

## Obesity profile in Turkey

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### Abstract

**Background:** Obesity is becoming a severe health problem worldwide. We evaluated the prevalence of obesity in different regions of Turkey, to study the association between BMI and regional nutritional habits and to compare the results with previous epidemiological studies. **Method:** 13,878 individuals (6,799 males and 7,079 females) were screened in six different regions of Turkey between 2000-2005 (Istanbul and Kastamonu from Northern part of the country, Gaziantep from South, Denizli and Kırklareli from the West and Konya from the middle part of the country). The sample was randomly selected and all participants were older than 20 years of age. Weight (kg), height (cm) and waist circumference (cm) were measured and body mass index (BMI) was calculated according to World Health Organization (WHO) methods and criteria. **Results:** The mean BMI was 27.52 kg/m<sup>2</sup>, 26.80 kg/m<sup>2</sup> in men and 28.24 kg/m<sup>2</sup> in women. The mean waist circumference was 98.5 cm in men and 79.8 cm in women. 30.9% of the subjects have normal weight, 39.6 % were overweight, and 29.5% were obese according to the WHO classification. The highest prevalence (39.9%) of obesity was observed between the ages of 50-59 years. The prevalence of obesity was highest in Gaziantep (41.6%), which is an industrialized city in the southeastern part of the country. The prevalence of overweight in men aged from 60-69 years was 49.7% and was 37.2% in women between the ages of 30-39 years. The highest frequency of obesity for men was 27.9 % in the 50-59 years age group whereas the highest frequency of obesity for women was 51.4 % in the 50-59 years age group. A heterogenous set of results were obtained with respect to lifestyles and nutritional habits for every city when the prevalence of overweight and obesity in the age groups were evaluated according to regions. **Conclusion:** Obesity is a major health problem in Turkey and the increased prevalence of obesity in the young age group raises concern.

**Key words:** Obesity prevalence, body mass index, waist circumference

### Introduction

The increasing prevalence of overweight and obesity is a major health problem not only in industrialized but also in developing countries. The prevalence of obesity has tripled in developing countries because they have been adopting a western mode of nutrition and lifestyle.<sup>1</sup> Today, more than 1.1 billion adults are overweight and 300 million are obese. More than 50 % of the US population is obese. Overweight and obesity are serious public health problems, especially during childhood and adolescence.<sup>2,3,4</sup>

Sedentary lifestyles that lack regular physical exercise and based on fast food are being adopted by an increasing number of people all over the world including Turkey. It is known that adopting a vegetarian diet or vegetable-rich diet decreases the risk of obesity<sup>5</sup>, however, it has been found that preparation of foods and cultural orientations affect this risk.<sup>6</sup>

More than two-thirds of people with type 2 diabetes are either overweight or obese. Weight reduction can decrease medication cost and improve metabolic control. The benefits of intentional weight loss on mortality rate are well established in overweight subjects with diabetes.<sup>7,8</sup>

Various definitions of obesity have made it difficult to compare data from different studies.<sup>9</sup> Previous studies in Europe have often used the definition of the Broca Index, whereas in 1985, a National Institutes of Health (NIH) consensus approved the use of body mass index (BMI).<sup>10</sup> In 1995, an expert committee convened by the WHO recommended a classification for obesity using BMI cut-off points of 25, 30, and 40 as grade 1, 2, and 3, respectively.<sup>11,12</sup> It has been demonstrated that BMI increases with age and its rate of increase is greater in men than in women.

Obesity and its complications are a growing epidemic across the world. Every year at least 300,000 deaths in the US can be linked to obesity.<sup>13,14</sup> Obesity also is one of the biggest obstacles in the management of type 2 diabetes. There is evidence for a causal link between obesity and type 2 diabetes in obese children.<sup>15,16</sup>

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## Methods

A total of 13,878 individuals were screened in six cities between the years 2000 and 2005. The screening process was conducted by the Turkish Association for the Study of Obesity (TOAD-TASO) which has its central office in Istanbul and also facilities in Konya, Gaziantep, Kirklareli, Kastamonu, and Denizli. In different areas of these cities, men and women aged over than 20 years were randomly selected. Differences in ethnic characteristics, lifestyles, and nutritional habits were analyzed in four different regions of the country.

Data collection was conducted using standard anthropometric techniques and equipment.<sup>11</sup> Weight (kg), height (cm), and waist circumference (cm) were measured and body mass index ( $\text{kg}/\text{m}^2$ ) was calculated according to WHO methods and criteria. Weight, height, and waist circumference were measured while subjects wore light clothing and without shoes.

## Statistical analysis

All participants were randomly evaluated. Descriptive statistics, one-way ANOVA, multiple comparisons, and chi-square tests were used in the statistical analysis. Student *t* test was performed to compare the means of BMI and waist circumference among age and gender subgroups.

## Results

Several screening studies on prevalence of obesity have been performed in our country (TEKHARF, TURDEP and TOHTA).<sup>17,18,19,20</sup> A fourth extensive screening study has been completed by the Turkish Association for the Study of Obesity (TASO–TOAD). The core data are presented in Table 1. A total of 13,878 individuals were screened at six different geographical regions. BMI values according to age and gender are presented in Figure 1. Among the study subjects 32.45 % were overweight and 28.63% were obese. The percentage of overweight subjects was above 41.1% in five age groups. The prevalence of obesity was 39.9% in the 50-59 years age group, the highest for any age group. In general, the highest prevalence of overweight for men was seen in the 60-69 years age group and for women in the 30-39 years age group. In contrast, obesity was frequent in both men and women between the ages 50-59 years, with a prevalence of 27.9% and 51.4%, respectively.

A comparison of BMI values according to sex and age groups is presented Figure 2 and Table 3. BMI values according to sex and the different geographical regions are presented Figure 2. The highest prevalence of overweight was in Istanbul with 43.4% (men, 49.1%; women, 33.3%) and the highest prevalence of obesity was in Gaziantep with 41.6% (men, 30.0%; women, 47.9%).

The distributions of normal, overweight, and obese in the total screened population are presented Table 2. According to their BMI values, 30.9%, 39.6%, and 29.5% of the subjects were normal weight, overweight, and obese, respectively. When the overweight and obese subjects were considered together, 9,499 (69.0%) of subjects had a weight

**Table 1:** Study population in different regions

City (Region)	Screened population: n	Men: n (%)	Women: n (%)
Istanbul (Marmara region)	2402	1524 (63.4)	878 (36.6)
Kirklareli (Marmara region)	2208	1220 (55.3)	988 (44.7)
Konya (Middle Anatolia)	3231	1473 (45.6)	1758 (54.4)
Denizli (Aegean region)	2204	1111 (50.4)	1093 (49.6)
G. Antep (Southeast Anatolia)	2920	1026 (35.1)	1894 (64.9)
Kastamonu (Blacksea region)	913	445 (48.7)	468 (51.3)
Total	13878	6799 (49.0)	7079 (51.0)

problem. The BMI averages for all women and men were significantly different between the age groups (Student *t* test,  $p=0.0001$ ).

The average waist circumference of 7,306 subjects was 89.17 cm. With regard to gender differences, the average waist circumference for men was 98.55 cm and for women 79.80 cm. Significant differences in these results between gender and age groups were only seen between the 30-39 and 50-59 years age groups (Table 3).

## Discussion

When the obesity profile in Turkey is evaluated, it can be seen that the prevalence of obesity is influenced by regional lifestyle and nutritional habits. Konya is an agricultural region and mostly grains, carbohydrates, fats, and sugars are consumed. Gaziantep is an industrial city where the nutritional habits of the residents are mostly based on meat, fat, pastry, and alcohol. Denizli is an industrial and tourist region with nutritional habits mainly based on carbohydrates and fats. Kirklareli is an agricultural and stock-breeding region with nutritional habits based on fats, proteins, and alcohol. Kastamonu is a highly forested region with handicraft industries and the nutritional habits in this city are based on sugar and fats. Finally, Istanbul is a cosmopolitan city with a population of nearly 12 million and has industry, tourist attractions, and educational resources and the nutritional habits are based on fast food, alcohol, carbohydrates, and fats.

There is a strikingly high prevalence of obesity in some regions due to Central and Southern Anatolian nutrition. Overweight prevalence of more than 36% in all cities was also another important finding. The overweight people have a high risk of obesity in the future.

Table 4 shows a summary of the screening studies (by different study groups) for overweight and obesity prevalence in Turkey. Our results are comparable to those of the three other extensive screening studies (TEKHARF, TURDEP, TOHTA) that were conducted in Turkey.

**Table 2:** Distribution of the population according to BMI

	BMI: n (%)			
	<25 kg/m <sup>2</sup>	25-30 kg/m <sup>2</sup>	≥30 kg/m <sup>2</sup>	Total
Men	2,256 (33.4)	3,027(44.8)	1,473 (21.8)	6,756
Women	1,999 (28.6)	2,416 (34.5)	2,583 (36.9)	6,998
Total	4,255 (30.9)	5,443(39.6)	4,056 (29.5)	13,754
			<b>X<sup>2</sup>= 383,74</b>	<b>p&lt; 0,001</b>

**Table 3:** Waist circumferences according to age and gender (n=7306)

Age (years)	Gender	Subjects (n)	Waist circumference (Mean ± SD)	p*
20-29	M	581	90.1±10.4	0.54
	F	552	83.2±11.9	
30-39	M	602	96.2±11.1	0.02
	F	719	94.6±13.3	
40-49	M	882	99.0±10.7	0.34
	F	950	98.5±12.9	
50-59	M	756	100.9±10.6	0.04
	F	833	102.1±11.8	
60-69	M	456	102.0±10.8	0.96
	F	528	102.0±12.1	
> 70	M	248	101.3±11.7	0.70
	F	190	100.9±10.9	

\* Student-t test

**Table 4:** Obesity prevalence in Turkey; results of different epidemiological

Study	N	Men (N)	Women (N)	Obese men (%)	Obese women (%)	Obesity Prevalence (%)	Overweight men (%)	Overweight Women (%)	Overweight Prevalence (%)
TEKHARF STUDY (1997-2000)	3681	1863	1818	21.10	43.00	32.05			
TURDEP STUDY (1998-2000)	24,788	11,080	13,708	12.90	29.90	22.30			35
TOAD STUDY (2000-2005)	13,878	6799	7079	21.8	36.9	29.35	44.8	34.5	39.6%

The highest mean prevalence of obesity of 32.05% was reported in the TEKHARF (men, 21.1%; women 43.0%). The highest obesity frequency in women was also reported in this study (43.0%). Mean obesity in the TURDEP was 22.3% (men, 12.9%; women, 29.9%), which for men was the lowest frequency among the three studies. Overweight frequency was 35%, which was higher than the frequencies in the other studies. Mean obesity prevalence in the TOHTA was 19.40% (men, 14.4%; women, 24.6%), which was the lowest obesity frequency that has been reported in our country. The percentage of overweight subjects in the TOHTA was 24.09%. When our results were compared with those studies performed in other countries, BMI values in 35-65 years age groups were found to be higher than the values reported in the MONICA study which investigated the effects of BMI on coronary heart disease in men (mean BMI 26 kg/m<sup>2</sup> compared with 27.17 kg/m<sup>2</sup> in our study) and women (mean BMI 25.5 kg/m<sup>2</sup> compared with 29.46 kg/m<sup>2</sup> in our study).<sup>21</sup>

In the ERICA study, another study supported by the WHO, 10% of the men living in Western and Northern Europe and

14-15% of the men living in Southern and Eastern Europe were found to be obese in the 40-59 years age group. Values for women in the same age group were 13-14% in Western and Northern Europe and 25-30% in Southern and Eastern Europe.<sup>24</sup> While the results for men (18%) in our study were similar to the those in European countries, obesity was more common in women (31.2%) in our study.

As a result of this extensive screening study involving 13,878 individuals, which was conducted in six different regions of our country, we have observed that obesity is a major health problem and is closely associated with type 2 diabetes. An increased prevalence of obesity among women in the 45-55 years age group together with a very high blood glucose level of 9.7% (will be published in another study) and waist circumference of greater than 100 cm have been shown to be associated with increased cardiovascular risk in the TEKHARF study. We believe that the increase in obesity prevalence can be explained in part by nutritional habits, lifestyle, and regionally popular food types with excessive carbohydrate and fat content. The low physical activity of women and in some regions high alcohol

consumption of men may have effects on the increasing prevalence of obesity.

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