Demographic, Socioeconomic and Educational Aspects of Obesity in an Adult Population

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Obesity as a disease is a yet-unidentified sum of genetic and environmental factors. Risky eating behavior and lifestyle may bring the disease. The aim of the study was to find out risk factors for obesity factors influencing definition of obesity. Participants (n=1500) who filled out a questionnaire about eating habits are grouped according to their body mass indices as normal weight, overweight and obese (n=500 in each group).

According to our results, the prevalence of having obese first-degree relatives is significantly higher in obese individuals ($p<0.001$). Sixty-two of normal weighing subjects were university graduates, whereas this ratio was only 31% in the obese group ($p<0.001$). Incidence of obesity was higher in married participants when compared to the single or divorced/widowed persons ($p<0.001$). Multinomial logistic regression analysis gave the following results: risk of obesity was 57% less in participants lacking a family history of obesity when compared to the ones with a positive family history ($p=0.005$). Being married increases the risk of obesity 2.5 times; being a primary school graduate increases the risk about 1.5 times.

Lower educational level, unemployment and lack of counseling seem to be risk factors associated with obesity. Diverging patterns of sociodemographic features, lifestyles and perception were evident even between overweight and obese populations.

Key words: obesity ■ demographics ■ socioeconomic status ■ educational status

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INTRODUCTION

Obesity, which is defined in numbers as a function of height and weight—that is, body mass index (BMI)—is obvious for the physician to diagnose, if present. However, its definition varies individually since the definition of "normal" differs from person to person. Perception of body image seems to be more important for women, and trends to become slimmer have accelerated among females in the last three decades, whereas figures from health statistics highlight the opposite curve towards obesity. We tried to look into variations in the definition of obesity and define risk factors in terms of eating behavior and personal and family history and find out what influences development of obesity.

SUBJECTS AND METHODS

Patients seen for any cause at outpatient clinics of the General Internal Medicine Department of Hacettepe University Hospital were chosen as participants. Female patients who consented to the interview filled out a questionnaire, which obtained their BMI, sociodemographic characteristics, eating habits and attitudes towards their weight status. Five-hundred normal-weight (BMI 18.5–24.9 kg/m^2), 500 overweight (BMI 25–29.9 kg/m^2) and 500 obese patients (BMI>30 kg/m^2) between 18–65 years of age were interviewed. The study was complete when 500 participants for normal weight, overweight and obese groups were reached. Study protocol was in accordance with the Declaration of Helsinki and approved by the local ethics committee of the institution. Written informed consent was taken from all subjects prior to study entry.

STATISTICS

Descriptive statistics were generated for all study variables, including mean ± SD for continuous variables and relative frequencies for categorical variables. Pearson's Chi-squared method for categorical and ANOVA

for continuous data were performed for univariate analysis. Two-sided values of $p<0.05$ were considered as statistically significant. A multinomial logistic regression model was built for statistically significant values derived from univariate analysis. The statistical analysis was performed with the statistical package SPSS Version 10.0 for Windows.®

RESULTS

Demographic data of participants are seen in Table 1. Statistically significant data were height (p=0.03); weight (p=0.001); and BMI (p=0.001), which was higher in obese and overweight groups.

Table 2 shows data from personal and familial past medical history. For all participants, hypertension was the most prevalent underlying disease reported.

The prevalence of having obese first-degree relatives was significantly higher in obese individuals ($p<0.001$). Educational levels of groups were significantly different. Sixty-two normal-weighing subjects were university graduates, whereas this ratio was only 31% in the obese group, which was significantly lower when compared to overweight and normal-weight subjects ($p<0.001$).

Incidence of obesity was higher in married participants when compared to single or divorced/widowed persons ($p<0.001$). Rates of unemployment were higher in the obese and overweight group (p=0.016).

Table 3 shows the results of questions about eating behavior, exercise and smoking. Regular breakfast and evening meal consumption were similar in all three groups. The rate of consumption of afternoon snacks was higher in obese individuals (p=0.001).

Regarding the places subjects eat, the answers did not differ significantly among the groups. Neither the smoking prevalence nor the frequency of consumption of different macronutrients was different among the groups. The most common exercise type was walking in all groups; exercise duration was similar. Alcohol consumption was significantly higher in normal-weighing subjects (p=0.005). "Coeating" activities, such as watching television, were not different among the groups.

All three groups gave the answer "breakfast", when the most important meal for them was asked. More obese participants were shopping daily for food when compared to others (p=0.029).

After univariate analysis, multinomial logistic regression model is built for statistically significant data (Table 4). According to this model, risk of obesity is 64% less in participants lacking a family history of obesity when compared to the ones with a positive family history, and being married increases the risk of obesity 2.5 times. When primary-school graduates are compared to the other educational level groups, the former are 1.5 times more under risk of obesity, whereas alco-

Table 1. Demographic properties

	Obese (Mean ± SD)	Overweight (Mean ± SD)	Normal (Mean ±SD)	P Value
Height	158.9 ± 5.4	159.7 ± 4.9	160.7 ± 4.7	**0.03***
Weight	88.8 ± 13.1	70.7 ± 6.9	58.1 ± 5.9	**0.001***
Age	42.0 ± 8.4	40.6 ± 7.9	41.4 ± 7.2	0.439
BMI	35.6 ± 4.8	27.7 ± 1.8	23.1 ± 1.3	**0.001***

* p<0.05 significant; BMI: body mass index

Table 2. Properties and medical and family history of participants

	Obese (n=500) (%)	Overweight (n=500) (%)	Normal (n=500) (%)	P Value
Obese Relative				
Yes/no	254/246 (50,8)	181/319 (36.2)	110/390 (22)	0.0001*
Education				
University	155 (31)	204 (40.8)	310 (62)	0.0001*
High school	106 (21.2)	154 (30.8)	133 (26.6)	
Primary school	239 (47.8)	142 (28.4)	57 (11.4)	
Marital Status				
Single	52 (10.4)	101(20.2)	166 (33.2)	0.0001*
Married	388 (77.6)	338 (67.6)	268 (53.6)	
Divorced/widowed	60 (12)	61 (12.2)	66 (13.2)	
Occupation				
Employed/unemployed	153/347 (30.6)	250/250 (50)	300/200 (60)	0.016*
Medical History				
Disease present/absent	123/377 (24.6)	154/346 (30.8)	60/440 (12)	0.033

* p<0.05 significant

hol consumption seems to decrease the risk. Absence of an underlying disease and related drug use decreases the risk of obesity by 67%. Consumption of afternoon snacks is found to double the risk of obesity. Other significant differences in the univariate model are excluded from the multinomial model since they are no longer meaningful.

DISCUSSION

"How do we get fat?" is an important question to answer—although not easy. Genetic factors are found to play an important role in the scenario; however, an imbalance between food intake and energy expenditure still forms the theoretical basis for obesity.

The increase in the rate of obesity in the United States is in part attributed to increasing availability of palatable calorie-rich food.[1] Consumption of sweetened soft drinks is shown to be a predictor of initial BMI in children in a study by Ludwig et al.[2] Consumption of high fructose corn sweeteners, especially, seems to be related to obesity epidemics.[3]

We were not able to show a correlation between consumption of snacks and obesity in our study; however, it is known that obese individuals tend to underestimate their food consumption.[4]

When participants were asked the definition of obesity, the answer "increased fat" ranked first in all three groups. Twenty-three percent of normal-weighing subjects defined obesity as "false body proportions," whereas only 6% of obese subjects replied so—in other words, defined themselves as such. From the result, it was possible to derive the idea that the normal group has a more cosmetic point of view. An interesting study about body image perception was carried out by Leonhard and Barry.[5] Subjects were asked to choose a picture among nine male and female silhouette drawings ranging from very thin to very obese that they thought represented themselves. The normal-weight women had the largest variance and so were the most inconsistent in their choices of a silhouette representing their current size. Obese and very obese women underestimated their size and felt that a desired size was unattainable.

Daytime eating schedule is an important factor for obesity. Research on obese individuals shows that they tend to skip breakfast and eat a larger meal in the daytime.[6] However, obese subjects tend to underestimate their daily consumption by up to 50%. This is true for unhealthy food in particular.[4,7] In our study, it seemed that everyone was of the same opinion about the importance of breakfast, although some were not applying this knowledge to their eating schedules. In contrary to the literature, obese participants seem to have breakfast regularly and at home most of the time. However, 69% of the obese group was unemployed so they had time to spend at the breakfast table in the morning when compared to the normal-weighing subjects of whom 60%

Table 3. Eating habits

	Obese Number (%)	Overweight Number (%)	Normal Number (%)	P Value
Main Meals				
Breakfast	464 (36.4)	453 (33.6)	482 (30)	0.179
Lunch	479 (31.9)	465 (33.5)	483 (34.7)	0.381
Dinner	500 (34.6)	491 (33.6)	492 (31.8)	0.206
Meals in Between				
Brunch	100 (32.7)	96 (34.5)	93 (32.7)	0.168
Afternoon	104 (55.6)	51 (22.2)	40 (22.2)	**0.001***
Midnight	57 (53.6)	40 (28.6)	33 (17.9)	0.081
Night eating	8 (0)	7 (100)	9 (0)	0.459
Regular meals (everyday)	378 (36.1)	360 (33.7)	349 (30.3)	0.130
Snack present at home	122 (32.9)	114 (31.7)	131 (35.4)	0.098
Habits				
Alcohol	100 (20.3)	90 (25.4)	180 (54.2)	**0.005***
Exercise	180 (31.4)	210 (36.4)	210 (32.2)	0.607
Smoking	155 (27.7)	180 (37.2)	215 (35.1)	0.424
Activities				
TV, radio, computer	405 (33.8)	407 (33.3)	426 (32.9)	0.086
Shopping for Food				
Daily	56 (62.1)	50 (31)	25 (6.9)	**0.029***
Weekly	444 (29.6)	450 (36.5)	475 (33.9)	
Meals Prepared Regularly Everyday				
Yes	471 (33.7)	475 (34.1)	466 (32.2)	0.533
No	29 (31.3)	25 (28.1)	34 (40.6)	

p<0.05 significant

were employed. The difference lost significance in the multinomial logistic regression model.

Sedentary individuals are more likely to gain weight, and to ensure weight loss maintenance, increased physical activity is a good method.[8] We failed to show any of the effects of exercise in our study.

A growing body of evidence was found about the association between obesity and genetics. Much of the variance in body weight and body fat distribution is attributed to genes, and the estimated genetic contribution is found to be somewhere between 20–70% in different studies.[9-12] Areas of interest identified on DNA thus far suggest that the familial contribution to obesity is driven by a polygenic mechanism. The presence of one obese parent or two obese parents raises the risk exponentially.[13] Our results parallel the literature since the most important risk factor for obesity was shown to be the family history. It was not possible to exclude the contribution of family eating culture, but whatever the exact relation is, family history of obesity increases the risk.

Many smokers perceive smoking as a weight control mechanism. Our study failed to show any correlation between smoking and BMI, though it is not possible to derive an exact explanation from the results since our questionnaire did not target weight concerns of smokers. Weight concerns of 286 male smokers were investigated in a study, and motivation to quit smoking was found to be significantly lower in those with weight concerns, which was defined on a scale of 11 questions. Participants self-reported that if they gained an increment of weight after quitting smoking, they would start smoking again. BMI was not significantly associated with weight concerns.[14]

The effect of alcohol on the development of obesity is discussable. Besides being an energy source by itself, alcohol also stimulates appetite. Studies testing intake within 1 hr of ingestion report a higher intake of food following alcohol relative to energy-matched controls. This appetite-stimulating effect may be either through enhanced orosensory reward or impaired satiety.[15] Inhibitory effects of alcohol on leptin, serotonin and glucagon such as peptide-1 may lead to overeating.[16] On the other hand, the French paradox started the discussion about beneficial effects on health. For example, the effect of isohumulones in beer are studied and success is achieved in animal models in prevention or improvement of obesity.[17] In contrary to the literature in general, alcohol consumption seems to prevent obesity, according to our results. However, the positive correlation of alcohol consumption and high educational level must not be disregarded, since it is a more sensible way of explaining this seemingly preventive effect. The World Health Organization report on obesity drives attention to a shift of the problem from high-to-low socioeconomic status in developing countries when studies up to 1989 and onwards are compared.[18] The inverse relationship between obesity and education is especially true for women. For example, a study on over 19,000 women in Cuba shows an inverse relationship between obesity and education for women and a positive relationship for men.[19] Studies from Brazil, China and South Africa gave similar results.[20-22]

The authors of the report explain this by a few propositions. One is fewer opportunities of low-class people for exercise coupled to a low level of knowledge on health. We may add rural cultural values favoring obesity, which are still alive in urban places of our capital, among low-educated individuals. The famous Turkish saying, "One piece of flesh covers a thousand defects," is a summary of the point of view and may, in part, explain the negative correlation between education and obesity.

In conclusion, socioeconomic factors such as unemployment and lack of higher education have the greatest impact on the development of obesity.

Table 4. Multinomial logistic regression analysis, with the normal group taken as reference

Factors	Obese			Overweight		
	P Value	OR	95% C	P Value	OR	95% CI
Family history for obesity (-)	**0.005***	0.36	0.18–0.74	0.126	0.49	0.23–1.03
Family history for obesity (+) (reference)						
Married	**0.043***	2.56	1.03–6.39	**0.038***	2.51	1.05–5.99
Divorced/widowed	0.62	1.3	0.41–4.48	**0.047***	3.08	1.01–9.39
Single (reference)						
Primary school graduate	**0.003***	1.41	1.41–9.11	0.175	1.87	0.75–4.65
High school graduate	0.71	1.17	0.50–2.73	0.53	1.27	0.59–2.71
University graduate (reference)						
Alcohol consumption(-)	0.59	0.81	0.37–1.75	0.062	0.49	0.24–1.02
Alcohol consumption (+) (reference)						
Medication (-)	**0.012***	0.33	0.14–0.78	**0.010***	0.34	0.15–0.77
Medication(+) (reference)						
Afternoon meals (+)	**0.17**	1.8	0.77–4.33	**0.009***	3.29	1.35–8.02
Afternoon meals (-) (reference)						

* p<0.05 significant

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