

## Original Article

# Prevalence of Obesity and Related Risk Factors among Secondary School Adolescents

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## Abstract

Childhood obesity is a health issue that need special attention as it increases the risk of adulthood obesity and the rates of morbidity and mortality. This study intends to determine the prevalence of obesity in adolescents and related risk factors. The study was planned as a descriptive study with a sample of 791 students. The data were collected using the Form of Descriptive Qualities of Students, the Form of Obesity Related Risk Factors, and a digital scale for anthropometric measurement. The data were obtained by anthropometric measurements and a face-to-face interview in a classroom environment. The data were processed and evaluated in the computer by using SPSS 16.0. The average age of the participants is  $12.08 \pm 0.79$  (11-13) while %51.3 of them are girls and %48.7 are boys. %27.1 of the participants were determined to be slightly overweight and %19.3 were obese. The prevalence of obesity was found to be higher in the age group of 11 (%27.5), in boys (%25.7) and in those with a family history of obesity (%27.5) ( $p < 0.05$ ). The prevalence of obesity was found to be significantly higher in those with the daily meal number of 2 and less (%22.2), in those without exercise (%27.5) and in those with no snack after dinner (%29.5) ( $p < 0.05$ ). The study found that the obesity prevalence was high. It was determined that the obesity prevalence was affected by sex, family history of obesity, eating frequency and physical activity.

**Keywords:** adolescents, obesity, risk factors

## Introduction

Obesity is a global health issue that threatens societies with a rapid increase in prevalence of childhood ages as well as all age groups (Williams et al., 2015). The obesity rate in children and adolescents in the United States was determined to be %18.5 in 2015-2016 (Hales et al., 2017). The prevalence of obesity in Turkey is increasing every day and the prevalence of childhood and adolescence obesity increased by 11.6 times between 1990-1995 and 2011-2015 and reached from %0.6 to %7.3 (Alper et al., 2018). Obesity prevalence reveals that the problem is alarming for children and adolescents.

It is known that many factors are effective in the development of obesity including genetic, metabolic, hormonal and environmental factors and life style (Williams et al., 2015; Taveras et al., 2013; Gamit et al., 2015; Danielzik, 2002). Obesity causes an increase in the rates of non-communicable diseases as well as in physical, psychological, social and severe medical problems which lead to shorter life expectancy and lower life quality (Williams et al., 2015; Nam et al., 2015; Dhanasekhar et al., 2017). The childhood obesity is a health issue that needs attention as it leads to the risk of adulthood obesity, many health problems and increase in

the rates of morbidity and mortality based on its side effects. Therefore, effective programs for prevention, protection and treatment of obesity should be planned and implemented particularly in the early period (childhood/adolescence) (Ardic and Omar, 2018; Dundar and Oz, 2012; Savashan et al., 2015; Dhanasekhar et al., 2017; Yigit, 2011).

Early diagnosis of the problem is a primary requirement for the society in the process of developing these programs. Nurses have significant responsibilities for the prevention, treatment and care of the disease in the fight with obesity in all stages of preventive, therapeutic and rehabilitating services during the healthy child examinations in the primary health care institutions, community health centres, schools and home. In the fight against obesity, health care professionals need to evaluate the body weight and weight increase rates of children. The awareness of children and parents on the obesity-related risk factors should be increased and healthy life style habits should be raised (Dundar and Oz, 2012; Williams et al., 2015; Savashan et al., 2015; Gamit et al., 2015; Ardic and Omar, 2018).

The study was planned to determine the obesity prevalence and related risk factors in adolescents.

## **Methods and Materials**

### ***Study Design and Sampling***

This study was conducted in the province centre of Giresun and it is a descriptive study. The population of the study consists of 5.578 students in total studying at 14 secondary schools in the province centre. The number of individuals to be included in the sample was determined to be at least 542. Cluster sampling method was used in the study. For this purpose, secondary school was taken as the cluster unit. 14 secondary schools were numbered from 1 to 14 and two random secondary schools were included in the sample.

This study intended to reach all of the sample but was concluded with 791 students (%98) due to reasons including absence, missing data and reluctance to participate.

### ***Instruments***

Data collection instruments in this study are Form of Descriptive Qualities of Students, the

Form of Obesity Related Risk Factors, and a digital scale for anthropometric measurement.

Form of descriptive qualities of students: the form was created by the researcher in line with the relevant literature including questions about age, sex, weight, height, family income, parents' education and employment, family type, number of children and presence of obese people in the family.

Form of obesity related risk factors: This form includes questions about nutrition habits including obesity-related risk factors, sedentary life and physical activity.

Digital scale (anthropometric measurements): Body weight and height of children were measured and BMI values were determined. Extra fine digital scale with height measurement was used. The device was developed to measure weight (kg), height (cm) and BMI through infrared and ultrasonic technology (capacity: 150 kg, accuracy: 0.1 kg). In evaluating BMI, the Z-score evaluation per age (5-19 years) and sex by the World Health Organization was taken as reference. BMI evaluation (5-19 years: very thin: < -3SD (Z score), thin: < -2SD (Z score), overweight: > + 1SD (Z score), obese: > + 2SD (Z score).

### ***Data Collection***

The data of the study were collected by the researchers at schools through anthropometric measurements and a face-to-face survey method in a classroom environment. It took 15 minutes on average for the students to fill in the forms and 10 minutes on average to complete the measurements.

### ***Statistical Analyses***

Data processing and evaluation were done in a computer environment by using SPSS 16.0. Data for descriptive analyses were expressed in frequency and percentage. Pearson Chi-Square Test and One-Way ANOVA Test were used in the data analyses and the value  $p < 0.05$  was accepted to be statistically significant.

### ***Ethical Issues***

Approval from the Ethical Committee of the Giresun University Faculty of Medicine and written permission from the Provincial Directorate of National Education were obtained for this study. The students who compose the

study group were informed about the study and written permissions were obtained from the students and their parents.

### Results

The average age of the participants was  $12.08 \pm 0.79$  while 11 was the youngest age and 13 was the oldest age. The ratio of girls was %51.3 and the ratio of boys was 48.7%. Majority of the participants (%80.7) had a core family structure. More than half of the parents (%53.9 of mothers and %46.8 of fathers) are high school graduates. Almost half of the parents (46.8%) and a majority of fathers (%94.2) don't have any job. The ratio of those who reported a low economic condition of family was %9.5 while %37.9 of them reported to have high economic condition. The ratio of those who reported a family history of obesity was %23.9 (Table 1).

%53.6 of the participants were determined to be thin and with normal weight, %27.1 to be overweight and 19.3% to be obese. The prevalence of obesity was found to be significantly higher in the age group of 11 years (%27.5), in boys (%25.7) and in those with a family history of obesity (%27.5) compared to those in the other group. No significant difference was found in the categories of number of siblings, family type, parents' education and employment, economic condition of the family and body mass index ( $p < 0.05$ ) (Table 2). The prevalence of obesity was found to be significantly higher in those with the daily meal number of 2 and less (%22.2), in those without exercise (%27.5) and in those with no snack after dinner (%29.5) ( $p < 0.05$ ). No significant difference was in the categories of skipping meal, eating speed, time spent with TV/computer and body mass index ( $p > 0.05$ ) (Table 3).

**Table 1. Socio-demographic characteristics of study participants**

Variables	Categories	Total	
		N	%
Age group (years) (mean years $\pm$ SD = $12.08 \pm 0.79$ )	11 years	218	27.6
	12 years	290	36.7
	13 years	283	35.8
Gender	Female	406	51.3
	Male	385	48.7
Number of siblings (Including himself)	$\leq 2$	493	62.3
	$\geq 3$	298	37.7
Family type	Nuclear	638	80.7
	Other	153	19.3
Mothers' education	Less than middle school	225	28.4
	High school	426	53.9
	University	140	17.7
Fathers' education	Less than middle school	123	15.5
	High school	464	58.7
	University	204	25.8
Mother's employment status	Employed	370	46.8
	Unemployed	421	53.2
Father's employment status	Employed	745	94.2
	Unemployed	46	5.8
Self-report family economy	Lower	75	9.5
	Middle	416	52.6
	Upper	300	37.9
Family history of obesity	No	602	76.1
	Yes	189	23.9
<b>Total</b>		<b>791</b>	<b>100.0</b>

**Table 2. Relationship between BMI and socio-demographic characteristics**

Variables	Categories	Body Mass Index (BMI) classifications						*P
		Thinness/ Normal weight		Overweight		Obesity		
		n	%	n	%	n	%	
<b>Age group (years)</b> (mean years $\pm$ SD = 12.08 $\pm$ 0.79)	<b>11 years</b>	113	51.8	45	20.6	60	27.5	<b>0.000</b>
	<b>12 years</b>	149	51.4	79	27.2	62	21.4	
	<b>13 years</b>	162	57.2	90	31.8	31	11.0	
<b>Gender</b>	<b>Female</b>	239	58.9	113	27.8	54	13.3	<b>0.000</b>
	<b>Male</b>	185	48.1	101	26.2	99	25.7	
<b>Number of siblings</b> (Including himself)	<b><math>\leq 2</math></b>	254	51.5	133	27.0	106	21.5	0.122
	<b><math>\geq 3</math></b>	170	57.0	81	27.2	47	15.8	
<b>Family type</b>	<b>Nuclear</b>	332	52.0	182	28.5	124	19.4	0.125
	<b>Other</b>	92	60.1	32	20.9	29	19.0	
<b>Mothers' education</b>	<b>Less than middle school</b>	127	56.4	64	28.4	34	15.1	0.449
		225	52.8	112	26.3	89	20.9	
	<b>High school</b>	72	51.4	38	27.1	30	21.4	
<b>Fathers' education</b>	<b>Less than middle school</b>	73	59.3	33	26.8	17	13.8	0.101
		235	50.6	137	29.5	92	19.8	
	<b>High school</b>	116	56.9	44	21.6	44	21.6	
	<b>University</b>							
<b>Mother's employment status</b>	<b>Employed</b>	183	49.5	104	28.1	83	22.4	0.051
	<b>Unemployed</b>	241	57.2	110	26.1	70	16.6	
<b>Father's employment status</b>	<b>Employed</b>	399	53.6	200	26.8	146	19.6	0.726
	<b>Unemployed</b>	25	54.3	14	30.4	7	15.2	
<b>Self-report family economy</b>	<b>Lower</b>	47	62.7	14	18.7	14	18.7	0.404
	<b>Middle</b>	224	53.8	113	27.2	79	19.0	
	<b>Upper</b>	153	51.0	87	29.0	60	20.0	
<b>Family history of obesity</b>	<b>No</b>	344	57.1	157	26.1	101	16.8	<b>0.000</b>
	<b>Yes</b>	80	42.3	57	30.2	52	27.5	
<b>Total</b>		<b>424</b>	<b>53.6</b>	<b>214</b>	<b>27.1</b>	<b>153</b>	<b>19.3</b>	

\*Pearson Chi-Square Test

**Table 3. Association between BMI and lifestyle characteristics among adolescents**

Variables	Categories	Body Mass Index (BMI) classifications						*P
		Thinness/ Normal weight		Overweight		Obesity		
		n	%	n	%	n	%	
Number of daily meals	≤2	161	46.9	106	30.9	76	22.2	<b>0.004</b>
	≥3	263	58.7	108	24.1	77	17.2	
Jumping meal	Never	37	61.7	10	16.7	13	21.7	0.242
	Sometimes	339	52.1	184	25.0	128	19.7	
	Always	48	60.0	20	27.1	12	15.0	
Eating speed	Fast	41	48.8	30	35.7	13	15.5	0.198
	Normal	294	53.6	150	27.3	105	19.1	
	Slow	89	56.3	34	21.5	35	22.2	
Daily time spent in TV/Computer	None	25	58.1	9	20.9	9	20.9	0.408
	< 2 hours	252	55.9	115	25.5	84	18.6	
	≥ 2 hours	147	49.5	90	30.3	60	20.2	
Exercise during last week	None	40	75.5	6	11.3	7	27.5	<b>0.017</b>
	≤ 3 times	210	50.7	119	28.7	85	20.5	
	> 3 times	174	53.7	89	27.5	61	18.8	
Snacking after dinner	Never	122	42.8	79	27.7	84	29.5	<b>0.000</b>
	Sometimes	265	58.6	123	27.2	64	14.2	
	Always	37	68.5	12	22.2	5	9.3	

\*Pearson Chi-Square Test

## Discussion

Obesity can be seen at any age while it is more frequent in adolescence which is one of the physiological processes that includes rapid fat storage. It is known that obesity is associated with short and long term diseases, obese people have low life quality and short life expectancy, and the beginning of a significant part of adult obesity is based on childhood years (Yigit, 2011; Savashan et al., 2015; Ardic and Omar, 2018; Dhanasekhar et al., 2017). All these reasons indicate that obesity is an issue which needs special attention.

The obesity prevalence in the study group was found to be quite high. Dhanasekhar et al., 2017 found the obesity prevalence to be %4.1 in the age group of 5-12 years; Nayak and Bhat, 2011

found the same to be %5 in the age group of 10-12 years; Farajian et al., 2013 found it to be %10.8 in the age group of 10-12 years; Nam et al., 2015 found it to be %9.5 in the age group of 12-18 years; Hales et al., 2017 found it to be %20.6 in the age group of 12-18 years; Gamit et al., 2015 found it to be 6% in the age group of 14-16 years; Ardic and Omar, 2018 found it to be 12.2% in the age group of 6-11 years; Savashan et al., 2015 found it to be 7.5% in the age group of 6-11 years; Dundar and Oz, 2012 found it to be 10.3% in the age group of 11-14 years; Simsek et al., 2005 found it to be 5.4% in the age group of 12-17 years. The studies had a broad spectrum of obesity rates regarding the differences of population and sample as well as having a high prevalence. It was determined that the prevalence of obesity increased by 11.6 times

between 1990-1995 and 2011-2015 (Alper et al., 2018). This rapid increase indicates the necessity of programs of prevention and treatment for obesity.

The study found that the weight differed according to sex while boys had higher obesity ratio than girls. The findings of the present study are parallel to the results of the national and international studies (Ardic and Omar, 2018; Dundar and Oz, 2012; Alper et al., 2015; Nam et al., 2015; Gamit et al., 2015; Silva et al., 2011; Janssen et al., 2004; Olds et al., 2009; Nicklas et al., 2003). Differing from these results, the study by Salazar-Martinez et al. found higher obesity prevalence among girls than boys (Salazar-Martinez et al., 2006). The adolescence is a period where physical appearance is important and it is believed that this is more remarkable among girls.

It is known that the genetic and environmental factors have an undeniable effect on the development of obesity (Taveras et al., 2013). The present study found significantly higher obesity prevalence in those with a family history of obesity. Again, similar to the results of the studies in the literature, obesity prevalence was higher in those with an obese family member (Metinoglu et al., 2012; Ardic and Omar, 2018, Simsek et al., 2005). In the studies of Danielzik et al., 2002; Wang et al., 2002; Farajian et al., 2013 and Savashan et al., 2015, it was found that the BMI values of the children and their parents were related and the obesity prevalence in children increased in parallel to the increase in the BMI averages of mothers and parents. Results show that genetic factors and environmental factors including family nutrition, eating culture and life style are effective on obesity. Results also give the idea that a holistic approach is required towards the family and children for the prevention and treatment of obesity.

In fact, there are many interrelated factors affecting the development of obesity and it is essential to determine the associated factors to prevent obesity. This study found obesity higher in those with the daily meal number of 2 and less, in those without exercise and in those with no snack after dinner. Similar to these findings, several studies found a relation between low physical activity and obesity rate (Simsek et al., 2005; Metinoglu et al., 2012; Ardic and Omar, 2018; Dhanasekhar et al., 2017; Taveras et al.,

2013; Silva et al., 2011; Janssen et al., 2004). Again, it is known that the irregular consumption of food is effective in obesity. The study by Toschke et al., 2005 found a reverse relationship between the eating frequency and obesity prevalence in children while Nicklas et al., 2003 didn't find a significant relationship in the same. Obesity is a problem that needs attention since many of its factors can be kept under control. Providing awareness for the obesity risk factors in children and parents is a serious requirement for obesity management.

### Conclusion

The study found the obesity prevalence to be 19.3%. It was found that sex, family history of obesity, eating frequency and physical activity are effective on obesity prevalence.

Maintaining and improving health are indispensable components of nursing care and nurses play an important role in the actions required for this process. The first stage in preventing and treating obesity is the detection of the problem. Nurses should evaluate the growth and development of children regularly. In this process, the knowledge and perceptions of children and parents on obesity should be determined. Obesity-related risk factors should be determined and awareness of adolescents and parents on them should be ensured.

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