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## Obesity and Nutritional Programs in Schools

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### Abstract

**Purpose:** To establish whether nutritional programs in special schools for children with neuropsychomotor deficiencies in Romania influence the prevalence of obesity compared to similar programs for unaffected children attending normal schools. **Materials and methods:** The survey included 3,103 pupils (age: 7-18 years): 663 from special schools serving breakfast, lunch and a snack and 2,440 from normal schools benefiting only from the EU fruit and milk in schools program. **Results:** The percentage of obese children in the normal schools was 8.97%, against 6.48% in the special schools. Although the presence of the deficiency implies the existence of several risk factors for obesity, contrary to expectations we find a smaller number of obese children among the children from the special schools. Under these circumstances, where there are multiple risk factors for obesity and food consumption is normal for the age group, with a higher ratio of hyper-caloric food the children with deficiencies have less prevalent obesity. **Conclusions:** The low obesity prevalence in the special schools is due to the nutritional programs these children benefit from. Nutritional programs should be rethought in terms of introducing them in all school types, especially in relation to quantitative standards.

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**Keywords:** nutritional programs; obesity; neuropsychomotor deficiencies.

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### 1. Introduction

In the study conducted by Ogden et al. (2012) it is stated that in the period 2009-2010 the prevalence of child and teenager obesity was 16.9%, unchanged from 2007-2008 in the United States. The prevalence of obesity in children and teenagers aged 2 to 19 years was 18.6% for males and 15% for females.

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From the ‘Report on Health Behaviour – Research on the Children and Teenagers from Romania’ (HBSC/WHO, 2010), which contains information from three databases with 5,504 valid questionnaires, we see that the ratio of children consuming breakfast daily varies between 34% and 54%; daily fruit consumption drops significantly with age; for both boys and girls, the consumption of acidic drinks remains very widespread, over the average of the 42 HBSC countries (2005/2006); the consumption of sweets, chips and fries is highly visible as a food behaviour pattern favouring obesity. Behavioural modification must occur not only among children but also among parents, considering that young people perceive that they can obtain such products from parents any time they want.

The school environment is of great importance for the development of any child, as children spend a great portion of their time at school (Papoutsis et al., 2013). This is especially true for children in special education institutions where meals are served.

Children with neuropsychomotor deficiencies in special education benefit in Romania from a nutrition program controlled and established under the government’s Order 1563 of 2008 September 12. According to this, children with special needs benefit from two meals a day plus a snack, in the order breakfast–snack–lunch. The possibility of introducing controlled nutritional programs also in normal schools in Romania is under discussion, especially for children from disadvantaged families.

There are controversies related to the efficiency of such programs in the reduction of obesity among children, the creation of healthy nutritional habits and the reduction of the school drop-out rate.

At the moment, some initiatives are underway in Europe such as schemes to provide fruit and milk in EU schools.

For the first time in the last 15 years in the US, the National School Lunch Program increased nutritional standards (DeNoon, 2012). USDA, the US agency supervising the School Breakfast Program (SBP) and the National School Lunch Program (NSLP), funded research projects related to these programs (Millimet, Tchernis, and Husain, 2010). The research showed that children participating in both programs tended to be less overweight than those being served only lunch.

Howard and Prakash (2011) found evidence that pupils participating in the state-funded food programs consume more fruits, vegetables and natural juices than those eating meals in the family. They benefit from a healthy food program that is maintained over a longer period of time than the schooling period (Howard, 2011).

Obesity prevention in schools is a complex matter. Data suggests that a multidirectional approach is required in order to make an impact. Nutritional education, food quality and macronutrient content, increased physical activity, and the support of the community and family are all important elements of this change (Lawton, 2012).

The interest in promoting healthy food and physical activity, i.e., a “healthy life-style”, has emerged from the global obesity pandemic (Kraak et al., 2009). The IOM (Institute of Medicine of the National Academy) recommends that food companies use their creativity, resources and practical experience to promote and support healthy food for children and teenagers (McGinnis, 2006).

## **2. Material and method**

The research included 3,103 children, their participation being freely consented to. 2,440 students were taken from normal schools and 663 from special schools for children with neuropsychomotor deficiencies. After correlating the BMI value (body mass index) with specific growth maps for age and sex according to the Center for Disease Control (2000), a questionnaire was sent to 202 of the total of 262 obese children ( $BMI \geq$  percentile  $95/+2DS/age/sex$ ) from the two types of schools: 30 (14.85%) from special schools and 172 (85.14%) from normal schools.

## **3. Results**

### **Food behavior**

The average number of meals consumed daily by the obese children is not significantly different for those with psychomotor deficiencies ( $2.93 \pm 0.52$ ) compared to those without deficiencies ( $2.91 \pm 0.49$ ) ( $t=0.25$ ;  $GL=200$ ;  $p>0.05$ ). Number of snacks: the average snacks consumed daily by the obese children from special schools is significantly higher ( $2.03 \pm 0.70$ ) compared to those from normal schools ( $1.73 \pm 0.98$ ) ( $t=2.03$ ;  $GL=200$ ;  $p<0.05$ ).

Food consumed at breakfast: the distribution of obese children by the main consumed aliments at breakfast highlights the following aspects:

- Most frequently consumed at breakfast is dairy, both for the obese children without deficiencies (42.4%) and those with neuropsychomotor deficiencies (46.7%);
- Bread is consumed by both investigated groups (33-35%);
- Sandwich consumption is around 25% for both groups;
- Cold-cuts consumption is slightly higher for the children with deficiencies (33.3% vs. 22.7%);
- Cereals are frequently consumed in the morning by around 30% of both categories.

Food consumed at lunch: the distribution of the children by the main consumed food at lunch highlights the following aspects:

- Borsch is consumed frequently at lunch by both the obese children without deficiencies (42.4%) and the children with deficiencies (60%);
- Children from both groups frequently consume roasted meat, but especially children with neuropsychomotor deficiencies (33.3% vs. 18.6%);
- Potato consumption at lunch is more frequent among the obese children from normal schools (21.5% vs. 16.7%);
- It is noticeable that dessert is significantly more frequently consumed by the obese children from the special schools compared to those from the normal schools (16.7% vs. 4.7%).

Food consumed at dinner: the inquiry showed that the main food consumed at dinner is:

- For the = obese children with neuropsychomotor deficiencies, potatoes are the most-consumed food at dinner (30%);
- Children from both groups frequently consume dairy (23.3% vs. 26.7%);
- Borsch (23.3% vs. 4.1%) and boiled-vegetable (23.3% vs. 9.3%) consumption is significantly more frequent at dinner within the group of obese children with neuropsychomotor deficiencies; also, with the children with neuropsychomotor deficiencies there is noticeably more frequent consumption at dinner of eggs (23.3% vs. 5.8%) and dessert (9.20% vs. 2.3%);
- It is also noticeable that in the group of obese children from special schools salad is not consumed at dinner.

The proportion of obese children from special schools who prefer roasted food is significantly higher ( $p=0.004$ ) (73.3% vs. 43%). Compared to the obese children without deficiencies, this represents a relative risk of being overweight that is 1.70 times higher ( $RR=1.70$ ;  $IC95\%: 1.29\div 2.25$ ). Boiled food is preferred by 47.7% within the normal-school obese children group and by 53.5% of those from the special schools – a distribution that does not show statistically significant difference ( $p=0.708$ ).

The percent preferring grilled food was significantly higher for the obese children from normal schools (82% vs. 63.3%) ( $p=0.038$ ).

From the study of the main food consumed:

- Cold-cuts are frequently consumed by both obese children with deficiencies (56.7%) and those without deficiencies (39%) -2 times per week;
- Butter or margarine are consumed by around 40% of the obese children with deficiencies and 18.6% of those without deficiencies, most often 1-2 times per week (26.7% vs. 11%);
- Cream consumption is at approximately the same frequency for both studied groups (23.8% vs. 23.3%);
- Fatty meat, pasta and processed cheese are also more frequently consumed by the obese children with deficiencies, without a statistically significant difference (Table 1).

Table 1. Consumption frequency of the most common foods eaten by obese children

Weekly frequency	w/o deficiency		with deficiency		w/o deficiency		with deficiency	
	n	%	n	%	n	%	n	%
<b>Food</b>	<b>Cold cuts</b>				<b>Butter/margarine</b>			
1-2 times	33	19.2	8	26.7	19	11.0	8	26.7
3-4 times	16	9.3	3	10.0	5	2.9	4	13.3
5+ times	18	10.5	6	20.0	8	4.7	0	0
Total	67	39.0	17	56.7	32	18.6	12	40.0
p	0.747				0.110			
<b>Food</b>	<b>Cream</b>				<b>Fatty meat</b>			
1-2 times	28	16.3	4	13.3	6	3.5	2	6.7
3-4 times	9	5.2	3	10.0	3	1.7	3	10.0
5+ times	4	2.3	0	0	4	2.3	1	3.3
Total	41	23.8	7	23.3	13	7.6	6	20.0
p	0.399				0.493			
<b>Food</b>	<b>Pasta</b>				<b>Processed cheese</b>			
1-2 times	3	1.7	2	6.7	28	16.3	7	23.3
3-4 times	1	0.6	1	3.3	8	4.7	4	13.3
5+ times	0	0	0	0	10	5.8	2	6.7
Total	4	2.3	3	10.0	46	26.7	13	43.3
p	0.546				0.555			

The consumption of tomatoes and carrots exceeds 60% for both categories of obese children. For the children with deficiencies associated with obesity, the proportion of the children consuming integral milk was 84.2%, significantly more than for the group of obese children without deficiencies, where the ratio of integral milk consumption was 51.3% ( $\chi^2=8.31$ ; GL=2;  $p=0.016$ ).

Dessert consumption displayed the following characteristics:

- Chocolate consumption was recorded most frequently for both study groups (30.2% vs. 23.3%);
- Biscuit consumption was more frequent for the children with deficiencies (26.7% vs. 14.5%), while the consumption of cookies was noticeable for the group of children without deficiencies (22.1% vs. 13.3%);
- Fruits were preferred by 23.3% of the obese children with deficiencies and only 11% of the children without deficiencies;
- Ice cream was slightly more frequently consumed by the children without deficiencies (12.2% vs. 6.7%) (Table 2).

Table 2. Dessert consumption frequency for obese children

Sweets	Obese w/o deficiencies		Obese with deficiencies		$\chi^2$	p
	n	%	n	%		
Biscuits	25	14.5	8	26.7	1.93	0.164
Cookies	38	22.1	6	13.3	0.07	0.798
Fruits	19	11.0	7	23.3	0.01	0.909
Chocolate	52	30.2	7	23.3	2.43	0.119
Candies	20	11.6	2	6.7	0.24	0.626
Pie	19	11.0	3	10.0	0.02	0.883
Ice cream	21	12.2	2	6.7	0.33	0.568
Wafers	8	4.7	3	10.0	0.57	0.450

The percent of obese children with deficiencies consuming sugar-free juices was 16.7%, slightly higher than for those without deficiencies (9.9%) ( $p=0.434$ ).

Natural juices were preferred by 20.3% of the obese children without deficiencies and by 10% of those with deficiencies, a distribution that is not statistically significant ( $p=0.228$ ).

The percent of children consuming acidic beverages with sugar was 66.7% for the group of obese children with

deficiencies against 43.6% for those without (66.7% vs. 43.6%), a distribution revealing a 1.53-times-higher obesity risk (RR=1.53; IC 95%: 1.13÷2.07).

#### 4. Discussions

Our survey compares two groups of children belonging to two different types of school. We reach the conclusion that, although the children with neuropsychomotor deficiencies have more obesity risk factors, they have a smaller obesity percentage than the normal-school children (6.48% compared to 8.97%). The low obesity prevalence in the special schools is due to the nutritional programs these children benefit from. The comparative analysis of the food behavior shows there is no difference as to the number of meals consumed between the two groups. Although the consumption of hyper-caloric food is higher in among the special-school children (butter, margarine, fatty meat, pasta, processed cheese), they have a lower obesity percentage. Normal-school obese children prefer refined sweets, which are more expensive, whereas in special schools biscuits are served more frequently. These circumstances represent multiple risk factors for obesity with food consumption normal for the age group, but with a higher ratio of hyper-caloric food the children with deficiencies show less prevalent obesity. It seems a re-assessment is required regarding Order 1563 of 12 September 2008, which regulated food consumption in schools, before national-scale nutritional programs are introduced; or rather, there should be a more rigorous compliance with nutritional standards.

Children with neuropsychomotor deficiencies represent a special category with special needs. Romania, after 1989, has recorded a series of changes in all sectors and services, including the field of care for persons with special needs. The fact that our country is now part of the European Union implies a series of obligations, norms and laws that have been adopted and need to be abided by – yet all these also need to be adapted to the specifics of our country. There are not enough allotted funds; nor are there enough specialists (e.g., kinetherapists, social assistants, medics, psychologists, psychiatrists, institutors), or any plan for developing and improving the services system intended for those with special needs. This should be coherent and well-constructed, and applied to real and current problems (Bonea 2011).

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