kg in post measurement. Significance level of  $p < 0.05$  was obtained. Bulca et al. in their research based on 15-week training found similar results (9). Chatterjee and Bandyopadhyay also found similar results in their study (10). This study, with similar results to previous studies, supports the litterateur.

Body mass indexes of subjects were measured and a significant increase was found in the study. Body mass index of subjects was found 35.30 kg/m<sup>2</sup> in pre measurement and 36.31 kg/m<sup>2</sup> in post measurement. Significance level of  $p < 0.05$  was obtained. Güler et al. found similar findings in their study (15). In litterateur similar results were found (19, 23). It is thought that since these findings are close to our results, they could be set as reference values for football playing children.

Body fat ratio of subjects was measured and a significant decrease was found in the study. Body fat ratio of subjects was found 11.47% in pre measurement and 11.28% in post measurement. Significance level of  $p < 0.05$  was obtained. İri and Eker found significance change in their study as  $p < 0.01$  (19). Ölçücü et al. found significance difference in pre and post tests in their research (26). Significant differences between body fat ratios could be explained by the help of 3 days a week 90 minutes a day training on metabolism's fat burning.

Hand and total arm length from upper extremities of subjects were measured and a significant increase was found in the study. Hand length of subjects was found 15.30 cm in pre measurement and 15.58 cm in post measurement. Significance level of  $p < 0.05$  was obtained. Total arm length of subjects was found 60.40 cm in pre measurement and 60.82 cm in post measurement. Significance level of  $p < 0.05$  was obtained. Akdoğan

et al. (1) and Cihan et al. (11) found similar results in their research.

Head circumference ratio of subjects was measured and a significant increase was found in the study. Head circumference ratio of subjects was found 50.66 cm in pre measurement and 51.14 ± cm in post measurement. Significance level of  $p < 0.05$  was obtained. Tuncer found significant difference in his study (38). Tuncer also found similar results in his research (39).

Hip circumference ratio of subjects was measured and a significant increase was found in the study. Hip circumference ratio of subjects was found 70.86 cm in pre measurement and 71.28 cm in post measurement. Significance level of  $p < 0.05$  was obtained. Tuncer found similar results in his research (39). This study, with similar results to previous studies, supports the litterateur. Additional to growth of children, this difference could also be explained by help of football trainings on hip development.

Biceps circumference ratio of subjects was measured and a significant increase was found in the study. Biceps circumference ratio of subjects was found 19.26 cm in pre measurement and 19.78 cm in post measurement. Significance level of  $p < 0.05$  was obtained. Kürkcü et al. found significant difference in their study (24). In litterateur similar results were (2, 7).

Forearm circumference ratio of subjects was measured and a significant increase was found in the study. Forearm circumference ratio of subjects was found 16.86 cm in pre measurement and 17.10 cm in post measurement. Significance level of  $p < 0.05$  was obtained. Tuncer found significant difference in his study (38).

Calf circumference ratio of subjects was measured and a significant increase was found in the study. Calf circumference ratio of subjects was found 26.52 cm in pre measurement and 26.80 cm in post measurement. Significance level of  $p < 0.05$  was obtained. Ayan and Mülazımoğlu found significance in their research (7).

Shoulder width, elbow width, hip width and knee width of subjects were measured and significant increases were found in the study. Shoulder width ratio of subjects was found 8.15 cm in pre measurement and 8.44 cm in post measurement. Significance level of  $p < 0.05$  was

obtained. Elbow width ratio of subjects was found 5.53 cm in pre measurement and 5.75 cm in post measurement. Significance level of  $p < 0.05$  was obtained. Hip width ratio of subjects was found 11.96 cm in pre measurement and 12.13 cm in post measurement. Significance level of  $p < 0.05$  was obtained. Knee width ratio of subjects was found 8.67 cm in pre measurement and 8.77 cm in post measurement. Significance level of  $p < 0.05$  was obtained. Ayan and Mülazımođlu found significant difference in their research (7). In litterateur similar results were found (24, 27).

Flexibility ratio of subjects was measured with reach and touch test and a significant increase was found in the study. Flexibility ratio of subjects was found 8.10 cm in pre measurement and 9.90 cm in post measurement. Significance level of  $p < 0.05$  was obtained. Chatterjee and Bandyopadhyay found similar results in their study (10). In litterateur similar results were found (17, 30).

Hand grip strength (right, left hand) of subjects were measured and a significant increase was found in the study. Left hand grip strength of subjects was found 12.65 kg in pre measurement and 13.15 kg in post measurement. Significance level of  $p < 0.05$  was obtained. Right hand grip strength of subjects was found 13.22 kg in pre measurement and 13.97 kg in post measurement. Significance level of  $p < 0.05$  was obtained. Gökdemir et al. found similar results in their study (13). In litterateur similar results were found (17, 33).

Standing long jump ratio of subjects was measured and a significant increase was found in the study. Standing long jump ratio of subjects was found 147.66 cm in pre measurement and 151.92 cm in post measurement. Significance level of  $p < 0.05$  was obtained. Ayan and Mülazımođlu found similar difference in their research (7). In litterateur similar results were found (3, 6, 14).

30 meter speed run time ratio of subjects was measured and a significant increase was found in the study. 30 meter speed run time ratio of subjects was found 5.56 sec in pre measurement and 5.60 sec in post measurement. Significance level of  $p < 0.05$  was obtained. Özsu (29) and Pekel et al. (30) found similar findings in their research at  $p < 0.05$ .

One minute sit-up test ratio of subjects was measured and a significant increase was found in the study. 1 minute shuttle test ratio of subjects was

found 37.08 repeat in pre test and 39.38 repeat in post test. Significance level of  $p < 0.05$  was obtained. Pekel et al. found similar findings in their research at  $p < 0.05$  (30). This study shows that regular football trainings help abdominal muscles grow and obtained values support litterateur.

Resting heart rate before the training of subjects were measured and a significant increase was found in the study. Resting heart rate before the training of subjects was found 79.32 pulse/min in pre measurement and 76.04 pulse/min in post measurement. Significance level of  $p < 0.05$  was obtained. Yıldız found similar difference in his study at  $p < 0.05$  (42). In litterateur similar results were found (1, 17). It is determined by researchers that resting heart rate decreases with trainings.

VO<sub>2</sub> max ratio of subjects was measured and a significant increase was found in the study. VO<sub>2</sub> max ratio of subjects was found 35.90 ml/kg/min in pre measurement and 37.17 ml/kg/min in post measurement. Significance level of  $p < 0.05$  was obtained. Hakkinen found significant difference in his study (16). Jousselin et al. found similar results in their study (21). In litterateur similar results were found (31, 34, 35, 36, 37).

Anaerobic power value ratio of subjects was measured and a significant increase was found in the study. Anaerobic power value ratio of subjects was found 33.06 kg.m/sec. in pre measurement and 34.81 kg.m/sec. in post measurement. Significance level of  $p < 0.05$  was obtained. İbiş (17) and Mosher et al. (25) found similar significant difference in their study at  $p < 0.05$ . This study, with similar results to previous studies, supports the litterateur.

As a result; it is determined that regular trainings in 8 week summer football camps helped physical development and positively affected physiological development features. Additionally, it is thought that this program helped children's natural physiological development. In this sense, Youth Services and Sport Provincial Directorate, which have the authority to open summer football schools, should increase the number of summer football schools. As a result of this, physical, physiological, and psychological development of children would be accelerated and they would be healthier in the future. But these schools should be organized within a scientific and plan and program. In summary, summer football schools are beneficial for children's development. The number of summer

football schools should be increased and it should be ensured that more children have access to them.

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