PREVALENCE AND RISK FACTORS OF OVERWEIGHT AND OBESITY IN TURKISH ACADEMIC STAFF

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Abstract. Obesity and overweight are a significant public health problem that affects the quality of life of the individuals concerned. We studied the prevalence and related risk factors for obesity among academics. This descriptive cross-sectional study sampled 499 academic staff at Elazig Firat University, Turkey. Height, weight and blood pressure values were obtained and a descriptive survey was conducted. The age range of the participants was 22 to 65 years, with a mean age 36.5±8.1 years. The group had 29% women, and 71% men; 80% were married. The mean BMI of the participants was 24.6±3.1 kg/m^2. Their mean systolic blood pressure was 117.0±12.1 mmHg and mean diastolic blood pressure was 73.1±8.0 mmHg. The overall prevalence of obesity was 7.0%; 2.1% in women and 9.0% in men. The combined prevalence of overweight and obesity was 45.9%. Nearly half the participants were either obese or overweight. A correlation was identified between overweight/obesity and sex, marital status, academic staff, physical activity, systolic and diastolic blood pressure. Although the study did not include all academics, the results reveal the need to evaluate the health impact of obesity in academics.

INTRODUCTION

Obesity is excess adipose tissue which affects the health of the individual. The increasing prevalence of obesity has been deemed a public health epidemic. Increased calorific intake and more sedentary lifestyles are important reasons for the increase in obesity. Another reason is increased consumption of foods containing high levels of fat (Filozof and Gonzalez, 2000). Besides cardiovascular problems and hypertension, obesity is closely linked with metabolic defects, such as diabetes, and increased morbidity and mortality. Obesity prevention studies start during childhood. Research suggests that obesity beginning in childhood continues into adulthood. In 1995, the number of obese adults was 200 million; this number reached 300 million in 2000 (WHO, 2001). While obesity prevalence in US citizens revised for age was 22.9% between 1988 and 1994, it increased to 30.5% between 1999 and 2000. During the same period, overweight prevalence increased from 55.9% to 64.5% (Flegal *et al*, 2002). Even in Japan where obesity is not regarded as a significant problem, 24.5% of the population is overweight and 2.3% is obese (Yoshiike *et al*, 2002). According to the diabetics, obesity and hypertension epidemiology study, the prevalence of obesity frequency in Turkey was 22.3% using BMI as a reference (Satman

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et al, 2002). We thought this highly-educated group would be aware of the benefits of physical exercise and appropriate dietary habits in offsetting their sedentary lifestyle and avoiding obesity.

This sample group was chosen in order to investigate obesity-related awareness and behavioral choices amongst a highly-educated social group. The purpose of this study was to investigate nutritional status (overweight, obesity) and associated factors among academic staff working at Elazig Firat University, Turkey.

MATERIALS AND METHODS

Subjects

This descriptive cross-sectional study surveyed 499 adults working for Elazig Firat University, Turkey. The university staff are comprised of 1,209 academic staff based within the faculties of Medicine, Veterinary Medicine, Science, Literature, Theology, Education, Communication, Technical Education, Engineering, Vocational Schools of Higher Education and the Conservatory. Height, weight and blood pressure were obtained from participants and a questionnaire was given which was comprised of descriptive questions. The survey was carried out in January 2006 with face to face interviews. During data collection, interviewers visited one school each day. Written informed consent was given by participants. Lecturers available at that time were asked to fill out the questionnaire. Due to teaching commitments, absences due to sickness and non-participation, the return rate was 41.3% (n=499). Each respondent in the sample had a university degree.

Study design

Heights and weights were taken without shoes, wearing light clothes. The BMI (kg/m^2) was calculated and used to evaluate for obesity. The study population was divided into three groups using World Health Organization criteria (Allison and Saunder, 2000). A BMI ≤24.9 was defined as a normal weight (group 1), A BMI 25-29.9 was defined as overweight (group 2), and a BMI ≥30 was defined as obese (group 3). Systolic blood pressure and diastolic blood pressure were measured three times in the sitting position after 15 minutes rest and the mean result was taken. Hypertension was defined as a systolic blood pressure of ≥140 mmHg and a diastolic blood pressure ≥90 mmHg (National Institutes of Health, 1998) or if subjects were on anti-hypertensive therapy, "hypertension" was an assumed diagnosis.

The researchers developed a form to collect information on each participant's age, gender, monthly income, marital status, and academic position. Cigarette and alcohol usage were determined by questioning participants. The criteria for regular sports activity was set as a minimum of thirty minutes activity, three times a week (Wasserman *et al*, 1994).

Statistical analyses

Data were analysed using SPSS for Windows (version 10.0) and statistical analysis, error controls and tables were carried out. Descriptive statistics included mean values and standard deviations (means ± SD). We compared categorical variables using χ^2 analysis; $p<0.05$ was considered significant (Ozdamar, 1999). Multivariate forward logistic regression analysis was also utilized. Only variables with significant associations (*ie*, p-value <0.05) with weight status in the χ^2 tests was considered in the logistic regressions. Overweight and obese staff were collected into one group. They were compared for risk factors with staff of normal weight (overweight/obesity weight 1, normal weight 0). The odds ratio (OR) and its 95% confidence interval (CI) were calculated for

Table 1
Body mass index (BMI) in men and women by age group.

Age group in years	Normal		Overweight		Obese		Total	
	n	%	*n*	%	*n*	%	*n*	%
Men[a]								
22-29	36	56.3	25	39.1	3	4.7	64	18.0
30-39	69	45.1	70	45.8	14	9.2	153	43.0
40-49	25	26.9	55	59.1	13	14.0	93	26.1
>50	22	47.8	22	47.8	2	4.3	46	12.9
Total	152	42.7	172	48.3	32	9.0	356	71.3
Women[b]								
22-29	50	92.6	4	7.4	0	0.0	54	37.8
30-39	59	84.3	9	12.9	2	2.9	70	49.0
40-49	9	50.0	8	44.4	1	5.6	18	12.6
>50	0	0.0	1	100.0	0	0.0	1	0.7
Total	118	82.5	22	15.4	3	2.1	143	28.7
All[c]								
22-29	86	72.9	29	24.6	3	2.5	118	23.6
30-39	128	57.4	79	35.4	16	7.2	223	44.7
40-49	34	30.6	63	56.8	14	12.6	111	22.2
>50	22	46.8	23	48.9	2	4.3	47	9.5
Total	270	54.1	194	38.9	35	7.0	499	100.0

[a]$p < 0.05$
[b]$p < 0.001$ Since the expected value was higher for women, the >50 year old age group and the 40-49 year old age group were combined. For the BMI, overweight and obese groups were combined.
[c]$p < 0.001$

each categorical variable.

The mean values for the different groups and their SDs were analyzed using the ANOVA or its equivalent, the nonparametric Kruskal-Wallis test. ANOVA and Kruskal-Wallis were used to compare the average blood pressures by BMI.

RESULTS

In the study group, 28.7% of the participants were women and 71.3% were men. The mean age of the men was 38.0±8.4, and the mean age of the women was 32.6±5.8. Of the participants, 79.8% were married. The prevalences of overweight and obesity are shown in Table 1. The overall prevalence of obesity was 7.0%; 2.1% in women and 9.0% in men. The prevalence of obesity was higher in men than in women ($p<0.001$). The percentage of overweight participants was 38.9% overall; 15.4% in women and 48.3% in men. The combined prevalence of both overweight and obesity was 45.9%. The prevalence of obesity increased with age ($p< 0.001$; Table 1), with the highest prevalence in the 40 to 49 year old age group (12.6%) and the prevalence declined thereafter. The prevalence of obesity among women increased markedly from the 22 to 29 year old age group to the 40 to 49 year old age group ($p<0.001$; Table 1). In our study, among the women under 29 years old, there was no obesity detected. Among men, there was a

Table 2
Prevalence of overweight/obesity by demographic, socio-economic and lifestyle factors.

	Normal		Overweight/Obese		Total	
	n	%	*n*	%	*n*	%
Academic staff[a]						
Faculty members	109	45.0	133	55.0	242	48.5
Lecturers+research assistants	161	62.6	96	37.4	257	51.5
Marital status[a]						
Single	74	73.3	27	26.7	101	20.2
Married	196	49.2	202	50.8	398	79.8
Monthly income [a,b]						
≤1,250 YTL	110	65.5	58	34.5	168	33.7
1,251-2,250 YTL	127	50.4	125	49.6	252	50.5
≥2,251 YTL	33	41.8	46	58.2	79	15.8
Smoking status						
Yes	82	52.2	75	47.8	157	31.5
No	188	55.0	154	45.0	342	68.5
Alcohol intake						
Yes	14	43.8	18	56.3	32	6.4
No	256	54.8	211	45.2	467	93.6
Physical activity[c]						
Never	182	51.3	173	48.7	355	71.1
Three times a week	88	61.1	56	38.9	144	28.9
Regular three meals a day						
Yes	183	54.0	156	46.0	339	67.9
No	87	54.4	73	45.6	160	32.1
Dieting for loosing weight						
Yes	45	46.4	52	53.6	97	19.4
No	225	56.0	177	44.0	402	80.6

[a]$p< 0.001$
[b]USD 1:1.6 YTL:Turkish Lira
[c]$p< 0.05$

steady increase in the prevalence of obesity in the 22 to 29 year old age group and the 40 to 49 year old age group (Table 1). The number of overweight respondents increased with age, with the highest prevalence in the 40 to 49 year old age group. The mean age of obese individuals was 39.2±6.9 years (Min: 26, Max: 59) and the mean age of normal-weight individuals was 34.7±8.0 (Min:22, Max: 60). A significant association was found between overweight/obesity and marital status ($p<0.001$; Table 2). When considering BMI values according to income rates, overweight/obesity increased as income increased. The difference between them is significant ($p<0.001$; Table 2).

The prevalence of overweight/obesity increased with decreased physical activity. The correlation between them was statistically significant ($p<0.05$; Table 2). The mean observed values of blood pressure are given in Table 3 in terms of BMIs. The mean systolic blood pressures for the normal weight and obese individuals were 117.0±12.2

Table 3
Distribution of systolic and diastolic blood pressure values according to BMI.

Blood pressure values	Normal weight	Overweight	Obese	*p*-value
Systolic blood pressure (mm/Hg)	116±13	118±11	120±13	0.058[a]
Diastolic blood pressure (mm/Hg)	72±9	74±7	76±7	0.029[b]

Results are expressed as means ± SD (*n*=499; 270 normal weight, 194 overweight, 35 obese)
[a]*p*: 0.058, nonparametric Kruskall-Wallis test
[b]*p*: 0.029, ANOVA

mmHg and 120.0±12.7 mmHg, respectively. The difference between them was close to being significant (W:6.72; *p*=0.058). The mean diastolic blood pressures in the normal weight and obese individuals were 73±8 and 76±7, respectively. The difference between them was statistically significant (F: 3.57; *p*= 0.02). Using multivariate logistic regression analysis, the odds ratios for each of the demographic factors, lifestyle factors, and socio-economic factors are presented in Table 4. Marriage was associated with an increased risk of overweight/obesity (OR 2.82, 95% CI 1.74-4.57). By increasing the levels of physical activity the risk for overweight/obesity was decreased (OR 1.49, 95% CI 1.07-2.21) (Table 4).

DISCUSSION

The prevalence of obesity varies significantly throughout the world. The rate of obesity and overweight among adult populations ranges from 15% to 60% and is usually more common in women than men (James *et al*, 2001). However, some studies have found that the prevalence of obesity among men is higher than women (Chu, 2005; Neovius *et al*, 2006). In a study performed in Peru covering the whole country, the obesity rate in women was reported as 23.5% and in men as 16% (Jacoby *et al*, 2003). In Turkey (Satman *et al*, 1999), in a study conducted in 1997 and 1998, the reported prevalence of obesity in adults (*n*=24,788; 13,708 women and 11,080 men) was 22.3% and the rate in women (29.9%) was higher than in men (12.9%) (*p*<0.001). In the present study, the prevalence of obesity overall was 7.0%. This is lower than the national obesity rate for Turkey. This could be related to a number of socio-economic factors, including education level, genetic variations, cultural and dietary differences. The National Population and Health Survey for Turkey reported a higher obesity rate amongst individuals with a low level of education (Hacettepe University Population Study Institute, 2003). Research conducted in several countries has reported a link between a low education level and increased obesity (Wen *et al*, 2003; Cournot *et al*, 2004). Education standards have been shown to be an important factor in determining responses to excess body weight in adulthood (Sobal, 2000).

Age is strongly associated with obesity. In many studies, it has been reported the prevalence of obesity increases with age (Martinez-Ros *et al*, 2001; Stene *et al*, 2001). In our study, the prevalence increased with age in both women and men. Obesity prevalence was found to be highest among both men and women within the 40-49 year old age group. In a study of 30-70 year old Saudi individuals overweight and obesity was reported to be higher in the 40-49 year old age

Table 4
Odds ratios for overweight/obesity by demographic, socio-economic and lifestyle factors (logistic regression analysis).

	Odds ratio	95% Confidence interval	*p*
Sex			
Female	1		
Male	6.33	3.92 - 10.23	0.001
Age			
≥40	1		
30-39	0.40	0.12 - 0.34	0.001
20-29	0.20	0.26 - 0.62	0.001
Academic staff			
Lecturers+research assistants	1		
Faculty members	2.04	1.43 - 2.92	0.001
Marital status			
Single	1		
Married	2.82	1.74 - 4.57	0.001
Monthly income			
≥2,251 YTL	1		
1,251-2,250 YTL	0.70	0.42 - 1.17	0.182
≤1,250 YTL	0.37	0.21 - 0.65	0.001
Physical activity			
Three times per week	1		
Never	1.49	1.07 - 2.21	0.046

group (Alsaif *et al*, 2002). In our study, 50% of women and 73% of men in the 40-49 year old age group had a BMI ≥25 kg/m^2. The overweight/obesity prevalence in the 40-49 year old age group was high. This association between obesity and age can be explained, in part, by a decrease in the level of physical activity with increasing age in both men and women (Martinez-Ros *et al*, 2001). There is also increasing body fat with increasing age. While the overweight/obesity rate of faculty members was 55.0%, the rate amongst researchers and assistants was 37.4%. The negative effect of low education level on obesity has been reported in many studies performed in various countries (Wen *et al*, 2003; Cournot *et al*, 2004). However, the findings of the current study indicate the opposite was true (overweight/obesity increases with education level). This may be related to the older ages of academics (mean age of faculty staff was 41.2±6.9, mean age of researchers and assistants was 31.9±6.4). Faculty members tended to be older than researchers/assistants and may have jobs that require more time sitting at their desk. They also tended to be married and have a higher income. All these factors are more likely to be related to obesity than just "education".

In our study, the obesity rate amongst unmarried participants was significantly lower than married ones. This may be explained by their lower mean age, social pressure to pay greater attention to their weight and the women within this younger age group are less likely to have borne children.

Being married has been found to be a risk factor for obesity in both men and women in some studies (Paeratakul *et al*, 2002; La Rosa *et al*, 2003). Pregnancy and changes in diet following marriage are factors for weight gain.

In our study, overweight and obesity levels increased with income. A decrease in the prevalence of obesity with an increase in household income in developed countries has been reported (Laurier *et al*, 1992). In contrast, rising income in developing countries, such as Turkey, may be a potential contributor to high rates of obesity (Alsaif *et al*, 2002). This may indicate higher levels of disposable income could result in increased household spending on higher caloric foods, especially given limited awareness of the health risks associated with obesity.

The overweight/obesity rate in smokers was 48.7%, compared with 45.0% for non-smokers. The difference was not statistically significant. Previous research has determined that smokers, as a group, display a lower prevalence of overweight and obesity than non-smokers (Seidell *et al*, 1996). Although smoking can be related to lower body weight, smoking-related diseases are among the most challenging public health problems facing society. The health benefits of giving up smoking far outweigh the negative correlation with overweight/obesity. In our study, the overweight/obesity rate among individuals with regular physical activity was 38.9%, compared with 48.7% in those who did not exercise regularly. There was significant correlation between individuals having regular physical activity and BMI ($p<0.05$). In the Coronary Artery Risk Development in Young Adults Study (CARDİA), physical activity was important to maintain body-weight (Lewis *et al*, 1997). In a nation wide study performed in Peru, a correlation was found between physical activity and obesity in men; however, the same was not found in women (Jacoby *et al*, 2003). Regular exercise is recommended for obesity treatment. Exercise is an important part of weight control because dieting alone results in loss of fat-free tissues. In the current study, the obesity rate was higher among those participants who were dieting to lose weight. Research has shown that BMI increases proportionally with frequent body weight changes and attempts to lose weight (Delahanty *et al*, 2002). Adults trying to lose weight because of obesity or obesity-related problems generally fail since they do not seek professional help or are unable to continue with this method.

Mean blood pressure values were higher in overweight and obese groups. Systolic and diastolic blood pressures in the two groups were found to be 1-4 mmHg higher than in the normal-weight group. A BMI increase is followed by an increased systolic and diastolic blood pressure (National Institute of Health, National Heart, 1998a,b). Between one-third and two-thirds of hypertensive patients are obese. The frequency of hypertension is three times greater among obese individuals (Narklewiez, 2002). A study by Framingham reported that 70% of hypertensive men and over 60% of hypertensive women were obese. According to the same study, the probability of hypertension increases eight-fold among people who are 20% above their ideal weight (Narklewiez, 2002). The strength of the correlation between blood pressure and weight can vary considerably in terms of gender, race, and age (Van Gaal and Mertens, 1998).

In this study, 45.9% of academics were either overweight or obese. A relationship was identified between overweight/obesity and, age, sex, marital status, monthly income, physical activity, systolic and diastolic blood pressure. Greater emphasis needs to be given to health promotions and health awareness initiatives, and greater individual

attention to regular exercise, a balanced diet and a healthy, active lifestyle.

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