

## Body Composition Changes Among 7-14 Years old Male Children Living in Ankara Province - A Fifteen Year Cross-Sectional Study

Cengiz AKALAN, Ph.D.

Ankara University, School of Physical Education and Sports

Office: +90 312 600 01 00 / ext. 1631 - 1583

Fax: +90 312 212 29 86, [cengizakalan@hotmail.com](mailto:cengizakalan@hotmail.com)

**Abstract:** Childhood obesity has increased worldwide, which raises the risk of morbidity and mortality for numerous chronic conditions in adulthood. Purpose of this study is to determine the changes in body composition among Turkish male children living in Ankara -The Capital- in fifteen years from 1995 to 2010. A total of 2400 boys age 7-10 years (n= 1200) and 11-14 years (n=1200) were assessed for body composition in 1995,2000,2005 and 2010. Statistical analyses identified a significant increase in total body weight, body mass index ratio (BMI-body size), and sum of five skinfold (ediposity) scores ( $p<0.05$ ) within fifteen years. As in many countries around the world, the prevalence of overweight and obesity among children appears to be rising in Ankara province. The promotion of physical activity and nutrition education are recommended at a young age to prevent the progression of chronic illnesses associated with overweight and obesity. [Cengiz AK. **Body Composition Changes Among 7-14 Years old Male Children Living in Ankara Province - A Fifteen Year Cross-Sectional Study.** *Life Sci J* 2013;10(4s):348-353] (ISSN: 1097-8135). <http://www.lifesciencesite.com>. 53

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### 1. Introduction

Obesity poses one of the greatest public health challenges for the 21<sup>st</sup> century, with particularly alarming trends in several parts of the world. The World Health Organization (WHO) reports that for the first time, the number of overweight people in the world now equals those who are underfed. Worldwide there are an estimated one billion overweight persons and at least 300 million of them are clinically obese (body mass index [BMI] equal to or greater than 30kg/m<sup>2</sup>). It is a complex condition with serious clinical, social and psychological dimensions, affecting virtually all ages and socioeconomic groups (Flegal et al.2013; Loos and Bouchard, 2003). In The European Region according to the recent data (The World Health Report-Fact Sheet EURO 2005) on nationally representative samples from different countries in the region, the prevalence of obesity ranges from 5% to 20% in men and up to 30% in women. Data showed that there is a rapid closing of the gap in prevalence between the western and eastern parts of the Region. Currently almost 400 million adults in the region are estimated to be overweight and about 130 million to be clinically obese. As all other countries in European region, this epidemic is also increasing in Turkey. According to the field surveys that were carried out a decade apart (TEKHARF 1990 and 2000) the overall prevalence of obesity in adults was 18.6% in the year 1990. Ten years later in 2000, the prevalence was 21.9%, which shows a relative increase rate of 17.7% (Yumuk, 2005). The obesity epidemic is not restricted to industrialized societies; often coexisting in developing countries with under-nutrition. Increased

consumption of more energy-dense nutrient poor foods with high levels of sugar and saturated fats, combined with reduced physical activity, have led to obesity rates that have risen three-fold or more since 1980 in North America, the United Kingdom, Eastern Europe, the Middle East, the Pacific Islands, Australia and China (Loos and Bouchard, 2003). Of especial concern is the increasing incidence of child obesity. Worldwide, approximately 22 million children under five years of age are overweight (Rocchini, 2002). In the last three decades childhood obesity has reached epidemic proportion and got prevalent as high as 18-30% in the developed countries (e.g. USA, Italy, Germany, England) (Odgen et.al.2010,Livingstone, 2000; Seidell, 1999; James and Ralph, 1999; Strauss, 1999; Bellizzi and Dietz, 1999; Falkner and Michel, 1999; De Vito et al., 1999; Bandini, 1992). The Health Behaviour in School-aged Children study conducted in 2001–2002 ([http://www.euro.who.int/youthhealth/hbsc/20030130\\_2](http://www.euro.who.int/youthhealth/hbsc/20030130_2)), which gathered self-reported data on the weight and height of more than 100 000 children in 35 countries in Europe and North America indicated that 11.7% of 13-year-olds and 11.4% of 15-year-olds were overweight. Various studies estimate that 10–30% of European children aged 7–11 years and 8–25% of adolescents (14–17 years) carry excess body fat (Lobstain and Frelut, 2003).

Why worry about these trends in child obesity?

Excess body fat in childhood tends to persist into adulthood. Results across a number of studies show that 26% to 41% of obese pre-school children become obese adults, and obesity is carried into adulthood in 42% to 63% obese school-aged children. The relative

risk of becoming an obese adult is 2 to 6.5 times higher for obese children than for those in the healthy-weight range (Tremblay and Willms, 2000., Limbert et al., 1994). Childhood and adolescent obesity has been identified as a risk factor for obesity in adulthood, and is related to an increased adult morbidity and mortality by leading to a variety of conditions (Singh et.al.2008). Obesity in children is associated with childhood hypertension and increases the risk of orthopedic and respiratory disorders. Obese children tend to have an abnormally high level of serum triglycerides, very low-density lipoprotein, low-density lipoprotein and low levels of high-density lipoprotein (Freedman et.al.2009; Bandini, 2001; Must and Straus, 1999; Despres et al., 1990). Thus, the most significant consequences for health of overweight and obesity include hypertension and hyperlipidaemia (major risk factors), coronary heart disease, ischaemic stroke, type 2 diabetes, certain types of cancer and psychosocial problems (Freedman et.al. 2007).

As overweight and obesity is increasing worldwide, it is important that countries monitor weight status of children and adolescents. While a lack of food is a problem in the developing world, obesity due to excess is generally centered in developed countries. Turkey is also experiencing this increase and childhood obesity becoming an alarming health issue.

Therefore, the purpose of this study is to determine the changes in body composition among Turkish children living in Ankara (The Capital) from 1995 to 2010. This simple example could provide additional data and valuable information that will heighten awareness about an emerging health concern in Turkey and lead to could initiatives to address the situation.

## **MATERIALS AND METHODS**

### **Subjects**

A total of 2400 boys were measured for this study. Two samples of 1200 boys between the age of 7-10 and 11-14 were randomly recruited from a private Extra Curricular Weekend and Summer Sport School located in central region of Ankara at the end of spring semester and during summer holiday in 1995, 2000, 2005 and 2010. A signed permission form was received from each subject's parent or guardian and a health history screening questionnaire was also administered prior to assessment. All subjects were considered to be apparently healthy and came from families of middle socioeconomic status. Entire subjects of all measured years groups were living in Ankara since 1995 thus; none of them was moved from another town during this period. All subjects were participating only their school physical education classes as an organized regular physical activity and neither of the schools had extra-curricular sports

programs. Since no data were available for girls in 1995 and 2000, only male data were used for the comparison.

### **Assessment Procedures**

Data collection included four sessions within a period of approximately four weeks. All measurements were conducted at the Ankara University in the School of Physical Education and Sports Indoor Arena. Each session included the completion of required paper work and a verbal orientation of the assessments protocols to the children and their parent or guardian followed by the height, weight and skinfold measurement. Height measurements were obtained barefooted at mid-expiration and recorded to the nearest 0.5 cm using a stadiometer (Accu-Hite Stadiometer, Seca Corporation, Columbia, Maryland, USA). Subjects were weighed in athletic apparel without shoes on a calibrated digital scale (Seca Corporation, Model # 707, Columbia, Maryland, USA) to the nearest 0.1 kg. Skinfold thickness was measured to the nearest +0.5 mm using a Lange caliper (Cambridge Scientific Industries, Columbia, Maryland, USA). All measurements were taken on the right side using anatomical sites according to the Jackson and Pollock (1980). These measurements were performed until two were within 10% of each other. An indicator of body size Body Mass Index ( $BMI = \frac{\text{weight [kg]}}{\text{height[m]}^2}$ ), and an indicator of ediposity sum of five anatomical sites (biceps, triceps, subscapular, suprailiac, and thigh) skinfold measures were computed for each child.

### **Statistical Analysis**

All data were analyzed using SPSS (Statistical Package for Social Sciences, version 11.1, Chicago, IL) database. For two age groups (7-10 and 11-14) of all four years (1995, 2000, 2005 and 2010) subjects, diagnostic tests were performed to detect missing, influential and/or outlying observations and found no problem. Standard descriptive statistics (means and standard deviations) were used to present the characteristics of the subjects. Alpha level was set at 0.05 for all analyses. One Way ANOVA test procedures were employed to establish the mean differences between four different year group for both 7 to 10 and 11 to 14 years of age separately in their height, total body weight, BMI and Sum of five skinfold scores.

## **RESULTS**

The means and standard deviations and percent change scores of measured variables of the 7-10 and 11-14 years age group subject's are presented in Table 1 and 2.

**Table 1.** The means and standard deviations scores of all measured variables for 7-10 years age group.

<b>7-10 Years Age Group (N=1200)</b>					
Variables	Years				
	1995 (n=300)	2000 (n=300)	2005 (n=300)	2010 (n=300)	
Height (cm)	132.0	133.0	133.6	135.4	Mean
	1.58	1, 93	0.57	1, 16	±SD
	-	0.7	0.4	1.3	% Change
Weight (kg)	32.56	37.54	38.40	43.53	Mean
	0.85	1.68	3.47	1.56	±SD
	-	15.2	2.2	13.3	% Change
BMI (W/m <sup>2</sup> )	18.53	19.45	22.03	24.73	Mean
	0.48	0.57	2.05	2.27	±SD
	-	4.9	13.2	12.2	% Change
Σ of Five Skinfold (mm)	37.00	42.00	47.00	57.00	Mean
	0.72	1.51	1.45	3.51	±SD
	-	13.5	11.9	21.12	% Change

**Table 2** The means and standard deviations scores of all measured variables for 11-14 years age group.

<b>11-14 Years Age Group (N=1200)</b>					
Variables	Years				
	1995 (n=300)	2000 (n=300)	2005 (n=300)	2010 (n=300)	
Height (cm)	156.5	157.3	155.6	157.9	Mean
	0.81	0.91	1.58	1.94	±SD
	-	0.5	-1.08	1.4	% Change
Weight (kg)	49.61	55.26	57.20	60.13	Mean
	1.67	1.56	1.34	1.00	±SD
	-	11.3	3.5	5.1	% Change
BMI (W/m <sup>2</sup> )	20.26	23.36	24.16	27.76	Mean
	0.72	0.86	2.10	1.26	±SD
	-	15.3	3.4	14.2	% Change
Σ of Five Skinfold (mm)	41.00	52.00	58.00	61.00	Mean
	3.18	1.52	1.00	1.00	±SD
	-	26.8	11.5	5.1	% Change

Table 3 and 4 presents the results of ANOVA statistical analysis for mean differences of 7 to 10 and 11 to 14 years of age subject's height, total body

weight, BMI and sum of five skinfold scores for 1995, 2000, 2005 and 2010.

**Table 3.** ANOVA results among 7-10 years of age group.

<b>7-10 Years Age Group (N=1200)</b>				
Variables	ANOVA Table			
	df	Mean Square	F	Sig.
Height (cm)	3	1.86	1.595	.265
Weight (kg)		60.50	13.370	.002*
BMI(W/m <sup>2</sup> )		23.24	9.321	.005*
Σ of Five Skinfold (mm)		229.06	53.03	.001*

\* p<0.05

**Table 4.** ANOVA results among 11-14 years of age group.

11-14 Years Age Group (N=1200)				
Variables	ANOVA Table			
	df	Mean Square	F	Sig.
Height (cm)	3	2.28	1.446	.300
Weight (kg)		59.01	29.296	.001*
BMI(W/m <sup>2</sup> )		28.50	15.656	.001*
Σ of Five Skinfold (mm)		219.96	60.693	.001*

\* p<0.05

As specified in Table 3 and 4, the results revealed that except height scores, there were significant mean differences in all variables for both 7 to 10 and 11 to 14 years of age group. when compared from 1995 to 2010 for four different years data. Results showed that there is a significant increase in children’s total body weight, body size, and level of adiposity from 1995 to 2010 (p<0.05).

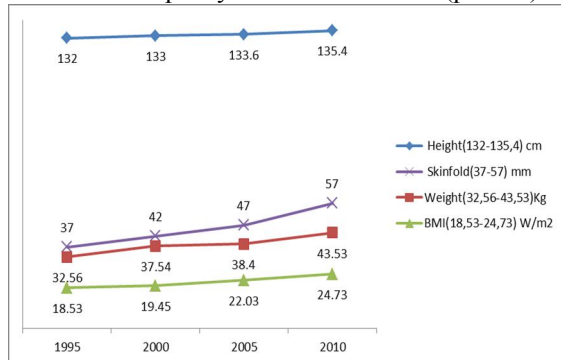


Figure 1. The means and standard deviations scores of all measured variables for 7-10 years age group.

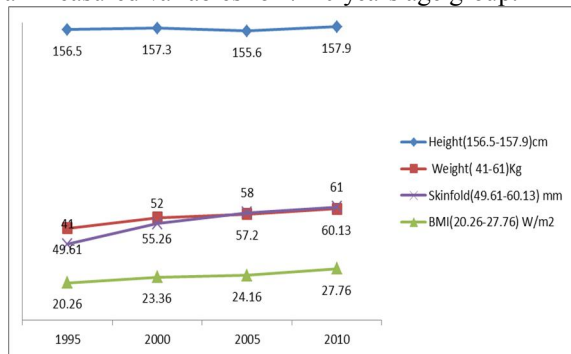


Figure 2. The means and standard deviations scores of all measured variables for 11-14 years age group.

**DISCUSSION**

In the last 30 years obesity has increased

- All around the world
- Both sexes
- All age group
- All racial/ethnic group
- All income levels

The prevalence of obesity has risen three-fold or more in many European countries since the 1980s. If prevalence continues to increase at the same rate as in the 1990s, it is estimated that about 150 million adults in the Region will be obese by 2010. This means that in just five years there will be 20 million more obese people, a striking four million more per year (The World Health Report-Fact Sheet EURO 2005).

There is a clear upward trend, even in countries with traditionally low rates of overweight and obesity such as France, the Netherlands and Norway. Further, while the prevalence in the European Region is expected to rise by an average of 2.4% in women and 2.2% in men over five years, some countries might show a faster increase, such as Finland, Germany, Greece, Sweden and the United Kingdom for men and Georgia, the Republic of Moldova, Slovakia and Tajikistan for women (WHO, 2005).

Obese children may be at risk for both short-term health consequences and long-term tracking obesity to adulthood (Ogden et.al. 2012).The epidemic is spreading at particularly alarming rates in children. In France, for example, the prevalence of childhood overweight and obesity increased from 3% in 1960 to 16% in 2000. In Poland the prevalence increased from 8% to 18% between 1994 and 2000, while Hungary reports that 20% of children aged 11–14 years are obese and that 6% of obese children suffer from hypertension. The increase has accelerated in recent years: according to the International Obesity Task Force, the annual increase in prevalence of around 0.2% during the 1970s rose to 0.6% during the 1980s and to 0.8% in the early 1990s, and in some cases reached as high as 2.0% by the 2000s (WHO, 2005). Turkish Diabetes Epidemiology Study (TURDEP) (Satman et.al., 1999 and 2002) and Turkish Obesity and Hypertension Study (TOHS) (Hatemi et.al., 2003) were two large-scale population based surveys across the nation. In TURDEP study the obesity prevalence was the highest in central Anatolian (25.0%) and lowest in eastern Anatolian (17.2%) regions of the country.

Recent local field surveys studies revealing the current magnitude of obesity in Trabzon (23.5%) (Erem et al., 2004) a city in the Black Sea region, in Adana (43.4%) (Gökcel et al., 2003) and Mersin (29.3%) (Akabay et al., 2003) southern provinces of Turkey, and a telephone survey in Kayseri (12.0%) (Krassas et al., 2003) a central Anatolian city. Obesity prevalence was found to be 0.9% in boys and 3.8% in girls, aged between 8 and 17 years, in Elazığ, in Middle Eastern Turkey (Aygün et al., 1997). A cross-sectional survey of 1024 children (mean age  $10.3 \pm 0.6$  years) in public primary schools was accomplished in Izmir, a city on the Aegean coast of Turkey. Children with a BMI  $\geq$  95th percentile for age and gender were defined as obese. When stratified for socio-economic status the prevalence of obesity in school children in well developed areas was higher than that of the underdeveloped areas (1.7% vs. 0.5%) (Soylu et al., 2000). The prevalence of overweight and obesity have recently been investigated in different countries. But there are only a few studies concerning the prevalence in Turkish children and adolescents. This article provides simple example and descriptive information on the changes in body composition among 7 to 14 years of age children in the city of Ankara, Turkey. Analyses of data collected for this study showed that even if randomly selected subject sample is small, it can still be seen that within ten years there is a significant increase in children's total body weight, body size, and level of adiposity. Unhealthy diets and physical inactivity are the main contributors to overweight and obesity, which are among the leading risk factors for the major noncommunicable diseases. To slow the rise in obesity among children, it is crucial to foster the early development of an active lifestyle in children. Lifestyle behaviors are established in childhood and tend to persist into adulthood. From a very young age, children will therefore benefit from an environment that is conducive for frequent activities, whether structured or unstructured. Increased physical activity decreases childhood obesity, particularly when accompanied by nutrition education and a behavior modification. Besides helping children reduce body weight and percent body fat, regular exercise may preserve lean body mass. Increased physical activity may also normalize carbohydrate metabolism and improve lipoprotein profiles (Booth et al., 2000., Parker and Bar-Or, 1991). Prescribed exercise should be tailored to each child's likes and dislikes. The challenge is to instill the motivation needed to induce long standing changes.

## CONCLUSION

Body composition and specifically fatness have implications for health status given the associations

between excessive fatness and complications of several chronic diseases. Increased regular physical activity is an important factor in the regulation of body weight. Our data mirror those from a number of developing countries. We need to focus on dietary and physical activity behaviors in children to strive for positive change before it is too late.

## KEY POINTS

- The obesity prevalence of children and adolescents is on the rise in Turkey as many other European countries.
- The health risks associated with increased childhood obesity is a major public health issue. Therefore, it is imperative that initiatives to prevent and manage obesity be established in a child's formative years.
- We need to focus on dietary and physical activity behaviors in children to strive for positive change before it is too late.

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