European Journal of Therapeutics DOI: 10.5152/EurJTher.2017.42

Original Investigation / Özgün Araştırma

Assessment of the prevalence of obesity, stunting, and hypertension among primary school children

İlkokul çocuklarında obezite, bodurluk ve hipertansiyon yaygınlığının değerlendirilmesi

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ABSTRACT

Objective: The study aimed to investigate the prevalence of obesity, stunting, and hypertension problems among 5-14 year-old students from three primary schools.

Methods: The sample of this cross-sectional study comprised of 2930 primary school children (first-eight grade). The participants' heights, weights, and blood pressures were measured.

Results: Of the participants, 17.4% were overweight, 22.8% were obese, 1.1% stunted, and 5.9% were short. In the eight-year age group, the percentage of overweight boy students was higher than that of the overweight girl students. The proportions of the students with stage I and stage II systolic hypertension were 6.8% and 3.2%, respectively. While 1.1% of the students had stage I diastolic hypertension, 5.5% had stage II diastolic hypertension.

Conclusions: The prevalence of stunting, overweight, and stage I and II hypertension among the children aged 6-14 years was high. Thus, it is important to identify such problems early among children and take precautions by conducting routine screenings in schools.

Keywords: School children, obesity, stunting, hypertension

ÖZ

Amaç: Bu çalışmanın amacı orta sosyoekonomik düzeydeki üç ilköğretim okulunda öğrenim gören 6-14 yaş arası öğrencilerde şişmanlık, bodurluk, hipertansiyon ve görme sorunu sıklığını değerlendirmektir.

Yöntemler: Tanımlayıcı ve kesitsel tipte olan bu çalışmanın evrenini birinci sınıftan 8. Sınıfa kadar öğrenim gören 2930 öğrenci oluşturmuştur. Öğrencilere boy-kilo-tansiyon ölçümleri yapılmıştır.

Bulgular: Araştırmaya katılan öğrencilerin %17,4'ü hafif şişman, %22,8'i şişman, %1,1'i çok kısa, %83'ü kısadır. Kızlar erkeklere göre 6 yaşta şişman ve 7 yaşta hafif şişman ve şişman grubundadır. Sekiz yaşta ise şişman grubundaki erkek öğrenci oranı daha fazladır. Sistolik kan basıncı Evre I hipertansif %6,8, Evre II %3,2'dir. Diastolik kan basıncı Evre I hipertansif %5,5 ve Evre II %1,1'dir.

Sonuç: Araştırma sonuçlarına göre 6-14 yaş arası çocuklarda kısa boy uzunluğu, hafif şişmanlık/kilolu olma, Evre I ve II hipertansiyon sıklığı yüksektir. Okullarda yürütülecek rutin taramalarla çocukların sorunlarının erken belirlenmesi ve önlem alınması yönünden önem taşımaktadır.

Anahtar kelimeler: Okul çağı çocuklar, obezite, bodurluk, hipertansiyon

INTRODUCTION

School age is a special period during which children undergo changes and develop, and thus they should be provided with healthcare and be closely followed. This period is particularly important because children gain knowledge, build attitudes, and develop behaviors related to health mostly in schools. During this period, health protection and promotion measures should be undertaken and early determination of problems is likely to prevent/delay learning and will prevent further problems occurring in the future or will provide the opportunity to easily overcome these problems (1). The services to be provided for school-age children include health examinations during the registration for the school; periodic physical examinations; monitoring of growth and development; and vision, hearing, dental, and scoliosis screenings (2, 3).

Monitoring the growth and development of children is crucial among school health services. Annual height-weight measurements are simple but effective methods in the early detection of serious health problems, such as intestinal, endocrinal, and

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Received/Geliş Tarihi: 11.04.2017 • **Accepted/Kabul Tarihi:** 07.07.2017

congenital diseases (2). Within the scope of Monitoring of the Growth of School Age Children (6-10 year-age group) Project in Turkey, anthropometric measurements of 11,387 children in both rural and urban fields of 26 provinces revealed that 6.5% were obese, 14.3% were overweight, 1.3% were severely underweight, 5.0% were stunted, and 21.5% were short. In Europe, the highest prevalence of overweight and obesity among children was in Spain (35.2% among 6-9-year-olds) and Portugal (31.5% among 7-9-year-olds), whereas the lowest prevalence was in Slovakia (15% among 7-9-year-olds), France (18.1% among 7-9-year-olds), Switzerland (18.3% among 6-9-year-olds), and Iceland (18.5% among 9-year-olds) (4).

According to clinical findings, although childhood hypertension is less common than adulthood hypertension, the development of essential hypertension in adults begins within the first 10 years of life, and children who have a family history of hypertension are more prone to hypertension. Thus, detecting hypertension should be started during childhood (5). Blood pressure in children is assessed using percentile curves based on age, gender, and weight, and three consecutive measurements must be considered (6). In a Canadian study, a high positive correlation was determined between obesity and systolic blood pressure in about 2000 children and adolescents aged 6-17 years. Blood pressure in obese adolescents was determined to be 7.6 mmHg higher on an average. While the hypertension prevalence was <1%, the prehypertension prevalence was approximately 2.2% (7). In a study conducted in Tunisia, hypertension was detected in 4.7% of the adolescents (8). Regional differences in the prevalence of childhood hypertension stem from many factors, such as different cultural practices, dietary habits, environmental factors, measurement methods, and age differences (9).

School health nurses cooperate with the school administration to identify health risks earlier, to plan appropriate interventions, and to take necessary measures. Thus, they contribute not only to the protection of child health but also to the continuation of family integrity and the appropriate use of community resources with early diagnosis (1, 2). The analysis of the results of screenings conducted by nurses within the scope of the school health services revealed that such interventions provide opportunities for the early detection of many health problems in children. This study was aimed at evaluating the prevalence of obesity, stunting, and hypertension problems among 5-14-year-old students from three primary schools.

METHODS

Design and Sampling: This descriptive and cross-sectional study was conducted in 5-14-year-old students from three primary schools. All the participating students belonged to middle-class socioeconomic status. The study population comprised of 2987 children from three elementary schools. Some of the participants were from kindergartens affiliated to these elementary schools. The others were from the first-eighth grade. The study sample included 2930 children going to school.

Data Collection: Data were collected by nursing students under the supervision of the researchers. The students were trained on height, weight, and blood pressure measurements. Separate teams were assigned to each school to measure blood pressure and anthropometric parameters.

Data on the students' age and gender were recorded in a form. Then, the results were recorded in data sheets. If a student had a health problem, his/her class teacher, school counselor, and family were informed, and the student was referred to a physician. Screenings were conducted in the school's conference or meeting rooms.

Height Measurements: Before measurements, girl students were asked to take off hairpins. A measuring tape was fixed to a flat wall. Measurements were performed in accordance with height measurement standards. The results were recorded in centimeters (10, 11). Heights for age were classified as stunted (<-2 standard deviation [SD]), short (≥-2 SD-<-1 SD), normal (≥-1 SD-<+1 SD), tall (≥+1 SD<+2 SD), and very tall (≥+2 SD) (12).

Weight Measurements: Weighing scales with 100 g sensitivity were used. The scales were calibrated before each measurement. While measuring weight, the students wore a thin school uniform, took off their shoes, and did not touch anywhere (10, 11). Weights for age evaluated in accordance with the Z-score assessment recommended by the World Health Organization (WHO) were classified as severely underweight (<2 SD), underweight (≥-2 SD<-1 SD), normal (≥-1 SD-<1 SD), overweight (≥+1 SD-<+2 SD), and obese (≥+2 SD) (12). The results were recorded in kilograms (kg).

Blood Pressure Measurement: While the child rested for about 15 minutes, he/she was told how the blood pressure would be measured. All measurements were performed on the right arm at the heart level. A cuff appropriate for children's arm circumference was used. The cuff was placed just above the antecubital fossa as to cover two-thirds of the length of the upper arm (2). The stethoscope diaphragm was placed slightly on the brachial artery, the cuff was inflated to a pressure of 20 mmHg where the brachial pulse pressure was lost, and then the pressure reduced at a rate of 2-3 mm Hg/sec (13). Blood pressures measured were classified as normal (<90 P), prehypertension (90 P-<95 P), stage-I hypertension (95 P-99 P), and stage-II hypertension (>99 P) (14).

Statistical Analysis

The data were analyzed using the Statistical Package for Social Sciences (SPSS) 20.0 software package (IBM Corp.; Armonk, NY, USA). To analyze the data, numbers, percentage distribution, arithmetic means, and SD were used. For statistical comparisons, the chi-square analysis was used. Anthropometric parameters were measured using the WHO-2007 reference values for children aged 5-19 years (body weight for age and body height for age) (10). Assessments were classified based on the Z-score (SD) cut-off points.

Ethics Approval and Consent to Participate: Before the study was conducted, approvals were obtained from relevant institutions and from the school administrations where the study was to be conducted. The families were informed of the research and their consent to allow their children to participate in the study

Table 1. Distribution of students by gender, age, and year in school

Characteristics	n	%
Age, years	8.74±2.50 (min–max: 5–14)	
Gender		
Female	1438	49.1
Male	1492	50.9
Grade		
Preschool	276	9.4
First	442	15.1
Second	496	16.9
Third	574	19.6
Fourth	408	13.9
Fifth	195	6.7
Sixth	209	7.1
Seventh	228	7.8
Eighth	102	3.5
Total	2930	100

min: minimum; max: maximum

was obtained. Prior to the research, the children were informed regarding what measurements they would undergo.

RESULTS

Of the students surveyed, 49.1% were girls, 50.9% were boys. Their mean±SD age was 8.74±2.5 years. The majority of the students were first-, second-, third-, and fourth-grade students (Table 1).

Of them, 1.3% were severely underweight, 9% were underweight, 49.3% were normal weight, 17.4% were overweight, 22.8% were obese, 1.1% were stunted, and 5.9% were short (Table 2, 3).

The distribution of the girls' and boys' height-for-age Z scores (SD) is shown in Table 2. According to this distribution, 11-, 12-, and 13-year-old girls were very short (5.6%, 4.4%, and 4.5%, respectively). The percentage of the very short boys in the 11-year-old age group was greater than that of the very short boys in the other age groups (6.3%). The height distributions by age and gender were compared, and differences by gender were observed only between 12-year-old children. While the percentage of 12-year-old stunted and short girl students was higher than their boy counterparts, the percentage of very tall boy students was higher than their girl counterparts (χ^2 = 14.56, p=0.006).

The distribution of the girls' and boys' weight-for-age Z scores (SD) is shown in Table 3. According to this distribution, while the obesity rate (>2 SD) among the girl students aged 5-9 years ranged between 20% and 36.2%, it ranged from 18% to 34% among the boy students in the same age group. In all the age groups, except for 12 years of age, the rate of severely underweight boy and girl students was very low. The comparison of the weight distributions by age and gender revealed that while the rate of overweight girls was higher than that of the boys among the 6-year-old children (χ^2=7.97, p=0.019), the rate of overweight boys was higher than that of the girls among the 7-year-old children (χ^2=11.18, p=0.011). The comparison also demonstrated that among the 6-year-old children, the rate of overweight boys was higher than that of the girls (χ^2=8.21, p=0.016).

The distribution of blood pressure values by gender is shown in Table 4. The rate of the students with normal systolic blood pressure was 77.9% (girls, 77.3%; boys, 78.5%). While the rate of the prehypertensive students was 12.0% (girls, 12.6%; boys, 11.5%), the rate of the students with stage I hypertension was 6.8% (girls, 6.5%; boys, 7.2%) and with stage II hypertension was 3.2% (girls, 3.6%; boys, 2.8%). The rate of the students with normal diastolic blood pressure was 83.1% (girls, 83.7%; boys, 82.5%). While the percentage of the prehypertensive students was 10.4% (girls, 10.0%; boys, 10.7%), the percentage of the students with stage I hypertension was 5.5% (girls, 5.2%; boys, 5.8%) and with stage II hypertension was 1.1% (girls, 1.1%; boys, 1.1%; p>0.05).

DISCUSSION

During primary school years, children's growth and development is rapid, and they develop most of the lifetime behaviors. Measurements to be made once a year in school-age children ensure the evaluation and monitoring of growth, early identification of deviations from normal growth, and planning of appropriate initiatives (2, 3). In the present study, the results obtained from the screenings demonstrated that 17.4% of the students were slightly overweight, 22.8% were overweight, and one-half of them were normal weight according to the WHO Z-score system. Based on the Z-score distribution of the boys' and girls' weights for age, the rate of obesity ranged from 20% to 36.2% among the girls aged 5-9 years and from 18% to 34% among the boys in the same age group.

The results also indicated that the 6-8-year-old girls were more obese than were the boys in the same age group (p<0.05). According to the Monitoring of the Growth of School Age Children Project in Turkey, of those children, 6.5% were obese, 14.3% were overweight, 1.3% were severely underweight, 5.0% were stunted, and 21.5% were short. The prevalence of obesity varies from one study to another conducted in different countries and regions. The rates of slightly overweight and obesity in this study were lower than those in Spain (35.2% in 6-9-year-olds) and Portugal (31.5% in 7-9-year-olds), close to those in France (18.1% in 7-9-year-olds), Switzerland (18.3% in 6-9-year-olds), Iceland (18.5% in 9-year-olds), and Slovakia (15.2% in 7-9-year-olds) (4) and higher than those in the UK (1.7% in 4-11-year-old boys and 2.6% in girls of the same age) and Scotland (2.1% in 4-11-year-old boys and 3.2% in girls of the same age) (4). These results suggest that different cultural aspects reflect the eating and activity habits. Although it was not investigated in the present study, it would not be wrong to relate the high prevalence of obesity to the decreased physical activity in school age children resulting

Table 2. Distribution of height-for-age z scores of girl and boy students

Age,		Female										Male										
		<−2 SD		≥−2 SD–<−1 SD		≤−1 SD–<1 SD		≥1 SD–<2 SD		≥2 SD			<−2 SD		−2 SD–1 SD		≥−1 SD–<1 SD		≥1 SD–<2 SD		≥2 SD	
years	n	%	n	%	n	%	n	%	n	%	%	n	%	n	%	n	%	n	%		n	%
5	122	-	-	-	-	40	32.8	44	36.1	38	31.1	121	-	-	2	1.7	41	33.9	36	29.8	42	34.7
6	155	-	-	1	0.6	64	41.3	54	34.8	36	23.2	153	-	-	6	3.9	65	42.5	53	34.6	29	19.0
7	235	5	2.3	13	5.5	108	46.0	69	29.4	40	17.0	273	2	0.7	19	7.0	140	51.3	68	24.9	44	16.1
8	246	-	-	3	1.2	115	46.7	80	32.5	48	19.5	259	1	0.4	12	4.6	123	47.5	71	27.4	52	20.1
9	228	1	0.4	10	4.4	108	47.6	57	25.1	51	22.5	232	1	0.4	10	4.3	117	50.4	68	29.3	36	15.5
10	76	1	1.3	2	2.6	44	57.9	22	28.9	7	9.2	95	1	1.1	2	2.1	57	60.0	19	20.0	16	16.8
11	89	1	5.6	22	24.7	56	62.9	6	6.7	-	-	95	6	6.3	16	16.8	56	58.9	12	12.6	5	5.3
12	113	5	4.4	20	17.7	70	61.9	18	15.9	-	-	100	1	1.0	11	11.0	72	72.0	9	9.0	7	7.0
13	110	5	4.5	10	9.1	64	58.2	26	23.6	5	4.5	96	-	-	7	7.3	61	63.5	23	24.0	5	5.2
14	63	-	-	8	12.7	42	66.7	10	15.9	3	4.8	68	-	-	13	19.1	44	64.7	10	14.7	1	1.5
Total 1438		18	1.3	89	6.2	711	49.4	376	26.4	228	15.9	1492	12	0.8	85	5.7	776	51.0	369	24.7	237	15.9

Total (female+male): < 2 SD = 1.0%; ≥−2 SD–<−1 SD = 5.9%; ≤−1 SD–<1 SD = 50.7%; ≥1 SD–<2 SD = 25.4%; ≥1 SD–<2 SD = 15.9%

SD: standard deviation

from their excessive involvement in today's technological devices with which they spent a lot of time without physical activity.

According to the findings of the present study as in other studies, obesity is more prevalent among students aged 6-8 years. Although obesity develops in any age group, its prevalence is higher in years when rapid fat deposition occurs, and childhood obesity increases in the first years of life, in the 5-7 years of life, and during adolescence (4, 14, 15). Based on the results of the present study, it can be said that healthy eating and appropriate lifestyle habits, which are the foundation of healthy living, should be gained during childhood. Within the scope of school health, children should be encouraged to gain healthy eating habits, and programs and activities to promote physical activities should be more extensive. In literature, it has been reported that interventions targeted to school-age children's health have yielded positive results (16, 17). For instance, a meta-analysis of school-based interventions suggests that school nurses can play a key role in implementing sustainable, effective, school-based obesity interventions (18).

In the study, results on stunting, another parameter of growth and development, were evaluated. When the students were classified according to the height-for-age Z scores, it was determined that 1.1% were stunted and 5.9% were short. When the distribution of height-for-age Z scores were analyzed in the 12-year age group, the rate of the stunted and short girl students was higher than the rate of boy students of the same height; however, the rate of the very tall boy students was higher than the rate of girls of the same height (p=0.006). According to the Childhood Obesity Survey (2013), the rate of the severely stunted children was 0.1%, and the rate of the stunted children was 2.3% (19). In a study of 1018 elementary school students aged 6-14, 7.46% of the students were stunted (20). According to the Monitoring of the Growth of School Age Children Project in Turkey, 5% were stunted and 21.5% were short. The results of the same project also demonstrated that the rates of the stunted (5.2%) and short (22.3%) girls were higher than those of the boys (4.9% and 20.7%, respectively). In this study, the height Z score distributions did not differ by gender. In a study conducted in Iraq, the stunting rate among school age children aged 7-12 years is 18.7% and stunting is the most prevalent (22.4%) in the 12-year age group (21). Defects in energy balance due to early under nutrition causes increases in the central adiposity in short children, fat oxidation becomes lower, lipolysis and lipid oxidation deteriorate, and the ratio of cortisol to insulin increases due to insufficient food intake and thus insulin resistance develops. The high rate of stunted and short children in the study group is noteworthy. Therefore, in children determined to have stunted growth, early detection and monitoring of chronic diseases with a detailed physical examination is essential.

Table 3. Distribution of weight-for-age z scores of girls and boy students

Age,	Female											Male										
		<−2 SD		≥−2 SD−<−1 SD		≤−1 SD−<1 SD		≥1 SD−<2 SD		≥2 SD			<−2 SD		−2 SD−1 SD		≥−1 SD−<1 SD		≥1 SD−<2 SD		≥2 SD	
years	n	n	%	n	%	n	%	n	%	n	%	n	n	%	n	%	n	%	n	%	n	%
5	122	-	-	4	3.3	51	41.8	37	30.3	30	24.6	121	3	2.5	2	1.7	63	52.1	19	15.7	34	28.1
6	155	1	1.0	2	2.1	76	50.0	36	23.7	40	26.3	153	-	-	-	-	82	53.6	34	22.2	37	24.2
7	235	-	-	16	6.8	121	51.5	51	21.7	47	20.0	273	-	-	5	1.8	169	61.9	48	17.6	51	18.7
8	246	-	-	2	2.8	126	51.2	44	17.9	69	28.0	259	5	1.9	23	8.9	92	35.5	49	18.9	90	34.7
9	228	2	0.9	29	12.7	112	49.1	32	14.0	53	23.2	232	1	0.4	26	11.2	99	42.7	36	15.5	70	30.2
10	76	-	-	13	17.1	40	52.6	11	14.5	12	15.8	95	3	3.2	14	14.7	43	45.3	11	11.6	24	25.3
11	90	2	2.2	20	22.2	40	44.4	19	21.1	9	10.0	95	1	1.1	24	25.4	38	40.0	14	14.7	18	18.9
12	113	9	8.0	13	11.5	59	52.2	22	19.5	10	8.8	100	4	4.0	18	18.0	52	52.0	11	11.0	15	15.0
13	110	4	3.6	18	16.4	55	50.0	9	8.2	24	21.8	96	2	2.1	14	14.6	48	50.0	13	13.5	19	19.8
14	63	1	1.6	6	9.5	38	60.3	7	11.1	11	17.5	68	1	1.5	15	22.1	39	57.4	8	11.8	5	7.4
Total	1438	19	1.3	123	8.7	718	49.9	268	18.8	305	21.2	1492	20	1.3	141	9.5	725	48.6	243	16.3	363	24.3

Total (female+male): <−2 SD=1.3%; ≥−2 SD−<−1 SD=9.0%; ≤−1SD−<1 SD=49.3%; ≥1 SD−<2 SD=17.4%; ≥1 SD−<2 SD=22.8%

SD: standard deviation

According to the results of the systolic blood pressure screenings, the rate of the students with prehypertension was 12.0%, with stage I hypertension was 6.8%, and with stage II hypertension was 3.2%. According to the results of the diastolic blood pressure screenings, the rate of the students with prehypertension was 10.4%, with stage I hypertension was 5.5%, and with stage II hypertension was 1.1%. The difference between the genders was not significant (p>0.05). According to the systolic blood pressure measurements of 1411 children aged 7-11 years, 4.5% were prehypertensive and 14.3% were stage I hypertensive (>ninety-fifth percentile). According to the diastolic blood pressure measurements of those children, 4% were prehypertensive and 4.7% were hypertensive. In a study conducted with 402 students, 7.5% had stage II hypertension, 12.2% had stage I hypertension, and 21.9% had prehypertension (22). In another study, 1.30% had presystolic hypertension, 2.02% had systolic hypertension, 2.65% had prediastolic hypertension, and 2.74% had diastolic hypertension. The distribution of blood pressure at the initial screen was as follows: normal (81.1%), prehypertension (9.5%), and hypertension (9.4%) (stage I, 8.4%, stage II, 1%) (23). The total prevalence of hypertension in children aged 6-18 years in India was 6.48% (6.74% in boys and 6.13% in girls), and the prevalence of hypertension increased with age in both sexes (24). In another study, the total prevalence of hypertension in school children aged 5-15 years was 3.19% (3.16% in girls and 3.22% in boys) (25). In studies conducted in Turkey, the prevalence ranged between 3.8% and 17.8% (26). The results of the present study are lower than those of some studies and higher than those of some other studies. The wide range of prevalence of hypertension might be due to differences between measurement and assessment techniques used in the studies and eating habits and demographic characteristics of children.

CONCLUSION

The results of the present study demonstrated that the prevalence of stunting, being slightly overweight/overweight, stage I hypertension and stage II hypertension in children aged 5-14 years was high. Therefore, routine screenings in schools play an important role in the detection of problems, such as stunting, hypertension, and being slightly overweight/overweight among children. In particular, programs on the prevention and management of obesity and implementation of healthy eating habits and physical activities will contribute to the improvement of health. Implementation and supervision of nutrition-friendly programs in all schools will be effective in combating obesity and obesity-induced hypertension. School health nurses are known to have various roles and responsibilities for the implementation of health protection and promotion programs. Programs aiming to protect and promote health in the world especially in the United States are very widely implemented by school health nurses. Although laws regarding school health in Turkey have been effective since 1930, school health

Table 4. Percentile breakdown of blood pressure measurements of students by gender

Percentile values of blood pressure	Systolic						Diastolic					
	Female		Male		Total		Female		Male		Total	
	n	%	n	%	n	%	n	%	n	%	n	%
<90	1108	77.3	1170	78.5	2278	77.9	1199	83.7	1230	82.5	2429	83.1
90–95	180	12.6	172	11.5	352	12.0	144	10.0	159	10.7	303	10.4
95.1–99	93	6.5	107	7.2	99	6.8	74	5.2	86	5.8	160	5.5
>99	52	3.6	42	2.8	12	3.2	16	1.1	16	1.1	32	1.1
Total	1433	100	1491	100	2924	100	1433	100	1491	100	2924	100

nurses are still not employed in schools. In a circular issued in 2008, emphasis was placed on school health services, but information on who will provide these services was not provided (27). Therefore, to have healthy future generations, it is important to begin with employment of health nurses in schools.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of İzmir Katip Çelebi Üniversitesi (26.05.2016- 2106/118).

Informed Consent: Written informed consent was obtained from the parents of the patients who participated in this study.

Peer-review: Externally peer-reviewed.

Author contributions: Concept - M.Y., B.A., H.Y.S.; Design - M.Y., B.A., H.Y.S., F.D.; Supervision - M.Y.; Resource - M.Y., B.A., F.D., H.Y.S., G.A.K., Z.T.; Materials - M.Y., B.A., F.D., H.Y.S., G.A.K., Z.T.; Data Collection and/or Processing - M.Y., B.A., F.D., H.Y.S., G.A.K., Z.T.; Analysis and/or Interpretation -M.Y., B.A., H.Y.S.; Literature Search - M.Y., H.Y.S., G.A., F.D.; Writing - M.Y., H.Y.S., B.A., G.A.; Critical Reviews - M.Y., B.A., F.D., H.Y.S., G.A.K., Z.T.

Acknowledgements: The authors thank to all school managers, families and children.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study has received no financial support.

Etik Komite Onayı: Bu çalışma için etik komite onayı İzmir Katip Çelebi Üniversitesi Girişimsel Olmayan Etik Kurulu'ndan alınmıştır (26.05.2016-2106/118).

Hasta Onamı: Yazılı hasta onamı bu çalışmaya katılan hastaların ailelerinden alınmıştır.

Hakem Değerlendirmesi: Dış Bağımsız.

Yazar Katkıları: Fikir - M.Y., B.A., H.Y.S.; Tasarım - M.Y., B.A., H.Y.S., F.D.; Denetleme - M.Y.; Kaynaklar - M.Y., B.A., F.D., H.Y.S., G.A.K., Z.T.; Malzemeler - M.Y., B.A., F.D., H.Y.S., G.A.K., Z.T.; Veri Toplanması ve/veya İşlemesi - M.Y., B.A., F.D., H.Y.S., G.A.K., Z.T.; Analiz ve/veya Yorum - M.Y., B.A., H.Y.S.; Literatür Taraması - M.Y., H.Y.S., G.A., F.D.; Yazıyı Yazan - M.Y., H.Y.S., B.A., G.A.; Eleştirel İnceleme - M.Y., B.A., F.D., H.Y.S., G.A.K., Z.T.

Teşekkür: İşbirliği yapan ilköğretim okulu yöneticileri, aileler ve çocuklara teşekkür ederiz.

Çıkar Çatışması: Yazarlar çıkar çatışması bildirmemişlerdir.

Finansal Destek: Yazarlar bu çalışma için finansal destek almadıklarını beyan etmişlerdir.

REFERENCES

1. Ergün A, Erol S, Gür K, Şişman FN. Evaluation of Health. Development of the School Age Children's Health. Gözüm S, editor. Ankara: Vize Publishing; 2016.
2. Erol S. School Health Screening. In; Development of the School Age Children's Health. Gözüm S, editor. Ankara: Vize Publishing; 2016.
3. Nihiser A, Lee S, Wechsler H, McKenna M, Odom E, Reinold C et al. Body mass index measurement in schools. J Sch Health. 2007; 77: 651-71. [CrossRef]
4. Branca F, Nikogosian H, Lobstein T, editors. The challenge of obesity in the WHO European region and the strategies for response, WHO. Denmark: Publications WHO Regional Office for Europe; 2007; p. 5.
5. Kılıç Z, Başıbüyük T, Tekin N, Ünalır A, Çolak Ö. Risk factors in children of parents with essential hypertension. Osmangazi University School of Medicine Journal 1995; 17: 49-57.
6. The Fourth Report on The Diagnosis, Evaluation, And Treatment Of High Blood Pressure In Children and Adolescents. U.S. Department of Health And Human Services National Institutes of Health National Heart, Lung, and Blood Institute NIH Publication No. 05-5267 Originally printed September 1996 (96-3790) Revised May 2005. https://www.nhlbi.nih.gov/files/docs/resources/heart/hbp_ped.pdf Accessed April 2016.
7. Shi Y, Groh M, Morrison H. Increasing blood pressure and its associated factors in Canadian children and adolescents from the Canadian Health Measures Survey. BMC Public Health 2012; 12: 388. [CrossRef]
8. Aounallah-Skhiri H, El Ati J, Traissac P, Ben Romdhane H, Eymard-Duvernay S, Delpeuch F et al. Blood pressure and associated factors in a North African adolescent population. a national cross-sectional study in Tunisia. BMC Public Health. 2012; 12: 98. [CrossRef]
9. Dişçigil G, Aydoğdu A, Başak O, Gemalmaz A, Gürel S. Prevalence of hypertension and related factors in primary school students in Aydın. TJFMPC 2007; 12: 17-22.
10. Yüce HI. Obesity and Hypertension Screening as a risk factor Metabolic Syndrome Risk Factors in School Children. Şişli Etfal Training And Research Hospital, Ministry of Health, Specialist Thesis. 2007; 47-57.
11. Çapık C, Karaçöp A, Elyıldırım ÜY. Anthropometric characteristics and health problems of primary school students based on a school screening study. Sted 2013; 22: 172-80.
12. Açık Y, Deveci SE, Çelik GT, Karaaslan O. Evaluation of the results of the health screening conducted on first graders of primary schools in Elazığ Yenimahalle research and training health center district. Public Health Bulletin 2006; 25: 30-4.
13. Wainwright, P, Thomas J, Jones M. Health promotion and the role of the school nurse: a systematic review. J Adv Nurs 2000; 32:1083-91. [CrossRef]

14. Pekcan G. Determination of Nutritional Status, Diet Handbook (Authors: A. Baysal ve ark). Ankara. Hatipoğlu Publisher. 2008a: 67-142.
15. Pekcan G. Determination of Nutritional Status, Nutrition Information Series Basic Health Service General Management of Turkish Republic Health Ministry. Ankara. Klasmat Typography. 2008b (ISBN: 978-975-590-248-7).
16. WHO. Growth reference data for 5-19 years. 2007b. www.who.int/childgrowth/en/ Accessed May 2016.
17. Tümer N, Yalçınkaya F, İnce E, Ekim M, Köse K, Çakar N, et al. Blood pressure nomograms for children and adolescents in Turkey. Pediatr Nephrol. 1999; 13: 438-43. [CrossRef]
18. National High Blood Pressure Education Program Working Group on Hypertension Control in Children and Adolescent. The fourth report on the diagnosis, evaluation and treatment of high blood pressure in children and adolescents. Pediatrics 2004; 114: 555-73. [CrossRef]
19. Chinn S, Rona RJ. Prevalence and trends in overweight and obesity in three cross sectional studies of British children, 1974-94. BMJ 2001; 322: 24-6. [CrossRef]
20. Evaluation of Growth in Turkish Schoolchildren (6-10 age group) Project: Research Report. 2011. Basic Health Service General Management of Turkish Republic Health Ministery. Ankara. Kurban Typography. 2011. http://beslenme.gov.tr/content/files/yayinlar/kitaplar/diger_kitaplar/tocbi_kitap.pdf Accessed May 2016
21. Savaşhan Ç, Sarı O, Aydoğan Ü, Erdal M. Obesity frequency in school children and related risk factors. TAHUD 2015; 19: 14-21. [CrossRef]
22. Cinaz P, Bideci A. Obesity. In: Günöz H, Öcal G, Yordam N, Kurtoğlu S. Pediatric Endocrinology. Ankara. Kalkan Typography. 2003; 487-505.
23. Ağca Ö, Koçoğlu G. Effects of regular exercise on body composition in overweight and obese adolescent girls. Dirim Journal of Medicine 2010; 85: 17-23.
24. Toruner EK, Savaser S. A controlled evaluation of a school-based obesity prevention in Turkish school children. J Sch Nurs 2010; 26: 473-82. [CrossRef]
25. Schroeder K, Travers J, Smaldone A. Are school nurses an overlooked resource in reducing childhood obesity? A systematic review and meta-analysis. J Sch Health 2016; 86: 309-21. [CrossRef]
26. Childhood Obesity Survey (Cosı-Tr). http://www.diabetcemiyeti.org/var/cdn/a/f/cosi-tr-sonuclari.pd .2013 Accessed May 2016.
27. Ersoy B, Günay T, Günes S. Stunting in primary school children and its association with obesity. Turkish Clinics Pediatric Journal 2007; 16:90-5.
28. Al-Saffar AJ. Stunting among primary-school children: a sample from Baghdad, Iraq. East Mediterranean Health Journal 2009; 15: 322-9.
29. Önsüz M, Zengin Z, Özkan M, Şahin H, Gedikoğlu S, Erseven S, et al. Evaluation of obesity and hypertension in students of a primary school in Sakarya. Sakarya Med J 2011; 1: 86-92. [CrossRef]
30. McNiece KL, Poffenbarger TS, Turner JL, Franco KD, Sorof JM, Portman RJ. Prevalence of hypertension and pre-hypertension among adolescents. J Pediatr 2007; 150: 640-4. [CrossRef]
31. Buch N, Goyal JP, Kumar N, Parmar I, Shah VB, Charan J. Prevalence of hypertension in school going children of Surat city, Western India. J Cardiovasc Dis Res 2011; 2: 228-32. [CrossRef]
32. Chirag BA, Chavda J, Kakkad KM, Damor P. A study of prevalence of hypertension in school children. GMJ 2013; 68: 79-81.
33. İnanç BB. 7-15 years of age group children hypertension and obesity. J Clin Anal Med 2013; 4: 116-9. [CrossRef]
34. Notice on the School Health Services in Turkey. http://www.saglik.gov.tr/TR/belge/1-7313/okul-sagligi-hizmetleri-hakkinda-genelge.html Accessed Februray 2016.

How to cite:

Yılmaz M, Aktaş B, Dereli F, Sarı HY, Kundakçı GA, Tiryaki Z. Assessment of the prevalence of obesity, stunting, and hypertension among primary school children. Eur J Ther 2017; 23: 99–105.