

THE EFFECT OF SOCIO - ECONOMIC CONDITIONS ON GROWTH, DEVELOPMENT AND OBESITY AMONG ADOLESCENTS IN TURKEY

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This study is designed to assess various factors such as socio - economic status, cultural level, nutritional status, age and sex on development of obesity during adolescence. Two groups of adolescent children between the ages of 11 and 15 with different socio-economics and cultural background were studied. The first group is from a private junior high school in Ankara where children of high socio - economic status attend. The second group is from a public junior high school of a semi urban area, 40 kilometres from Ankara. The descriptive analysis of subjects from these two different socio - economic backgrounds revealed major differences between the education and income levels of families of subjects studied. The evaluation of height measurements for age have shown 10 cms difference on the average between two socio - economic groups at all ages. The assessment of obesity, made by using weight for height tables was made. 15.9 % of children from high socio - economic group and 22.5 % of children from low socio - economic group were classified as overweight and obese respectively.

Children of high socio - economic status were found to be more active physically than children from low socio - economic group. Availability of well programmed sports activities with adequate facilities enabled these children to get involved in sports and exercise. Food consumption patterns of these two groups were assessed by frequency use of foods techniques. Children from high socio - economic group were found to be consuming a more varied diet rich in animal proteins and fats. Whereas, the typical diet of children from low socio - economic group consisted mainly of cereals, sugars and vegetables with insignificant amounts of dairy products. The number of meals consumed also sig-

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nificantly different. Children from high socio-economic group had proper 3 meals with more than one snack daily. The results of this study have clearly demonstrated the effects of socio-economic and cultural status on the development of obesity during adolescence. Type of diet, inadequate physical activity are strongly influenced by socio-economic status. Short stature attained especially among girls of low socio-economic group raises the question whether children showing a tendency towards obesity during adolescence, may become obese women after frequent pregnancies should also be studied.

INTRODUCTION

Over the past two decades, obesity is becoming an important public health problem in Turkey. According to «Nationwide Health and Nutrition Survey» carried out in 1974, the prevalence of obesity was found to be 26.8 % among women and 7.6 % among men over 20 years of age (1). More recent but smaller studies also show similar rates for women of rural areas. Güneyli (2) reported a very high prevalence of 58.4 % for adult rural women living in villages around Ankara. However, the rate of obesity was found to be much less for educated younger women who work as professionals in urban areas (3).

These studies have relied upon height and weight relationships in assessing the prevalence of obesity. The criteria accepted for obesity and overweight are 25 % and more and 15 % - 25 % of the desired standard weight for height respectively.

This high prevalence observed among adult women raised the need to identify some of the aetiological factors regarding the causes and the time of onset of obesity to suggest means by which prevention may be practiced at community level.

In normal weight humans it is postulated that there are

two critical periods in adipose tissue development; the first occurs prior to the age of 2 years, and the second is associated with puberty. Salans and Cushman (4) have suggested that the adipose cell number in adult obese humans is related to the age of onset of obesity. Adults who become obese in childhood tend to have higher cell numbers than those who become obese as adults.

Difficulties involved in studying the very young children led us to concentrate on adolescents regarding the time of onset of obesity. Although the effects of the final growth spurt on development of obesity is not very clearly known, two forms of obesity during adolescence has been described. First, the fat child who comes into adolescence and becomes increasingly obese, and the second, the adolescent who becomes obese.

This study is designed to assess various factors such as socio - economic status, culture level, nutritional status, age and sex on development of obesity during adolescence.

METHOD AND MATERIALS

The study which is presented in the following was carried out in two junior high schools from two different socio - economic areas, cross - sectionally.

The first school «Ankara College» is a private junior high school studied in Ankara, the capital city. Children who attend this school are from families of higher socio - economic classes. This school has good sport facilities and other social activities. 507 children, 248 boys and 259 girls between the ages of 11 and 15 are selected randomly from a total population of 3200 children.

The second high school, «Çubuk Junior High School» is a public junior high school in a semi - urban area 40 kilometres from Ankara. Children who attend this school are partly from rural villages, partly from semi - urban settlement of Çubuk. 448 children 287 boys and 161 girls were included in the study.

The study was carried out at schools. The study team composed of a medical doctor, a nutritionist and a dietician visited each school for 2 weeks each. The medical doctor carried out

the clinical examinations. Anthropometric measurements were taken by the nutritionist and the dietician undertook the questionnaires.

Height, weight, skinfold thicknesses from biceps, triceps, subscapular and suprailiac sites were collected for anthropometric evaluation. The measurements were made according to the techniques suggested by Jelliffe (5).

A standard bathroom scale (Salter) with 140 kg capacity, reading to the nearest 0.5 kg was used for weighing. A simple wooden stadiometer measuring to the nearest 0.5 cm for height measurements and Holtain Skinfold caliper were used for skinfold measurements.

The coverage rates for Ankara College and Çubuk Junior High School were 99.2 % and 98.3 %. To assess the socio-demographic characteristics and food consumption a pre-coded, pre-tested and self administered questionnaire was prepared by the author and conducted under the supervision of dietician in each classroom. Food consumption information was collected by a 24 hour recall method.

For the evaluation of weight for height values, translated and extended values of Baldwin - Wood Tables were used (5).

By using parents occupation and education status weighed scores were developed for the classification of socio-economic classes.

RESULTS

Table I, shows the distribution of adolescents studied by sex and schools. There were 535 male and 420 female children. 53.1 % and 46.9 % of children are from Ankara College (A.C.) and Çubuk Junior High School (ÇHS) respectively. There is a significant difference between the number of girls aged 14 and 15 years. In Turkey, this is quite common for rural areas, for parents with rural backgrounds prefer not to educate their young daughters. Therefore only 35.9 % of ÇHS children were girls.

Table 1 : Distribution of Children by School and Sex

Schools	Male		Female		Total	
	n	%	n	%	n	%
Ankara College	248	48.9	259	51.1	507	53.1
Çubuk Junior High School	287	64.1	161	35.9	448	46.9
Total	535	100.0	420	100.0	955	100.0
$X^2 = 22.149$		$SD = 1$		$p < 0.01$		

Table 2 : Distribution of Children by Age and School

Schools	Age - Groups											
	11		12		13		14		15		Total	
	n	%	n	%	n	%	n	%	n	%	n	%
Ankara College	14	2.8	126	24.9	130	25.6	142	28.0	95	18.7	507	100.0
Çubuk J. H. S.	54	12.1	136	30.4	147	32.8	93	20.7	18	4.0	448	100.0
Total	68	7.2	262	27.4	277	29.0	235	24.6	113	11.8	955	100.0

In Table 2, the age distribution of adolescents is given by age and school. In order to assess ages correctly, the birth dates asked were cross checked with school records. The number of 11 year old children from Ankara College is significantly less than the ones in Çubuk because of the preparatory class of Ankara College.

Table 3 gives the educational status of parents of the study groups. 63.5 % and 29.8 % of fathers of adolescents attending Ankara College are university and high school graduates respectively. These rates are much above the average rates for Turkey in general. On the other hand, as it is typical for rural areas in Turkey, only 8.0 % and 12.7 % of fathers of adolescents attending Çubuk High School are university and high school graduates. Although primary school education is compulsory, the rate of illiterate mothers of Çubuk group with 40.6 % significantly differs from Ankara College group.

Table 3 : Educational Status of Parents by Schools

Educational Status		Ankara College		Çubuk Junior High School		Total	
		Father	Mother	Father	Mother	Father	Mother
Illiterate	n	1	15	41	182	42	197
	%	0.2	3.0	9.2	40.6	4.4	20.6
Literate	n	0	6	15	8	15	14
	%	—	1.2	3.3	1.8	1.6	1.5
Primary School	n	16	26	246	218	262	244
	%	3.2	5.1	55.0	48.7	27.4	25.5
Junior high school	n	17	80	53	29	70	109
	%	3.4	15.8	11.8	6.5	7.3	11.4
High School	n	151	208	57	10	208	218
	%	29.8	41.0	12.7	2.2	21.8	22.8
Higher education	n	322	172	36	1	358	173
	%	63.5	34.0	8.0	0.2	37.5	18.1
Total	n	507	507	448	448	955	955
	%	100.0	100.0	100.0	100.0	100.0	100.0

Table 4 : Distribution of Children by Schools and Socio - Economic Status

Weighed Score	Socio - Economic Status		Ankara College	High School	Total
31 — 40	High	n	341	9	350
		%	67.2	2.1	36.7
30 — 21	Middle	n	157	122	279
		%	31.0	27.2	29.2
11 — 20	Lower - middle	n	8	83	91
		%	1.6	63.1	9.5
0 — 11	Low	n	1	34	35
		%	0.2	7.6	3.7
Total		n	507	448	955
		%	100.0	100.0	100.0

Table 4 gives the socio-economic status classification of two groups according to the weighed scoring method developed by using parents occupation and educational status. As expected, there are significant differences between the two groups. 70.7 % of adolescents are from lower and lower middle classes. However only 1.8 % of Ankara College group are from lower socio - economic class.

Anthropometric evaluation :

Average heights, weights and skinfold thickness measurements along with their standard deviations were calculated separately for boys and girls for each age group. Because of rapid and changing growth patterns during adolescence, no height and weight by age standard seemed applicable. Weight for height standards are used for the assessment of overweight and obese children. Table 5 gives the mean heights of boys by age and school. Although the cross sectional nature of our data seems insufficient to come to definite conclusions, there is on the average 6 cm difference in height for 11-12-13 years and the increase in height reaches to 9 cm between the ages 13 to 14 years Ankara College boys who belong to higher socio-economic classes. However for Çubuk boys, the average increment in height is 3 cm for 11-12-13-14 years. The difference of 12 cms between 14 and 15 years may indicate the growth spurt, which seems to occur a year later than the Ankara College boys. There are considerable significant differences between the mean heights of boys from two groups. Ankara College boys are 4 to 14 cms taller than Çubuk boys.

Table 5 : Average Height of Boys by Age and School

Age		11	12	13	14	15
	n	12	61	58	59	58
Ankara College	\bar{X}	147.2	153.6	159.9	168.8	171.8
	S_D	6.64	7.61	8.59	8.15	6.94
	S_E	1.74	0.97	1.11	1.06	0.91
	n	39	81	91	64	12
Çubuk Junior High School	\bar{X}	139.2	142.1	147.8	154.6	167.5
	S_D	5.79	6.68	8.56	9.69	5.45
	S_E	0.92	7.68	0.89	1.21	1.57
	t	4.051	9.396	8.47	8.88	2.38
	p	< 0.001	< 0.001	< 0.01	< 0.01	< 0.05

Table 6 : Average Weight of Boys by Age and Schools

Age		11	12	13	14	15
	n	12	61	58	59	58
Schools	\bar{X}	32.25	41.81	47.0	52.0	55.8
Ankara	S_D	10.04	8.44	10.03	8.46	8.06
College	S_E	2.89	1.08	1.31	1.10	1.05
	n	39	81	91	64	12
Çubuk Junior	\bar{X}	32.6	34.3	37.5	42.2	54.2
High School	S_D	7.06	5.40	6.65	8.03	6.15
	S_E	1.13	0.60	0.69	1.00	1.77
	t	0.855	6.097	6.40	6.613	0.780
	p	< 0.05	< 0.001	< 0.001	< 0.001	> 0.05

The mean weights of boys are shown in Table 6. Parallel to mean heights, the mean weight gained by two groups show significant differences for 12, 13 and 14 years. On the average Ankara College boys are 7 to 10 kg heavier than Çubuk boys, between the ages 12 and 14 years. However the weight difference is only 2 kg for 15 year olds.

Tables 7 and 8 give the mean heights and weights for girls. There are significant differences between the two groups for 12, 13 and 14 years for height. The differences are between 8 - 10 cms. On the other hand the differences between weights seem to decrease for 14 and 15 years. These findings may indicate that the girls from lower socio economic classes do not reach the expected height of girls from higher socio economic classes but gain weight almost as much as the girls from upper classes and become heavier for their heights.

Table 7 : Average Heights of Girls by Age and Schools

Age		11	12	13	14	15
Schools	n	2	65	58	83	37
Ankara	\bar{X}	151.5	155.3	159.9	161.4	162.3
College	S_D	8.50	7.79	6.26	5.82	7.07
	S_E	0.35	0.96	0.73	0.63	1.16
	n	15	55	56	29	6
Çubuk Junior	\bar{X}	141.0	144.6	149.9	155.5	153.5
Heigh School	S_D	6.46	0.74	7.72	5.52	4.11
	S_E	1.66	1.03	1.03	1.01	1.67
	t		7.59	7.62	4.92	
	p	< 0.001		< 0.001	< 0.001	

Table 8 : Average Weights of Girls by Age and Schools

Age		11	12	13	14	15
Schools	n	2	65	72	83	37
Ankara College	\bar{X}	35.0	41.7	47.1	49.7	53.6
	S_D	1.00	7.75	7.03	6.9	9.04
	S_E	0.70	0.96	0.82	0.76	1.48
Çubuk	n	15	55	56	29	6
Junior High school	\bar{X}	31.7	35.9	39.7	47.1	52.1
	S_D	4.89	6.90	7.77	8.65	5.17
	S_E	1.26	0.93	1.03	1.60	2.11
	t		4.34	5.611	1.47	
	p		< 0.001	< 0.001	> 0.05	

The distribution of adolescents by expected percent weight for height standard is given in Table 9. The rates of children who are classified as obese and overweight are more in Çubuk group with 4.18 % obese, 13.2 % overweight for boys and 11.18 % and 15.5 % for girls respectively. There seems to be a tendency for lower socio economic groups to become shorter but heavier children.

Table 9 : Distribution of Boys and Girls by Percent Weight for Height

Schools	Percent Weight for Height							Total
	120 -	119 - 110	109 - 105	104 - 100	99 - 95	94 - 90	89 -	
Ankara College								
n	7	26	20	41	31	38	85	248
% B	2.8	10.4	8.1	16.5	12.5	15.3	34.3	100
n	12	36	22	39	32	40	78	259
% G	4.6	13.8	8.5	15.1	12.4	15.4	30.1	100
Çubuk Junior High School								
n	12	38	24	80	48	40	45	287
% B	4.18	13.2	8.5	27.8	16.7	13.9	15.6	100
n	18	25	19	25	22	21	31	161
% G	11.6	15.5	11.8	15.5	13.7	13.0	19.6	100
Total								
n	19	64	44	121	79	78	130	535
% B	3.5	11.9	8.2	22.5	14.7	14.5	24.1	100
n	30	61	41	64	54	61	109	420
% G	7.1	14.5	9.8	15.2	12.9	14.5	25.9	955

B: boys G: girls

Table 10 : Consumption Frequency of Animal Origin Foods (Distribution of Children per day Consumption)

Food and Beverages	Ankara				Çnbuk Junior High School							
	Boys		Girls		Total		Boys		Girls		Total	
	n	%	n	%	n	%	n	%	n	%	n	%
Milk	160	64.45	175	67.6	335	66.1	38	13.2	19	11.8	57	12.7
Yogurt and ayran	96	38.7	89	34.4	185	36.5	53	18.4	43	21.1	87	19.4
Cheese	189	79.8	201	77.6	399	78.7	61	21.3	42	26.1	103	22.3
Fish; meat poultry	150	60.5	171	66.0	321	63.3	6	2.1	4	2.5	10	2.2
Eggs	96	38.7	89	34.4	185	36.5	21	7.3	11	6.8	32	7.1

According to food consumption data collected by 24 hour recall and history of eating patterns method, it is found that there were differences between the groups in the number of meals consumed each day. 2 % of Çubuk high school children had only one meal a day whereas in Ankara College all children had at least 2 meals a day. On the other hand children who could consume 4 meals a day in Ankara College is 41.4 % in comparison with 6.9 % for Çubuk group. The frequency use of milk and products, meat and poultry was much less for the lower socio economic Çubuk adolescents. Also the type and frequency of eating snacks also differed between the groups. Wealthy children of Ankara College not only had the money to buy snacks and sandwiches to consume between the meals but also all these foods were available for them. On the other hand, purchase and consumption of snacks by Çubuk group was limited.

DISCUSSION

The rate of pubertal growth and maturation is a complex set of interrelationships between genetic endowment and its surrounding environment. The influence of environmental conditions especially the nutritional status on growth and development during infancy and childhood is very well documented. There has been reports on the secular trend in growth during adolescence in the Western Countries (6). Dreizen et. al. (7) have shown that chronic undernutrition during the entire growth period resulted in slowed skeletal growth and maturation, delayed menarche and a prolonged growth. Frisch and Ravelle (8) have suggested the use of mean age of maximum increment in growth of height or weight of adolescent boys as a useful index of nutritional status of a region or country.

Children from Çubuk high school showed delayed growth, especially for height. The height attainment from 11 years to 14 years is found to be much slower than their counterparts in Ankara College. According to our food consumption data, the diet consumed in this semi urban area meets the requirements but insufficient in protein both qualitatively and quantitatively. One of the major causes of slow growth is probably protein inadequacy. The average height attained, especially by girls

at fifteen years of age is 153 cm. This value is in accordance with the national average height for women. However, weight increment continues despite the very slow growth in height. When the weights of these adolescents are evaluated by weight for height standards, there seems to be many children who are overweight and obese. In reality, we probably have «insufficiently nourished obese» adolescents in our hands. Bearing in mind the very high prevalence of obesity among women in Turkey, we assume that these relatively fat adolescent girls turn into fat women when faced with conditions which leads to obesity : these can be summarised as frequent pregnancies, lack of physical activity and consumption of foods rich in carbohydrates. All these factors lead majority of women in Turkey to obesity when they are 35 - 40 years old.

ÖZET

SOSYO - EKONOMİK KOŞULLARIN ADÖLESLANLARDA BÜYÜME GELİŞME VE ŞİŞMANLIK ÜZERİNE ETKİSİ

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Bu çalışmanın amacı, adölesanlarda, büyüme ve şişmanlık oluşumu üzerine sosyo - ekonomik, kültürel ve beslenme koşullarının etkisini saptamaktadır. Araştırma örneklemini, iki değişik sosyo - ekonomik ve kültürel düzeydeki 11 - 15 yaşlar arasındaki adölesanlar oluşturmuştur. Birinci grupta, Ankara'da sosyo - ekonomik koşulları yüksek özel bir ortaokul, ikinci grupta ise Ankara'ya 40 km uzaklıktaki Çubuk'ta bulunan düşük sosyo - ekonomik düzeydeki ortaokul öğrencileri yer almıştır. Gruplar arasında ailelerin eğitim ve gelir düzeyleri arasında önemli farklılıklar saptanmıştır. Tüm yaşlarda, iki grubun boy uzunluğu arası fark ise 10 cm dir. Şişmanlığın saptanmasında boya göre ağırlık standardı kullanılmıştır. Yüksek sosyo - ekonomik düzeydeki çocukların % 15.9 u ve düşük sosyo - ekonomik düzeydeki çocukların % 22.5 i hafif şişman ve şişman bulunmuştur. Yüksek sosyo - ekonomik düzeydeki çocuklar arasında iyi programlanmış spor aktivitesi nedeniyle çok aktif çocuk oranı yüksektir. Yüksek sosyo - ekonomik düzeydeki çocukların diyeti hayvansal protein ve yağdan zengin, düşük sosyo - ekonomik düzeydeki çocukların diyeti ise tahıl, şeker ve sebzelere dayalı bulunmuştur. Bu grup, özellikle süt ürünlerini

yetersiz tüketmektedirler. Yüksek sosyo - ekonomik düzeydeki çocuklar 3 ana ve en az bir ara öğün alırken, düşük sosyo - ekonomik grupta öğün atlayanlar daha çoktur. Bu araştırmanın sonuçları, adölesanlarda, şişmanlığın oluşumunda sosyo - ekonomik ve kültürel koşulların etkisini açıkça göstermektedir. Diyet tipi ve elverişsiz fiziksel aktivite, sosyo - ekonomik ve kültürel düzeyle ilgilidir. Kısa boy özellikle kızlar arasında, düşük sosyo-ekonomik grupta şişmanlığa eğilimi vurgulamaktadır ve ileri yaşlarda sık gebeliklerin etkisi ile de şişman yetişkin olasılığı artmaktadır.

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