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Overweightness and obesity prevalence among university students in 2015-2016 educational season

Eren Uluöz[1]

Abstract

The main purpose of this study is to find out the obesity prevalence among university students. In addition to the main purpose, another aims of this study is to determine the individual features of participants related to obesity such as gender, age, being an obese in family and doing physical activity.

This study was performed on university students from five different faculties of Çukurova University in 2015-2016 educational season. In this study, 894 volunteer students accepted for attending to the research. The mean age of female participants was 21.39±2.53 years. However, mean of males was 22.28±2.73 years. Descriptive study design and causal comparative methods were used. The individual information form created by the researcher was used to determine the demographic characteristics of the participants. BMI was analyzed both quantitative and categorical ways in this study. WHO's classification method was used for categorizing of BMI. All findings in the study were summarized by descriptive statistical methods such as mean, standard deviation, frequency, percentage, etc. The independent sample T test, the ANOVA test, Pearson correlation test and chi-square test were used. In all analyzes, significance level was accepted as $p < 0.05$.

The mean of the BMI was calculated as 22.40±3.49 kg/m^2. There was a statistically significant difference between the mean BMI of males (23.80±3.40 kg/m^2) and female participants (21,01±2,99 kg/m^2, $t(-13,043)=892$, $p<0.05$). Also, it was found statically significant difference among BMI classification groups for gender (obesity rate of male: 4.9% ; female:1.1%) , $x^2(df=3, n=894)=101.21$, $p<0.05$. These results have indicated that the rate of obesity among university students is lower than normal population in Turkey. At the same time the findings of this study have shown similar characteristics with the university students' of other countries reported by previous studies.

In conclusion, it should be taken some measures for reducing overweightness and obesity such as increasing physical activity possibilities for people in all condition by local and central Governments, increasing the number of hours of physical education and sports lessons in schools as much as possible and the processing of these courses must be inspected strongly, more strict measures taken by the government to reduce obesity rates in society, informing and awareness of community on obesity, informing adequate and balanced nutrition by using the all media devices and facilities.

Keywords: Obesity; overweight; University Students; BMI; Health.

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Introduction

Obesity is one of the most common health problems all over the word. World Health Organization (WHO) reported that worldwide obesity prevalence has more than doubled since 1980. Furthermore, in 2014, more than 1.9 billion adults in which 18 years and older were overweight. Over 600 million of this population was obese. Thirty nine percent of adults aged 18 years and over were overweight in 2014, and 13% were obese. Forty one million children under the age of 5 were overweight or obese in 2014. WHO has claimed that obesity is a preventable health problem. (WHO media center, 2016).

Obesity is a chronic disease that is characterized by unbalanced nutrition condition due to excessive and incorrect eating habits. In accordance with these facts, numerous risk factors have been reported related to overweightness and obesity (Avenell et al, 2004; Fogelholm et al, 2010; Mokdad et al, 2003; Moreno and Rodriguez). The major risks and the influencing factors are listed below;

- Age
- Gender
- Genetic factors
- Excessive and incorrect eating habits
- Insufficient physical activity
- Level of education
- Socio-cultural factors
- Financial status
- Hormonal factors
- Metabolic factors
- Psychological problems
- Repetitive very low energy diets
- Using of alcohol
- Using some medications (antidepressants, etc.)
- Number of births and time between births

Obesity is an important health problem that can lead to various disorders and even deaths by affecting all organs and systems of the body, especially cardiovascular and endocrine system (WHO, 1998). Furthermore, obesity causes various health disorders. Investigation of the diseases related to overweight and obesity are the most popular research subject in recent years. Numerous researchers have strived to define obesity-related diseases (Cancello and Clement, 2006; Cheung and Wong, 2007; Eckel et al, 2002; Hersoug and Linneberg, 2007; Kalan and Yeşil, 2010; Must et al, 1999; Özdel et al, 2011). Most of the diseases have a strong relationship with obesity. The most common diseases are given below (NIH, 2012);

- Coronary heart disease
- High blood pressure
- Stroke
- Type 2 diabetes
- Abnormal blood fats
- Metabolic syndrome
- Cancer (colon, uterus, prostate, breast, endometrial, and gallbladder cancers)
- Osteoarthritis
- Sleep apnea

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- Obesity hypoventilation syndrome
- Reproductive problems
- Gallstones
- Muscle-skeletal disorders
- Respiratory problems
- Hypertension
- Fat and cholesterol increase in blood
- Inflammatory diseases and stone
- Decreased fertility
- Menstrual irregularities
- Emotional stress
- Social exclusion
- Social obsession
- Self-obsession

Body mass index (BMI) is the major standard to diagnose the obesity. BMI standard is used for the identification and classification of body structure. According to a form determined by the WHO, BMI – the weight in kilograms divided by the square of the height in meters (kg/m2) – is a commonly used index for classifying overweight and obesity in adults or all age groups. WHO defines overweight as a BMI equal to or more than 25 kg/m^2, and obesity as a BMI equal to or more than 30 kg/m^2. The classification of obesity is shown in Figure 1 (WHO, 1997).

Figure 1. BMI Classification of WHO

BMI classification	
Underweight	< 18.5
Normal range	18.5 - 24.9
Overweight	⩾ 25.0
Preobese	25.0 - 29.9
Obese	⩾ 30.0
Obese class I	30.0 - 34.9
Obese class II	35.0 - 39.9
Obese class III	⩾ 40.0

Obesity is accepted as one of the most important health problem for people all over the world by WHO. General information of obesity has been updated regularly by WHO in its own official web pages. These explanations are given Figure 2.

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Figure 2. General information of obesity (WHO, 2016)

WHO has given these general information for obesity

- Overweight and obesity are defined as "abnormal or excessive fat accumulation that may impair health": Body mass index (BMI) – the weight in kilograms divided by the square of the height in meters (kg/m2) – is a commonly used index to classify overweight and obesity in adults. WHO defines overweight as a BMI equal to or more than 25, and obesity as a BMI equal to or more than 30.
- In 2008, more than 1.4 billion adults were overweight and more than half a billion were obese. At least 2.8 million people each year die as a result of being overweight or obese. The prevalence of obesity has nearly doubled between 1980 and 2008. Once associated with high-income countries, obesity is now also prevalent in low- and middle-income countries.
- Globally, 42 million preschool children were overweight in 2013: Childhood obesity is one of the most serious public health challenges of the 21st century. Overweight children are likely to become obese adults. They are more likely than non-overweight children to develop diabetes and cardiovascular diseases at a younger age, which in turn are associated with a higher chance of premature death and disability.
- Overweight and obesity are linked to more deaths worldwide than underweight: 65% of the world's population lives in a country where overweight and obesity kills more people than underweight. This includes all high-income and middle-income countries. Globally, 44% of diabetes, 23% of ischemic heart disease and 7–41% of certain cancers are attributable to overweight and obesity.
- For an individual, obesity is usually the result of an imbalance between calories consumed and calories expended: An increased consumption of highly calorific foods, without an equal increase in physical activity, leads to an unhealthy increase in weight. Decreased levels of physical activity will also result in an energy imbalance and lead to weight gain.
- Supportive environments and communities are fundamental in shaping people's choices and preventing obesity: Individual responsibility can only have its full effect where people have access to a healthy lifestyle, and are supported to make healthy choices. WHO mobilizes the range of stakeholders who have vital roles to play in shaping healthy environments and making healthier diet options affordable and easily accessible.
- Children's choices, diet and physical activity habits are influenced by their surrounding environment: Social and economic development as well as policies in the areas of agriculture, transport, urban planning, environment, education, food processing, distribution and marketing influence children's dietary habits and preferences as well as their physical activity patterns. Increasingly, these influences are promoting unhealthy weight gain leading to a steady rise in the prevalence of childhood obesity.
- Eating a healthy diet can help prevent obesity: People can: "maintain a healthy weight", "limit total fat intake and shift fat consumption away from saturated fats to unsaturated fats", "increase consumption of fruit, vegetables, pulses, whole grains and nuts", "limit the intake of sugar and salt".
- Regular physical activity helps maintain a healthy body: People should engage in adequate levels of physical activity throughout their lives. At least 30 minutes of regular, moderate-intensity physical activity on most days reduces the risk of cardiovascular disease, diabetes, colon cancer and breast cancer. Muscle strengthening and balance training can reduce falls and improve mobility among older adults. More activity may be required for weight control.
- Curbing the global obesity epidemic requires a population-based multi-sectoral, multi-disciplinary, and culturally relevant approach: WHO's Action Plan for the Global Strategy for the Prevention and Control of Non-communicable Diseases provides a roadmap to establish and strengthen initiatives for the surveillance, prevention and management of non-communicable diseases, including obesity.

Obesity prevalence shows various results among different population in the world. For example, Wang and Beydoun (2007) reported that obesity prevalence increased from 13% to 32% between the 1960s and 2004 among adults and 66% of adults are overweight or obese; 16% of children and adolescents are overweight and 34% are at risk of overweight in United States. They have claimed that by 2015, 75% of adults will be overweight or obese, and 41% will be obese. On

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the other hand, Steyn et al (1998) found out that the prevalence of underweight in men was 19% and in women 3.7%; 22% of the men were overweight and 7.9% obese, while 36.4% of women were overweight and 34.4% obese in an African sample. Brown et al (2007) focused on the rate of obesity in Australia and they reported the prevalence of obesity was 16,2% (men: 16,6%, women: 15,8% / age: 18+). Similarly, Vanasse et al (2003) found out 15,2% obesity rate for Canadian population (age: 20+). Although the rates of overweightness or obesity of Turkish population are relatively lower in comparison with developed societies such as United States, Australia and European countries, it is reported that prevalence of obesity have increased day by day in recent years in Turkey. For example, in Turkey, the incidence of obesity in children has increased from 6-7% to 15-16% in the last 20 years (TC Sağlık Bakanlığı/Ministry of Health, 2010). Although there are four major studies (Heart Disease and Risk Factor Study in Adults in Turkey (TEKHARF), Turkey Obesity and Hypertension Research (TOHTA), Turkey Diabetes, Obesity and Hypertension Epidemiology (TURDEP) and TOAD-Turkey Obesity Profiling Study) that investigate a wide range of subjects related to the prevalence of obesity in adults in Turkey, there is a few studies performed on university students.

In this context, the main purpose of this study is to find out the obesity prevalence among university students. In addition to the main purpose, another aims of this study is to determine the individual features of participants related to obesity such as gender, age, being an obese in family and doing physical activity.

Materials and Methods

This study was performed on university students from five different faculties of Çukurova University in 2015-2016 educational season. In this study, 894 students accepted attending to the study. Some demographic characteristics of the participants are given Table 1 and Table 2.

Table 1. The age variables of participants attending to the study

		n	min	max	mean	s.d.
Age	Female	447	16,00	48.00	21.39	2.53
	Male	447	17,00	45.00	22.28	2.73
	Total	894	16,00	48.00	21.84	2.67

The mean age of female participants was 21.39±2.53 years. However, mean age of males was 22.28±2.73 years. Distribution of participants in terms of gender, faculties and classes are given Table 2.

Table 2. Distributions of participant in terms of gender, faculties and classes

		f	%
Gender	Female	447	50.0
	Male	447	50.0
	Total	894	100.0
Faculties	The School of Physical Education and Sports	109	12.2
	Engineering and Architecture Faculty	194	21.7
	Health Sciences Faculty	196	21.9
	Economics and Administrative Sciences Faculty	201	22.5
	The Faculty of Education	194	21.7
	Total	894	100.0
Classes	1. classes	219	24.5
	2. classes	248	27.7
	3. classes	229	25.6
	4. classes	198	22.1
	Total	894	100.0

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The distribution of female and male participants is the same as 50%. School of Physical Education and Sports (109 participants), Engineering and Architecture Faculty (194 participants), Health Sciences Faculty (196 participants), Economics and Administrative Sciences Faculty (201 participants) and Faculty of Education (194 participants) hosted to this study with 894 students totally.

Descriptive study design and causal comparative methods were used in this study. Cohen&Manion, (1994) reported that there were at least two groups exposed to the same conditions in different ways, or different groups exposed and not exposed for causal comparative method. These groups are examined from the perspective of some variables in order to reveal the possible causes and influences of this present situation.

In this study, the individual information form created by the researcher was used to determine the demographic characteristics of the participants. The explanatory information related to the study has been given by the researcher on the purpose and importance of researching to the participants in the classroom environment. Necessary explanations have been given to the participants that the findings to be obtained in the research will be presented only as quantitative results after being processed by statistical methods and also individual information will not be included with certainty and that the results of the research will not be used except for the stated purposes. As a result of these explanations, students who stated that they did not want to participate in the study were excluded from the classroom environment and taken out of the classroom environment and data collection instruments were applied to students who volunteered to participate in the study. Before the participants began to fill in the data collection tools, necessary explanations were made on the importance of the scientific research and requested answering to read the questions carefully and give the correct answers as much as possible.

BMI was analyzed both quantitative and categorical ways in this study. WHO's classification method was used for the classifying BMI. On the other hand all of the three obese groups (class I, Class II, Class II) defined by WHO (see figure 1) was transformed as a single group for statistical analyses. All findings were summarized by statistical methods such as mean, standard deviation, frequency, percentage, etc. The independent sample T test, one of the parametric hypothesis tests, was used to test the significance of the mean differences of the two group independent variables in the study. The ANOVA test was used to test the significance of the mean differences between groups when the number of groups was higher than double. Pearson correlation test was used to determine the relationship between continuous numerical variables. (Büyüköztürk, 2012). In all analyzes, statically significance level was accepted as $p < 0.05$.

Results

The findings of this study are given in this part of the paper. All variables are summarized by descriptive statistics techniques such as mean, standard deviation, frequency and percentage. Table 3 and Table 4 show general descriptive statistic results of participants.

Table 3. Physical measurement results of participants

	n	min	max	mean	s.d.
Weight	894	39.00	130	66.48	14.37
Height	894	145.00	210	171.59	9.54
BMI	894	14.69	39.54	22.40	3.49

The mean weight of the participants was 66.48±14.37 kg. (min:39 kg., max: 130 kg.). However the height mean of the participants was found as 171.59±9.54 cm. (min: 145 cm., max: 210 cm.). According as weight and height findings, the mean of the BMI was calculated as

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22.40±3.49 kg/m^2 (min: 14.69 kg/m^2, max: 39.54 kg/m^2). Table 4 demonstrates the distribution of BMI classification of the participants.

Table 4. Distribution of BMI classification of the participants

BMI classification	f	%
1. Underweight	86	9.6
2. Normal weight	646	72.3
3. Overweight	135	15.1
4. Class I obesity	21	2.3
5. Class II obesity	6	0.7
6. Class III obesity	0	0.0
Total	894	100.0

The most common group of the BMI classification of this study was the second group (normal weight: 646 participants) with the rate of 72.3%. The rate of overweight participants was found as 15.1%. Similarly, 9.6% of the participants were taken placed in underweight groups. Class I obese groups had 2.3% of rate. On the other hand Class II groups and Class III groups had lower rates, 0.7% and 0.0%, respectively. The result of the independent T test result of comparison BMI scores in terms of gender is given Table 5.

Table 5. Independent T test result of comparison BMI scores in terms of gender

Gender		mean	Sd	df	t	p
Female	447	21.01	2.99			
Male	447	23.80	3.40	892	-13.043	***0.00****

p<0.05*

There was a statistically significant difference between the mean BMI of male and female participants, t(-13.043)=892, p<0.05. Table 6 shows Chi square test results of BMI classification comparison in terms of gender.

Table 6. Chi square test results of BMI classification comparison in terms of gender

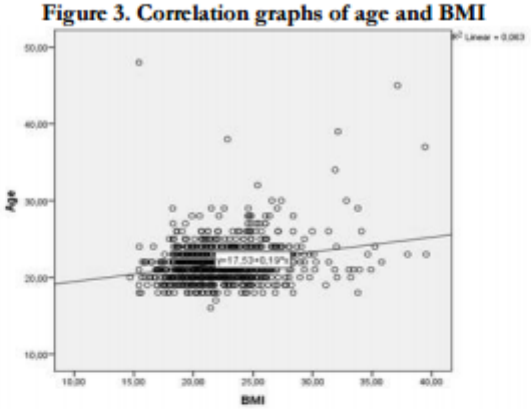
		Underweight	Normal weight	Overweight	Obese	x^2	df	p
Female	n	75	337	30	5			
	%	16.8%	75.4%	6.7%	1.1%			
Male	n	11	309	105	22	101.21	3	***0.00****
	%	2.5%	69.1%	23.5%	4.9%			
Total	n	86	646	135	27			
	%	9.6%	72.3%	15.1%	3.0%			

p<0,05*

It was found significant differences among BMI classification groups for gender, x^2(df=3, n=894)=101.21, p<0.05. The result of correlation between age and BMI is given figure 3.

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Figure 3. Correlation graphs of age and BMI



The result of the Pearson correlation test between age and BMI demonstrated a weak and positive relationship, r=0.252, p<0.05. Descriptive statistic and ANOVA test results of age in terms of BMI classification are presented Table 7.

Table 7. Descriptive statistic and ANOVA test results of ages in terms of BMI classification

BMI classification	n	min	max	mean	s.d.
Underweight	86	18,00	48,00	21,23	3,54
Normal weight	646	16,00	38,00	21,67	2,76
Overweight	135	18,00	32,00	22,60	2,58
Obese	27	18,00	45,00	25,00	6,62
Total	894	16,00	70,00	21,87	3,07

	Sum of squares	df	Mean square	f	p	Significant differences
Between Groups	396.649	3	132.216			
Within Groups	8042.569	890	9.037	14.631	***0.00****	underweight – overweight, obese normal weight- overweight, obese
Total	8439.218	893				

p<0.05*

A one-way between groups analysis of variance was conducted to determine the differences among four BMI classification groups in age variable. Results derived from one-way ANOVA demonstrated that, there were statistically significant differences at the p<0.05 level in BMI scores for the four BMI classification groups in age results, F(3, 890) = 14.631, p= 0.05. Independent T test result of comparison of BMI in terms of being an obese in family is demonstrated Table 8.

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Table 8. Independent T test result of comparison of BMI in terms of being an obese in family

Being an obese in family	n	mean	Sd	df	t	p
Yes	122	23.86	4.46	892	5.035	***0.00****
No	772	22.17	3.25			

p<0.05*

A statistically significant difference was found between the mean BMI of having an obese person in own family or not groups, t(5.035)=892, p<0.05. Chi square test result of BMI classification comparison in terms of whether being an obese in family is shown in Table 9.

Table 9. Chi square test result of BMI classification comparison in terms of being an obese in family or not

		Being an obese in family		x^2	df	p
		yes	no			
Underweight	n	7	79	30.090	3	***0.00****
	%	8.1%	91.9%			
Normal weight	n	74	572			
	%	11.5%	88.5%			
Overweight	n	30	105			
	%	22.2%	77.8%			
Obese	n	11	16			
	%	40.7%	59.3%			
Total	n	122	772			
	%	13.6%	86.4%			

p<0.05*

There was a highly significant difference among BMI classification groups for having an obese person in own family or not groups, x^2(df=3, n=894)=30.090, p<0.05. Independent T test result of comparison of BMI scores in terms of doing physical activity is given Table 10.

Table 10 . Independent T test result of comparison of BMI scores in terms of doing physical activity (regularly)

Doing physical activity		mean	Sd	df	t	p
Yes	546	22.38	2.97	892	-0.204	0.839
No	348	22.43	4.18			

A statistically significant difference was not found between the mean body mass indexes of doing physical activity or not groups, t(-0.204)=892, p>0.05. Chi square test result of BMI classification comparison in terms of whether doing physical activity is shown in Table 11.

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Table 11. Chi square test result of BMI classification comparison in terms of doing physical activity (regularly)

		Doing physical activity (regularly)		x^2	df	p
		yes	no			
Underweight	n	40	46	18.887	3	***0.00****
	%	46.5%	53.5%			
Normal weight	n	414	232			
	%	64.1%	35.9%			
Overweight	n	83	52			
	%	61.5%	38.5%			
Obese	n	9	18			
	%	33.3%	66.7%			
Total	n	546	348			
	%	61.1%	38.9%			

p<0.05*

There was a highly significant difference among BMI classification groups for doing physical activity or not groups, $x^2(df=3, n=894)=18.887$, $p<0.05$.

Discussion

In this study the mean of the BMI was found as 22.40±3.49 kg/m^2 (min: 14.69 kg/m^2, max: 39.54 kg/m^2). The most common group of the BMI classification of this study was the "normal weight" (646 participants) with the rate of 72.3%. The rate of overweight participants was found as 15.1%. Similarly, 9.6% of the participants were taken placed in underweight groups. Class I obese groups had 2.3% of rate. On the other hand Class II groups and Class III groups had lower rates, 0.7% and 0.0%, respectively. In our study all of the three obese groups defined by WHO (see Figure 1) were transformed as a single group. Depending on this new BMI classification total obese rate (Class I+Class II+Class III) was found surprisingly low rate as 3.0% in our study. When the literature is analyzed, opposite results might be found generally. For example, Cameron et al (2003) reported that 20.8% of population in Australia was obese (n=11.247; age=25+). Luo et al found out that the prevalence of obesity in a Canadian sample (n=18.668; age= 20+) was 22.7%. On the other hand Bassett et al (2008) and Prentice (2006) performed meta-analyzes on obesity prevalence in different countries in the world. Obesity prevalence in different countries is demonstrated and compared with our study in Table 12.

Table 12. Obesity prevalence in different countries and comparison of our study

Country	Researchers	Age	Obesity rate (female)	Obesity rate (male)	General obesity rate	Compared our study Female: 1.1% Male: 4.9% Total: 3%***
Philippines	Nishida&Mucavele*	20+	4%	3%	***2.0%***	Similar
Japan	Nishida&Mucavele*	15+	3%	3%	3.0%	Similar
China	Nishida&Mucavele*	20+	4%	2%	3.0%	Similar
Singapore	Nishida&Mucavele*	18+	7%	5%	6.0%	Similar
Switzerland	Eichholzer et al**	15+	N.A	N.A	8.0%	Partly similar
Netherland	Schokker et al**	20+	7.7%	8.5%	8.1%	Partly similar
Italy	Gallus et al**	18+	8.9%	7.4%	8.2%	Partly similar
Sweden	Sundquist et al**	16+	9.3%	9.6%	9.4%	Partly similar
Morocco	Nishida&Mucavele*	18+	16%	4%	10.0%	Similar
Iran	Nishida&Mucavele*	15+	14%	6%	10.0%	Partly similar
France	INSERM**	15+	N.A.	N.A.	11.0%	Higher

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Germany	Federal Statistical Office, Germany **	18+	N.A.	N. A.	12.1%	Higher
Denmark	Bendixen et al**	16+	12.5%	11.8%	12.2%	Higher
Spain	Martinez et al**	16+	13.6	11.9%	12.8%	Higher
Finland	Tikkinen et al**	18+	13.2	13.5%	13.3%	Higher
Canada	Vanasse et al**	20+	N.A.	N.A.	15.2%	Higher
Australia	Brown et al**	18+	15.8%	16.6%	16.2%	Higher
Saudi Arabia	Nishida&Mucavele*	18+	20%	13%	17.0%	Higher
Ireland	McCarthy et al**	18+	16%	20%	18.0%	Higher
USA	Ni et al**	20+	N.A.	N.A.	23.9%	Higher
Egypt	Nishida&Mucavele*	18+	33%	13%	25.0%	Higher
Bahrain	Nishida&Mucavele*	19+	34%	23%	***29.0%***	Higher

N.A. (not available)
*quoted by Prentice (2006)
**quoted by Bassett et al (2008)
***BMI was calculated from self-reported height and weight. Obesity (BMI ≥ 30 kg/m^2)

Table 12 demonstrates that our result of obesity prevalence is similar to Philippines, Japan, China and Singapore population where place in Asia like Turkey. In contrast with the similarity, France, Germany, Denmark, Spain, Finland, Canada, Australia, Saudi Arabia, Ireland, United States, Egypt, Bahrain populations have higher obesity rates than Turkey. Both similarity of our results to Asian population and opposition of the result of developed countries have higher rates than our result might be accepted a usual status. Living style, eating habits and various geographical conditions might cause these differences related to obesity prevalence rates.

Table 13. Obesity prevalence in Turkey and comparison of our study

Name of study/city/sample	Researchers	Age	Obesity rate (female)	Obesity rate (male)	General obesity rate	Compare our study Female: 1.1% Male: 4.9% Total: 3%***
TEKHARF (General population)	Onat et al, 1999	<30	43.0%	21.1%	***32.0%***	Extremely higher
TOHTA (General population)	Hatemi et al (2003)	20+	35.4%	19.6%	27.5%	Extremely higher
TURDEP (General population)	Satman et al (2002)	20+	29.9%	12.9%	22.3%	Extremely higher
TOAD (General population)	Bağrıaçık et al (2009)	20+	36.9%	21.8%	29.3%	Extremely higher
Kocaeli City sample (General population)	Aladağ et al (2007)	18+	29.2%	26.9%	28.0%	Extremely higher
Ankara City sample (University students)	Avşar et al (2013)	17-21	N.A.	N.A.	3.6%	Similar

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Erzurum City sample (University students)	Vançelik et al (2006)	21.6±1.9	0.2%	1.0%	***0.6%***	Lower
Kayseri City Sample (University students)	Soyuer et al (2010)	20.68±3.15	7.4%	12.2%	8.5%	Higher
Ankara City sample (University students)	Ergün&Erten (2004)	18-22	0.5%	2.4%	1.5%	Lower

As the Table 13 is observed, it can be seen the differences of the rate of obesity among the previous studies and our study. We found out the general obesity rate as 3.0%. Avşar et al (2013) reported a similar result with our study. On the other hand, Vançelik et al (2006) and Ergün&Erten (2004) found a lower obesity rate compared with Avşar et al (2013) and our study. Although, there is a small amount of differences between results of the four studies, the rate of obesity in TEKHARF, TOHTA, TURDEP, TOAD and Kocaeli City sample studies have been extremely higher than the four studies performed among university students. It might be derived from these sharp differences due to large (TEKHARF, TOHTA, TURDEP, TOAD and Kocaeli City sample) and narrow (Avşar et al., 2013; Vançelik et al., 2006; Soyuer et al.,2010; Ergün&Erten, 2004 and our study) age ranges in all studies. Also, while all university students have almost the same living condition, there are many various reasons related to obesity such as gender, age, socio economic level, lifestyle, etc. in normal population affected overweightness and obesity. Table 14 shows the mean of the BMI scores of male and female university students from 22 different countries in the world reported by Wardle et al (2006), various university students from Turkey and the result of our study.

Table 14. BMI of university students reported by Wardle et al (2006) (from 22 countries) and comparing with Turkish Students and our samples

Country	Female (kg/m²)	Our study (Female) BMI=21.01 kg/m²	Male (kg/m²)	Our study (Male) BMI=23.80 kg/m²
Belgium	20.9	Lower	22.1	Lower
England	20.9	Lower	22.7	Lower
France	20.6	Lower	21.9	Lower
Germany	20.9	Lower	22.8	Lower
Iceland	22.1	Higher	23.6	Lower
Ireland	21.3	Higher	22.3	Lower
Netherlands	21.5	Higher	21.9	Lower
United States	***22.6***	Higher	***24.3***	Higher
Bulgaria	19.9	Lower	23.1	Lower
Hungary	20.4	Lower	22.1	Lower
Poland	20.1	Lower	22.8	Lower
Romania	20.0	Lower	22.3	Lower
Slovakia	20.4	Lower	23.0	Lower
Greece	20.8	Lower	23.4	Lower
Italy	20.0	Lower	22.2	Lower
Portugal	21.1	Higher	22.9	Lower
Spain	21.1	Higher	23.2	Lower
Japan	20.5	Lower	21.5	Lower
Korea	***19.3***	Lower	20.7	Lower
Thailand	19.6	Lower	***20.5***	Lower

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Columbia	20.6	Lower	21.8	Lower
Venezuela	21.0	Lower	23.6	Lower
Total	20.7	Lower	22.4	Lower
BMI means of Turkish university students reported by previous studies				
Mazıcıoğlu&Öztürk (2003)	20.77	Lower	22.70	lower
Vançelik et al (2006)	20.70	lower	22.60	lower
Altın (2015)	26.23	Higher	23.43	lower

Surprisingly, the mean BMI score of male in our study are higher than both the mean BMI scores of male in 22 different countries reported by Wardle et al (2006) and all of the previous studies performed on male university students in Turkey. On the other hand our result is lower only United States result reported by Wardle et al (2006). Because numerous studies have been reported that the prevalence of obesity among all age groups in United States have been extremely higher than the other countries (Filozof et al., 2001; Janssen et al., 2005; Monteiro et al., 2004; Ogden et al., 2006), it might be accepted as usual (being the highest rate in American male population in comparing of Table 14). Another comparison in table 14 is the mean BMI scores of females among the various populations. In accordance with the comparison, Korean female university students have the lowest BMI mean with 19.3%. Conversely, the female students in United States have the highest BMI mean among the all other countries. It have been demonstrated that American University students have the highest BMI scores without gender differences. It might be considered a remarkable point of this compassion in Table 14 that the result of our study in male group is having the second highest BMI scores (23.80±3.40) among the all other male groups after the American students. Although the result seems as if an unexpected situation at first, however, in fact this might be usual because of the similarity of the other studies results which have been performed on male university student populations in Turkey in Table 14 (Altın, 2015; Mazıcıoğlu&Öztürk, 2003; Vançelik et al., 2006). In addition to this comparison performed in male and female groups in their own gender, we also compared the mean of BMI scores of our participants in terms of opposite gender. We found that the mean of BMI of male statistically significant higher than female participants' (see table 5). Parallel to our findings, Wardle et al (2006), Mazıcıoğlu&Öztürk (2003) and Vançelik et al. (2006) reported that the mean of BMI of males higher than female participants'. In contrast with this specific result for female age group (university students), numerous studies reported that BMI scores of females or obesity rates clearly higher than males (see Table 12). These differences might be explained that physical niceness, attractiveness and cosmetic perfection are more especially important for females in the twenties ages than the older ages compared with males.

We not surprisingly found that the mean of BMI of participants whom being an obese person in own family statistically significant higher than not being group. In accordance with this result, we also found highly significant difference among BMI classification groups for having an obese person in own family or not groups (see Table 9). As numerous studies have clearly focused that there is an extremely strong relationship between obesity and heredity or genetic factors (Bulik et al., 2003; Hartz et al., 1977; Hellström&Reynisdottir, 2000; Scuteri et al., 2007), our findings might be accepted usual. Numerous studies have focused physical activities and the hindering factors related to physical activities among university students and reported a relationship BMI and doing physical activity. (Aslan et al., 2007; Burke et al., 2006; Haase et al., 2004; Irwin, 2007; Özcan&Bozhüyük, 2016; Savcı et al., 2006; Türkmen et al., 2016; Uluöz et al., 2016). We also found that there is no statistically significant difference between the mean BMI of doing physical activity or not groups. On the other hand, there was a highly significant difference among BMI classification groups for doing physical activity or not groups. Overweight group had the highest

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rate for doing physical activity (61,5)%. Contrarily, obese groups had the lowest rate (33%). This result might be explained that obese peoples may unconsciously concede their own physical condition by means of social bias (Janssen et al., 2004; Puhl&Brownell, 2001; Yılmaz, C.Y.&Dinç Z.F., 2010)

Conclusions and Recommendations

In conclusion, obesity is the most common health problem for humanity. In fact, obesity is a multi-factor chronic disease which reduces quality of life. It is one of the diseases increasing rapidly and affecting individuals and societies in Turkey like all over the world. For this reason policies are being developed all over the world in the fight against obesity for all kind of population (all age groups and genders). In accordance with this situation, some recommendations should be given as below;

- Ensuring political demands and resilience at the national and local level and implementation against obesity
- More strict measures taken by the government to reduce obesity rates in society
- Informing and awareness of community on obesity
- Informing adequate and balanced nutrition
- Informing benefits of regular physical activity against obesity
- Increasing the number of hours of physical education and sports lessons in schools as much as possible. The processing of these courses must be inspected strongly
- Selling of fast food product in all school from pre-school to university must be forbidden by The Governments.
- Organizing social responsibility projects to prevent obese individuals from being excluded from society
- Increasing physical activity possibilities for people in all condition by Governments
- All media facilities should be used against obesity (TV, Radio, Press, Social Media).

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DERGİNİN İNDEX BİLGİSİ (MAKALENİN YAYINLANDIĞI TARİHTE)

