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Investigation of factors associated with overweight and obesity prevalence in secondary school students

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ABSTRACT

The purpose of this study is to investigate whether the time spent on viewing television and using computer is associated with overweight and obesity among 11- to 14-y-old Turkish secondary school students'. This study was carried out in 5th, 6th and 7th grades of two secondary schools in Zonguldak province in 2016. A total of 476 students, 52.3% (n = 249) female and 47.7% (n = 227) male, between the ages of 10 and 13 and continuing to secondary school, participated in the study. The data of the study were collected with the "Personal Information Form" and body mass index (BMI) measurements were made with the bioelectric impedance analyzer system. According to the results of current study; 20% of secondary school students were found to be overweight and extremely overweight. Extremely overweight children used computers for >2 hours a weekday is 1.55 times, watched TV is 1.67 times higher than normal children. Although the frequency of overweight is higher in female secondary school students than in male, overweight or obesity in both genders is a serious threat to health.

Keywords: Overweight, obesity, secondary school student, physical activity.

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INTRODUCTION

Obesity and overweight constitute a major public health problem, and their prevalence is increasing worldwide at an alarming rate in both developing and developed countries (WHO, 2013). WHO has described obesity as the worst non-infectious epidemic in history (WHO Consultation on Obesity, 1998). During the past two decades, the prevalence of overweight and obesity has also increased rapidly in children, largely due to growing urbanization and nutrition transitions (Popkin and Gordon-Larsen, 2004). Globally, around one in 10 young people aged 5 to 17 years are overweight or obese, with levels increasing rapidly in many countries and regions in recent years (WHO Obesity and overweight, 2020).

The vast majority of overweight or obese children live in developing countries, where the rate of increase has been more than 30% higher than that of developed countries. Without intervention, obese infants and young children will likely continue to be obese during childhood, adolescence and adulthood. Obese children are more likely to develop a variety of health problems as adults. These include: cardiovascular disease, insulin resistance, musculoskeletal disorders, some cancers, disability (WHO Facts and Figures on Childhood Obesity, 2020).

Prevention of obesity in children is largely dependent on healthy lifestyle behaviors including regular physical activity, decreased sedentary behaviors, and a healthy diet, low in saturated fats and sugars. Evidence suggests that environmental factors play a significant role in lifestyle behaviors (Drewnowski and Specter, 2004a; Drewnowski et al., 2004b). The widespread use of advanced technological devices (smart mobile phones, televisions, computers, tablets, home theater, etc.) that easily fill leisure time contributes significantly to the increase in obesity (TEMD Obezite, 2016).

Regular physical activity is associated with prevention of obesity in children and adolescents and is inversely correlated with total body fat and BMI (Maziak et al., 2008, Abbott and Davies, 2004). Current global recommendations state that young people aged 5 to 17 years should accumulate at least 60 minutes of

moderate-intensity physical activity every day and include vigorous-intensity activities at least three times a week. Physical activity includes play, games, sports, transportation, housework, recreation, physical education and structured exercise and may be undertaken in the context of family, school or community activities (WHO, 2010).

The increasingly urbanized and digitalized world offers fewer opportunities for physical activity through healthy play (WHO, 2020). We need to consider factors behind this development. One of them may be the increased use of information and communication technology, particularly television, digital games (video, computer and console games) and computers. Many people believe that overeating is the sole cause of obesity, but the time that children devote to sedentary activities has increased drastically in the past few decades. This increase in sedentary patterns, i.e. using buses to go to school, not having physical education classes, watching TV an average of 3 to 4.5 h per day (Mokdad et al., 2000), has been suggested as a behavioral determinant of children's and adolescent's obesity (Chakravarthy and Booth, 2003). In particular, television (TV) viewing has been extensively studied in relation to fatness, mainly among children and adolescents from developed countries (Andersen et al., 1998; Marshall et al., 2004). Studies in children, mainly cross-sectional, indicate that there is a significant association between TV viewing and obesity among children (Marshall et al., 2004; Robinson, 1999).

The aim of this study was to investigate whether the time spent on viewing television and using computer is associated with overweight and obesity among 11- to 14-y-old Turkish secondary school students'.

METHODOLOGY

Research model

A descriptive cross-sectional study model used to estimate the prevalence of the relevant outcome for a given population was used in this study (Levin, 2006), which was conducted to determine the relationship between television viewing and computer use time in secondary school students' and overweight and obesity.

The universe and sample of the research

This study was carried out in 5th, 6th and 7th grades of two secondary schools in Zonguldak province in 2016. A total of 476 students, 52.3% (n = 249) female and 47.7% (n = 227) male, between the ages of 10 and 13 and continuing to secondary school, participated in the study. 34 students who were found to be incomplete or incorrectly filled were not included in the analysis. The frequency and percentage distributions regarding the demographic characteristics of the students are shown in Table 1.

Data collection

The data of the study were collected with the "Personal Information Form" and body mass index (BMI) measurements were made with the bioelectric impedance analyzer system. It was declared that the subjects had the option to leave the study at any time, without having any responsibility. The study protocol and purpose were explained to all subjects, and a written informed consent was obtained from each participant and one of the parents. School principals and physical education teachers were informed about the purpose and methodology of the study, and the necessary permissions were obtained after their school decided to participate in the study.

Personal information form

The "Personal Information Form" prepared by the researchers was created to collect data on the demographic characteristics of the students participating in the study (gender, age, grade, parents' education, family income level and whether the student has a computer at home, duration of physical activity, etc).

Body mass index measurements

The body height of the subjects was measured by a metal scale with 0.1 cm sensitivity.

In fact, the measurement of body composition in terms of fat mass (FM), fat-free mass (FFM) and total body water (TBW) has been considered as a superior approach to evaluate nutritional status which goes beyond the information given by weight and height (Gutiérrez-Marín et al., 2019; Mazzoccoli, 2015). Body composition in children is usually assessed using two-component (2C) methods, which partition body weight into its major components FM and FFM (Fabiansen et al., 2017).

All measurements were taken during morning hours (09:30 to 12:30) and the subjects didn’t have any vigorous activity during the preceding 12 hours of the measurement. Measurements were performed in the morning, more than three hours after waking up and after last eating and drinking. Body mass and body composition were assessed with the bioelectrical impedance method (body’s inherent resistance to an electrical current) using a Tanita BC 418- MA body composition analyzer (Tanita, Tokyo, Japan - 8 electrodes bioelectric impedance analyzer system). All the recommendations for the analysis of bioelectrical

Table 1. Demographic characteristics of the secondary school students' participating in the study.

Variables (n = 476)	Mean ± SD	Med, (Min - Max)	*n* - %
Age (year)	11.15 ± 1.07	11.00 (9.00 - 14.00)	-
Body height (cm)	147.36 ± 8.45	147.50 (123.00 - 178.00)	-
Body weight (kg)	44.41 ± 12.35	42.50 (21.80 - 92.40)	-
BMI (kg/m^2)	20.19 ± 4.24	19.26 (12.55 - 39.52)	-
What goes and comes to school?	Vehicle	-	279 - 58.6
	On foot	-	197 - 41.4
Obesity and diabetes status of the mother	Obesity	-	37 - 3.8
	Non obesity	-	439 - 96.2
	Diabetes	-	48 - 4.9
	Non diabetes	-	428 - 95.1
Obesity and diabetes status of the father	Obesity	-	61 - 6.3
	Non obesity	-	415 - 93.8
	Diabetes	-	73 - 7.5
	Non diabetes	-	403 - 92.5
Have a computer at home?	Yes	-	398 - 83.6
	No	-	78 - 16.4
Have a sports license?	Yes	-	117 - 24.6
	No	-	359 - 75.4
Training (days/week)	2.52 ± 1.15	2.00 (1.00 - 5.00)	-
Playing time outside on weekdays	1.90 ± 0.89	2.00 (0.50 - 4.00)	-
Playing time outside on the weekend	2.95 ± 1.43	3.00 (0.50 - 8.00)	-
TV hours on weekdays	1.90 ± 1.17	2.00 (0.50 - 7.00)	-
TV hours on weekend	2.81 ± 1.65	2.00 (0.50 - 12.00)	-
Computer hours on weekdays	1.71 ± 1.11	1.00 (0.50 - 9.00)	-
Computer hours on weekend	2.46 ± 1.68	2.00 (0.50 - 12.00)	-

impedance were followed. The variables measured were: body weight (kg), BMI (kg/m^2), fat-free mass (FFM, kg), fat mass (FM, kg), bone mass (kg), muscle mass (kg) and total body water (TBW, %). In evaluating presence of obesity in children participating in the study, reference values determined by the World Health Organization (WHO) for children aged 5 to 19 years were used (de Onis et al., 2007).

Statistical analysis

Data were analyzed with the SPSS for Windows 21.0 packet program. Descriptive statistics were given as “mean ± standard deviation” and frequency distributions, Chi-square test was used to compare qualitative data between groups, results of analysis were evaluated with 95% confidence interval.

RESULTS

In this section, there are statistical analyzes and interpretations of the data obtained as a result of the application of data collection tools (demographic characteristics of the students and body mass index) of secondary school students.

When the body composition values of female and male students were examined, a statistically significant difference was found between the measurements of FM (kg), FM (%), bone mass (kg) and TBW (%) ($p = 0.001$), respectively ($p < 0.001$). There was no significant difference between other measurement data ($p < 0.05$) (Table 2).

In evaluating the presence of obesity in children participating in the study, reference values determined by the World Health Organization for children aged 5 to 19 years were used [extremely overweight (-3 SD),

Table 2. Distribution and comparison and of body composition measurements between the male and female secondary students.

Variables (n = 476)	Female (n = 249) Mean ± SD Med, (Min - Max)	Male (n = 227) Mean ± SD Med, (Min - Max)	p
Age (year)	11.17 ± 1.08 11.00 (9.00-14.00)	11.13 ± 1.05 11.00 (9.00-14.00)	0.557
Body height (cm)	147.52 ± 8.16 148.00 (127.00-178.00)	147.19 ± 8.76 146.00 (123.00-172.00)	0.543
Body weight (kg)	45.01 ± 12.34 43.70 (21.80-92.40)	43.75 ± 12.34 41.10 (22.00-90.10)	0.113
BMI (kg/m^2)	20.44 ± 4.35 19.43 (12.55-35.63)	19.91 ± 4.12 18.90 (13.43-39.52)	0.056
FM (kg)	12.64 ± 6.30 10.85 (3.20-39.20)	10.61 ± 6.44 8.45 (3.20-47.20)	**0.001***
FM (%)	26.70 ± 6.30 25.50 (13.00-43.40)	22.71 ± 7.34 20.70 (10.90-52.40)	**0.001***
FFM (kg)	32.36 ± 6.63 32.45 (17.80-61.40)	33.14 ± 6.99 32.20 (17.70-57.90)	0.076
Bone mass (kg)	1.67 ± 0.33 1.70 (1.00-3.10)	1.77 ± 0.32 1.70 (1.10-2.90)	**0.001***
Muscle mass (kg)	30.70 ± 6.30 30.75 (16.80-58.30)	31.37 ± 6.67 30.50 (16.60-55.00)	0.105
TBW (%)	53.66 ± 4.61 54.50(41.50-63.60)	56.58 ± 5.37 58.10 (34.90-65.10)	**0.001***

*p < 0.001.

overweight (-2 SD), risky overweight (-1 SD), normal (median), risky weakness (1 SD), weakness (2 SD) and extremely weakness (3 SD)] (de Onis et al., 2007).

When the BMI values of the secondary school students were examined according to the Z score, it is determined that, 47% (n = 221) were normal, 22% (n = 106) were risky overweight, 17% (n = 82) were overweight, 2% (n = 10) were extremely overweight, 10% (n = 48) were at risky weakness, and 2% (n = 9) were weak. When the BMI classification of secondary school students were examined, a statistically significant difference was found between the categories of computer hours on weekdays (p = 0.002), -weekend (p = 0.006), and TV hours on weekdays (p = 0.022) (p < 0.001) There was no significant difference between the other categories data (p < 0.05) (Table 3).

When BMI values are evaluated as extremely overweight (extremely overweight n = 10 and overweight n = 82, total n = 92) and normal (normal n = 221, risky overweight n = 106, and risky weakness n = 48, total n = 375), BMI classification of secondary school students were examined, a statistically significant difference was found between the categories of computer hours on weekdays (p = 0.015) and TV hours on weekdays (p = 0.004) (p < 0.001) There was no significant difference between the other categories data (p < 0.05) (Table 4).

Extremely overweight children use computers for >2 hours a weekday is 1.55 times higher than normal children (OR = 1.55, OR%95 CI = 1.09 to 2.21). Extremely overweight children watching TV for >2 hours a weekday is 1.67 times higher than normal children (OR = 1.67, OR%95 CI = 1.18 to 2.35) (Table 4).

Table 3. BMI values of secondary school students' classification/prevalence of according to the Z scores.

Main Grouping - Category		Extremely overweight (n = 10) (2%)	Overweight (n = 82) (17%)	Risky overweight (n = 106) (22%)	Normal (n = 221) (47%)	Risky weakness (n = 48) (10%)	Weakness (n = 9) (2%)	Total (n = 476) (100%)	p
What goes and comes to school?	Vehicle	8 (80%)	45 (55%)	58 (55%)	133 (60%)	30 (63%)	5 (56%)	279 (59%)	0.335
	On foot	2 (20%)	37 (45%)	48 (45%)	88 (40%)	18 (37%)	4 (44%)	197 (41%)	
Have a sports license?	No	9 (90%)	64 (78%)	76 (72%)	165 (75%)	38 (79%)	7 (78%)	359 (75%)	0.516
	Yes	1 (10%)	18 (22%)	30 (28%)	56 (25%)	10 (21%)	2 (22%)	117 (25%)	
Training (days/week)	1-2 day	1 (50%)	11 (58%)	17 (61%)	31 (55%)	7 (64%)	1 (100%)	68 (58%)	0.790
	2+ day	1 (50%)	8 (42%)	11 (39%)	25 (45%)	4 (36%)	0 (0%)	49 (42%)	
Playing time outside on weekdays	1-2 hour	3 (50%)	39 (78%)	58 (77%)	118 (79%)	24 (80%)	6 (86%)	248 (78%)	0.276
	2+ hour	3 (50%)	11 (22%)	17 (23%)	31 (21%)	6 (20%)	1 (14%)	69 (22%)	
Playing time outside on the weekend	1-2 hour	3 (50%)	27 (43%)	33 (40%)	81 (45%)	16 (46%)	4 (57%)	164 (44%)	0.833
	2+ hour	3 (50%)	36 (57%)	49 (60%)	98 (55%)	19 (54%)	3 (43%)	208 (56%)	
Have a computer at home?	Yes	9 (90%)	71 (87%)	87 (82%)	187 (85%)	37 (77%)	7 (78%)	398 (84%)	0.261
	No	1 (10%)	11 (13%)	18 (18%)	34 (15%)	11 (23%)	3 (32%)	78 (16%)	
Computer hours on weekdays	>2 hour	3 (37%)	33 (40%)	43 (41%)	111 (50%)	26 (54%)	3 (33%)	219 (46%)	**0.002***
	0-2 hour	7 (63%)	49 (60%)	63 (59%)	110 (50%)	22 (46%)	6 (67%)	257 (54%)	
Computer hours on weekend	>2 hour	7 (70%)	57 (70%)	86 (81%)	155 (70%)	32 (67%)	6 (67%)	343 (72%)	**0.006***
	0-2 hour	3 (30%)	25 (30%)	20 (19%)	66 (30%)	16 (33%)	3 (33%)	133 (28%)	
TV hours on weekdays	>2 hour	7 (70%)	54 (66%)	64 (60%)	120 (54%)	22 (46%)	5 (56%)	272 (57%)	**0.022***
	0-2 hour	3 (30%)	28 (34%)	42 (40%)	101 (46%)	26 (54%)	4 (44%)	204 (43%)	
TV hours on weekend	>2 hour	8 (80%)	66 (80%)	88 (83%)	175 (79%)	36 (75%)	6 (67%)	379 (80%)	0.601
	0-2 hour	2 (20%)	16 (20%)	18 (17%)	46 (21%)	12 (25%)	3 (33%)	97 (20%)	

*$p < 0.001$, Reference values determined by the WHO for children aged 5-19 years were used; extremely overweight (-3 SD), overweight (-2 SD), risky overweight (-1 SD), normal (median), risky weakness (1 SD), weakness (2 SD) and extremely weakness (3 SD).

Table 4. Examining the risk factors of extremely overweight secondary school students.

Main Grouping - Category		Extremely overweight (n = 92 - 20%)	Normal (n = 375 - 80%)	Total (n = 467)	p	Odds Ratio
What goes and comes to school?	Vehicle	53 (58%)	221 (59%)	274 (59%)	0.519	0.899
	On foot	39 (42%)	154 (41%)	193 (41%)		(0.651-1.242)
Have a sports license?	No	73 (79%)	279 (74%)	352 (75%)	0.165	1.316
	Yes	19 (21%)	96 (26%)	115 (25%)		(0.893-1.940)
Training (days/week)	1-2 day	12 (57%)	55 (58%)	67 (58%)	0.547	1.260
	2+ day	9 (43%)	40 (42%)	49 (42%)		(0.594-2.674)
Playing time outside on weekdays	1-2 hour	42 (75%)	200 (79%)	242 (78%)	0.434	0.827
	2+ hour	14 (25%)	54 (21%)	68 (22%)		(0.514-1.331)
Playing time outside on the weekend	1-2 hour	30 (43%)	130 (44%)	160 (44%)	0.869	0.969
	2+ hour	39 (57%)	166 (56%)	205 (56%)		(0.668-1.406)
Have a computer at home?	Yes	80 (87%)	312 (83%)	392 (84%)	0.339	1.248
	No	12 (13%)	63 (17%)	75 (16%)		(0.792-1.968)
Computer hours on weekdays	>2 hour	36 (39%)	180 (48%)	216 (46%)	**0.015***	1.552
	0-2 hour	56 (61%)	195 (52%)	251 (54%)		(1.089-2.211)
Computer hours on weekend	>2 hour	64 (70%)	273 (73%)	337 (72%)	0.967	0.992
	0-2 hour	28 (30%)	102 (27%)	130 (18%)		(0.682-1.443)
TV hours on weekdays	>2 hour	61 (66%)	206 (55%)	267 (57%)	**0.004***	1.665
	0-2 hour	31 (34%)	169 (45%)	200 (43%)		(1.179-2.352)
TV hours on weekend	>2 hour	74 (80%)	299 (80%)	373 (80%)	0.775	1.063
	0-2 hour	18 (20%)	76 (20%)	94 (20%)		(0.701-1.612)

*p < 0.001, Students were divided into two groups according to the BMI classification as overweight (extremely overweight n=10 and overweight n= 82, total n= 92) and normal (normal n= 221, risky overweight n= 106, and risky weakness n= 48, total n= 375).

DISCUSSION

According to the results of the research, when the body composition values of female and male students' Chi-square test results were examined (Table 2), a statistically significant difference was found between the measurements of FM (kg), FM (%), bone mass (kg) and TBW (%) (p = 0.001), respectively (p < 0.001). Children today grow up in unhealthy eating or obesogenic environments more than children born ten years ago (Sallis and Glanz, 2006). Ergin et al. (2019) in their research with 1253 students, approximately one in three children in the 6 to 14 age group found that they were overweight/obese. 4% of the students were found to be thin, 16% overweight and 12% obese. 4% of the students were found to be thin, 16% overweight and 12% obese. Similar to the results of our study, obesity prevalence was found to be higher in female students compared to boys.

Turkey Statistical Institute (TUIK) Household Survey on Information Technology Ownership According to the data of 2016, in households in the total population of Turkey, 36% the rate of the portable computer, tablet computers have 29%, no desktop computer ratio is 23% (TÜİK, 2016). Considering these data, it is observed that the use of technological devices and applications is increasing rapidly and the frequency of use is increasing. Preventive measures are constantly sought to tackle growing childhood obesity around the world. As well as dealing with a regular sport, some activities that include physical activity are also very important for the physical development and body composition of children. Although no statistically significant difference was found in our study, it was observed that the children played very little games outside during weekdays. School-based

programs such as PHS may increase physical activity. In a systematic review of school-based interventions to increase physical activity, of the 14 interventions reviewed, most observed improvements in physical activity and a reduction in obesity among students in some interventions (Dwyer et al., 1983, Stone et al., 1998).

According to the statements of the families, 58.6% of the children travel to school by car and 41.4% by walking. According to the BMI classification of family members; 3.8% of mothers are obese and 4.6% have diabetes, 6.3% of fathers are obese and 7.5% have diabetes. In addition, 83.6% of the families have a computer (tablet etc.) at home.

Results from the current study show BMI values of the secondary school students were examined according to the Z score, it is determined that, 47% (n = 221) were normal, 22% (n = 106) were risky overweight, 17% (n = 82) were overweight, 2% (n = 10) were extremely overweight, 10% (n = 48) were at risky weakness, and 2% (n = 9) were weak. When the BMI classification of secondary school students were examined, a statistically significant difference was found between the categories of computer hours on weekdays ($p = 0.002$), -weekend ($p= 0.006$), and TV hours on weekdays ($p = 0.022$) ($p < 0.001$). There was no significant difference between the other categories data ($p < 0.05$) (Table 3).

Results from the study BMI classification of secondary school students were examined, a statistically significant difference was found between the categories of computer hours on weekdays ($p = 0.015$) and TV hours on weekdays ($p = 0.004$) ($p < 0.001$). There was no significant difference between the other categories data ($p < 0.05$). Extremely overweight children use computers for >2 hours a weekday is 1.55 times higher than normal children (OR = 1.55, OR%95 CI = 1.09 to 2.21). Extremely overweight children watch TV for >2 hours a weekday is 1.67 times higher than normal children (OR = 1.67, OR%95 CI = 1.18 to 2.35) (Table 4). Several studies have assessed the association between TV watching time and obesity risk among school-aged children (Rey-Lopez et al., 2008). A cross-sectional study conducted by Dennison et al. (2002) found that TV viewing time and TV in the child's bedroom were associated with overweight risk in preschool children. Another cross-sectional study from 34 countries found that television viewing times were higher in overweight compared to normal weight youth at 10 to 16 years old (Janssen et al., 2005). The International Study of Childhood Obesity, Lifestyle and the Environment (ISCOLE) found a positive association between TV watching time and the risk of obesity among 6026 children at 9 to 11 years of age in 12 countries (Katzmarzyk et al., 2015). In a study by further et al with 2,930 adolescents and 2,209 parents, total weekend screen time was significantly associated with a higher body mass index (BMI) in 10-year-old boys ($p < 0.005$) and 10-year-old girls ($p = 0.002$), and there were significant associations between higher BMI and television time and longer weekend video game use in subjects aged 10 and 14 (Table 4).

In a study of to quantify the relationships between youth use of television (TV) and other screen devices, including smartphones and tablets, and obesity risk factors, approximately 20% of participants used other screen devices for ≥5 hours daily. Watching TV ≥5 hours daily was associated with daily sugar-sweetened beverage (SSB) consumption (OR = 2.72, 95% CI: 2.23, 3.32) and obesity (OR = 1.78, 95% CI: 1.40, 2.27). Using other screen devices ≥5 hours daily was associated with daily SSB consumption (OR = 1.98, 95% CI: 1.69, 2.32), inadequate physical activity (OR = 1.94, 95% CI: 1.69, 2.25), and inadequate sleep (OR = 1.79, 95% CI: 1.54, 2.08). TV and other display device use, including smartphones, tablets, computers, and/or video games, a national representation of 24,800 US high school students highlighted that watching screens for more than 2 hours in a cross-sectional sample study poses many risks (Kenney and Gortmaker, 2017).

In the words of Shephard (2005), "obesity is easier to prevent than to correct". Policy makers at national and sub-national levels have a major role to play in the development and implementation of policies that promote healthy eating and physical activity in the school environment through changes in environment, behavior and education. School policies and programs should support the adoption of healthy diets and physical activity for the prevention of overweight and obesity. Physical activity is one of the most basic human functions. It is an important foundation of health throughout life. Therefore, interested parties should develop and implement strategies to increase physical activity and reduce sedentary lifestyle.

The causes of excessive weight gain in children are multi-factorial. With regards to environmental factors, sufficient evidence exists to recommend setting a limit to the time spent watching TV, especially by young children (Rey-Lopez et al., 2008). Future research could evaluate the impact of family and school interventions to promote healthy screen use behaviors.

We suggest that parents should control the amount of time their adolescent children spend watching TV and use computer (screen time). Special attention should also be focused on school-age children, as they use technical devices for longer each day and face a higher risk of becoming overweight or obese. According to the results of current study; 20% of secondary school students were found to be overweight and extremely overweight. Extremely overweight children used computers for >2 hours a weekday is 1.55 times, watched TV is 1.67 times higher than normal children. Although the frequency of overweight is higher in female secondary school students than in male, overweight or obesity in both genders is a serious threat to health.

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