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OVERWEIGHT AND OBESITY PREVALENCE OF LATVIAN PRE-SCHOOL CHILDREN

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ABSTRACT

This data is a part from the study ordered by the Ministry of Education to assess physical development of pre-school children in Latvia. Various somatometric measurements were determined – height (cm), the body mass (kg), the circumference of the head, chest, waist, hips (cm), vital lung capacity (ml), blood pressure (mm/Hg) and other parameters. This study evaluates the body mass index (BMI), overweight and obesity prevalence of pre-school children. Comparing the data with the data of other European countries, we can conclude how high the prevalence of overweight and obesity in our country is and what are potential activities to reduce the prevalence.

Keywords: *prevalence; overweight; obesity*

INTRODUCTION

Overweight and obesity is a worldwide problem. The World Health Organization maintains that in 2014 more than 1.9 billion adults, 18 years and older, were overweight. Of these 600 million were obese [4]. In 2014, an estimated 41 million children under the age of 5 were overweight or obese [4]. Obesity is a chronic disease that is complex and multifactorial in nature [6]. The main causes of obesity are genetic factors and environmental factors. Obesity is a significant cause in cardiovascular diseases, diabetes, musculoskeletal disorders and some types of cancers. Childhood obesity is associated with a higher chance of obesity, premature death and disability in adulthood [4].

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THE AIM

To assess and analyze the body mass index (BMI), overweight and obesity of pre-school children (age 4–7).

MATERIAL AND METHODS

In the study there were 995 children – 527 girls and 468 boys involved from 22 different Riga pre-school educational institutions. Children were 4 to 7 years old. Anthropometric measurements were done by R. Martin's and K. Saller's methods (1957–1966). All the instruments in measurements were certified. Weight (kg) and height (cm) were detected. The Formula BMI = weight (kg)/ height^2 (m) (kg/m^2) was used for the body mass index. For obtained results SPSS and MS Excel programs were used.

RESULTS AND DISCUSSION

The average height of four-year-old girls is 103.2 ± 5.7 cm (min. 85.9 cm; max. 128.2 cm). In the group of five-year-old girls the average height is 110.7 cm ± 4.9 cm (min. 96.6 cm; max. 124.2 cm). In the group of six-year-old girls the average height is 117.7 ± 5.7 cm (min. 104.0 cm; max. 131.7 cm) but in the group of seven -year-old girls it is 122.5 ± 5.4 cm (min. 104.4 cm; max. 139.2 cm).

In the group of four-year-old boys the average height is 105.1 ± 4.7 cm (min. 90.0 cm; max. 120.4 cm). The average height of five-year-old boys is 111.8 ± 5.4 cm (min. 99.6 cm; max. 131. 0 cm). The average height of six-year-old boys is 118.7 ± 4.9 cm (min. 103.4 cm; max. 131.3 cm). In the group of seven-year-old – boys it is 124.4 ± 4.7 cm (min. 113.6 cm; max. 135.8 cm). In Table 1 the difference of height results between age groups of both genders is shown.

We compared our data with the data of other European countries. Thus, in Larsen et al. study the data of children in Denmark are similar to ours. The height of four-year-old girls was 1.05 ± 0.05 (m) and in the group of five-year-old girls it was 1.12 ± 0.05 (m) [3]. The height of four-year-old boys was 1.04 ± 0.05, in the group of five-year-old boys it was 1.13 ± 0.05 [3].

In our study the body mass of four-year-old girls is 16.8 ± 2.4 (min. 10.0, max. 22.7). In the group of five-year-old girls body mass is 19.2 ± 2.9 (min. 12.5, max. 28.0), in the group of six-year-old girls it is 22.1 ± 3.9 (min. 15.5; max. 36.0). Finally the body mass in the group of seven-year-old girls is 23.7 ± 3.5 (min. 14.5; max. 34.1). Looking at the male gender the data of the study are

similar to the female gender. The body mass of four-year-old boys is 17.7 ± 2.3 (min. 12.6; max. 25.1), of five-year-old boys it is 19.6 ± 2.8 (min. 14.0; max. 36.5). In the group of six-year-old boys the body mass is 21.9 ± 3.5 (min. 16.7; max. 36.0) and in the group of seven-year-old boys it is 24.9 ± 3.7 (min. 19.6; max. 40.0). The data about the body mass in pre-school children are shown in Table 2.

We compared our data with the situation in Denmark. In Larsen et al. study the weight of four-year-old girls was 17.59 ± 2.54 and in the group of five-year-old girls it was 19.06 ± 2.97 [3]. The weight of four-year-old boys was 17.27 ± 2.18, in the group of five-year-old boys it was 20.11 ± 2.76 [3].

Table 1. Children's body length.

Gender	Age	N	Average height (cm)	Minimum height (cm)	Maximum height (cm)
Girls	4	116	103.2 ± 5.7	85.9	128.2
	5	154	110.7 ± 4.9	96.6	124.2
	6	136	117.7 ± 5.7	104.0	131.7
	7	105	122.5 ± 5.4	104.4	139.2
Boys	4	95	105.1 ± 4.7	90.0	120.4
	5	127	111.8 ± 5.4	99.6	131.0
	6	136	118.7 ± 4.9	103.4	131.3
	7	90	124.4 ± 4.7	113.6	135.8

Table 2. Children's body mass.

Gender	Age	N	Average body mass (kg)	Minimum body mass (kg)	Maximum body mass (kg)
Girls	4	116	16.8 ± 2.4	10.0	22.7
	5	154	19.2 ± 2.9	12.5	28.0
	6	136	22.1 ± 3.9	15.5	36.0
	7	105	23.7 ± 3.5	14.5	34.1
Boys	4	95	17.7 ± 2.3	12.6	25.1
	5	127	19.6 ± 2.8	14.0	36.5
	6	136	21.9 ± 3.5	16.7	36.0
	7	90	24.9 ± 3.7	19.6	40.0

In our study also the average value of the children's height growth rate per year (cm/year) in each age group and gender was calculated. The largest increase of height per year for girls in the age group 4–5 years was 7.5 cm/year, but for boys in the age group 5–6 years it was 6.9 cm/year. These data are shown in Table 3. The average value of children's weight growth rate per year (kg/year) in each age group and gender was calculated. The largest increase of weight per year for girls in the age group 5–6 years was 2.9 kg/year, for boys in age group 6–7 years it was 3.0 kg/year. These data are shown in Table 4.

Table 3. Average value of children's height growth rate per year.

Gender	Age (groups)			
	3 to 4	4 to 5	5 to 6	6 to 7
Girls	3.0	7.5	7.0	4.8
Boys	5.2	6.7	6.9	5.7

Table 4. Average value of children's weight growth rate per year.

Gender	Age (groups)			
	3 to 4	4 to 5	5 to 6	6 to 7
Girls	0.1	2.4	2.9	1.6
Boys	1.4	1.9	2.3	3.0

The body mass index was calculated next during our study. Table 5 shows the results in each age group and gender group. The data of the body mass index in other European populations are similar to ours. Thus, in Larsen et al. study of the population in Denmark the BMI of four-year-old girls is 15.90 ± 1.68, the BMI of five-year-old girls is 15.60 ± 1.74. The BMI of four-year-old boys is 15.84 ± 1.15, but in the group of five-year-old boys it is 15.71 ± 1.55 [3].

After that all the children in our study were divided into three groups according to the BMI. The first group, BMI-1, included the children whose BMI against weight and height is under 85th percentile. The second group, BMI-2, included the children with overweight and the BMI in this group was between 85th and 94th percentile. The third group, BMI-3, included the children with obesity and the BMI there was more than 94th percentile. In Table 6 there is an absolute and relative incidence of pre-school children body mass index in accordance with the BMI standards shown. Final results showed that there were

12.5% of girls and 11.1% of boys with overweight in pre-school educational institutions. Obesity was found in 4.2% of girls and 5.1% of boys of pre-school age.

Table 5. Children's body mass index.

Gender	Age	N	Average body mass index (kg/m²)	Minimum body mass index (kg/m²)	Maximum body mass index (kg/m²)
Girls	4	116	15.8 ± 1.2	12.6	19.5
	5	154	15.6 ± 1.7	9.2	22.1
	6	136	15.8 ± 2.0	10.9	24.0
	7	105	15.7 ± 1.6	12.9	22.1
Boys	4	95	15.9 ± 1.2	13.0	19.4
	5	127	15.6 ± 1.4	12.7	24.0
	6	136	15.5 ± 1.6	12.5	22.0
	7	90	11.6 ± 1.6	14.0	21.7

Table 6. Absolute (N) and relative (%) incidence of the pre-school children body mass index (in accordance with the BMI standards).

	Age								Total	
	4		5		6		7			
	N	%	N	%	N	%	N	%	N	%
Girls										
BMI-1	92	79.3	129	83.8	112	82.4	96	91.4	439	83.3
BMI-2	21	18.1	18	11.7	14	10.3	7	6.7	66	12.5
BMI-3	3	2.6	7	4.5	10	7.4	2	1.9	22	4.2
Total	116	100.0	154	100.0	136	100.0	105	100.0	527	100.0
Boys										
BMI-1	77	81.1	108	85.0	115	84.6	77	85.6	392	83.8
BMI-2	12	12.6	15	11.8	13	9.6	7	7.8	52	11.1
BMI-3	6	6.3	4	3.1	8	5.9	6	6.7	24	5.1
Total	95	100.0	127	100.0	136	100.0	90	100.0	468	100.0

If we look at overweight and obesity in separate groups and compare them to other data some differences arise. In Denmark the population overweight in four-year-old girls is 10.9% but obesity in the same group 2.9%. Overweight in four-year-old boys is 7.1% but obesity 2.3% [3]. Boneberger et al. study shows the situation in Bavaria, Germany. In the group of 5–6-year-old children 16% of girls and 11.7% of boys are overweight but 3.3% of girls and 3.5 % of boys have obesity [2]. W. Ahrens et al. study shows the baseline condition of overweight and obese children (age 2.0–9.9) in several European countries [1]. The study displays the problem in Italy, Estonia, Cyprus, Belgium, Sweden, Germany and Hungary. Total data of all the countries show that 11.8% of boys and 13.8% of girls have overweight but 6.8% of boys and 7.3% of girls have obesity [1]. Scandinavian countries like Estonia and Sweden have similar data to ours. Thus, Estonia has overweight of 10.2% of boys and 10.8% of girls and obesity of 3.6% of boys and 4.2% of girls [1]. But data in Sweden shows a better situation – 7.7% of boys and 9.9% of girls have overweight and 2.4% of boys and 2.1% of girls have obesity. Data of Italy data show that overweight and obesity there is quite a serious problem. 20.8% of boys and 24.3% of girls have overweight but 19.9% of boys and 19.8% of girls are obese [1].

CONCLUSIONS

1. The average value of height for boys (age 4–7) is higher than for girls in the same age. The value of height increase on average is about 19.3 cm/per year for both genders.
2. The highest increase of height growth rate per year for girls in the age 4–5 on average is 7.5 cm per year. For boys in the age 5–6, it is on average 6.9 cm per year.
3. The average value of the body mass essentially does not differ for both genders in the pre-school age.
4. The average increase of the body mass per year is equal for both genders.
5. The highest increase of the body mass for girls is at age 5–6 but for boys it is in the age group 6–7.
6. In pre-school age 11.8% of children (12.5% of girls and 11.1% of boys) have overweight but 4.6% of children (4.2% of girls and 5.1% of boys) have obesity.

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