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İLKÖĞRETİM ÖĞRENCİLERİNDE CİNSİYET, BEDEN KÜTLE İNDEKSİ VE KAN BASINCI PERSENTİLLERİ İLİŞKİSİ

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ÖZET

Bu araştırmanın amacı, Mersin'in merkezinde bulunan bir ilköğretim okulu öğrencilerinin cinsiyete göre vücut kitle indeksi ve kan basıncı persentillerini obezite ve hipertansiyon riski açısından değerlendirmektir. Araştırma, tanımlayıcı-ilişki arayıcı bir çalışmadır. Çalışma ailesinden yazılı izin formu alınan 755 öğrenciyle yürütülmüştür. Öğrencilere ait ölçümler araştırmacılar tarafından yapılmıştır. Beden kütle indeksi ve kan basıncı persentilleri açısından öğrenciler değerlendirilmiştir. Araştırmaya katılan 755 öğrencinin %49,9'u erkektir. Çalışmaya katılan erkek öğrencilerin ise %21,0'i obezdir. Sistolik ve diyastolik kan basıncı persentili 95 üstü olan kız öğrencilerin oranı sırasıyla %8,0 ve %10,0'dur. Erkek öğrencilerde ise sistolik ve diyastolik kan basıncı persentili 95 üstü olanların oranı sırasıyla %8.0 ve %7,0'dir. Çalışmamızda vücut kitle indeksi persentilleri ile kan basıncı persentilleri arasında anlamlı bir ilişki bulunmuştur (p<0,05). Beden kütle indeksi 95 persentil üstü olan öğrencilerin sistolik ve diyastolik kan basıncı persentilleri de yüksek bulunmuştur. Beden kütle indeksi ve kan basıncı persentilin 95 üstü olan erkek öğrenci oranı kız öğrenci oranından daha fazladır. Çocukluk çağında vücut ağırlığının fazla olması hipertansiyon için önemli bir risk faktörüdür.

Anahtar Kelimeler: Çocuk, Obezite, Hipertansiyon

EVALUATION OF GENDER, BODY MASS INDEX AND BLOOD PRESSURE PERCENTILES İN PRIMARY SCHOOL STUDENTS

ABSTRACT

The purpose of this research is to evaluate the body mass index and blood pressure percentiles of students in a primary school located in the center of Mersin in terms of obesity and hypertension risk according to their gender. The present study is a descriptive-correlational study. The study was carried out with 755 students, whose written permission form had been obtained from their families. Measurements of the students were performed by the researchers. Students were evaluated in terms of body mass index (BMI) and blood pressure percentiles. 49,9% of 755 students, who participated in the research, were male. 21,0% of the male students participating in the study are obese. The rate of female students with systolic and diastolic blood pressure percentiles above 95 is 8,0% and 10,0%, respectively. When it comes to male students, the rate of systolic and diastolic blood pressure percentiles above 95 is 8,0% and 7,0%, respectively. In our study, a significant correlation was found between the percentiles of body mass index and blood pressure (p<0,05). Systolic and diastolic blood pressure percentiles of students with body mass index percentile of above 95 were also determined to be high. The rate of male students with body mass index and blood pressure percentile above 95 is higher than the rate of female students. High body weight during childhood is an important risk factor that can lead to hypertension.

Keywords: Child, Obesity, Hypertension

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INTRODUCTION

It is of common knowledge that the onset of obesity, which is regarded as one of the most important public health problems today, often coincides with childhood (1). In addition, obesity leads to many different health problems. Chronic diseases such as hypertension and diabetes are the foremost among them (2,3). 9.9% of children between 7-8 years old were found obese, 14.6% were found overweight, and only 1.5% was found slim according to the results of the "Turkey Childhood (Elementary School Students in 2nd Grade) Obesity Surveillance Initiative (COSI-TUR) 2016" (4). It was determined that 8% of all children in Turkey are obese according to the results of the Turkey Demographic and Health Survey (2018) (5). In studies conducted in Turkey, it was found that the incidence rate of obesity in male and female students is different from one another (6-8).

Studies conducted in recent years have determined that the incidence rate of hypertension in children has increased. Obesity was pinpointed as the leading reason for this increase in blood pressure in early childhood (9-11) According to the report of the World Health Organization, childhood obesity has increased more than 10 times in the last 40 years. (12). It is reported that obesity is responsible for 30% of childhood hypertension and that the incidence rate of hypertension in obese children is 3.5 times more than that of in other children (13,14).

It is important to follow up on early against the risk of hypertension and obesity (14). The school health nurse can contribute to early diagnosis by doing the follow-up on children. Along with the fact that school health nursing is not effectively implemented in Turkey, there are a limited number of studies in the literature that support their roles in early diagnosis and treatment (15). Nurses play a key role during school terms in health promotion and protection, gaining healthy lifestyle behaviors, and effectively combating chronic and infectious diseases (16).

Parameters such as age, gender, weight and height have been reported to affect blood pressure in studies conducted with children (17,18). In our study, our goal has been to evaluate children in primary school age in terms of obesity and hypertension risk, by inspecting their body mass index (BMI) and blood pressure percentiles according to their gender.

METHOD

Research Type

This is a descriptive-correlational study.

Universe and Sample of the Research

Research was carried out with 755 students, who accepted to partake in the study among 1285 primary school students in a primary school, in Mersin in October 2018. Full count sample selection technique was used. All students, whose written consent had been taken from their families, were included in the study. When evaluating the body mass index and blood pressure measurements of children according to gender, other factors that are height and weight percentiles were also examined.

Data Collection Tools and Data Collection

Measurement Technique: Blood pressure in children was measured with a mercury sphygmomanometer and stethoscope with an age-appropriate coupling. While the width of the coupling embraced near half of the middle section of the arm, its length embraced the entirety of the arm. During the measurement, it was paid attention that the students rested in sitting position for at least five minutes and the arm was at the same level as the heart (17).

Height and weight measurements were made with sensitive measuring instruments, by removing the clothes such as cardigans, jackets and shoes that the children wore.

Evaluations: In the growth curves determined for age and gender, those below the 5th percentile were evaluated as short and slim. BMI of each student was calculated with the formula of kg/m^2.

In the BMI evaluation found in the growth curves according to age and gender; values over 95th percentile was viewed as obese (19,20). Blood pressure assessment during childhood was determined as a result of three different properly made measurements by looking at the systolic or diastolic blood pressure above 95th percentile based on gender, age and height (19).

Evaluation of Data

The data are presented as count, percentage, mean and standard deviation. Analysis of categorical variables was made with chi-squared test, where analysis of parametric variables was made with T-test and Pearson correlation. If the difference between comparisons were p<0,05; it would be considered to be statistically significant.

Ethical Aspect of the Research

Written permission was taken from the ethics committee of a university and the related institutions before the beginning of the study. Written permission was also obtained from the families of the children, whereas children gave their verbal consent. (Ethics committee decision no:05).

RESULTS

Comparisons of the weight, height, BMI, systolic and diastolic pressure values of the students partaking in the study were made according to gender. It was determined that there was no statistically significant difference in weight, BMI, systolic pressure and diastolic pressure values of the students participating in the study according to gender (p> 0,05) (Table-1)

Table 1. Weight, height, BMI, systolic and diastolic blood pressure values by gender

Measurements	Gender	n	$\bar{X}$ ±SS	Min-max	t	p
Weight (kg)	Male	377	31,28±8,38	18,00-76,70	1,630	0,104
	Female	378	30,32±7,89	13,10-67,50		
Height (cm)	Male	377	131,32±9,89	107,00-174,00	2,792	0,005
	Female	378	129,34±9,53	98,00-156,00		
BMI (kg/m^2)	Male	377	17,83±3,26	12,06-34,30	-0,707	0,480
	Female	378	18,01±3,69	11,10-32,18		
Systolic Pressure	Male	377	99,66±11,34	70,00-150,00	0,114	0,909

(mmHg)	Female	378	99,56±12,03	70,00-190,00		
Diastolic Pressure (mmHg)	Male	377	64,83±10,47	40,00-124,00	-0,061	0,952
	Female	378	64,88±11,29	40,00-143,00		

t: independent samples t test; $\overline{X}$: arithmetic mean; SS : standard deviation

According to the results of female students, there is a statistically significant and positive relationship between systolic pressure and weight and BMI (r=0.153, r=0.238 ; p<0,05) . There is also a statistically significant and positive relationship between diastolic pressure and BMI (r=0.142; p<0,05). In the results of male students, there is a statistically significant and positive relationship between systolic pressure and weight and BMI (r=0.147; r=0.181; p<0,05) .There is a statistically significant positive relationship between diastolic systolic pressure and weight and BMI, and a statistically significant and positive relationship between diastolic pressure and BMI (r=0.135; r=0.149; p<0,05) (Table 2).

Table 2. Correlation of systolic and diastolic pressure values of female and male students with weight, height and BMI

Gender	**Variable**	**Systolic Pressure**		**Diastolic Pressure**	
		r	**p**	**r**	**p**
Female	Weight (kg)	0,153	0,003	0,086	0,095
	Height (cm)	-0,052	0,313	-0,045	0,387
	BMI (kg/m^2)	0,238	0,000	0,142	0,006
Male	Weight (kg)	0,147	0,004	0,135	0,009
	Height (cm)	0,048	0,352	0,061	0,236
	BMI (kg/m^2)	0,181	0,000	0,149	0,004

r: correlation

The rate of BMI above 95th percentile is 21% for females and 24% for males. Upon examination of the systolic blood pressure percentile: 15% of males are between the 90-95 percentiles, 18% of whom are above 95th percentile; whereas 16% of females are between the 90-95 percentiles, 8% of whom are above 95th percentiles. Upon examination of the diastolic blood pressure percentile: 15% of males are between the 90-95 percentile, 7% of whom are above the 95th percentile; whereas 15% of girls are between the 90-95 percentiles, 10% of whom are above the 95th percentiles (Table 3).

When the systolic blood research percentile of the students participating in the study is examined, it is seen that the rate of being above the 95th percentile is 9% for girls and 8% for boys.6% of those with a 95th percentile in diastolic blood research are male and 9% are female students (Table 4).

Table 3. Height, weight, BMI percentiles by gender

Variable	**Percentiles**				
	Genders	**n (%) below 5**	**n (%) 5-85**	**n (%) 85-95**	**n (%) above 95**
Height Percentiles	Male	20 (5%)	229 (61%)	70 (19%)	58 (15%)
	Female	33 (9%)	229 (60%)	69 (18%)	47 (13%)
Weight Percentiles	Male	4 (1%)	202 (54%)	82 (22%)	89 (23%)
	Female	13 (4%)	213 (56%)	88 (23%)	64 (17%)
BMI Percentiles	Male	7 (2%)	217 (58%)	61 (16%)	92 (24%)
	Female	13 (4%)	209 (55%)	76 (20%)	80 (21%)

Table 4. Systolic blood pressure percentiles and diastolic blood pressure percentiles by gender

Variable	**Percentiles**			
	Gender	**n (%) below 90**	**n (%) 90-95**	**n (%) above 95**
Systolic Blood Pressure Percentiles	Male	291 (%77)	56 (%15)	30 (%8)
	Female	286(%76)	60 (%15)	32 (%9)
Diastolic Blood Pressure Percentiles	Male	296 (%79)	55 (%15)	26 (%6)
	Female	283 (%75)	59 (%16)	36 (%9)

It was determined that there is a relationship between the weight and BMI percentiles of the study participants and the percentile of systolic blood pressure. There was no relationship between height percentile and systolic blood pressure percentile (p> 0,05) (Table 5).

Table 5. Crosstab and pearson chi-square results between systolic blood pressure percentiles and height, weight and BMI percentiles

Variable		**Systolic Blood Pressure Percentiles**							
		90 below		**90-95**		**95 above**		**Total**	
		n	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Height Percentiles	**5 below**	38	71,7	7	13,2	8	15,1	53	100
	5-85	360	78,6	70	15,3	28	6,1	458	100
	85-95	101	72,7	22	15,8	16	11,5	139	100
	95 above	78	74,3	17	16,2	10	9,5	105	100
X^2 = 8.563 p =0.200									
Weight Percentiles	**5 below**	13	76,5	4	23,5	0	0	17	100
	5-85	333	80,2	57	13,7	25	6,0	415	100
	85-95	126	74,1	31	18,2	12	7,6	170	100
	95 above	105	76,4	24	15,4	24	8,2	153	100
X^2 =18.793 p =**0.005***									
BMI Percentiles	**5 below**	19	95	1	5,0	0	0,0	20	100
	5-85	351	82,4	54	12,7	21	4,9	426	100
	85-95	101	73,7	25	18,2	11	8,0	137	100
	95 above	106	61,6	36	20,9	30	17,4	172	100
X^2 =40.640 p =**0.000***									

It was determined that there was no relationship between the height percentile of the participants and the diastolic blood pressure percentile (p> 0,05).It was found that there was a relationship between the weight and BMI percentiles of the students and their diastolic blood pressure (p <0,05) (Table 6).

Table 6. Crosstab and pearson chi-square results between diastolic blood pressure percentiles and height, weight and BMI percentiles

Variable		**Diastolic Blood Pressure Percentiles**							
		90 below		**90-95**		**95 above**		**Total**	
		n	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Height Percentiles	**5 below**	43	81,1	6	11,3	4	7,5	53	100
	5-85	361	78,8	61	13,3	36	7,9	458	100
	85-95	99	71,2	25	18,0	15	10,8	139	100
	95 above	76	72,4	22	21,0	7	6,7	105	100
X^2 =7.345 p =0.290									
Weight Percentiles	**5 below**	16	94,1	1	5,9	0	0	17	100
	5-85	337	81,2	47	11,3	31	7,5	415	100
	85-95	126	74,1	33	19,4	11	6,5	170	100
	95 above	100	65,4	33	21,6	20	13,1	153	100
X^2 =22.393 p = **0.001***									
BMI Percentiles	**5 below**	19	95,0	1	5,0	0	0	20	100
	5-85	344	80,8	51	12,0	31	7,3	426	100
	85-95	101	73,7	27	19,7	9	6,6	137	100
	95 above	115	66,9	35	20,3	22	12,8	172	100
X^2 =20.229 p =**0.003***									

DISCUSSION

Childhood obesity has become an important problem in our country and the world. There is also an increase in the number of chronic diseases associated with childhood obesity (21). Hypertension is the leading among these chronic diseases (22).

Childhood obesity and hypertension are common in our country as well as in the world. . The prevalence of obesity between the ages of 6 and 10 is 7.0%, according to the Research Report of Project for Monitoring Growth in School-Age Children in Turkey (TOÇBİ) in School-Age Children (6-10 Years) in Turkey (23).

According to the results of the studies conducted in the provinces of our country, the prevalence of overweight and obesity in Isparta was found to be 12.2% - 11.6%, respectively. It was found to be 4.8% in Ankara, 5.4% in Istanbul, 10.1% in Muğla, 0.9%(24-26) in Iğdır. When we look at the obesity rate of primary and secondary school children in the world, Al-Mohammed et al. found that 37% of children were determined to be obese in a study conducted with 300 primary school students in Kuantan. While this rate is 47% in female students, it is 53% in male students (27). In a study conducted with 1324 primary school students in England, Lloyd et al. found that 29% were overweight or obese (28).found that 29% were overweight or obese (28). The obesity rate among the students who participated in our study was determined to be 23%, and; 24% of male students and 21% of female students were obese When we look at the results of different studies in the world and in our country, it is seen that the obesity rate of male students in this age group is higher than that of female students. It was determined that cultural and economic reasons, starting from childhood, affect the diet and obesity of genders. (29).

In a study conducted by Muhihi et al. with 446 primary school students in Tanzania, it was found that 5.2% of the children were obese and the rate of hypertensive children was 10.8%. Obese children were found to have a higher blood pressure than other children, and no relationship was found with gender (30). In their study in South Africa, Bhimma et al. found that 13.3% of the participants were hypertensive, 13.7% were obese, and there was a relationship between high blood pressure and obesity. Also in the same study, it was found that children with high blood sugar, blood pressure, and body mass index are at high risk in terms of diseases such as hypertension and metabolic syndrome (31). In the study conducted by Şanlı and Alpcan with 905 primary school students in Kırıkkale, the incidence rate of systolic hypertension was found to be 4.4% and diastolic hypertension to be 3.1% (32). In the study, a significant relationship was found between systolic blood pressure and gender. In a study conducted by Battaloğlu İnanç with primary school students in Mardin, it was found that 2.02% of the children had systolic hypertension, 2.74% had diastolic hypertension, and 10.57% were obese (33). In our study, while the rate of systolic blood pressure above the 95th percentile in female and male students is 9% and 8%, respectively, this rate is 9% and 6% for diastolic blood pressure. In addition, in our study, it was determined that there was a significant relationship and positive correlation between body mass index and systolic and diastolic blood pressures in both genders. Studies have similarities in terms of weight, body mass index, and blood pressure percentages. Although there are differences between sample size and age group distributions, it is a common result of studies that obese children are at risk of hypertension regardless of gender. Autonomic dysfunction, high insulin, vascular structure, renin-angiotensin system affect the pathophysiology of hypertension due to obesity (34). It has been reported that in obesity, the increased adipose tissue may directly cause compression on the kidney, leads to an increase in interstitial pressure and a decrease in medullary blood flow. This explains the blood pressure changes seen in children (35).

CONCLUSION AND RECOMMENDATIONS

Our study revealed that the rate of obesity is high in students. Those with a body mass index above the 95th percentile were also found to have high blood pressure percentiles. Increasing obesity has brought the problem of childhood hypertension in the school-age period. We see that it is important to follow up starting from childhood in order to reduce the prevalence of obesity and hypertension in society. The fact that periodic school follow-ups applied in our country are only requested from students who start primary school shows that we do not have an effective school health policy. By establishing school health units in our schools, these chronic diseases can be prevented by cost-effective follow-ups (height, weight, blood pressure). In addition, health education can be given to students in the school health unit, which is constantly located at the school. Thus, obesity and hypertension prevented in childhood will contribute to the formation of healthy and conscious individuals in adulthood. In addition, it is recommended to conduct long-term follow-up studies to reveal the importance of early diagnosis and treatment by monitoring the chronic diseases seen in childhood within the scope of the school.

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