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Nutrition of Pre-School Children with Obesity: a Retrospective Cross-Sectional Study

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Background. The prevalence of obesity in children continues to increase. The study of dietary habits of pre-school children allows assessing or establishing the relationship between the dietary factor and obesity in this age group. Objective. Our aim was to determine the relationship between dietary habits and obesity in pre-school children. Methods. The study included pre-school children with primary exogenous obesity of the first degree and healthy children attending pre-school educational institutions. Based on the parent survey results, we determined the frequency of consumption of certain food groups, portion size (using the display material «Album of Meal and Food Portions»), the chemical composition, and energy value of diets (in the program «The Analysis of Human Nutritional Status»). The hygienic assessment of nutrition is performed in accordance with the age norms of physiological needs (NPNs) approved for the population of the Russian Federation. Results. The energy value and content of basic macronutrients of food rations for children with obesity (n =40) were 45–58% higher than the NPNs. In the structure of the fat component of diets for children with obesity, saturated fatty acids predominated which caloric quota was significantly higher than in healthy children (n =40). In healthy children with a normal energy value of diets, the total fat was 12% higher and the total carbohydrate was 12% lower than the NPNs. A general negative trend in a part of excess (2.5–4.4 times higher than the NPNs) consumption of mono- and disaccharides was revealed. The study revealed that obesity was associated with frequent (> 5 times/day) consumption of bakery products [odds ratio (OR) 6.7 (95% confidence interval (CI) 2.4–18.2], confectionery products (> 3 times/day) (OR 28.8; 95% CI 7.4–111.8), and products with a high fat content (mayonnaise, cream butter, etc. > 2 times/day) (OR 10.3; 95% CI 3.7–29.0). Conclusion. Obesity in pre-school children is associated with excessive and unbalanced nutrition with frequent consumption of bakery, confectionery, and high-fat foods.

Key words: children, pre-school age, nutrition, energy value, chemical composition, obesity.

Table 1. Characteristics of study participants

Parameter	Children with obesity, $n=40$	Healthy children, $n=40$	p
Age, years	6 (6; 6.5)	6 (6; 6.5)	0.773
Sex (girls), abs. (%)	17 (43)	20 (50)	0.654
BMI Z-score	2.2 (2.1; 2.5)	0.5 (0.3; 0.7)	0.001

Note. BMI — body mass index.

Table 2. The energy value and chemical composition of food rations for pre-school children with obesity and healthy children

Parameter	Factual data		Mean difference (95% CI)	p	Norms of physiological needs, %		Mean difference (95% CI)	p
	Children with obesity, $n=40$	Healthy children, $n=40$			Children with obesity, $n=40$	Healthy children, $n=40$		
Energy value, kcal	2,849 (2,520; 3,146)	1,841 (1,542; 2,165)	1,042 (850; 1,234)	0.001	158 (140; 175)	102 (86; 120)	58 (47–69)	0.001
Proteins, g	85 (80; 93)	57 (45; 65)	32 (23–40)	0.001	157 (149; 172)	105 (84; 120)	59 (43–74)	0.001
Total fat, g	94 (87; 104)	67 (55; 88)	21 (7–36)	0.001	156 (144; 173)	112 (92; 146)	36 (12–59)	0.001
SAFA, g	47 (36; 59)	25 (20; 29)	25 (16–34)	0.001	234 (179; 293)	123 (98; 144)	123 (77–169)	0.001
PUFAs, g	35 (30; 47)	14 (11; 20)	22 (14–30)	0.001	124 (106; 168)	50 (41; 71)	78 (50–107)	0.001
• Omega-6	29 (26; 46)	13 (10; 18)	20 (12–28)	0.001	122 (108; 193)	53 (43; 74)	82 (48–115)	0.001
• Omega-3	6 (4; 8)	1.8 (1.4; 2.5)	4 (2.8–4.8)	0.001	145 (104; 190)	44 (35; 62)	96 (70–121)	0.001
Cholesterol, mg	300 (245; 342)	109 (92; 158)	174 (138–210)	0.001	100 (82; 114)	36 (31; 53)	58 (46–70)	0.001
Total carbohydrates, g	379 (333; 452)	228 (200; 288)	157 (110–204)	0.001	145 (128; 173)	88 (77; 110)	60 (42–78)	0.001
Mono-/disaccharides, g	197 (148; 232)	111 (92; 129)	83 (49–117)	0.001	438 (330; 516)	246 (204; 286)	185 (109–260)	0.001
Dietary fibers, g	11 (9; 13)	5 (4; 6)	6 (4–8)	0.001	107 (86; 126)	47 (40; 60)	59 (43–75)	0.001

Note. SAFA — saturated fatty acids, PUFAs — polyunsaturated fatty acids.

Table 3. Frequency of consumption (times per day) of some products by pre-school children with obesity and healthy children

Parameter	Children with obesity, $n=40$	Healthy children, $n=40$	Mean difference (95% CI)	p
Bakery products	5.9 (5.1; 7.5)	4.6 (2.5; 5.9)	1.7 (0.9; 2.6)	0.001
Confectionery	5.3 (4.1; 5.8)	2.4 (1.4; 3.4)	2.4 (1.4; 3.3)	0.001
Dairy	2.2 (1.7; 2.8)	1,1 (0.9; 1.7)	0.9 (0.5; 1.4)	0.001
Potatoes	0.5 (0.4; 0.7)	0.2 (0.1; 0.2)	0.3 (0.2; 0.4)	0.001
Vegetables	2.4 (1.5; 3.3)	1.6 (1.2; 2.2)	0.7 (0; 1.3)	0.004
Fruit	1.8 (1.2; 2.8)	1.2 (0.8; 1.8)	0.7 (0.2; 1.3)	0.001
Fats	2.8 (2; 4.6)	0.8 (0.6; 1.8)	1.9 (1.1; 2.6)	0.001
Meat	2.0 (1.7; 2.7)	1.3 (1; 1.6)	0.8 (0.4; 1.2)	0.001
Fish	0.4 (0.2; 0.5)	0.2 (0.1; 0.4)	0.1 (-0.1; 0.3)	0.021