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The Evaluation of The Connectıon Between Motor Performance Skills and Body Composition of 6-10 Year Old Children

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Abstract

This study was conducted to evaluate motor performance skills of the children between 6-10 ages. 87 students between 6-10 ages were included in the study. Physical condition parameters and body composition measurements of the participants were noted. Pearson Correlation Test was used for the analysis. According to the results, the average age is 8.00±0.988 years; the average height is 129.4±9.08 cm; the average weight is 29.7±8.27 kg. There is a statistically significant correlation between long jump, right hand, left hand, back strength, 20 meters speed test, 1 minute pull-up test, flamingo balance test and Body Fat Mass (BFM), Free Fat Mass (FFM), Lean Muscle Mass (LMM), Body Mass Index (BMI) and Body Fat Percentage (BFP) at the $p<0.01$ level. However, there isn't a significant difference between body composition and sit& reach test. At the end of our study, we found that there is a significant correlation between body composition and motor performance skills of the children.

Keywords: Child, Physical Suitability, Balance, Body Fat Rate

6-10 Yaş Arasındaki Çocukların Motor Performans Becerileri İle Vücut Kompozisyonları Arasındaki İlişkinin İncelenmesi

Öz

Bu çalışma, 6-10 yaş arasındaki erkek çocuklarının motor performans becerilerinin değerlendirilmesi amacıyla yapılmıştır. Çalışmaya yaşları 6-10 arasında 87 öğrenci katılmıştır. Katılımcıların fiziksel uygunluk parametreleri ve vücut kompozisyonu ölçümleri yapılmıştır. Analizler için Pearson Korelasyon testi uygulanmıştır. Katılımcıları yaş ortalamaları 8,00±,988 yıl, boy ortalamaları 129,4±,9,08 cm ve kilo ortalamaları 29,7±,8,27 kg olarak tespit edilmiştir. Katılımcıların uzun atlama, sağ el, sol el, sırt kuvvetleri, 20 metre sürat testi, 1 dk. mekik çekme testi, flamingo denge testi ile VYK, SYK, YKK, VKİ ve VYY arasında $p<0,01$ düzeyinde istatistiksel olarak anlamlı ilişki tespit edilirken, otur eriş testi ile vücut kompozisyonu parametreleri arasında anlamlı bir farklılık tespit edilememiştir. Çalışmamızın sonucunda, erkek çocuklarının vücut kompozisyonu ile motor performans becerileri arasında anlamlı bir ilişkinin olduğu tespit edilmiştir.

Anahtar Kelimeler: Çocuk, Fiziksel Uygunluk, Denge, Vücut Yağ Oranı

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INTRODUCTION

There is a well-known fact about the benefits of physical activities for human health. The studies have shown that when the children participate in physical activities, it directly affects their physical and psychological conditions in a positive way. It is found that doing sports throughout childhood years is related to the lipoidosis, body fat rate and cardiovascular health in adulthood (Roman et al., 2015). For instance, recoveries in cardiorespiratory health prove to decrease the risk of being over-weight during adolescence period (Ortega et al., 2014). A child constantly moves and is completely active; particularly when he starts walking, he is in constant motion. A child needs movement in order to make his organs function, enhance his skeletal structure, develop his lungs, activate his blood, and strengthen his nerve-muscle connections (Taş, 2017). Basic movement skills are basic behavior pattern of childhood which can be observed, and movements observed during sports, exercise and physical activity include physical skills such as running, bouncing, jumping, balancing, contorting, escaping, throwing and catching (Brien et al., 2016). Gaining basic movement skills (BMS) are developmentally listed as biological, psychological, sociological, motivational, cognitive etc. The process of gaining these skills contains active play experiences and created programs (Siahkouhian et al., 2011). As BMS abilities increase, health and physical sufficiency increase, thereby increasing ideal body weight maintaining rate (Bryant et al., 2014). According to some results, BMS is related to physical activity level. Not improving these skills in childhood may affect physical activity level in adulthood (Comeau et al., 2017). For example, Henrique and his colleagues have conducted a research on 293 children. After 2 years of monitoring physical activity, they found that BMS are improved in the ratio of 21% (Henrique et al., 2016). This study was conducted for the evaluation of the connection between motor performance skills and body composition of 6-10 years old children.

METHODS

Participants

The study was conducted in İzmir Özel Türk Koleji, Bornova. 87 schoolboys with 8.00±0.988 years average age, 129.4±9.08 cm average height and 29.7±8.27 kg average weight have participated in the study. The study period was during their school time which is between 9 am and 4 pm. It continued from 10th to 12th of April. Before the study, their parents have signed papers so as to show their volunteering. The following tests were applied to the participants respectively. Body Composition Measurement, Long Jump Test, Right Hand and Left Hand Strength Test, Back Strength, 1 Minute Pull-Up Test, 20 Meters Speed Test, Sit & Reach Test and Flamingo Balance Test. This study was designed in 2017. This study is a project to determine the general physical fitness and body composition of boys in primary school. We determined the sample of this study as boys between 6-10 years of age.

Test Protocol Methods

1) Body Composition Measurement: The bioelectrical impedance analysis measurement was made with "in body 230" model device of in body brand. Body Weight, Free Fat Mass (FFM), Lean Muscle Mass (LMM), Body Fat Mass (BFM), Body Mass Index (BMI) and Body Fat Percentage (BFP) values of all participants were recorded. Participants took off their shoes and socks before the measurement process. After their height, age and sex features were entered into the computer, they stepped up onto the device. While they were on the device, they held it with their hands. As the device measurement was finished, they went to the next test station.

2) Long Jump Test: The explosive force of the participants was measured with long jump test. They got two chances to try. They were asked for jumping to the longest distance by waving their arms with maximum power from where they stand. The best score was recorded (Fang et al., 2017).

3) Hand Grip Strength Test: The measurement was made with Takei hand dynamometer (hand grip). While the participant was standing, without bending the arm and contacting with the body, there was a 45 degree angle between the measured arm

and the body. Then measurement was applied. This process was performed three times, and the highest value was recorded (Ayaydin, 2015).

4) Back Strength Test: The measurement was made with Takei digital back-leg dynamometer. After the participant's feet were placed onto the dynamometer standing with a tense knee position, he drove up the dynamometer bar in a vertical way through his hands with tense arms, straight back and a little forward body leaning position. This experiment was performed three times, and the highest value was recorded (Ayaydin, 2015).

5) 20 Meters Speed Test: The purpose of this test is to define pace, agility and velocity of the participants by moving 20 meters as quick as possible. The test distance was decided as 20 meters, and the participants were asked for running this distance as fast as possible. Time was recorded with a chronometer. This test was conducted for two times, and the best result was recorded (Erikoglu et al., 2015).

6) Sit & Reach Test: This test was applied to measure participants' flexibility capacity. First of all, the participants took their shoes off, sat on the floor and placed their legs onto the sit& reach table. They tried to reach the table as far as possible.

Meanwhile, the researcher was very careful about whether the knee position of the participant was straight. Then, the participant placed his feet against sit& reach table. He started to push forward the mechanism on the table slowly and softly with his toes. This test was performed two times, and the best result was recorded (Vancampfort et al., 2015).

7) 1 Minute Pull-Up Test: The participants were made to pull-up in recumbency position as much as possible in 1 minute period with "BEGIN" command. Knees were in a 90 degree angle, hands were on the back of the head, and the soles were in touch with the floor. Their feet were held during pull-ups to prevent disconnection with the floor. Before the test, every participant tried the pull-up position for once. It was watched out whether the participants' shoulders touched the floor when they lay down, and their elbows touched their knees when they straightened up. Pull-up scores in one minute were recorded on the information form (Pekel, 2007).

8) Flamingo Balance Test: This test was performed in order to assess the ability of balance while standing on one leg. The participants took their shoes off and performed the test on a wooden board. At the beginning of the test, the instructors helped them to step on the board. When the time was started, they didn't help. The number of fallings during the balance test in 60 seconds was recorded (Karppanen et al., 2012).

Statistical Analysis Methods

The data analysis was carried out with SPSS 23.0 program. Frequency analysis was conducted so as to find the height, weight and age averages of children. Pearson Correlation Test was applied in order to specify the correlation between their performance tests and body composition measurements.

RESULTS

Table 1: *Average and Standard Deviation Values of the Participants*

Variables	N	Average (X) ± SS
Age (years)	87	8.00±0.988
Height (cm)	87	129.4±9.08
Body Weight (kg)	87	29.7±8.27
BMI (kg/m2)	87	17.4±3.01
BFP (%)	87	22.3±9.17
FFM (%)	87	22.4±4.16
BFM (kg)	87	7.24±4.95
LMM (kg)	87	11.2±2.47
Long Jump (cm)	87	119.7±21.0
Right Hand Strength (kg)	87	11.0±3.03
Left Hand Strength (kg)	87	10.4±2.88
Back Strength (kg)	87	30.2±9.29
20 meters Speed Test (sec.)	87	5.20±0.550
Sit& Reach Test (cm)	87	6.52±4.37
1 min Pull-Up Test (number)	87	19.3±5.13
Flamingo Balance Test (n)	87	18.3±8.42

The average and the standard deviation values of the participants are shown in the table. The average age is 8.00±0.988 years; the average height is 129.4±9.08 cm; the average body weight is 29.7±8.27 kg; the average BMI is 17.4±3.01 kg/m^2; the average BFP is 22.3±9.17; the average FFM is 22.4±4.16; the average BFM is 7.24±4.95 kg; the average LLM is 11.2±2.47 kg; the average Long Jump distance is 119.7±21.0 cm; the average Right Hand Strength is 11.0±3.03 kg; the average Left Hand Strength is 10.4±2.88 kg; the average Back Strength is 30.2±9.29 kg; the average 20 meters Speed

Test time is 5.20±0.550 seconds; the average Sit & Reach Test distance is 6.52±4.37 cm; the average 1 min Pull-Up Test number is 19.3±5.13; the average Flamingo Balance Test number is 18.3±8.42.

Table 2: *The Correlation between Body Composition and Physical Parameters of the Children*

Variables	Long Jump	Right Hand Strength	Left Hand Strength	Back Strength	20 meters Speed Test	Sit& Reach Test	1 min Pull-Up Test	Flamingo Balance Test
Long Jump	1	**,358****	**,369****	**,318****	**-,489****	,161	,170	,211
Right Hand Strength	**,358****	1	**,883****	**,741****	**-,235***	-,005	-,045	**,304****
Left Hand Strength	**,369****	**,883****	1	**,696****	**-,295****	-,046	-,030	**,246***
Back Strength	**,318****	**,741****	**,696****	1	-,155	,080	,032	**,225***
20 meters Speed Test	**-,489****	**-,235***	**-,295****	-,155	1	-,077	-,123	-,063
Sit& Reach Test	,161	-,005	-,046	,080	-,077	1	-,123	,019
1 min Pull-Up Test	,170	-,045	-,030	,032	-,123	-,123	1	-,050
Flamingo Balance Test	,211	**,304****	**,246***	**,225***	-,063	,019	-,050	1
BFM	-,071	**,500****	**,526****	**,518****	**-,218***	-,084	**-,229***	,127
FFM	**,342****	**,783****	**,765****	**,626****	**-,218***	-,129	-,171	**,237***
LMM	**,346****	**,786****	**,767****	**,634****	**-,225***	-,121	-,171	**,234***
BMI	-,064	**,486****	**,496****	**,505****	**,215***	-,029	**-,217***	,070
BFP	-,196	**,316****	**,336****	**,349****	**,334****	-,096	**-,224***	,015

***p< 0.05; **p< 0.01**

There is a p<0.01 level significant correlation between Long Jump Test, Right Hand Strength Test, Left Hand Strength Test, Back Strength, 20 meters Speed Test, FFM and LMM of the children. However, there isn't a significant difference between Sit& Reach Test, 1 min Pull-Up Test, Flamingo Balance Test, BFM, BMI and BFP of the children.

There is a p<0.01 level significant correlation between Right Hand Strength Test, Left Hand Strength Test, Back Strength, Flamingo Balance Test, BFM, FFM, LMM, BMI and BFP of the children. Besides, a p<0.05 level significant correlation is found in 20 meters Speed Test. However, there isn't a significant difference between Sit& Reach Test and 1 min Pull-Up Test of the children.

There is a $p<0.01$ level significant correlation in a positive way between Left Hand Strength, Flamingo Balance Test, BFM, FFM, LMM, BMI and BFP of the children while a $p<0.01$ level significant correlation is found in a negative way in 20 meters Speed Test. There isn't a significant difference between Sit& Reach Test and 1 min Pull-Up Test of the children.

There is a $p<0.05$ level significant correlation in a positive way between Flamingo Balance Test and Back Strength of the children. There isn't a significant difference between 20 meters Speed Test, Sit& Reach Test and 1 min Pull-Up Test of the children.

There is a $p<0.01$ level significant correlation between 20 meters Speed Test and BFP of the children. Moreover, a $p<0.05$ level significant correlation is found in BFM, FFM, LMM and BMI. However, there isn't a significant difference between Sit& Reach Test, 1 min Pull-Up Test and Flamingo Balance Test.

There isn't a significant difference between Sit& Reach Test, 1 min Pull-Up Test, Flamingo Balance Test, BFM, FFM, LMM, BMI and BFP.

There is a $p<0.05$ level significant difference found in a negative way between 1 min Pull-Up Test, BFM, BMI and BFP while there isn't a significant difference between Flamingo Balance Test, FFM and LMM of the children.

There isn't a significant difference between Flamingo Balance Test, Long Jump Test, 20 meters Speed Test, Sit& Reach Test, 1 min Pull-Up Test BFM, BMI and BFP of the children.

DISCUSSION and CONCLUSIONS

In our study, BMI averages of the children are found as 17.4±3.0. When we searched literature about this topic, we found that Pekel et al. (2006) observed BMI averages of the children between 10-12 years are 16.4±2.6. On the other hand, Duncan et al. (2017) carried out a study about relationship between BMI averages and motor skills of the children between 6-11 years, and they found that BMI averages of the children are 16.9±0.3. Also, Santos et al. (2014) made a study about relationship between body composition and motor performance of the children between 7-10 years, and they found that BMI averages of the children are 17.0±2.9. In addition, Kim et al. (2016) made a search on pre-school children in Korea, and they found that BMI averages of the children are 16.8±1.41. Having made a research on other studies in literature, we have discovered that the results are similar to our study's findings.

BFP values of the children are found as 22.3±9.17. Marmeleira et al. (2017) studied on correlation between motor performance and body composition of the children between 6-10 years, and they found that BFP averages of the children are are18.3±8.6. On the other hand, Ozkocak (2018) conducted a study on body composition of the children between 5-14 years and found that BFP averages of the children are 23.17±6.39. It has been detected that the results in Marmeleira et al. (2017) and Ozkocak (2018) are close to our study's findings.

When we analyzed the correlation between BMI and both hands strength of the children, there is a $p<0.01$ level statistically significant correlation. In addition to our study, whereas Montalcini et al. (2016), Souza et al. (2014), Liao (2016) and Ervin et al. (2014) had similar results in their studies, Omar et al. (2014) acquired different findings from ours. On the other hand, Lad et al. (2013) study result is $p<0.05$ level.

Long Jump Test average of the children is found as 119.7±21.0. Santos et al. (2015) made a research about lower body strength of the children, and they found Long Jump Test averages of the children are 132.89±24.05. On the other hand, Ranson et al. (2015) studied on school children, and they found Long Jump Test averages of the children are 138.92±21.06. In addition, Zaqout et al. (2016) made a study about physical suitability of European children and observed that Long Jump Test averages of the children are 120.6±24.6. Also, Henrique et al. (2017) analyzed motor improvement performances of Portuguese children and found Long Jump Test averages of 9 years old children 116.3±38.4. Finally, Chaves et al. (2015) analyzed motor improvements of Portuguese children between 6-10 years, and they observed Long Jump Test averages of the children are 121.00±20.79. Our results are same as Zaqout et al. (2016), Henrique et al. (2017) and Chaves et al. (2015). On the other hand, it is determined that the result of averages Ranson et al. (2015) and Santos et al. (2015) found is higher than our findings.

We found the average 20 meters Speed Test of the children is 5.20±0.55. Román et al. (2016) made a search on pre-school children and observed that the average 20 meters Speed Test of the children is 6.05±1.15. In addition, Dumit et al. (2010) studied about obesity and physical suitability on the children and adolescents. They found the average 20 meters Speed Test of the children is 4.00±0.50. On the other hand, Sanches et al. (2015) made an analyze on pre-school children for physical suitability, and the average

20 meters Speed Test of the children was found to be 5.45±0.63. Also, Roman et al. (2016) made a study about identifying physical suitability of the children between 3-6 ages and found the average 20 meters Speed Test of the children is 6.23±1.08. Our findings are similar to other literature findings.

In our study, the average Sit& Reach Test of the children is found to be 18,3±,8,42. Yıkılmaz et al. (2015) made a search on 8-12 age group children and observed that the average Sit& Reach Test of the children is 15.46±7.55. On the other hand, Chillón et al. (2011) made a study about contrasting Spanish children and adolescents. They found the average Sit & Reach Test of the boys is 16.6±5.4. Şahiner et al. (2010) studied different flexibility tests on the children and found the average Sit& Reach Test of the children is 17.30±6.28. In another study, Çelik et al. (2013) tested motoric features of 7-9 age group children and observed the average Sit& Reach Test of the children is 18.39±5.32.

Casonatto et al. (2015) made a study about physical suitability and BMI of the children and observed the average Sit & Reach Test of the boys is 27.0±8.0. Urlu (2014) analyzed physical activity level of the children between 10-12 years old and found the average Sit& Reach Test of the children is 21.36 ± 6.35. Casonatto et al. (2015) made a study about physical suitability and BMI of the children and observed the average Sit& Reach Test of the children is 27.0±8.0 .

Chaves et al. (2016) analyzed Peruvian children between 6-14 ages in terms of motor improvements. They found the average Sit& Reach Test of 10 years old children group is 21.5±2.8 . The results are similar to those of Yıkılmaz et al. (2015), Şahiner et al. (2010), Çelik et al. (2013), Urlu (2014) and Chaves et al. (2016) studies; however, Casonatto et al. (2015) study findings are higher than ours which means that there is a contrast with our findings.

In conclusion, we can say that there is a significant correlation between body composition and motor performance skills of the children.

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