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Comparison of Physical Fitness Parameters with EUROFIT Test Battery of Male Adolescent Soccer Players and Sedentary Counterparts

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Abstract

The aim of this study was to compare physical fitness parameters of male adolescent soccer players and sedentary counterparts. A total of 26 male adolescents participated in this study voluntarily: Active soccer players (n: 3, age $\bar{x}$: 13,00 ± 0,00) and sedentary counterparts (n: 13, age $\bar{x}$:12,92 ± 0,75). The EUROFIT test battery was used to determine physical fitness. The test battery includes body height and weight measurements, touching the discs, flamingo balance, throwing health ball, vertical jumping, sit and reach, sit-up for 30 s, 20 meter sprint run, and 20 meter shuttle run tests. Data were analyzed by Mann Whitney U test. Significance was defined as $p<0.05$. Statistically significant differences were found between active soccer players and sedentary counterparts in flamingo balance, throwing health ball, 20 meter shuttle run performance and predicted VO2 values ($p<.05$). There was no significant difference in sit and reach, vertical jump, sit-up for 30s, and touching the discs performances between the two groups ($p>.05$). In conclusion, children who do sports are more successful on most of the fitness parameters than sedentary children.

Keywords: EUROFIT, physical fitness, performance, coordination, power

Introduction

Soccer is a sport which requires the combination of various performance components such as endurance, power, speed, coordination, and flexibility. Determination of the performance parameters is one of the most important aspects in sports sciences. Developments in sports sciences have lead to the development of new tests in order to evaluate physical fitness and sports performance. These tests enable the coaches and researchers to evaluate the effects of training on performance. Evaluation of certain performance parameters (speed, power, flexibility, and VO_{2max} etc.) is of great significance for the follow up and assessment of the training, particularly in team sports. For that reason; Committee of Ministers of the Council of Europe suggested its members to use the European Test of Physical Fitness (EUROFIT) in order to measure and evaluate the physical fitness of children at school age between the ages of 6-7 and 16-18 and take the necessary precautions for this application in the advisory jurisdiction dated May 19, 1987 and numbered R (87)9 (Committee of Experts on Sports Research, 1988).

At the heart of thoughts and policies related to the evaluation of physical fitness of children, EUROFIT tests provide descriptive and new information. The measurement of physical fitness for each child helps them to develop positive attitudes towards their bodies and get information about their physical status. The EUROFIT tests enable the parents to actively deal with the physical fitness of their children besides establishing a base for revealing the deficiencies of their children related to health. The application of the EUROFIT test battery in various age groups can be helpful in the determination of general state of health, the evaluation and gaining regular exercise habit and doing sports, giving information to the physical training teachers and trainers about the structural and functional characteristics of the children, developing national norms and determining national policies related to children (Fjortoft, 2000, Gronmo, 2000, Houwen, 2006, Ziyagil, 1996).

Physical fitness is closely related to both health and skills since it is one of the most important factor that affect daily life, activity and sportive productivity of the individual (Houwen, 2006, Lieberman & McHugh, 2001). It is stated that a lot of problems that arise during childhood and adolescence result from insufficient exercising habits and bad life standards (Astrand, 1977). It is overemphasized by the sports scientists that lower physical activity results in the decrease in flexibility, insufficiency in endurance, decline in power and speed (Houwen, 2006, Riddoch & Boreham, 2000).

Nowadays, determination of parameters affecting the performance in football that is one of the best loved and carried out most in the world occupies an important place. This study was aimed to execute with the thought that the determination of these parameters in the soccer court would be more reliable since it is a team sport. The results of this study will enable us to identify the differences between the boys who do sports and don't and the trainers and the families will be informed about the physical fitness and the development of the children.

Materials and Methods

Subjects: A total of 26 male adolescents (Age: 13-14 years) participated in this study voluntarily. Thirteen of the subjects were active soccer players (SP) and the remaining 13 were not active in any sports (C). The families of the children and the school administrations were informed in detail related to the study and their consent was obtained.

Data Collecting Tools: Anthropometric measurements and the physical fitness tests were executed in a definite order. The subjects joined all the measurements in their sports clothes.

Measurements of indoor sports hall, was taken by the researcher. Researchers of children and their families, giving detailed information about working with the school management, parents were informed and consent.

Anthropometric Measurements

Measurement of Body Weight:

The weight of the participants were measured by a weighing which measures with a ±0,1kg sensitivity. (Tanita 401 A Japan)

Measurement of Body Height:

The length of the subjects are taken the measure by a stadiometre devices (Holtain UK) with naked feet after the head is put to the Frankfort plane with a deep inspiration and by taking the measurements between vertex point of head and the feet.

EUROFIT Test Battery

Committee of Ministers of the Council of Europe published a book by the name of "Sports Research for Eurofit Test of Physical Fitness (EUROFIT) in 1988. In order to make all sports researches EUROFIT by standardizing the measurements physical fitness of school age children. All applied tests during this study. Is put in to practice by deriving benefit from declared methodology in handbook published by European Council.

Flamingo Balance Test:

The aim of this test is measurement of possibly standing in balance by remaining one foot in balance tendon defining leg, pelvic and trunk muscles.

The test subjects in balance on one leg while bending the knee to free his leg bones of the comb with the same hand while holding the other side has helped in providing free-hand balance. Protection of this balance, the subject was asked at least one minute. The first 30 seconds after the beginning of the test subjects lost their balance 15 times were considered unsuccessful, the test is ended. A balance can, within minutes, the longest period of time, have been the subject Flamingo equilibrium value. 2 times the test has been applied and the best rating.

Standing Medicine Ball Throw Test:

The aim of this test is defining the upper and lower body strength and explosive power by measuring the throw distance of a medicine ball which was thrown into the possibly distance with two hands by standing on foot.

This test is the measurement of the farthest distance that the subject can throw the medicine ball with the determined weight with his both hands and standing. The subjects of the line behind the ball of the feet of health to be hard to stop and asked to take the ball with two hands and the ball falls a distance measured in meters. Measurement repeated 2 times and recorded the best result

Vertical Jump Test:

The aim of this test is defining leg muscles strenght by measuring the highest distance which was jumped by standing.

The subject was standing adjacent to each leg, both arms above (strained case) from the knee by the force (bending) measured parallel to a wall, spread, reach the highest point touched with the fingers. As a measure has been touched in the vertical jump. Measurement repeated 2 times and the best results were taken into consideration.

Sit and Reach Flexibility Test:

The aim of this test is defining the flexibility of lower back and hamstring muscles by measuring the possibly accessible point while the participants were in position of sitting legs adjoining with the possibly body stretching to the front.

The test, the lower surface of 35 cm in length, the length of the upper surface of 55 cm, width 45 and length 32 cm. extents carried out using a tripod. 0-50 cm from the edge side of the subjects face from the top of the stand graded and the grading of side 30 cm. a ruler placed in the neck. Students are placed so that the bottom edge of the table and the soles of the feet without bending subject knees, learning forward, the ruler of the last change distance measures on the table. This test applied 2 times and which one is the best it is the record.

Sit-up Test for 30 seconds Test:

The aim of this test is defining the abdominal strength and muscles endurance by defining the pull-up exercise which the participant can do possibly at maximum in 30 seconds.

The subjects on the soles of the feet mat, knees bent 90 degrees and the body of an upright position. help you grasp the subjects' feet, sits behind an element of the subjects knees. Sit up during the movement of the elbows must touch the string. The subject makes the movement of the shuttle during the 30 seconds and within this period the number of sit-ups as the value of the subject is recorded.

Sprint Run for 20 meters Test:

The aim of this test is defining the speed, agility and quickness by measuring the shortest time which the participants can possibly cover a 20-meters distance.

Testing distance of 20 meters in the area designated start and end locations and photocells are placed into the football field. This 20 meter distance to the subject was asked to fold as quickly as possible, and his time was measured. This test applied 2 times and which one is the best results were recorded.

Plate Tapping Test:

The aim of this test is defining of the coordination of leg activity and speed by measuring the time while one hand stands fixed between two discs standed side by side and other hand touches at discs 25 times.

A table with adjustable height, 20 cm in diameter, with two rubber discs and a 15 x 20cm rectangular plate was used for testing. Rectangular plate with two on each side of the table placed in the center of the disc is placed at intervals of about 6 cm. Standing in front of the table legs slightly open rectangular plate with a hand placed on the subject, on

the other hand, can do the hard hand of the rapid movement of the tide right and left in contact with the disk has been carried 25 times. 2 times the test is best applied and recorded.

20m Multistage Fitness Test (Beep Test) Instructions:

The aim of this test is defining the maximum oxygen consumption (VO_{2max}) while the participant run a 20 meters distance till exhausted.

Method:

- Subjects in a round-trip runs 20 meters distance.

- Testing at the speed of a slow jogging (8 km / h) and subjects that begins first the sound signal start s to run course. Second until the voice signal has to reach the line. When you hear the second sound again to return to the starting line and the running speed of rotating every minute 0.5 km/h increasing signals continues.

- When the participants heard the sound signal, at the second signal have to reach at the other side of the line. The speed, the slow at first, increases gradually in every 10 seconds.

- When the participant misses the first signal sound and hears the second signal, it has to continue with the test or misses the signal sounds two times again, the test ends.

The Determination of VO_{2max}: In order to appreciate a sportsman with test, it is occurred a level form. With every 20-meters line, it is made a sign on the form. At the end of the test the sign which the sportsmen received is counted and from the valuation from, the maximum VO_{2max} value of the participant is fixed approximately in ml/kg/min category (Fox et al., 1999).

Analysis of the Data: Descriptive statistics were calculated. Physical fitness parameters of the two groups were compared by Mann-Whitney U test. The level of significance was used as 0.05.

Results

Table 1. Age and physical aspects of soccer players and control groups. The values presented as means and SDs

Parameters	Soccer Players (n:13)	Control (n:113)	P
Age (years)	13,00 ± 0,00	12,92 ± 0,75	0,668
Height (cm)	158.28 ± 0,71	154.87 ± 0,11	0,228
Weight (kg)	46,84 ± 6,84	50,95 ± 15,09	0,472
BMI (Kg/height^2)	18,58 ± 1,47	21,05 ± 3,93	0,137

* = $p<0.05$

The age and physical aspects of the soccer players and controls were similar ($p>.05$, Table 1).

Table 2. Comparison of physical fitness parameters between soccer players and control groups

Parameters	Soccer Players	Control	P
Flamingo Balance (sec)	26,92 ± 24,82	9,77 ± 16,53	0,011*
Throwing Medicine Balls	4,20 ± 0,29	3,54 ± 1,11	0,027*
Vertical Jumping (cm)	27,65 ± 4,52	26,18 ± 4,25	0,898
Sit & Reach (cm)	23,84 ± 5,81	19,65 ± 6,97	0,117
Sit-up (pieces)	39,07 ± 3,30	32,46 ± 8,3	0,085
20 m Sprint Run (sec)	3,16 ± 0,14	3,88 ± 0,55	0,000*
Plate Tapping (sec)	5,92 ± 0,75	5,78 ± 0,94	0,518
20 m Shuttle Run ($VO2_{max}$)	45,08 ± 2,29	36,73 ± 5,30	0,000*

* = $p < 0.05$

Soccer players were able to keep their balances for longer periods and throw the medicine ball further than the control group ($p<0.05$, Table 2). In addition, soccer players 20m sprint run time was shorter and 20m shuttle run time was longer compared those of control group ($p>0.05$, Table 2). Accordingly, the predicted values of $VO2_{max}$ were higher in the soccer players ($p>0.05$, Table 2). However, there was no significant difference between the two groups with regard to anaerobic power, flexibility, sit-up for 30 seconds and tapping plate ($p>0.05$, Table 2).

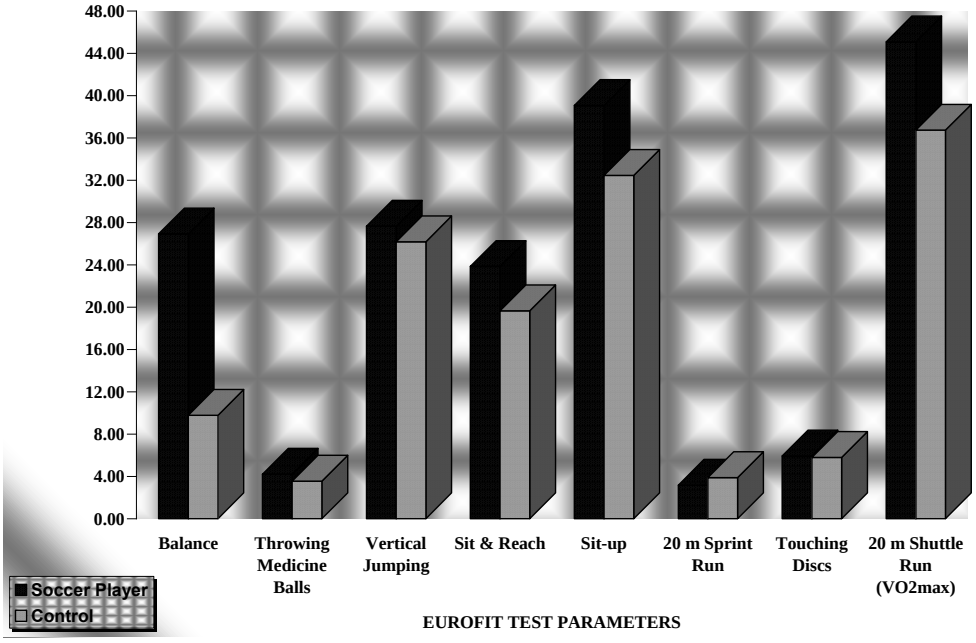

Figure 1. Physical fitness parameters of the subjects

Discussion and Conclusion

Upper extremity arm power evaluated by throwing medicine balls test was significantly greater in soccer players compared to that of controls ($p<0.05$). It is thought that this difference occurs since the throwing process is carried out with a greater effect as a result of development in the body structures of boys (especially the shoulder region) after sports and status of training (Houwen, 2006). In the results of the measurements for ball throwing among the athlete boys at the age of 12, Savucu et al., (Savucu et al., 2005) stated that there was no difference between these two groups with training of game and without games.

One of the basic motoric characteristics of EUROFIT Test Battery is the test for tapping plate. In a study by Lieberman (Lieberman & McHugh, 2001) significant differences have been reported between the age groups with regard to plate tapping in children between the ages of 5 and 7. According to the literature, plate tapping time improves with age in Turkish boys (Baydil, 2006, Çalış et al., 1992, Demirel et al., 1990). Plate tapping times for 11 years old (Demirel et al., 1990), 12-14 years old (Baydil, 2006), and for 15-16 years old boys who join the physical education lessons (Çalış et al., 1992) were reposted as 14.3±1.9 s, 13.08±1.55 sec. and 12.2 sec. respectively. Baydil et al., (Baydil, 2006) for the older boys (15-16 years of age) Although the results of the previous studies are in line with each other, in the present study we found very low values (5,92 ± 0,75 5.78±0,94 for soccer players and controls, respectively).

VO_{2max} values, which were predicted according to the results of 20m shuttle run test, were significantly higher in soccer players than controls ($p<0.05$). This finding is an indicator that participating in sports activities regularly improves VO_2 consumption. However, this finding is in contrast to the findings of Diallo et al., (Diallo et al., 2001) reporting no improvement in VO_{2max} in response to 10 weeks training program in 12-13 years old children. Baydil (Baydil,2006), the 12-14 age male students in a study of aerobic power values, 32.43±3.48 ml/ kg / min as determined. Senel (Şenel, Ö., 1995), the 13-16 age groups, male student's aerobic power values of the control group 38.27±5.37 ml/ kg / found in minutes. The ability to model their work accomplished on children between the ages of 11-16 and the training time of VO2max values ranging from 12-96 months, respectively, the average values of 38 male athletes VO2max 50.8±0.42, 50.43±5.83, 49.85±5.96, 56,205±4.79, 53.84±5.84 and 52.10±7.87 ml/kg/min as found. In this study, the highest VO2max value of the age of 15 male long-distance sprinters (64.0 ml/kg/min) and the lowest value of VO2max is only 15 years old male shooter (42.85 ml/kg/min) were identified as. When expressed per kg body weight as a relative, significant change in VO2max was found between the ages of 6-16 have emphasized values (Zorba et al., 1995).

There was no significant difference in anaerobic power determined by vertical jumping test between the groups (27.65±4.52 cm for soccer players, 26.18±4.25 cm for controls. Vertical jumping values reported in the literature for similar groups are as follows: 32.94±6.1 cm for 11 years old boys (Demirel et al., 1990), 22.25±4.85cm for 11-13 year old boys (Baydil, 2006), 23.96±3.98 cm for 12-15 years old Turkish volleyball players and 23.36±2.75cm for sedentary counterparts (Özder & Günay, 1994) 33.0±5.8 cm for 12-14 years old boys (Özder & Günay, 1994).The findings of the present study with regard to vertical jumping test performance are in line with the literature. Furthermore, the findings revealing the differences between athletes and the sedantaries are in parallel to the literature. As a result we can

conclude that anaerobic power shows a linear increase in relation with the age and it significantly differs in male adolescents who participate in sport activities.

No significant difference was found between soccer players and controls with regard to flexibility ($p>0.05$). The flexibility values in children depend on the structure of joints and muscles (McArdle, 1986). In addition, the balancing abilities of children increase with growth (McArdle, 1986). Özder et al., (İşleğen, 1988.) have found significant gender differences in motor skills and performance throughout childhood; males were better with the actions that require speed and balance while the children who do sports were better at the movements that require flexibility and coordination of small muscle groups. McArdle (Şenel, 1995) have reported increased flexibility in children playing basketball. In light of these results, we can conclude that the flexibility may depend on the activity level of the individual. There are several studies reporting the flexibility level of Turkish children (Boreham, 1986, Şenel, Ö., 1995, Tınazcı et al., 2004). In a study by Tınazcı (Pense & Turnagöl, 2010), flexibility of boys (7-11 years) was found as 28.77±4.75 cm. Şenel (Boreham, 1986) determined the flexibility values o male students between the ages of 13 and 16 as 23.4±5.48 cm, while we found the flexibility values of our subjects as 23.84±5.81cm and 19.65±6.97cm in soccer players and controls, respectively. The findings of the present study regarding flexibility are in line with the literature reporting no difference in flexibility between active and inactive children. In the studies reporting differences between active and inactive children, subjects' age, sport branch or inactivity were accounted for the differences in flexibility.

With regard to gender differences in flexibility, Tınazcı (Pense & Turnagöl, 2010), found no significant difference between girls and boys (28.84±4.91cm and 28.77±4.75cm, respectively) In another study, Pense (Saemundsen, 1986.) compared female basketball players with their sedentary counterparts (14-16 years) and found no significant difference between them (28.14±0.80cm and 24.01±28.14cm, respectively).

The flamingo balance test has been formed in accordance with the norms of EUROFIT. It is used to determine the level of balance and the power of the muscles playing role in balance (Committee of Experts on Sports Research, 1988).

Saemundsen (Uzuncan, 1991) worked on a large group of 190 students between the ages of 9 and 16, and found average value of flamingo balance test as 9.21 s. In the preset study we found that the balancing ability of soccer players was significantly higher in soccer players (26.92±24.82 s) than in controls (9.77±1.53 s). The control values of balancing ability were similar to the findings of Saemundsen (Uzuncan, 1991) and Baydil (Baydil, 2006). Moreover, the significant difference ($p<0.01$) in balance in favor of the group playing soccer can be considered as the positive effect of sports on balance and the development of related muscles.

As for the the sit-up performance, although the values of soccer players (39.07±3.30 pcs) was greater than in controls (32.46±8.3 pcs), the difference was not significant. There are a number of studies reporting sit-up values for Turkish children (Çalış et al., 1992, Demirel et al., 1990, Diallo et al., 2001, Kalkavan, 1999) Sit-up values for 11 years old boys was reported as 18.15±2.96 pcs (Demirel et al., 1990), for 12 years old as 22.19 pieces (Kalkavan, 1999), for 10,5±1,4 year old boys playing basketball as 16,6±2,5 pcs, for 15-16 years old boys who were joining physical training lessons as 20.4±2.5 pieces (Çalış et al., 1992), for 12-15 years old boys playing volleyball and sedentary counterparts as 24.81±1.80 pcs and 21.57±2.24 pcs, respectively (Özder et al., 1994). The results of these studies show that sports participation improves sit-up performance. Moreover, the researchers state that the type

of exercises and the intensity of training are also important in addition to age (Çalış et al., 1992, Demirel et al., 1990, Özder et al., 1994, Kalkavan, 1999).

In summary; in the present study physical fitness parameters of adolescent male soccer players and sedentary counterparts (13-15 years) were compared. Performance of flamingo balance, throwing medicine ball, 20 meter sprint run and 20 meter shuttle run test were significantly better in soccer players. On the other hand, there was no significant difference between the two groups with regard to vertical jump, sit and reach, sit-up for 30s and touching the discs test performances.

In conclusion, findings of this study showed that anthropometric characteristics of male adolescents participating in sports and who not are similar. On the other hand, children who do sports are more successful on most of the fitness parameters than sedentary children

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