

Effects of Recreational Exercises on Children's Anthropometric Parameters and Their Level of Nutrition Knowledge

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ABSTRACT This paper was done with the intent of studying and reviewing the effects of summer schools on children's physical development and their level of knowledge about nutrition. In this study, the target segment was 200 volunteer children in age group of 10 to 12 years. Children's average age was 11. 12 year, average stature was 145.25 cm, average body weight was 44.57 kg, and average body-mass index was 21. Physical fitness and anthropometric evaluations and stature, body weight, vertical jump, anaerobic strength, grip strength, back and lift strength, body and 30 meters tests were implemented. A survey on students was conducted to collect information about student's nutritional habits and effects of their socio-economical situation on their nutritional habits. Besides, the summer schools adversely affect and cause hindrance in physical and mental development. However, the nutrition knowledge and habits should be constantly improved.

INTRODUCTION

Development of children is continuous, however the acceleration of development in continuity vary according to periods. Phases of this process cannot tell apart each other because every phase links up with the previous phase in terms of personal differences and specific features (Muratli 2003).

Adolescence period is defined as phase of transition from childhood to adulthood. Important physical changes occur in this period. These changes are hormonal changes that bring maturity of height, weight, motor skills and sexuality (Ozer et al. 2002).

In the early periods of adolescence (12-14 years old), boys' physical development shows a heavy increase. This period is between 10-11 years old for girls. This period is called period of motor unskills for both girls and boys. The reason is that entering the adolescence increases the physical development and motor skills cannot keep up with the physical development (Larson et al. 1995; Ozer et al. 2002).

Sport is the physical activities done in the manner of games or contest aiming to increase physical strength and stamina. The basic aim of the gym classes and sport in the schools is increasing the children's development and tendencies with physical activities and help them to take their ability of movement to the next level (Gallahue et al. 1998; Mengutay 2005).

Even though the term physical fitness is used widely in the society it is difficult to define the term. Physical fitness is one's work capacity (Cakmakci 2002; Sevim 1995). According to this definition the person with the highest physical fitness is the one who can tirelessly move around for the longest time (Gallahue et al. 1998; Ozer et al. 2002; Mengütay 2005). In other words physical fitness is the ability of doing physical activities successfully (Zorba 1999).

This work is done with the intent of studying and reviewing the effects of summer schools on physical development of 10-12 years children and their level of knowledge on nutrition.

METHODOLOGY

The paper is based on survey done with 200 volunteer children aged 10-12 years old, who never participate in any sportive activities, but healthy children were picked from Gaziantep Sehitkamil Municipality Summer Sport Course. The subjects were picked according to simple random sampling method and all of them volunteered. Physical fitness and anthropometric test are followings in order of implementation: Stature and body weight, vertical jump, anaerobic strength, grip strength, back and lift strength, circumference and 30 meters speed test and a survey about nutrition knowledge of the children.

Activity Training Program

An activity training program in format of games which helps children to improve their flexibility, speed, coordination, quickness and aerobic strength and durability is implemented for 1.5 hours in a day and three days in a week.

Stature and Body Weight Measurement

Subjects are weighted on a 0.1 kg sensitive bascule without shoes and only wearing shorts. Stature measurement is measured with a Holtier brand sliding caliper. Sliding caliper is set on the scale as it touches subjects' heads while they are standing straight and measurements are noted with 0.1 mm sensitivity.

Caliber and Circumference Measurement

Body measurements are taken from 5 different areas such as chest, shoulder, hips, thigh and calf by using Lafayette instrument.

Hand Grip Strength: measurement is carried out with a Lafayette brand hand grip dynamometer. After 5 minutes of warming up, the measurement is taken while he/she was standing from 45 degree angle without subject's arm touching the body and without bending. This method is repeated 3 times for both left and right arms and the best scores for both arms are taken into consideration (Zorba 1999).

Back and Lift Strength: measurements are taken with a Lafayette brand back and lift dynamometer. After 5 minutes of warming up, subjects stood on the dynamometer's stand as their knees are bent, arms are stretched, back is straight and the body is little bent to the front. While subjects are in this position, they pull the bar of the dynamometer vertically as high as possible by using their legs. This test is repeated 3 times and best scores are taken into consideration (Zorba 1999).

Vertical Jump Test and Measurement of Anaerobic Strength: for this anaerobic measurement test a 1mx1m photocell which can measure the weight, jump pressure, endurance and landing pressure is used. Test is repeated twice and the best result is taken into consideration. Anaerobic strength is calculated by using vertical jump test results (Zorba 1999).

30m Sprint Test: A place in running track is designated for the test. Before starting the sprint

subjects and control groups are warmed up 15 minutes and asked to run 30m with high speed output. After 15 minutes test is repeated. The best results are taken into consideration (Sen 1998; Saygin 2009).

Nutrition Survey

There are 6 questions to detect subjects' demographic situation in the first part of the survey. In the second part the questions are asked to detect subjects' food habits. 20 questions asking subjects' knowledge on nutrition are prepared by searching the literature sources. In this data gathering work, research data are gathered by the researcher. As pre-implementation survey is handed to 20 students who are not in the sample group and clarity and validity of survey is confirmed (Cronbach's Alpha=0.7052). Subjects are picked randomly and survey is implemented as face to face meetings.

Statistical Analysis

SPSS 18 package software is used for evaluation of the data. Data's arithmetic mean, standard deviation, frequency and percentage values are calculated. Paired Samples T test is used to compare pretests and posttest. When the p value is <0.05, statistically significant difference is accepted.

RESULTS AND DISCUSSION

In Table 1, it was found that average of the children is 11.12 and standard deviation is .81. In Table 2, statistically significant difference was found between pretests and posttests in terms of stature and body mass index measurements degree $p < 0.001$, but statistically no significant difference was found in body weight measurements. According stature and body mass index measurements in the Table 2, $p < 0.001$ degree statistically significant difference was found between pretests and posttests but a statistically significant difference cannot be found in body weight measurements. Eather et al. (2012), with the test done with 213 children with the average age of 10.74, found that there was statistically significant difference in favor of experimental group between the body mass index of experimental and control group. Trost et al. (2003), in the research about physical activities of obese

Table 1: Average age of the subjects

	<i>N</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Arithmetic mean</i>	<i>Standard deviation</i>
<i>Age (year)</i>	200	10.00	12.00	11.12	.81

and non-obese children, found that non-obese children's body mass index has lower significant difference than obese children's body mass index. Etayo et al. (2014) suggested that BMI was a good indicator of body fat composition changes in children and adolescents, although BMI assessed by anthropometry was also a good indicator.

Saygin et al. (2005) found statistically significant difference between posttests of experimental group's and control group's body mass index after 16 week exercise called elements of physical activity training on 10-12 ages of children. In this study, especially during 12 weeks of exercise, getting into the weight control period and as a natural part of development period growing tall can be explained as the reason of statistically significant difference of body mass index.

In Table 3, the waist circumference mean of pretest (cm) was found to be 67.25 ± 6.84 ($p > 0.05$). The waist circumference mean of posttest (cm) was found to be 67.67 ± 6.32 ($p > 0.05$). Average of the pretest for waist circumference (cm) was found to be 74.35 ± 6.60 ($p > 0.05$). Average of the posttest for waist circumference (cm) was found to be 74.07 ± 9.53 ($p > 0.05$).

In Table 4, average of the pretest for back strength (kg) was found to be 45.52 ± 12.57

($p < 0.01$). Average of the posttest for Back strength (kg) was found to be 52.44 ± 13.26 ($p < 0.01$). Average of the pretest for Leg strength (kg) was found to be 44.37 ± 12.27 ($p < 0.01$). Average of the posttest for Leg strength (kg) was found to be 51.20 ± 17.07 ($p < 0.01$). Average of the pretest for Right Grip Strength (kg) was found to be 14.53 ± 2.87 ($p < 0.01$). Average of the posttest for Right Grip Strength (kg) was found to be 16.32 ± 3.69 ($p < 0.01$). Average of the pretest for Left Grip Strength (kg) was found to be 14.03 ± 3.32 ($p < 0.01$). Average of the posttest for Leg strength (kg) was found to be 15.17 ± 4.06 ($p < 0.01$). Average of the pretest for Vertical jump (cm) was found to be 23.38 ± 5.98 ($p < 0.05$). Average of the posttest for Vertical jump (cm) was found to be 26.77 ± 17.10 ($p < 0.05$). Average of the pretest for 30-meter sprint (sec) was found to be 6.06 ± 0.48 ($p < 0.05$). Average of the posttest for 30-meter sprint (sec) was found to be 5.94 ± 0.44 ($p > 0.05$). According to table 4, back strength of the subjects was found to be 45.52 ± 12.57 kg at pretest and it increased to 52.44 ± 13.26 kg at posttest and it makes an increase on significant difference ($p < 0.05$). Leg test was found to be 44.37 ± 12.27 kg at pretest while it was found to be 51.20 ± 17.07 kg at posttest and the difference between them is statistically significant different ($p < 0.05$). Saygin et al. (2005) found the leg

Table 2: Subjects' stature, body weights and body-mass index

<i>Variables</i>	<i>Tests</i>	<i>N</i>	<i>Arithmetic mean</i>	<i>Standard deviation</i>	<i>t</i>	<i>p</i>
Height (cm)	Pretest	200	145.25	7.53	-14.871	<0.001
	Posttest	200	149.40	8.11		
Body weight (kg)	Pretest	200	44.57	9.07	-1.801	>0.05
	Posttest	200	45.23	7.90		
Body-mass index (kg/m ²)	Pretest	200	.21	.3	5.37	<0.001
	Posttest	200	.20	.2		

Table 3: Subjects' body measurements

<i>Variables</i>	<i>Tests</i>	<i>N</i>	<i>Arithmetic mean</i>	<i>Standard deviation</i>	<i>t</i>	<i>p</i>
Waist circumference (cm)	Pretest	200	67.25	6.84	-1.148	>0.05
	Posttest	200	67.67	6.32		
Hip circumference (cm)	Pretest	200	74.35	6.60	.347	>0.05
	Posttest	200	74.07	9.53		

Table 4: Subjects' strength, vertical jump and 30 meters measurements

<i>Variables</i>	<i>Tests</i>	<i>N</i>	<i>Arithmetic mean</i>	<i>Standard deviation</i>	<i>t</i>	<i>p</i>
Back strength (kg)	Pretest	200	45.52	12.57	-7.410	<0.001
	Posttest	200	52.44	13.26		
Legstrength (kg)	Pretest	200	44.37	12.27	-5.052	<0.001
	Posttest	200	51.20	17.07		
Right Grip Strength (kg)	Pretest	200	14.53	2.87	-6.046	<0.001
	Posttest	200	16.32	3.69		
Left Grip Strength (kg)	Pretest	200	14.03	3.32	-3.733	<0.001
	Posttest	200	15.17	4.06		
Vertical Jump (cm)	Pretest	200	23.38	5.98	-2.117	<0.05
	Posttest	200	26.77	17.10		
30 Meter Sprint (sec)	Pretest	200	6.06	.48	1.517	>0.05
	Posttest	200	5.94	.44		

test results of the children who participated in the activities has higher significant difference than children who didn't participated in the activities (Saygin et al. 2005).

While subjects' right hand grip strength is 14.53 ± 2.87 kg at pretest, it is calculated 16.32 ± 3.69 kg at posttest and while left hand grip strength is 14.03 ± 3.32 kg at pretest, it is calculated 15.17 ± 4.06 kg at posttest and the difference between pretest and posttest was found statistically significant difference ($p < 0.05$). Hamurcu and his friends (2002) in their study on 10-13 age of children found that sedentary children's right hand grip is 6.58 ± 3.11 kg, left hand grip is 6.05 ± 3.19 kg, skier children's right hand grip is 11.20 ± 4.63 kg., left hand grip is 8.53 ± 4.36 kg. Karacabey and Kara (2006) in their study on 10-12 year old footballers found that, right hand grip is 15.27 ± 2.79 kg, left hand grip is 15.29 ± 2.93 kg. Ziyagil and his friends (1996) in their study on children who do sports find that 10 year old group hand grip is 15.20 ± 4.07 kg, 11 year old group hand grip is 15.88 ± 1.75 kg, 12 year old group hand grip is 17.00 ± 3.02 kg. Findings in this study show similarities.

While subjects' vertical jump values is 23.38 ± 5.98 cm at pretest, it is calculated 26.77 ± 17.10 cm at posttest and the difference is statistically significant ($p < 0.05$). Saygin et al. (2005) found a higher significant difference in vertical jump results of children who participate in activities than results of children who don't participate in activities (Saygin et al. 2005). Another study with same age group showed that while a significant difference was found in experimental group according to vertical jump distance ($p < 0.05$), a significant difference isn't

found in control group ($p > 0.05$). Researchers associate this result to fact that experimental groups are put to strength and stamina exercises (Sen 1998). Katie and friends (2003) found difference in vertical jump results between the children who only educated in class and children who educated balanced with sport activities. There are similarities in the findings with the study done by Hoffman et al. (1995) which showed $p < 0.05$ level difference in vertical jump parameters of 12-14 year old children who gets physical activities education. Leg, back and abdominal muscles' role in jumping ability is known. We can say jumping ability of subjects is improved as their leg, back and abdominal muscles get more strength in our study. Erol et al. (1999) found the average anaerobic strength as 77.61 ± 15.41 kgm/sec after 10 weeks of exercise in their study on 13-14 year old basketball players. This shows similarities with Hoffman et al.'s (1995) study which indicated a level of $p < 0.05$ significant difference in parameters of anaerobic strength of 12-14 year old children who gets sport education. A significant difference was found between children those who have low reputable activity level and those who have medium reputable activity level in anaerobic strength level (Saygin 2003). This shows similarities with the study by Diallo et al. (2001) that shows significant difference in 20, 30, 40 meters sprint results of 10-12 years old children after they exercised 3 days a week. Karabacak (2005) while meter speed tests are 6.06 ± 0.48 sec at pretest, it was found to be 5.94 ± 0.44 sec at posttest and a difference was found between them ($p > 0.05$).

In Table 5, the percentage distribution of eating meal once a day was 2%, eating twice a

Table 5: How many times do you eat in a day?

	1		2		3		4		5	
	F	%	F	%	F	%	F	%	F	%
How many times do you eat in a day?	4	2	39	19.5	139	69.5	17	8.5	1	.5

day was 19.5, eating three times a day was 69.5, eating four times a day was 8.5% and eating five times a day was 0.5%. In Table 5, the percentage distribution of eating meal once a day was 2%, eating twice a day was 19.5, eating three times a day was 69.5, eating four times a day was 8.5% and eating five times a day was 0.5%. In Table 6, arithmetic mean and standard deviation of the answers was 1.76 ± 0.80 for the first question "do you have breakfast?", it was 3.31 ± 0.74 for second question "how often do you skip breakfast?", it was 1.70 ± 0.89 for third question "do you receive allowance from your parents?", it was 2.95 ± 0.88 for fourth question "how much do you spend for eating?" and it was 2.94 ± 1.06 for fifth question "are you happy with school food?" In Table 7, the percentage distribution of proper markings of options of question "what is your favorite food?" (1. All of them, 2. Vegetables and legume with meat and olive oil, 3. Fried dishes, 4. Rice and pasta, 5. Pies, 6. Hamburger, toasted sandwich, 7. Milk puddings, 8. Pastry, 9. Meat, meatballs etc.) shows $p < .05$ level statistically significant difference. While answers of 10-11 year old subjects were centered around option 9 (all of them), 12 year old subjects' answers were centered around option 1 (Meat, meatballs etc.). Meat and meat products were really important for our diet. Meat contains protein, fat, minerals and vitamins and because of it is rich in protein and it has high quality protein, meat is one of the most important protein sources. It should certainly be consumed especially during the childhood when the growth rates are high. Meats are rich in C and E group vitamins but vitamin B12, iron, zinc and all other minerals (Sevindi 2012). Several different researches showed similar results (Zorba 1999; Yigit 2006; Erten 2006; Avan 2006; Derek Oy 2006; Turkmenoglu 2007).

There is couple of period in human life that nutrition is really important. One of these periods is adolescence period which considered as transitional period between childhood and adulthood, a period contains fast growth rate, improving of children's psychology and gaining

sexual identity. In this period children's need for energy, protein, vitamins, minerals therefore nutrition is increased (Sevindi 2012; Baysal 2002; Karabacak 2005; Ozmen et al. 2007).

Arithmetic mean of subjects' answers was found to be 1.74 and standard deviation was found to be .80 for breakfast. Arithmetic mean of subjects' answers was found to be 3.30 and standard deviation was found to be .74 for skipping breakfast. Arithmetic mean of subjects' answers was found to be 1.67 and standard deviation was found to be .89 for allowing from family. Arithmetic mean of subjects' answers was found as 2.89 and standard deviation was found as .88 for spending time on eating. Arithmetic mean of subjects' answers was found to be 2.91 and standard deviation was found to be 1.06 for happiness on school food.

In Table 7, percentage distribution of answer of the question "what are your favorite foods" can be seen (1. All of them, 2. Vegetables and legume with meat and olive oil, 3. Fried dishes, 4. Rice and pasta, 5. Pies, 6. Hamburger, toasted sandwich, 7. milk puddings, 8. Pastry, 9. Meat, meatballs etc.).

This work is done with the intent of studying and reviewing the effects of summer schools on physical development of 10-12 years children and their level of knowledge on nutrition. The number of researches on children's physical development is increasing constantly. Additionally the reasons and sources of diseases rise

Table 6: Arithmetic mean of subjects' answers to first question

Question	Arithmetic mean	Standard deviation
Do you have breakfast?	1.74	.80
How often do you skip breakfast?	3.30	.74
Do you receive allowance from your family?	1.67	.89
How much do you spend on eating?	2.89	.88
Are you happy with school food?	2.91	1.06

Table 7: What are your favorite foods?

	1		2		3		4		5		6		7		8		9	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%
What is your favorite foods?	32	16	6	3	38	19	21	10.5	19	9.5	11	5.5	3	1.5	8	4	62	31

among adults are being studied according to results of such researches. However, it is really important to gain sportive habits at a young age and to teach physical abilities to the children like any other beneficial habits (Akgün 1979; Chai et al. 2002). Sportive activities awake the children's undiscovered abilities and creativity and help them to gain self confidence. Self confidence is really significant for kid to be socialized (Akgün 1979; Chai et al. 2002). Especially, the results of researches about physical activities done starting from early childhood help the researches into the direction of education, health and sports (Eather et al. 2013).

CONCLUSION

It is always significant that family, school and society should work together and improve knowledge and skills to detect the biological, psychological and social problems children may face during this period. Poor diet, malnutrition and lack of physical activity in adolescent can leave a negative mark on the whole life and adversely affect the health and standards of life. Such effects cause deficiency of physical and mental development. The nutrition knowledge and habits should be constantly improved with effective and continues dietetics. It can be said that systematic physical education has positive effects on anthropometric levels and physical fitness of 10-12 years year old children.

RECOMMENDATIONS

The various programs with respect to knowledge nutrition and physical development can be organized at the schools. Also conferences can be organized for families to inform them.

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