Eurasian Journal of Anthropology Euras J Anthropol 7(1):11−19, 2016

Obesity is a more common problem among children from higher social classes than lower social classes in Ankara, Turkey: a retrospective study

Derya Atamtürk[1], Berna Ertuğrul[2], İzzet Duyar[1*]

[1]*Department of Anthropology, Istanbul University, Istanbul, Turkey*
[2]*Department of Anthropology, Cumhuriyet University, Sivas, Turkey*

Received November 11, 2015
Accepted April 28, 2016

Abstract

It has been suggested that the prevalence of obesity is higher in lower socioeconomic status of high-income countries and in upper socioeconomic strata of low-income countries. This pattern has not been thoroughly examined in middle-income countries. We aimed to clarify the distribution pattern of obesity and overweight among social classes in Ankara, Turkey. The pupils were chosen from lower, middle, and upper socioeconomic sectors of society. A total of 1074 males and 1045 females were measured anthropometrically (stature, body weight, and triceps skinfold thickness) and their body mass indices (BMI) were calculated. Obesity and overweight prevalence were assessed using the reference values derived from National Health and Nutritional Examination Survey (NHANES I and II) conducted on US children. Our findings indicated that the prevalence of overweight and obesity were markedly different among social classes in Turkey. The prevalence of obesity was similar in lower and middle socioeconomic status (SES) whereas it was higher in upper SES. It could be said that overweight and obesity are more common problem among children from upper SES than lower and middle SES. In other words, the pattern of overweight + obesity prevalence in Turkey resembles that of children in low-income countries.

Keywords: *Obesity, overweight, anthropometry, socioeconomic conditions*

Introduction

Obesity and overweight have now taken the place of malnutrition and infectious diseases in many places of the world (WHO, 1998; Antipatis and Gill, 2001; Bundred et al., 2001; Moraes and Ogden et al., 2006; Falcäo, 2013). In the literature, it is well documented that socio-demographic and cultural factors such as eating habits, physical activity patterns, age, gender, marital status, occupation, and level of income influence the propensity for overweight and obesity (Hill and Coyne, 1998; WHO, 1998; Sobal, 2001; Readera et al., 2006; Case and Menendez, 2009; Ziraba et al., 2009;

* Corresponding author: Department of Anthropology, Faculty of Literature, Istanbul University, Beyazıt 34459 Istanbul, Turkey (**e-mail:** izduyar@yahoo.com)

ISSN: 2166-7411

Sjöberg et al., 2011). The above mentioned studies also indicate that "fast food" eating habits and consuming energy-dense foods can contribute to a rise in obesity levels, attributable to a nutritional habit of Western society within certain socioeconomic factors (i.e. Alviola et al., 2014).

Various studies have analysed the role socioeconomic conditions play in the increase of overweight in both low- and high-income countries (Darnton-Hill and Coyne, 1998; Wardle et al., 2002; Kaneria et al., 2006; Ziraba et al., 2009; Musaiger, 2011). On the other hand, some researchers have observed a pattern indicate that obesity is more common in lower socioeconomic status (SES) of low-income communities while in poor societies the obesity is more prevalent in high SES (e.g., Wang, 2001; Monteiro et al., 2002; Wang et al., 2002; Carmo et al., 2008). The studies compared the prevalence pattern are generally focused on merely poor and affluent societies. It is not well-known the distribution pattern of obesity among social classes in transitional societies.

As a transitional society in Turkey, there have been studies that examine the prevalence of obesity among different socioeconomic groups and overweight differences among adults (Duyar, 1990, 1992, 1993, 1998; Erem et al., 2004; Ersoy et al., 2005; Ersoy and Imamoglu, 2006; İşeri and Arslan, 2008), but the pattern mentioned above has not been thoroughly examined. In this paper, we aimed to light the patterns of prevalence of overweight and obesity among social classes in children living Ankara, Turkey.

Subjects and method

In the present study the anthropometrical data from a previous study that aimed to understand the influencing factors on physical growth in a metropolitan city, Ankara, was used (Duyar, unpublished data). This investigation was conducted on children from different SES attending primary schools in Keçiören, Mamak, Yenimahalle and Çankaya neighborhoods between 1999 and 2001. In total 2.119 students were measured (1.074 boys, 1.045 girls) with age varying between 7-12 years (Table 1). Among the regions where the study was conducted, relative poverty level is the lowest in Çankaya and the highest in Mamak. Yenimahalle and Keçiören are worse than Çankaya and better than Mamak in economic condition (Taş, 2012).

Anthropometric measurements of height, weight, and skinfold thickness were measured in line with standards of the International Biological Programme (Cameron et al., 1981). Body mass index (BMI), a measurement frequently used to determine obesity level, was also calculated for each individual.

Table 1: Distribution of individuals according to age and sex groups

Age (year)	Boys	Girls	Total
7	196	166	362
8	223	215	438
9	198	210	408
10	195	197	392
11	183	186	369
12	79	71	150
Total	1074	1045	2119

Height. Each subject's body height and tibia length were measured using a Martin type anthropometer. Students' feet were joined together with a 60 degree angle allotted between each foot. With the students standing still, the distance between the top of the head (vertex) to the bottom of the heel was taken. The pupils' head was

adjusted to the horizontal plane, and then the head was tilted slightly upwards by applying gentle force to the mastoid processes and zygomatic bones. Measurements were recorded to the nearest millimeter.

Weight. Students were dressed in light clothing and stood with their feet equidistant on a digital scale, sensitive to 100 gr. Their clothing weight was noted on measurement registry forms so that the actual body weight could later be obtained by subtracting the clothing weight.

Triceps skinfold thickness (TSF). Students stood still with both arms at their sides. The midpoint was located halfway between the top of the acromial process and the bottom of the olecranon process of the ulna on the back of left arm triceps. Measurements were taken with a Harpenden skinfold caliper (sensitivity to 0.2 mm). This was repeated three times and an average was calculated for the two measurements that were most similar in numbers.

Since our data has collected from a growth study carried out in late 1990s we have not preferred an actual reference to assign overweight and obese person. To determine the levels of overweight and obesity the cut-off points of National Health and Nutritional Examination Survey (NHANES I and II) (Frisancho, 1990) were used. At that time, this reference data has also been recommended by World Health Organization. Measurements corresponding to 85-94.9 percent BMI and TSF rates were defined as 'overweight' and those corresponding to 95 percent were classified as 'obese.'

T**able 2**: Paternal occupation, classification and scoring

Father's occupation	Category	Score
Manager, doctor, lawyer, engineer, inspector, military officer, academician, etc.	Expert	6
Big craft, teacher, officer, technician, police, military officer, etc.	Semi-expert	4
Worker, sales clerk, secretary, driver, retiree, small craft, farmer, etc.	Non expert	2
Unemployed	Non-workers	0

Table 3: Parental education, classification and scoring

Category	Score
Illiterate	0
Literacy	1
Primary school graduate	2
Secondary school graduate	3
High school graduate	4
University graduate	5

Table 4: Siblings, classification and scoring

Category (Number of sibling)	Score
1	4
2	3
3-4	2
5-6	1
7-8	0

Table 5: Percentiles and scores used in the separation of SES

SES	n	Scoring	Percentile cut-off points
Lower	755	4 -9	≤ 33
Middle	605	10–12	34–66
Upper	759	13–20	≥67

To ascertain each child's socioeconomic status several variables were taken into account: parental education, parental profession, and number of siblings; that were identified, classified, and then graded within. In accordance with the socioeconomic index, those who were in a 'high' SES were given a high mark, those who were in the 'low' SES were given a low mark. Tables 2-5 show how the variables were classified and which marks were given in detail. Values for SES were sorted into ranges from 0-33 percent, 34-66 percent, and 67 percent and categorized as low SES, middle SES, and high SES respectively (Table 5).

Results

Body mass index (BMI) rates according to age and sex are shown for children in low, middle, and high SES in Table 6. BMI values for boys were found to be rapidly increasing in low to high SES for all ages except 11-12 year olds. There is a slight decline in the low SES and middle SES for this age group (11-12 years). BMI measure for girls also showed an increase in the low to high SES for all ages except for 7-12 year olds. In this age group there is a slight decline in the low and middle SES while in high SES the BMI measure again increases.

The results indicate that there is a positive association between the thicknesses of triceps skinfold (TSF) and social class in females. Given a girl's high SES, TSF values are also high, excluding 12 year olds (Table 7). For boys in all age groups TSF values were higher among individuals in high SES. Boys, with the exception of 11-12 year olds, and girls, with the exception of 12 year olds, in all age groups showed the lowest TSF values for individuals in low SES.

Although the prevalence of overweight and obesity in each age group are estimated, the main focus of this study is to highlight the importance of SES in influencing those rates. For this reason estimation of age and sex difference are not discussed within the scope of our study. In accordance with BMI, the overweight and obesity prevalence rates are 7.5% (n=159) and 2.9% (n=61) respectively. When individual's overweight and obesity prevalence rates are analyzed in the low, middle and high SES, statistically significant differences were found (Table 8).

Overweight prevalence is similar among children in the low- and middle SES, whereas in the high SES prevalence are about doubled. The prevalence of obesity is similarly higher among individuals in high SES. Obesity prevalence in low SES is 0.5%, 0.7% in the middle SES, and 1.7% in the high SES. TSF reveals overweight prevalence is 4.6% (n=97) and obesity rate to be 1.1% (n=24). Overweight and obesity prevalence are significantly higher in high SES (Table 9). The prevalence of overweight and obesity are 0.8% and 0.9% in the low and middle SES respectively— three times less than the high SES.

Discussion

The global increase of obesity first manifested in economically developed countries during the 1980's and is now increasing rapidly in economically less developed countries like Turkey. According to overweight trends, economically less developed countries are following some ten years behind rates of occurrence in more developed countries, but the rate of occurrence is notably increasing. Considering this, the WHO labels obesity as an illness posing a public threat to economically developed and less developed countries and emphasizes that the countries must take up precautionary measures (WHO, 1998).

Table 6: Descriptive statistics of body mass index (BMI) by socioeconomic status (SES)

	Low			Middle			High		
	n	Mean	SD	n	Mean	SD	n	Mean	SD
Males									
7±	74	15.58	1,41	59	15.70	1.53	63	16.11	1.98
8±	75	15.76	1.45	57	16.62	2.37	91	16.81	2.43
9±	49	15.79	1.78	52	16.67	2.39	97	16.81	2.17
10±	72	16.73	2.19	41	16.88	1.97	82	17.09	2.36
11±	67	16.87	2.29	60	16.76	1.76	56	17.54	2.43
12±	40	17.56	2.66	28	16.66	1.53	11	17.93	3.25
Females									
7±	54	15.76	1.90	45	15.55	2.20	67	15.94	2.43
8±	84	15.58	1.75	60	15.89	1.71	71	16.50	1.89
9±	64	16.55	2.29	53	16.06	2.12	93	16.50	2.27
10±	66	16.29	1.76	54	16.64	2.53	77	17.09	2.88
11±	81	17.37	2.93	66	17.14	2.57	39	18.15	2.90
12±	29	18.12	3.23	30	17.96	2.45	12	17.59	2.57

Table 7: Descriptive statistics of triceps skinfold (TSF) by socioeconomic status (SES)

	Low			Middle			High		
	n	Mean	SD	n	Mean	SD	n	Mean	SD
Males									
7±	74	8.16	2.03	59	8.52	2.50	63	9.07	2.90
8±	75	7.40	1.88	57	9.40	4.26	91	10.60	4.49
9±	49	8.29	2.63	52	9.70	3.77	97	10.55	3.91
10±	72	9.22	3.44	41	9.66	3.23	82	10.44	4.21
11±	67	9.82	4.42	60	9.54	3.72	56	12.03	5.02
12±	40	10.47	4.93	28	8.79	2.49	11	11.56	4.48
Females									
7±	54	9.15	2.43	45	10.13	2.89	67	10.90	3.88
8±	84	9.53	2.75	60	10.57	2.66	71	11.99	3.20
9±	64	11.01	3.79	53	10.48	2.80	93	12.36	4.13
10±	66	10.41	2.49	54	11.49	4.20	77	12.70	4.84
11±	81	11.14	3.56	66	11.99	4.52	39	13.57	5.09
12±	29	12.12	4.01	30	12.05	3.66	12	11.18	3.83

Table 8: Distribution of overweight and obesity rates by SES according to BMI

	Overweight		Obesity	
Socioeconomic status	n	%	n	%
Lower	40	1.9	11	0.5
Middle	39	1.9	14	0.7
Upper	80	3.8	36	1.7
χ^2	20.642		18.328	
P	0.000		0.000	

Table 9: Distribution of overweight and obesity rates by SES according to TSF

	Overweight		Obesity	
Socioeconomic status	n	%	n	%
Lower	17	0.9	2	0.1
Middle	16	0.8	8	0.4
Upper	64	3.0	14	0.7
χ^2	46.536		9.000	
P	0.000		0.011	

Many studies have aimed to detect the underlying factors that foment the increase in cases of overweight and obesity in various countries (Coyne, 1998; WHO, 1998; Bjöintorp, 2002; Hill and Musaiger, 2011; Sjöberg et al., 2011; Xiao et al., 2013;). Although studies showed that there are some underlying biological agents such as metabolic, hormonal, genetics (Pasquali and Vicennati, 2001; Goran et al., 2002) the most important factor is said to be the fast-changing nutritional habits and lifestyle, especially since 1980s (Delpeuch and Maire, 1997; Pena and Bacallao, 2002; Papandreou et al., 2008; Xiao et al., 2013). Indeed, high incomes and changing social relations in Western societies have led to substantial changes in people's fundamental nutritional habits—namely the 'fast food' habit. With 'fast food,' nutrition and quality are substituted for convenience and affordability at the cost of salt, sugar, and oil consumption. Although the main causes of obesity are deemed altered nutritional habit and lifestyle; education, warfare, neo-liberal economic models, and other socioeconomic factors should also be taken into consideration (Florentino and Pedro, 1992; Hill and Coyne, 1998; Dijkshoorn et al., 2008; Moraes and Falcäo, 2013). It is well known that this trend is spreading to economically less developed countries; especially those of Far Eastern, Near Eastern and Latin American societies (Florentino and Pedro, 1992; Martorell et al., 2000; Papandreou et al., 2008). It is interesting that although malnutrition remains a common problem in these regions the prevalence of obesity and overweight increase each passing day, particularly in lower social classes.

Our findings are compared with results from other low- and high-income countries. Martorell (2000) examined the prevalence of overweight and obesity in 50 Third World Countries in South America, Asia, and Africa finding obesity to be lowest in Thailand, 0.4% and highest in Egypt, overweight prevalence 25.1% and obesity prevalence 7.5%. Another study assesses the frequency of obesity in various regions and found that the obesity prevalence is 32% in America, 20% in Europe, and 16% in Middle Eastern countries (Lobstein et al., 2004). Wang (2001) examined obesity in children by comparing the results from USA, Russia, and China. The frequency of overweight and obesity was 11%, 1% and 14.03% in the US, 6.0% and 10.0% in Russia and, 3.6% and 3.4% in China. Lissau et al. (2004) found the incidence of overweight to be %15 and obesity %5 in the 15 high income countries, Austria, Czech Republic, Belgium, France, Germany, USA, and Sweden. In our research the obesity prevalence is 2.9% according to BMI and 1.1% in respect to TSF cut-off points. The conclusive obesity prevalence in our investigation resembles that of children in low-income countries.

Studies show that there is an increase in obesity proportional to the economically development grade of a country while obesity frequency also varies among different social classes within each country (Wardle et al., 2002; Kaneria et al., 2006; Yoon et al., 2006; Sabanayagam et al., 2007; Xiao et al., 2013). Some researchers also emphasize that there is a distinctive increase in obesity in low SES in high-income countries and in high SES in low-income countries (Wang, 2001; 2002; Monteiro et al., 2002; Carmo et al., 2008; Zhang and Wang, 2012). For example, Wang (2001) examined the prevalence of obesity among low and high SES in Russia, USA, and China comparing the findings of obesity rates among these groups. He found that in China and Russia the rate of obesity was highest in high SES, and in the USA obesity was highest in low SES. In this comparison, it could be said that the figures of the present study resemble China and Russia rather than USA.

Other surveys conducted in the 17 developing countries in the Mediterranean region, totaling 102 investigations, revealed the following obesity prevalence: of 7.20%

for girls of a moderate income family and 11.50% for boys of the same familial income range. Obesity for children from low income families was seen at a rate of 3.90% for girls and 3.20% for boys (Papandreou et al., 2008). Kaneria et al. (2006) compared the overweight and obesity rates in children between high and low SES in India. They found the overweight incidence to be 4.85% among children of high SES, 1.6% for low SES, and the obesity rate to be 3.73% for high SES and 0% for low SES. In a recent study by Pampel and his colleagues (2012) used data for 67 countries representing all the regions of the world to examine how economic development, socioeconomic status, and obesity were related. They found that in lower-income countries, people with higher SES were more likely to be obese. Conversely, in high-income countries, those with higher SES were less likely to be obese.

Why are the people of higher SES living in lower-income countries and the people from lower SES living in higher-income countries fatter than the average? It is widely known that the people of higher SES living in higher-income countries consume high calorie industrial products less, eat healthier foods and exercise more. Consumption of high calorie industrial products is higher among the people of higher SES living in lower-income countries (Pampel, 2012). On the other hand, working out in order to stay healthy and fit is often regarded as wasting of time and energy in lower-income countries (Powell et al., 2006). Our investigation reveals that prevalence rates of overweight and obesity are found to be the greatest for high SES compared to other SES examined. In the matter of nutrition, Turkey is experiencing both the problems of developing and developed countries. The main reason of this situation is income inequality. According to the results of the study (State of Nutrition in Turkey) conducted by Pekcan and Karaağaoğlu (2000) which was carried out in the same period with our study, 50% of the daily calorie is gained from bread and other grain products. On the other hand, since 1990s, fast food consumption has become a common way of feeding among the children and adolescents living in urban areas (see Cömert, 2014). Despite the fact that the high calorie industrial foods (rich in sugar, salt and fat) are cheap enough for the lower SES people of higher-income countries (Schlosser, 2001), these products are relatively expensive in Turkey and mostly consumed by higher SES people. As the high calorie food consumption is regarded as a characteristic of Western feeding manner, it is somehow considered as a sign of wealthiness in Turkey. This situation makes it clear why the obesity level of the children from higher SES, who are included in our sample, is higher than average. As conclusion our findings showed that the overweight pattern among social classes of a middle-income country, Turkey, correspond with affluent societies rather than low-income communities.

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