Original Article

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A Study of Obesity Prevalence in the Rural Population in Turkey: Güzelyurt (Aksaray) Example

Türkiye'de Kırsal Nüfusta Obezite Sıklığı Üzerine Bir Araştırma: Güzelyurt (Aksaray) Örneği

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ABSTRACT

Objective: Obesity is a common health problem in almost all societies. The aim of this study was to investigate obesity in rural areas.

Methods: Descriptive, cross-sectional study included patients who applied to Güzelyurt District Hospital in September-November 2018 for any reason over 18 years of age. Body weight, height, body mass index (BMI), waist/hip circumference ratio (WHR), waist-to-height ratio (WHtR), and blood pressure measurements were evaluated. In addition, age, gender, marital status, education level, occupation, smoking habits, the disease was diagnosed, whether the drug was recorded.

Results: The mean age of the 191 participants was 46.8±15.6 years, 79.1% were female, 36.6% were primary school graduates, 72.8% were housewives, 85.9% living in town or village. The frequency of obesity 46.6%, 51.7% in females, 27.5% in males. Abdominal obesity; according to WC, 25.0% males, 68.2% females, according to WHR, 70.0% males, 57.6% females, and according to WHtR, 77.5% males and 90.7% females. There was a moderate positive correlation between the age and BMI. BMI was strong positively significantly correlated with WHtR, WC and HC, a weaker correlation between BMI to NC and WHR.

Conclusion: The prevalence of obesity was 46.6%. It is possible to say that such a high rate in living conditions does not allow

ÖZ

Amaç: Obezite, hemen hemen tüm toplumlarda yaygın görülen bir sağlık sorunudur. Bu çalışmanın amacı kırsal kesimdeki obeziteyi araştırmaktır.

Yöntemler: Tanımlayıcı, kesitsel tipteki bu araştırmaya Eylül 2018-Kasım 2018 tarihleri arasında Güzelyurt İlçe Devlet Hastanesi aile hekimliği polikliniğine 18 yaş ve üzeri herhangi bir nedenle müracaat eden hastalar dahil edildi. Tüm katılımcıların vücut ağırlığı, boy, beden kitle indeksi (BKİ), bel/kalça çevresi oranı (BKO), bel-boy oranı, boyun çevresi (ByÇ) ve kan basıncı ölçümleri değerlendirildi. Ayrıca yaş, cinsiyet, medeni durum, eğitim düzeyi, meslek, sigara kullanım alışkanlığı, tanı aldığı hastalık ve kullandığı ilaç olup olmadığı kaydedildi.

Bulgular: Çalışmaya kabul edilen 191 katılımcının yaş ortalaması 46,8±15,6 yıl (19-85) %79,1'i kadın, %36,6'sı ilkokul mezunu, %72,8'i ev hanımı, %85,9'u kasaba veya köyde yaşamakta idi. BKİ'ne göre obezite sıklığı genelde %46,6, kadınlarda %51,7, erkeklerde %27,5 olarak saptandı. Abdominal obezite sıklığı; BÇ'ye göre erkeklerde %25,0, kadınlarda %68,2, BKO'ya göre erkeklerde %70,0, kadınlarda %57,6 ve bel/boy oranına göre erkeklerde %77,5, kadınlarda %90,7 olarak bulundu. Katılımcıların yaşı ile BKİ arasındaki korelasyon incelendiğinde pozitif yönde orta derecede bir korelasyon saptandı BKİ ile bel-boy oranı, BÇ ve KÇ arasında pozitif yönde çok kuvvetli derecede bir korelasyon saptanmasına rağmen, BKİ ile BynÇ ve BKO arasında pozitif yönde daha zayıf bir korelasyon mevcuttu.

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sedentary life and families with low socioeconomic status have such a high rate. Obesity is health problem of our age in rural areas.

Keywords: Obesity prevalence, rural, body mass index, waist-to-height ratio, waist/hip circumference ratio, neck circumference

Sonuç: Bu çalışmada obezite prevalansı %46.6 olarak tespit edildi. Yaşam koşulları sedanter yaşama elvermeyen, sosyoekonomik düzeyi düşük ailelerin çoğunlukta olduğu bir ilçede bu kadar yüksek bir oran saptamamız obezitenin kırsalda da çağımızın en önemli sağlık sorunu olduğunu söylemek mümkündür.

Anahtar Sözcükler: Obezite prevalansı, kırsal, beden kitle indeksi, bel-boy oranı, bel/kalça çevresi oranı, boyun çevresi

Introduction

Obesity is defined by the World Health Organization (WHO) as the accumulation of excess fat in the body to the extent that it disrupts human health. It is a common public health problem all over the world. The WHO reported in 2016 that the the country with the highest prevalence of obesity in Europe was Turkey with the rate of 29.5% (1). According to the studies of TURDEP-I (1998) and TURDEP-II (2010) conducted with an interval of twelve years in the adult population in our country and in the same centers, the prevalence of obesity increased from 22.3% (32.9% in women, 13.2% in men) to 31.2% (44.2% in women, 27.3% in men) (2).

Although obesity is mostly a problem of developed countries, it is estimated that the prevalence of obesity is increasing rapidly in developing countries. Knowing the body fat distribution is important in predicting the health problems that may be related and determining the risk factors. Performing some anthropometric measurements contributes to the determination of these risk factors (3). Increased waist circumference (WC) or waist/hip ratio (WHR) is defined as abdominal (central or visceral) obesity. Abdominal obesity is an important risk factor for cardiovascular problems. It has been reported that waist circumference in particular reflects the current risk better as an indicator of abdominal obesity (4).

Overweight is defined as body mass index (BMI) of 25 kg/m^2 or above, and obesity as 30 kg/m^2 or above. Abdominal obesity is a waist circumference of 88 cm or above for women and 102 cm or above for men (5). The frequency of abdominal obesity was found to be 64.3% in women and 34.6% in men in the TURDEP-II study (6).

The aim of this study was to determine the prevalence of obesity with anthropometric measurements in adults whose living conditions did not allow for sedentary life, in a rural district where families with low socioeconomic levels were in the majority and to determine the sociodemographic status of obese people. In the literature review, no clear data showing the prevalence of obesity in Aksaray province and its districts was found, and our study was intended to be a guide on this issue.

Method

In this descriptive, cross-sectional study, patients aged 18 or over who were admitted to the District State Hospital General Outpatient Clinic between September 2018 and November 2018 for any reason were included. Before starting the study, the study was approved by The Aksaray University Ethics Committee with the number 152 on 10.07.2018. Afterwards, administrative permission was obtained from the Provincial Health Directorate.

Data Collection

Sociodemographic characteristics, smoking and chronic illnesses status, drug use, height, weight, WC, hip circumference (HC), neck circumference (NC), and blood pressure (BP) values were recorded in the questionnaire form previously prepared by the researcher. Before starting the study, the participants were informed about the study and their verbal consent was obtained. Individuals whose standing height and weight could not be measured, those under the age of 18 and those who did not want to participate in the study voluntarily were excluded from the study.

The prevalence of obesity in our country has been found to be 35% in studies based on the general population (1).

Anthropometric Measurements

By the same researcher, the heights of the patients were measured after removing the shoes, and the weights of the patients were measured after removing the jacket and excess clothes with an adult digital scales with height measurement (weight sensitivity range 100 g). While the patients were standing, WC was measured from the midpoint between the lowest rib and lateral iliac spurs, and HC was measured at the level of the greater trochanters. The NC was measured at the superior edge of the cricothyroid membrane while the patients were awake and standing. All measurements were made by the same person and the results were rounded to the nearest 0.5 cm value to reduce the person's margin of error.

BMI was determined with the formula of weight (kg)/height (m)^2.

- BMI ≤18.5 kg/m^2 underweight
- BMI between 18.5-24.99 kg/m^2 normal weight
- BMI between 25.00-29.99 kg/m^2 overweight
- BMI ≥30 kg/m^2 obese
  - BMI between 30.00-34.99 kg/m^2 mild obese
  - BMI between 35.00-39.99 kg/m^2 moderate obese

- BMI between 40.00-49.99 kg/m^2 morbid obese
- BMI ≥50 kg/m^2 super obese

Abdominal obesity criteria; waist circumference ≥100 cm for men, ≥90 cm for women, waist circumference to hip circumference ratio >0.85 and waist-height ratio ≥0.5 (1).

Statistical Analysis

Statistical analyzes were performed using SPSS version 20 software. The normal distribution of the variables was examined by visual (histogram and probability graphics) and analytical methods (Kolmogorov-Smirnov/Shapiro-Wilk tests). Descriptive analyzes were given for variables without normal distribution, using median and minimum-maximum values (and frequency tables for ordinal variables). Since it was determined that WC, HC, NC, systolic and diastolic blood pressure variables did not show normal distribution, these and the ordinal BMI variable were compared using the Kruskal-Wallis test. Chi-Square test was used to compare categorical data. Pearson's correlation analysis was used to determine the relationship between numerical variables. The significance was evaluated at the p<0.05 level and the results were evaluated within the 95% confidence interval. Correlation coefficient (r); between 0.00-0.24 was determined as weak, between 0.25-0.49 as medium, between 0.50-0.74 as strong, and between 0.75-1.00 as very strong.

Results

The mean age of the 191 patients included in our study was 46.8±15.6 years (min: 19, max: 85). Of the participants, 79.1% (n=151) were female, 20.9% (n=40) were male, 36.6% (n=70) were primary school graduates, 72.8% (n=139) were housewives, % 85.9 (n=164) were living in a town or village. Of the participants, 11.5% (n=22) were current smokers (Table 1). The mean systolic BP was 123.69±14.33 mmHg and the mean diastolic BP was 75.35±8.57 mmHg. In anthropometric measurements; average height was 1.58±0.08 m (1.40-1.94), average weight was 73.80±13.39 kg (45-110), mean WC was 94.65±12.92 cm (60-124), mean HC was 108.56 ± 12.76 cm (72-145), and mean NC was 37.17 ± 3.91 cm (29-46). According to BMI, 1.0% of the participants were underweight (n=2), 22.0% (n=42) were normal weight, 30.4% (n=58) were overweight, 46.6% (n = 89) were found to be obese (Figure 1). According to BMI, the frequency of obesity was 51.7% in women and 27.5% in men. The frequency of abdominal obesity was 25.0% (n=10/40) in men, 68.2% in women (n=103/151) according to WC, 70.0% in men (n=28/40) and 57.6% in women (n=87/151) according to WHR, and 77.5% (n=31/40) in men and 90.7% (n=137/151) in women according to the waist/height ratio.

In our research, some variables were compared in the 3 groups we classified according to BMI (Table 2). Median values of WC, HC, BMI, systolic BP were significantly higher in the normal weight group than the normal-underweight group (p<0.001, p<0.001, p=0.007, and p=0.001, respectively). Median systolic and diastolic BP values were significantly higher in the obese group compared to the normal-underweight group (p<0.001 and p=0.001, respectively). In addition, systolic BP value was significantly higher in the obese group compared to the overweight group (p=0.002) (Figure 2).

The comparison of various sociodemographic characteristics of obese and non-obese participants is given in Table 3. According

Table 1. Sociodemographic characteristics of the participants

	n	%
Gender		
Female	151	79.1
Male	40	20.9
Age (median:45, min:19, max: 85 years)		
18-35 years	52	27.2
36-55 years	83	43.5
>55 years	56	29.3
Education status		
Illiterate	28	14.7
Literate	30	15.7
Primary school	70	36.6
Middle school	21	11.0
High school	24	12.6
College-university	18	9.4
Occupation		
Housewife	139	72.8
Officer	15	7.9
Retired	23	12.0
Worker	8	4.2
Student	6	3.1
Marital status		
Married	152	79.6
Single	24	12.6
Widow	15	7.8
Income level of family		
<500 TL/month	24	12.6
500-1000 TL/month	46	24.1
1001-2000 TL/month	81	42.4
>2000 TL/month	40	20.9
Living place		
District center	27	14.1
Town	152	79.6
Village	12	6.3
Smoking status		
Yes	22	11.5
Never smoked	152	79.6
Left	17	8.9
Total	191	100.0

to this; the frequency of obesity was significantly higher in the group aged 45 or over than in the group under 45 years of age (p<0.001). The BMI in the group aged 45 or over was 3.669 times higher than in those under 45 years of age [OR = 3.669, 95% CI; (2.012-6.693)]. The incidence of obesity was statistically significantly higher in the non-working group than in the working group, and in those with education level of primary school or below, compared to the group with high school or above (p<0.001). Obesity was found to be significantly higher in patients with a diagnosed disease than in patients without a diagnosed disease (p=0.006).

When the correlation between participants' age and BMI was examined, a moderate positive correlation was found (r=0.407, p=0.000) (Table 4). When linear regression analysis was performed, 16.5% of the increase in BMI was attributed to the increase in age (R^2=0.165) (Figure 3). When the correlation between WC and NC was examined, a moderate positive correlation was found (r=0.455, p=0.000). When the correlation between HC and NC was examined, a moderately significant positive correlation was found (r=0.429, p=0.000) (Table 4). The variables showing the best correlation coefficient value with systolic BP in all participants were BMI (r=0.504, p<0.001) and waist/height ratio (p<0.001; r=0.454), respectively. The variables showing the best correlation coefficient value with diastolic BP were determined as age (r=0.391, p<0.001) and waist/height

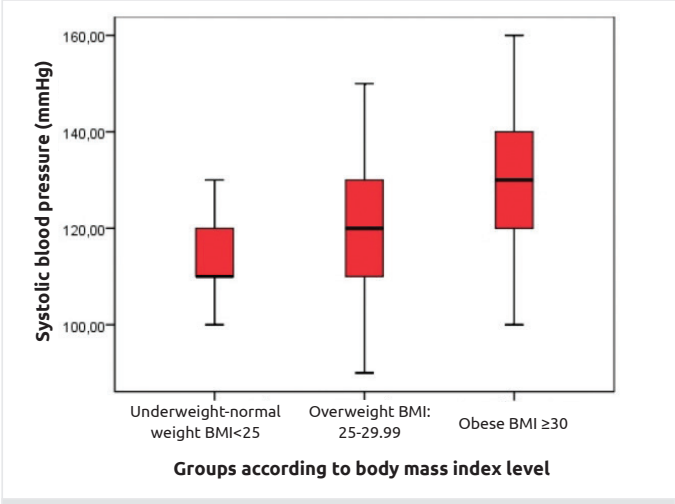

Figure 1. Relationship between body mass index (BMI) and systolic blood pressure values

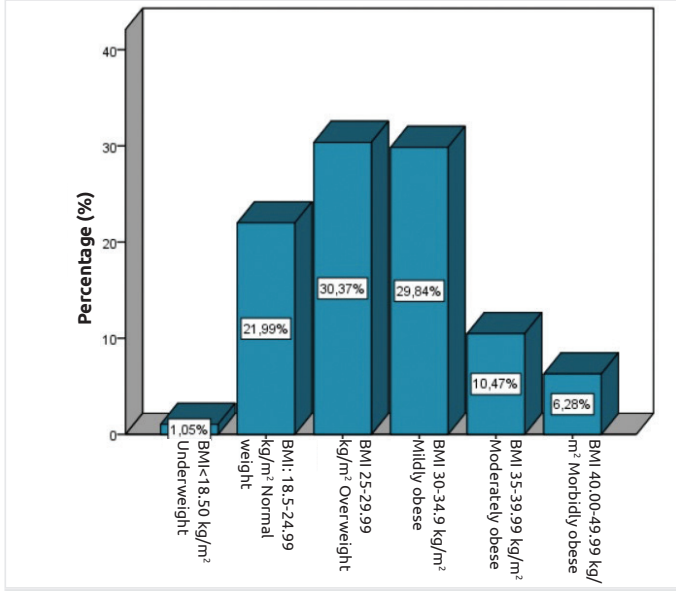

Figure 2. Classification of patients according to their body mass index (BMI)

Table 2. Relationship between some variables and body mass indexes

Variables	BMI <25 kg/m² (a) (n=44) Median (min-max)	BMI 25-29.99 kg/m² (b) (n=58) Median (min-max)	BMI ≥30 kg/m² (c) (n=89) Median (min-max)	x²	p
Waist circumference (cm)	81.0 (60.0-102.0)	91.5 (68.0-110.0)	103.0 (82.0-124.0)	90.127	**<0.001ab*** **<0.001ac*** **<0.001bc***
Hip circumference (cm)	95.0 (78.0-122.0)	108.0 (72.00-121.00)	117.0 (101.0-145.0)	91.435	**<0.001ab*** **<0.001ac*** **<0.001bc***
Neck circumference (cm)	35.0 (29.0-41.0)	37.0 (30.0-45.0)	39.0 (29.0-46.0)	25.356	**0.007ab*** **<0.001ac*** **0.004bc***
Systolic blood pressure (mmHg)	110.0 (90.0-160.0)	120.0 (90.0-150.0)	130.0 (100.0-160.0)	36.868	**0.001ab*** **<0.001ac*** **0.002bc***
Diastolic blood pressure (mmHg)	70.0 (60.0-90.0)	75.0 (60.0-90.0)	76.0 (60.0-100.0)	10.457	**0.001ac***

Kruskal-Wallis test, *Mann-Whitney U test, BMI: Body mass index, min: Minumum, max: Maximum

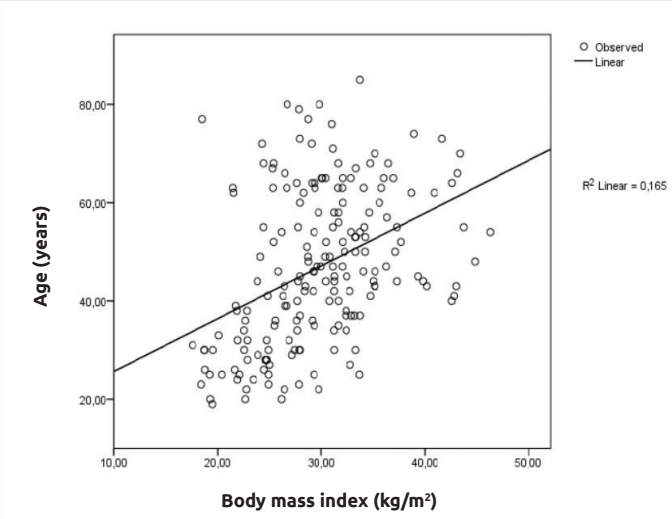

Figure 3. Linear regression analysis between age and body mass index

R2 =Coefficient of determination (R2 =0.165, p=0.000)

ratio (r=0.309, p<0.001), respectively. When the correlation between anthropometric measurement variables was examined, there was a very strong positive correlation between BMI and waist/height ratio, WC and HC (r=0.826, p<0.001, r=0.769, p<0.001; r=0.751, p<0.001), a very strong positive correlation BMI and waist/height ratio (r=0.826, p<0.001) between BMI and WC (r=0.769, p<0.001) and a very strong positive correlation between BMI and HS (r=0.769, p<0.001) =0.751, p<0.001). In addition, a strong positive correlation between BMI and NC (r=0.504, p<0.001) and a weak positive correlation between BMI and WHR (r=0.196, p<0.001) were found (Table 4).

Discussion

While smoking is the first cause of preventable deaths in our era, the second important reason is obesity. The prevalence of obesity is above the critically high value of 30% in the adult population in our country. In our study, it was determined that 30.4% of the participants were overweight and 46.6% were obese according to BMI. The frequency of obesity according to BMI was 51.7% in

Table 3. Relationship between some demographic features and body mass indexes

Variables		BMI < 30 kg/m² (n=102)		BMI ≥ 30 kg/m² (n=89)		Total (n=191)		x²	p
n		%	n	%	n	%			
Age	<45 years	64	69.6	28	30.4	92	100.0	18.632	**<0.001**
	≥45 years	38	38.4	61	61.6	99	100.0		
Gender	Female	73	48.3	78	51.7	151	100.0	7.415	**0.006**
	Male	29	72.5	11	27.5	40	100.0		
Education status	Primary school or below	69	46.3	80	53.7	149	100.0	13.705	**<0.001**
	High school or above	33	78.6	9	21.4	42	100.0		
Marital status	Married	78	51.3	74	48.7	152	100.0	1.303	0.254
	Single	24	61.5	15	38.5	39	100.0		
Living place	District center	14	51.9	13	48.1	27	100.0	0.030	0.862
	Village-town	88	53.7	76	46.3	164	100.0		
Occupation	Working	41	78.8	11	21.2	52	100.0	18.588	**<0.001**
	Not working	61	43.9	78	56.1	139	100.0		
Income level	<1,000 TL	27	38.6	43	61.4	70	100.0	9.768	**0.002**
	≥1,000 TL	75	62.0	46	38.0	121	100.0		
Type of family	Nuclear family	90	55.2	73	44.8	163	100.0	1.466	0.226
	Extended family	12	42.9	16	25.1	28	100.0		
Smoking	Current smoker	18	81.8	4	18.2	22	100.0	8.068	**0.005**
	Not smoking	84	49.7	85	50.3	169	100.0		
Diagnosis of a disease	Yes	35	42.2	41	57.8	83	100.0	7.445	**0.006**
	No	67	62.0	41	38.0	108	100.0		
Drug use	Yes	33	41.8	46	58.2	79	100.0	7.324	**0.007**
	No	69	61.6	43	38.4	112	100.0		

BMI: Body mass index

Table 4. Correlation status between some variables

Değişkenler	Age	Height	Weight	WC	HC	NC	SBP	DBP	WHR	BMI	WHeR
Age											
r											
p	1										
n	191										
Height											
r	-0.334**										
p	**0.000**	1									
n	191	191									
Weight											
r	0.264**	0.099									
p	**0.000**	0.175	1								
n	191	191	191								
WC											
r	0.472**	-0.163*	0.759**								
p	**0.000**	0.024	**0.000**	1							
n	191	191	191	q191							
HC											
r	0.397**	-0.258**	0.682**	0.798**							
p	**0.000**	**0.000**	**0.000**	**0.000**	1						
n	191	191	191	191	q191						
NC											
r	0.258**	-0.129	0.467**	0.455**	0.429**						
p	**0.000**	0.075	**0.000**	**0.000**	**0.000**	1					
n	191	191	191	191	191	q191					
SBP											
r	0.423**	-0.285**	0.392**	0.418**	0.393**	0.232**					
p	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.001**	1				
n	191	191	191	191	191	191	q191				
DBP											
r	0.391**	-0.154*	0.214**	0.281**	0.211**	0.260**	0.682**				
p	**0.000**	**0.034**	**0.003**	**0.000**	**0.003**	**0.000**	**0.000**	1			
n	191	191	191	191	191	191	191	191			
WHR											
r	0.218**	0.104	0.281**	0.505**	-0.111	0.137	0.120	0.153*			
p	**0.000**	0.152	**0.000**	**0.000**	0.127	0.060	0.098	**0.035**	1		
n	191	191	191	191	191	191	191	191	191		
BMI											
r	0.407**	-0.419**	0.857**	0.769**	0.751**	0.504**	0.508**	0.280**	0.196**		
p	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.007**	1	
n	191	191	191	191	191	191	191	191	191	191	
WHeR											
r	0.533**	-0.470**	0.645**	0.946**	0.796**	0.454**	0.473**	0.309**	0.418**	0.826**	
p	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	1
n	191	191	191	191	191	191	191	191	191	191	191

* Correlation is significant at 0.05 level, ** Correlation is significant at 0.01 level, WC: Waist circumference, HC: Hip circumference, NC: Neck circumference, SBP: Systolic blood pressure, DBP: Diastolic blood pressure, WHR: Waist/hip ratio, BMI: Body mass index, WHeR: Waist/height ratio, BMI: Body mass index

women and 27.5% in men. Similar to our study, the prevalence of obesity was found 51.0% in women and 15.1% in men in a study conducted with a total of 1672 adults aged between 25-64 and residing in the working community in Ankara (7). Similarly, in a study conducted in Kocaeli University, the rate of obese women was higher than men among 207 patients who were admitted to the family medicine outpatient clinic (8). In the study conducted by Akman et al., the frequency of obesity was found to be 31.6% and overweight 33.3% according to BMI. It was found that obesity gradually increased in the patients starting from the 40s and decreased relatively by the age of 60s (9). Similarly, in our study, the frequency of obesity was significantly higher in the 45 years or older group than the group below 45 years. In another study, obesity status was evaluated in housewives and working women and it was reported that weight, WC, BMI, and WHR values among body composition variables were significantly different between groups in favor of working women (10). The reason we found high frequency of obesity in our study might be that women and housewives were in the majority. Similar to our study, the incidence of obesity was statistically significantly higher in the group that did not work compared to the group working, and also in those with education level of primary school or below compared to the group with education level of high school or above. As a matter of fact, in the study of Erkol et al., it was found that there was a relationship between the obesity and occupation, and that housewives were more obese (11). In the study conducted by Baugman et al. (12) in 665 overweight or obese people, it was found that higher BMI was associated with low education level.

In the "National Health and Nutrition Examination Survey" (NHANES) study, it was reported that 5-9.9 kg of excess weight in women with overweight (BMI 25 kg/m^2 or above) increased the risk of developing hypertension 1.7 times, and an excess of 25 kg or above increased 5.2 times (13). Similarly, in our study, the median systolic and diastolic BP values were found to be significantly higher in the obese group compared to the normal-underweight group, and the systolic BP value was significantly higher in the obese group compared to the overweight group. In addition, the correlation coefficient value of both systolic and diastolic blood pressure and waist/height ratio was found to be higher than WC and WHR measurement.

Measurement of BMI and WC is usually sufficient in the diagnosis of obesity. The most important deficiency of BMI measurement is that it cannot give an idea about the body fat distribution that predicts complications caused by obesity (14). Waist/height ratio is a valid measurement in determining abdominal obesity (15). In a systematic review and meta-analysis study by Ashwell et al. (16), it was shown that waist/height ratio is a better screening tool for cardiometabolic risk factors for adults than WC. In this study, we hypothesized that waist/height ratio and NC measurements could show body fat distribution together with WC and WHR. Although there was a very strong positive correlation between BMI and waist/height ratio, WC and HC; the correlation coefficient value between BMI and NC and WHR was found to be lower. There was no clear data in the literature about waist/height ratio, NC, and the prevalence of abdominal obesity in rural areas. The frequency of abdominal obesity in our study was 25.0% in men, 68.2% in women according to WC, 60.2% according to WHR and 88% according to waist/height ratio.

Study Limitations

First, this study was performed only in the adult population, and obesity is increasing rapidly in childhood and adolescence. Second, this study had a relatively small number of participants. In addition, the ratio of women to men was not equal in the participants, and the higher number of women was the weakness of our study.

Conclusion

In this study, the prevalence of obesity was determined as 46.6%. We detected obesity at a high rate in a rural district with living conditions that were not suitable for sedentary life, where families with low socioeconomic level were in the majority. People who did not have eating habits of simple and refined sugars called as fast-food, did not reach food easily, and were not lack of physical activity due to spending time with technological devices such as computers at home, lived in this rural district. It is possible to say that obesity is also the most important health problem of our era in the countryside.

Ethics

Ethics Committee Approval: The Aksaray University Ethics Committee with the number 152 on 10.07.2018. Afterwards, administrative permission was obtained from the Provincial Health Directorate.

Informed Consent: Obtained.

Peer-review: Externally peer reviewed.

Authorship Contributions

Concept: D.İ.Ö., Design: D.İ.Ö., Ö.Ö., Data Collection or Processing: D.İ.Ö., Analysis or Interpretation: D.İ.Ö., Ö.Ö. Literature Search: D.İ.Ö., Writing: D.İ.Ö., Ö.Ö.

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