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The Effect of Obesity Awareness of Body Mass Index and Blood Pressure in Primary School Students

İlköğretim Öğrencilerinde Obezite Farkındalığının Kan Basıncı ve Beden Kütle İndeksi Üzerine Etkisi

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ABSTRACT

Background: This study aimed to examine the effect of obesity awareness on blood pressure and body mass index in primary school students. This study aimed to examine the effect of obesity awareness on blood pressure and body mass index in primary school students.

Subject and Methods: This cross-sectional study was carried out with a total of 633 students, primary schools located in the western Anatolia of Turkey. Data were collected using a Socio-Demographic Data Collection Form and the Obesity Awareness Scale (OAS). Spearman's correlation analysis, Mann-Whitney U, Kruskal-Wallis, and Bonferroni tests were used to analyze the study data.

Results: The students 12.6% were overweight, 11.8% were obese, 9.8% had stage-1 hypertension, and 2.1% had stage-2 hypertension. The mean total score of the students from the obesity awareness scale (OAS) was 20.36 and moderate level of obesity awareness, no statistical difference was found between blood pressure and OAS and its sub-scales ($p>0.05$). There was a statistically significant difference between BMI and the physical activity sub-scales of (OAS) ($p<0.05$).

Conclusion: The obesity awareness of those who were female, whose father had an undergraduate degree, whose mother was a high school graduate, who did sports regularly, and who had breakfast at home was higher. Obesity awareness had no effect on blood pressure, and there was a significant relationship between BMI and physical activity sub-scales of the obesity awareness scale.

Keywords: Obesity awareness, BMI, blood pressure, nursing.

ÖZET

Amaç: Bu çalışma, ilkokul öğrencilerinde obezite farkındalığının kan basıncı ve vücut kitle indeksi üzerine etkisini incelemeyi amaçlamıştır.

Gereç ve Yöntem: Kesitsel tipteki bu araştırma, Türkiye'nin Batı Anadolu bölgesinde yer alan ilköğretim okullarında toplam 633 öğrenci ile gerçekleştirilmiştir. Veriler, Sosyodemografik Veri Toplama Formu ve Obezite Farkındalık Ölçeği (OFÖ) kullanılarak toplanmıştır. Çalışma verilerinin analizinde Spearman korelasyon analizi, Mann-Whitney U, Kruskal-Wallis ve Bonferroni testleri kullanılmıştır.

Bulgular: Öğrencilerin %12.6'sı fazla kilolu, %11.8'i obez, %9.8'i evre-1, %2.1'i evre-2 hipertansiyona sahipti. Öğrencilerin obezite farkındalık ölçeği (OFÖ) toplam puan ortalaması 20.36 ve orta düzeyde obezite farkındalık olup, kan basıncı ile OFÖ ve alt boyutları arasında istatistiksel olarak fark bulunmamıştır ($p>0.05$). BKİ ile OFÖ fiziksel aktivite alt boyutu arasında istatistiksel olarak anlamlı fark bulunmuştur ($p<0.05$).

Sonuç: Kadınların, lisans mezunu baba, lise mezunu anne, düzenli spor yapan ve evde kahvaltı yapanların obezite farkındalıkları daha yüksektir. Obezite farkındalığının kan basıncına etkisi yoktu ve BKİ ile obezite farkındalık ölçeğinin fiziksel aktivite alt boyutu arasında anlamlı bir ilişki saptanmıştır.

Anahtar Sözcükler: Obezite farkındalığı, BKİ, kan basıncı, hemşirelik.

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INTRODUCTION

Obesity is growing serious public health problem globally with high rates in both developed and developing countries (Alper, Ercan & Uncu 2015, Ma et al. 2021, Valerio et al. 2017) Obesity in children is a major public health challenge and greater burden in the future, and it is associated with numerous short and long-term health hazards including the higher prevalence of metabolic syndrome, cancer, hypertension, and cardiovascular diseases resulting from lifestyles changes (Back, Oliveira, Silva & Marcon 2018, Valerio et al. 2017). Over 340 million children and adolescents aged 5-19 were overweight or obese in 2016 (Back, Oliveira, Silva & Marcon 2018, Ma et al. 2021, Uyar et al. 2020, Valerio et al. 2017). According to the 2011 report of the Growth Monitoring in School-Aged Children in Turkey Survey carried out in our country, among the children aged 6-10, 14.3% were overweight and 6.5% were obese (T.R. Ministry of Health, General Directorate of Basic Health Services 2011). Some studies carried out in Turkey have shown that the frequency of overweight and obesity is gradually increasing and that the rate of obesity in children ranges between 8.4% and 20.7% (Başar 2019, Ergin et al. 2019). In study Çolak and Ergün, 22.0% of the students aged 9-13 who participated in the study were overweight/obese (Çolak & Ergün 2020). In study Kalkım et al. 7.7% of the children were found to be overweight and 8.8% of them were obese (Kalkım et al. 2020). In study Uyar et al. 12.4% of the students were overweight and 15.8% were obese (Uyar et al. 2020).

Today, the change in eating habits in children and adolescents has increased the prevalence of obesity, thereby resulting in increased prevalence of hypertension (Brady 2007, Ebrahimi et al. 2018, Kaur, Chandel & Chandel 2020, Paksi, Sirijunpen & Nuntnarumit 2021). The prevalence of hypertension (HT) in children has been increasing over recent decades (Kaur, Chandel & Chandel 2020). In the study of Giussani et al., the prevalence of prehypertension and hypertension was 7.1% in the normal weight, 21.9% in the overweight, and 42.3% in the obese (Giussani et al. 2013). In study Paksi et al. showed the overall rate of hypertension was 2.61% (Paksi, Sirijunpen & Nuntnarumit 2021). The frequency of hypertension in childhood in Turkey varies between 2.2% and 12.3% in different regions (Şanlı & Alpcan 2015). In the study of Sarıkan and Öngel, the prevalence of HT was found to be 5.5% (Sarıkan & Öngel 2020).

It is known that raising awareness of childhood obesity is important in body weight management and health promotion in the future. Since healthy eating behaviors to be developed in childhood turn into a lifestyle in adulthood, the fight against obesity should be planned from childhood. Schools are seen as suitable environments for the prevention of obesity and the creation of health promotion behaviors in children (Bozbulut et al. 2020, Madsen et al. 2015). School health nurses have a considerable role in preventing obesity (Tedik 2017). Health education on healthy nutrition, physical activity, and the risks of obesity is important in developing obesity awareness in school children. Nurses must regularly make the anthropometric measurements of the students and periodically measure the blood pressure of students with overweight and obesity (Yeşilfidan & Adana 2019). There are some descriptive studies that determine the BMI and blood pressure levels of school children in our country. However, there are not enough studies investigating the relationship between students' obesity awareness, blood pressure, and BMI.

This study aimed to examine the effect of obesity awareness of body mass index and blood pressure in primary school students

METHODS

Study Design and Participants

The study used a cross-sectional design. The study was carried out in three primary schools of the Ministry of National Education located in the western Anatolia region of Turkey between February and June 2019. The data were collected from three primary schools of the Ministry of National Education, which were selected using the simple random sampling method. The data were collected from students during class hours with the support of their classroom teachers. Inclusion criteria of The study consisted of children aged 7-15 who voluntarily agreed to participate in the study and whose parents submitted written consent.

Instruments

The study data were collected using a Questionnaire Form and the Obesity Awareness Scale.

Questionnaire Form

The form, which was designed by the researchers in light of the literature, consists of 18 items for sociodemographic characteristics (8 items) of the students and their eating habits and physical activity (10 items) (Giussani et al. 2013, Hajian-Tilaki & Heidar 2013, Şanlı & Alpcan 2015).

The Obesity Awareness Scale

This scale, which was developed by Allen in 2011, consists of a total of 23 items and 3 sub-scales, namely, obesity awareness (8 items), nutrition (7 items), and physical activity (8 items) (Allen 2011). The scale has a 4-point Likert-type rating structure from negative to positive. The Turkish adaptation study of the scale was carried out by Kafkas and Özen (Kafkas & Özen 2014). The Turkish version was evaluated over 20 items, including 9 items in obesity awareness, 6 items in nutrition, and 5 items in physical activity. It consists of twenty items and questions assessing obesity awareness, nutrition and physical activity knowledge of the children. Each statement was scored from 0 to 4. The scores were added to give a final score (0–80). Higher scores indicate an increase in the awareness of obesity. The internal consistency coefficient of the original version of the scale was 0.80, and it was 0.87 for the Turkish version (Kafkas and

Özen 2014). In this study, Cronbach's alpha was found to be 0.82, which was considered acceptable.

Variables of the research

Dependent variables: Obesity awareness

Independent variables: Sociodemographic characteristics, BMI values, blood pressure levels

Research Questions

1. What is the prevalence of obesity and hypertension in students?

2. What are the factors affecting students' obesity status?

3. What are the nutritional behaviors of your students?

4. What is the obesity awareness level of the students?

5. Is there a relationship between students' BMI and blood pressure levels and obesity awareness?

Measurements

The blood pressure, height, and weight measurements of the students were made and recorded in the classroom environment. Measurements were made by the same researcher by using calibrated instruments.

Blood pressure measurement

The blood pressure of the students was measured in mmHg using a child sphygmomanometer and a full sleeve covering approximately 75% of the length of the upper arm while the student was in a resting position and sitting upright and the right arm located at the level of the heart. The measurements of each student were recorded as systolic and diastolic blood pressure. The measurement of students with high blood pressure was made three times on different days, and the mean of these measurements was recorded.

The assessment of the blood pressure percentile was made according to the "the Fourth Report on the Diagnosis, Evaluation, and Treatment of High Blood Pressure in Children and Adolescents" published by the American Academy of Pediatrics. According to age, sex, and height, the classification of blood pressure measurements was as follows: normal below the 90th percentile, prehypertension between 90th and 95th percentiles, stage-1 hypertension at 95th or above but less than 99th percentile, and stage-2 hypertension at 99th percentile or above.

Physical measurements

Height Measurement: The height of the students was measured in meters and cm, with shoes taken off, hands on both sides, without bending knees, heels touching, standing, head, feet, back, and hips touching the wall and looking ahead.

Weight Measurement: The weight of the students was measured in kg with a digital scale sensitive to 100 grams, with students placed on the scale with both feet on the device with light clothes and looking ahead. The device was reset after each measurement.

Body mass index (BMI) is widely used to classify obesity in children and adolescents, and it is closely related to body fat and long-term health hazard outcomes (Hajian-Tilaki & Heidar 2013, Valerio et al. 2017). The BMI of the students was calculated with the Weight (kg) / Height2 (m2) formula. Percentile curves determined for Turkish children were used to determine obesity. According to sex and age, individuals with a BMI value at 95th percentile or above were considered obese, those between the 85th and 94th percentiles were considered overweight, and those between the 5th and 84th percentiles were classified as normal weight (Neyzi et al. 2008, Öztürk et al. 2008).

Statistical Analysis

In the evaluation of demographic data, numbers, percentages, and mean values were used. Spearman's correlation analysis, Mann-Whitney U test, and Kruskal Wallis test were used to analyze the data. Also, Bonferroni post hoc analysis was used to find the group that caused the difference. Cronbach's alpha internal consistency coefficient was calculated for the validity of the scale, and $p < 0.05$ was considered statistically significant. All analyses were performed using SPSS for Windows 25.0.

Ethical Considerations

At the outset, the written permission of the Scientific Ethics Committee was obtained. The necessary written permission of the Provincial Directorate of National Education was obtained so that the study could be conducted in the schools. Also, the permission of the authors who adapted the Obesity Awareness Scale to Turkish was obtained via e-mail. The parents of the students signed an informed consent form after they were informed about the purpose and method of the study, and verbal consent of all students was obtained.

RESULTS

In this study, the mean score of the students from the overall obesity awareness scale was 20.36 (min.: 14, max.: 36). Also, 67.1% of the students were 3rd-grade and 4th-grade, 53.7% were girls, the mothers of 39.5% and the fathers of 35.5% were high school graduates. Of the students in the study, 11.8% were obese, 9.8% had stage-1 hypertension, and 2.1% had stage-2 hypertension. Also, 49.9% of the students spent less than 1 hour a day on their computers, and 55.8% did sports for less than 1 hour every day. Apart from these, 57.2% had breakfast at home, and 44.2% did not buy food sold around the school (Table 1).

The mean obesity awareness score of female students was higher than male students. The obesity awareness was higher in students whose mothers were university graduates compared to those whose mothers were primary school and high school graduates ($p < 0.05$), in students whose fathers were university graduates compared to those whose fathers were primary and secondary school graduates ($p < 0.05$), in students who did sports more than 1 hour and less than 3 hours compared to those who did sports less than 1 hour ($p < 0.05$), in students who watched TV for less than 1 hour

compared to those who watched TV for more than 3 hours ($p < 0.05$), in students who had breakfast at home compared to those who had breakfast out ($p < 0.05$), and in students who did not buy food sold around school compared to those who did and sometimes did ($p < 0.05$) (Table 2).

While there was no statistically significant difference between the BMI percentile of the students and their OAS total score, the obesity awareness, and nutrition sub-scale scores ($p > 0.05$), a statistically significant relationship was found with the physical activity sub-scale score ($p < 0.05$). No statistically significant difference was found between blood pressure percentiles and OAS total score and sub-scale scores ($p > 0.05$) (Table 3).

Table 1. Sociodemographic, BMI, blood pressure vharacteristics of the students

Variables		n	%
Grade	3rd and 4th-grade	425	67.1
	5th and 6th grade	119	18.8
	7th and 8th grade	89	14.1
Gender	Female	340	53.7
	Male	293	46.3
The education level of mothers	Elementary	115	18.2
	Middle	78	12.3
	High	250	39.5
	University	190	30.0
The education level of fathers	Elementary	91	14.4
	Middle	105	16.6
	High	225	35.5
	University	212	33.5
BMI percentiles	Underweight	28	4.4
	Normal weight	450	71.2
	Overweight	80	12.6
	Obese	75	11.8
Blood pressure percentiles	Normal	470	74.2
	Prehypertension	88	13.9
	Stage-1 hypertension	62	9.8
	Stage-2 hypertension	13	2.1
Daily TV watching time	Less than 1 hour	339	53.6
	More than 1 hour and less than 3 hours	188	29.7
	More than 3 hours	106	16.7
Status of doing sports daily	Less than 1 hour	353	55.8
	More than 1 hour and less than 3 hours	140	22.1
	More than 3 hours	140	22.1
Place of having breakfast	Home	362	57.2
	School	91	14.4
	Out	180	28.4
Buying food sold around the school	Yes	95	15.0
	No	280	44.2
	Sometimes	258	40.8
Total		**633**	**100**

Table 2. Comparison of students' demographic characteristics and overall Obesity Awareness Scale scores

Variables		Overall OAS		
		X ±SS	U/X^2	p / Bonferroni
Grade	3rd and 4th-grade	60.95±7.64	0.412	0.814**
	5th and 6th grade	60.90±8.10		
	7th and 8th grade	60.97±6.85		
Gender	Female	61.40±7.47	45059.00	**0.038***
	Male	60.47±7.75		
Education level of mothers	Elementary (1)	59.36±7.63	28.829	**0.000**** **4>1, 4>3*****
	Middle (2)	59.19±8.49		
	High (3)	60.43±7.15		
	University (4)	63.37±7.27		
Education level of fathers	Elementary (1)	59.45±7.19	9.464	**0.024**** **4>1, 4>2*****
	Middle (2)	59.61±9.61		
	High (3)	61.19±7.04		
	University (4)	62.06±7.08		
Status of doing sports daily	Less than 1 hour	60.33±7.53	10.112	**0.001**** **2>1*****
	More than 1 hour and less than 3 hours	62.57±7.68		
	More than 3 hours	60.99±7.56		
Daily TV watching time	Less than 1 hour	61.15±7.25	6.219	**0.002**** **1>3*****
	More than 1 hour and less than 3 hours	61.10±7.50		
	More than 3 hours	58.84±8.58		
Place of breakfast	Home	61.49±7.47	6.102	**0.047**** **1>3*****
	School	60.75±7.62		
	Out	60.02±7.83		
Buying food sold around the school	Yes	59.72±8.62	13.228	**0.001**** **2>1, 2>3*****
	No	62.30±6.88		
	Sometimes	59.98±7.77		

*Mann Whitney U test ** Kruskal Wallis Test ***Bonferroni

Table 3. Examination of the students' BMI and blood pressure percentiles by overall and sub-scales of the Obesity Awareness Scale

Variables	OAS (Overall)		Obesity Awareness		Nutrition		Physical Activity	
	X ±SS	KW / p	X ±SS	KW / p	X ±SS	KW / p	X ±SS	KW / p
BMI Percentiles								
Underweight	63.26±7.21	0.810* 0.667	27.36±3.31	2.637* 0.451	19.95±2.70	2.373* 0.499	15.94±2.47	10.096* **0.018****
Normal	60.91±7.60		26.32±3.74		19.32±3.03		15.26±2.25	
Overweight	60.00±7.51		26.15±3.78		19.17±2.93		14.67±2.24	
Obese	61.51±7.85		26.44±4.03		19.60±2.92		15.47±2.24	

Blood Pressure Percentiles								
Normal	60.87±7.76		26.29±3.93		19.33±3.01		15.25±2.20	
Prehypertension	61.70±6.14	0.949*	26.64±3.32	0.662*	19.76±2.19	1.321*	15.29±2.24	0.034*
		0.814		0.882		0.724		0.998*
Stage-1 Hypertension	61.12±7.35		26.60±2.99		19.29±3.26		14.53±3.64	
Stage-2 Hypertension	58.79±11.89		25.92±4.11		18.30±4.90		14.42±2.37	

*Kruskal-Wallis Test, **p<0.0

DISCUSSION

In this study, which investigated the effect of obesity awareness on blood pressure and BMI in primary school students, one in ten students in the study was overweight or obese. In addition 13.9% had prehypertension, 9.8% had stage-1 hypertension, and 2.1% had stage-2 hypertension. In study Kaur et at al. with school going children of India found that 3% were overweight, and 2% were obese and hypertension (Kaur, Chandel & Chandel 2020). In the study of Yılmaz et al. (Yılmaz et al. 2019), and Çolak and Ergün (Çolak & Ergün 2020) were determined that the prevalence of obesity was higher in boys than in girls. In study Arora and Patel in school going students of Ahmedabad, Gujarat, prevalence of overweight and obesity was found to be 8.8% and 2.9% respectively (Arora & Patel 2017). Prevalence of overweight and obesity was more prevalent among girls comparatively among boys. Overall prevalence of hypertension was 5.8%. In study Ebrahimi et al, in 5620 schoolchildren aged 6–12 years living in Shahroud, Northeast of Iran, the prevalence of prehypertension was 7.44% and the prevalence of hypertension was 6.82% (Ebrahimi et al. 2018).

The obesity awareness of girls, who had their breakfast at home, who did more than 1 hour of physical activity a day, who did not buy food from the school environment was found to be higher than boys. Unlike our findings, Alasmari et al. determined that boys had higher awareness of obesity (Alasmari et al. 2017). In the study of Özkan et al. with university students, no significant relationship was found between obesity awareness and gender (Özkan et al. 2020).

In the study of Güdük et al, obesity awareness of female students was found to be higher (Güdük et al. 2020). Obesity awareness of children who did not buy food from the school environment was found to be higher in this study. Despite attempts to have schools in Turkey sell healthy food and imposing some rules that prohibit the sale of fast-food, not all schools have started implementing these rules, yet. Physical activity is important for health. In this study, obesity awareness of students who did more than 1 hour of physical activity a day was found to be high. The findings in the literature are consistent with our findings (Desalew , Mandesh & Semaheg 2017, Saunders & Vallance 2017), Unlike our study, Özkan et al. found no significant relationship between physical activity and awareness of obesity (Özkan et al. 2020).

In this study, a significant difference was found between BMI percentiles and physical activity sub-scale, but no difference was found between mean nutrition and obesity sub-scale and overall scores. Acaroğlu and Çolakoğlu found no difference between BMI and nutrition, physical activity, and overall scale scores in their study on young people (Acaroğlu & Çolakoğlu 2020). In the study of Özkan et al. with university students, it was found that there is a negative but insignificant relationship between BMI and obesity awareness sub-scale scores; nutrition, physical activity positive direction between scale size and scale total score, but it was found that there is a non-significant relationship (Özkan et al. 2020). In this study, only the awareness of physical activity was correlated with BMI, which shows how important it is to raise the awareness of children about exercise. There was no significant relationship between blood pressure percentiles and overall obesity awareness scale and sub-scale scores. No similar results were found in the literature.

CONCLUSION

In conclusion, it was determined that one fourth of the students were overweight and obese and that one out of every 10 students had stage 1 and 2 hypertension. It was found that the students had a moderate level of obesity awareness and that the awareness of obesity was higher in students who were female, whose fathers were university graduates, whose mothers were high school graduates, who did sports for more than 1 hour and less than 3 hours a day, who had breakfast at home, and who did not buy food sold around the school. In addition, although there was a statistically significant difference between the physical activity sub-scale of the OAS and the BMI percentiles, there was no significant difference between the blood pressure percentiles and OAS and its sub-scale.

Healthy nutrition and adequate physical activity are not only of particular importance for the prevention of childhood obesity, but also important for children's body growth and development. Interventions to prevent the long-term negative consequences of obesity should be maintaine

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starting from the preschool period. To prevent childhood obesity, it is necessary that policy makers should take action on the sale of healthy food in school canteens that will make sure students have a healthy diet at school, create areas where students can do sports, and present these practices within the scope of the education program. School nurses should regularly monitor and record weight, height, and BMI of students, and refer students in the risk group to health centers. Besides, they must provide regular training to students, families, and teachers about physical activity and healthy nutrition to take early precautions.

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