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ANALYSIS OF RESULTS OF DIET AND PHYSICAL ACTIVITY QUESTIONNAIRES IN PRIMARY SCHOOL STUDENTS

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Abstract. *Obesity is one of the most widespread chronic diseases in the world and reaches the proportions of an non-communicable epidemic. According to the World Health Organization (WHO), the number of obese children doubles every three decades. Childhood obesity is a major factor in the further development of many serious somatic diseases such as: type 2 diabetes, ischemic heart disease, hypertensive disease, asthma and some forms of cancer. These diseases are currently the leading cause of annual death of more than 2.5 million people in industrialized countries. Thus, the early prevention of overweight and childhood obesity is a priority in the health care of a population. The key factors, which favor the development of overweight and obesity in childhood, is high-calorie diet and lack of physical activity. The present study is dedicated to the analysis of the results obtained based on food questionnaires and evaluation of physical activity of primary school students aged 8-9 years. Concrete practical recommendations for the prevention of overweight, rational nutrition, physical activity in educating a healthy lifestyle of the young school age population are discussed.*

Keywords*: obesity, children, nutrition, physical activity, education, healthy lifestyle*

Introduction: Obesity is defined as the accumulation and storage of excess body fat as a result of positive energy balance through increased caloric intake or reduced energy expenditure that poses a health risk, while overweight is body mass that exceeds the reference standard of normal weight [7].

Many factors are involved in the development of obesity, including perinatal, genetic, environmental (lifestyle, eating behavior, level of physical activity), neuroendocrine, etc. Currently, the most common form of obesity in children, in approximately 95% of cases, is the constitutional-exogenous one, associated with excessive intake of calories in conditions of physical inactivity, and the remaining 5% of cases are due to hormonal changes and genetic stress [3].

An increase in the prevalence of obesity among children and adolescents occurred at the end of the century XX and the beginning of the century XXI in almost all countries of the world. Wang Y. et al. conducted a study, based on international references, on the incidence of overweight in children and adolescents aged 6-18 years from 4 countries (between 1975 and 1997). Thus, the prevalence of overweight increased in Brazil (from 4.1% to 13.9%), China (from 6.4% to 7.7%) and the United States (from 15.4% to 25.6 %) while in Russia it decreased (from 15.6% to 9.0%). A similar study was carried out in Great Britain, the results of which showed that in English children the incidence of overweight varied from 22% at the age of 6 to 31% at the age of 15, while obesity varied from 10% at age 6 to 17% at age 15. And in 2007, a study was conducted on the incidence of overweight and obesity, in children aged 6-9 years, from 12 countries of the European region. The highest incidence of overweight in

children was detected in Spain (35.2%) and Portugal (31.5%) and the lowest was in Slovakia (15.2%) France (18.1%), Switzerland (18.3%) and Iceland (18.5%) [2, 3, 10, 16].

According to the latest WHO data, the number of overweight and obese children under the age of five is estimated at over 42 million. And the International Association for the Study of Obesity (IASO) has estimated that more than 200 million school-aged children are overweight. According to IASO forecasts, in 2030 one third of the world's population (3.3 billion) will be overweight, of which 1.1 billion will be obese. Thus, childhood obesity has become one of the most important problems of modern health care. The importance of the problem is obvious, because it is known that from 40% to 80% of obese children remain obese in adulthood [7, 10, 12].

In the Republic of Moldova, researchers Zavalisca A. et al., Dulapciu E., Obreja G. conducted studies, estimating the incidence of obesity among children of different ages. The results of these studies showed that in 2012, 5% of children under 5 were overweight compared to zero in 2005 [7]. And among children aged 7-10 years, the incidence of obesity varies from 9.3% to 13.5% depending on the age of the children [4]. With age, the incidence of overweight in children also increases. Thus, among adolescents, in different areas of the country, overweight in girls varies from 23.3% to 29.9% while in boys from 27.2% to 31.6%, including obesity in girls varied from from 6.6% to 12.2%, respectively in boys from 6.6% to 13.3% [5, 13, 14].

Unfortunately, in our country there is no state service that deals with weight correction and the formation of a healthy lifestyle for overweight and obese children and their parents. Children's clinics do not have enough nutritionists, and district pediatricians have enough problems that require urgent solutions. Thus, overweight children come to the doctor's attention already with advanced obesity and various complications.

As a rule, parents turn to doctors not because of the child's excess weight, but because of the complications induced by the conditions associated with this condition, such as: attitude deficiencies, type 2 diabetes, cardiovascular diseases, etc. [1]. It is currently considered that 70% of obese children have at least one risk factor for cardiovascular disease, while 30% have two or more factors [3]. Also, up to 70% of obese children come to the attention of specialists 5-10 years after the onset of the condition. Arriving at the doctor's consultation, children most often complain of: headache, back and leg pain, discomfort in the heart region, excessive thirst, puberty disorders, etc. [5].

Obesity in children is determined by genetic and behavioral factors that are influenced by the family and community environment, and children can be more easily targeted as a group, for example, in preschool and school settings [6]. From the perspective of US specialists, the obese lifestyle contributes to a large extent to 7 out of 10 serious physical ailments that are the cause of the annual death of over 4 million people [11].

Public health officials believe that, in the long term, there are good economic and medical reasons to prevent childhood obesity that can worsen in adulthood as a result of obesity-related behaviors learned in childhood.

Research methods

50 primary school students, aged 8-9, were included in the research. Anthropometric indices such as height and body weight were assessed. The body length (height) of the children was measured in the sitting position with the help of a medical thaliometer (the accuracy of the measurement was 0.1 cm); children's body weight - with the help of the medical electronic scale (accurate up to 50 g). Body mass index (BMI) was calculated using the formula: body weight (in kg) / height (in m2). And the children's physical development was evaluated according to WHO standards. The BMI value according to age and sex is reported both as percentiles and as the number

of standard deviations (SD) from the mean (which is the z-score or standard deviation score) [18].

A survey of the students included in the study was carried out. The survey contained 10 questions about the diet and daily diet, as well as 12 questions about daily physical activity. All questions were proposed from 2 to 6 answer variants, or to write their own variant. The surveys were completed independently and anonymously by the students included in the study.

The purpose of the study – assessment of the lifestyle and eating behavior of obese primary school students, based on the analysis of the survey results.

Research results

Our study included 50 students with an average age of 8.7 years, whose body mass index (BMI) was equal to or greater than the 95th percentile or from >+1 to +2,0 SDS. Thus, 4 students were assessed as overweight >+1 (SD BMI), obesity degree I ≥+2 SD BMI (38 students) and obesity degree II >+2 SD (8 students).

Table 1 The average values of the anthropometric indices evaluated in the students included in the study (n=50)

Anthropometric indices	Nutritional level according to the 2007 WHO Z-scores (SD).		
	Overweight n (4)	Obesity gr. I n (38)	Obesity gr. II n (8)
Height (cm)	135,5	133,5	138,5
Weight (kg)	36	40,5	46
BMI (kg/m2)	19,55	22,9	23,9

Note: n – the number of students

The mean BMI values for the study group is 22.1 ± 0.53 kg/m2, which corresponds to obesity of the first degree (≥+2 SD BMI). The average values of the anthropometric indices and the nutritional level evaluated in the study group are displayed in the table below (tab. 1).

Compliance with the diet is essential for the health and harmonious physical development of a child. Thus, through a food survey, developed by us, we aimed to elucidate the behavior and eating habits of obese students (8 – 9 years old).

- **The food survey includes:**

- the number and frequency of meals, the inclusion of healthy food products (cereals, fruits, vegetables, dairy products, meat and derivatives, eggs and fish) and products considered unhealthy (fast food, pastries rich in fat and sugar, carbonated drinks) at the main meals and snacks.

The results of the investigation revealed the characteristics of the diet of obese students with the following data:

An important factor in children's nutrition was the frequency and number of meals during the day. Most of the respondents 30 (61.4%) answered that they eat the main meals and 2 snacks a day, while 17 (34.7%) of the students answered that sometimes they do not manage to eat breakfast and 2 (4.1%) have answered that they never eat breakfast (Figure 1).

Only 21 (42.9%) of the respondents regularly eat lunch at the school canteen, what when 23 (46.9%) answered that they sometimes eat lunch and 5 (10.2%) answered that they never eat the lunch that is offered at the school canteen (Figure 2).

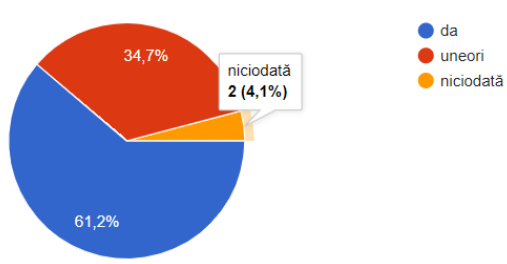

Fig. 1. Breakfast at home

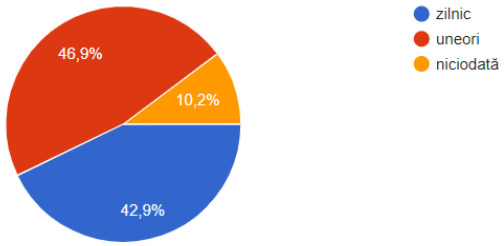

Fig. 2. Lunch at the school canteen

100% of respondents eat dinner regularly. Among the favorite foods for dinner, 22 (44.9%) of the respondents named meat and meat derivatives, 13 (26.5%) answered that they usually eat fast food; 8 (16.3) respondents answered that they consume fruits and vegetables and 6 (10.2%) answered that they prefer milk and milk derivatives (Figure 3).

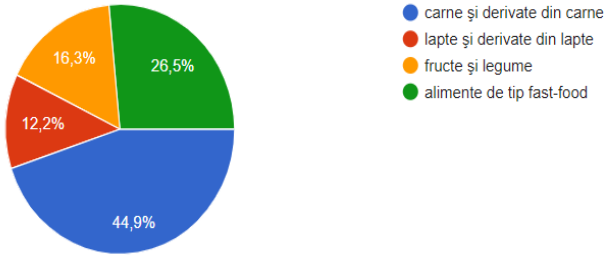

Fig. 3. Children's favorite foods for dinner

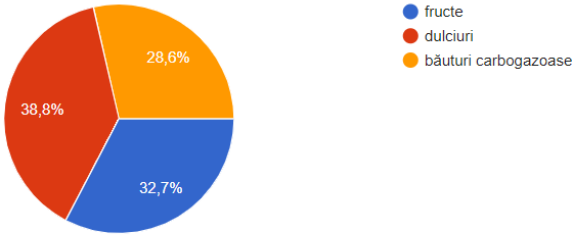

Fig. 4. Children's favorite snacks

Regarding the snacks, between the main meals of the day, the students answered as follows: 19 (38.8%) of the respondents prefer to eat sweets; while 16 (32.7%) of the respondents answered that they prefer to eat fruit and 15 (28.6%) of the respondents answered that they prefer carbonated drinks (fig. 4). The types of food included in the food survey were classified into 7 large groups according to the food pyramid. From a statistical point of view, we highlighted the increased consumption of foods from the 7 included groups as follows:

1. Consume cereals daily: for breakfast 33 (66%) of the respondents; at lunch 9 (18%) of the respondents; at snacks 2 (4%) and at dinner 6 (12%) of the respondents.

2. Fruits consumed daily: at breakfast 12 (24%) of the investigated children answered affirmatively; at lunch 29 (58%) of the respondents; at snacks 3 (6%) and at dinner 4 (8%) of the respondents.

3. Vegetables consumed daily: at breakfast only one child (2%) answered affirmatively; at noon 11 (22%); for snacks 3 children (6%) and for dinner 4 (8%) answered affirmatively from the investigated children.

4. Consume meat and derivatives, fish and eggs daily: at breakfast 4 (8%) of the respondents; at lunch 22 (44%) of the respondents; at snacks 8 (16%) of the respondents and at dinner 15 (30%) of the respondents.

5. Consume milk and milk products daily: at breakfast 49.1% of the respondents; at lunch 24.6% of respondents; at snacks 14% and at dinner 12.3% of the investigated children.

6. Consume fast food every day: for breakfast 1 (1.8%) of the respondents; at lunch

10.5% of respondents; at snacks 15.8% and at dinner 17.5% of the respondents.

7. Consume sweets, juices and carbonated drinks daily: at breakfast 2 (4%) of the respondents; at lunch 12 (24%) of the respondents; at snacks 25 (50%) and at dinner 6 (12%) of the respondents.

During the preschool period, a primary role in physical and psycho-motor development is attributed to the child's daily physical activity.

➢ **The survey of physical activities includes:**

- participation in physical education classes, sport practiced regularly in the sports sections organized in the educational institution or in the city (in the last 6 months), duration of physical activities in free time (more or less than 7 hours per week); the time spent in front of the TV, computer, video game screens (from less than 2 hours/day to more than 4 hours/day).

The results of the physical activities assessment survey elucidated the following:

46 (92.2%) of the respondents regularly participate in physical education classes, while 4 (7.8%) answered that they do not regularly participate in physical education lessons (Figure 5).

In their free time, they do regular physical activity (2-3 times a week) at sports clubs organized in school or in the city: 24 (47.1%) of the respondents, while 27 (52.9%) of the respondents gave a negative answer (Figure 6).

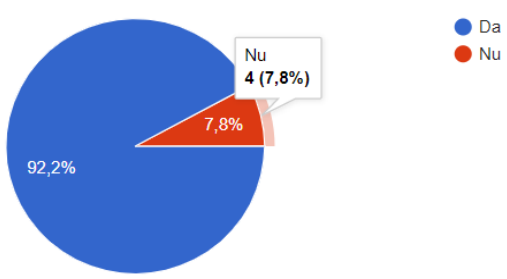

Fig. 5. The percentage of students who participate in education classes

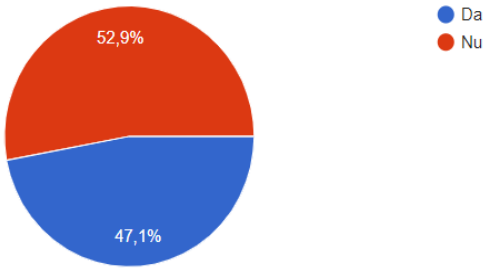

Fig. 6. The percentage of students who do regular physical activity in their free time

Some respondents do moderate to vigorous physical activity, but not regularly: 35 (68.6%) of the respondents and 16 (31.4%) answered negatively (Figure 7).

Preferred sports activities as an activity in their free time: 5 (10%) of the respondents prefer cycling, 4 (8%) respondents prefer swimming, football is the favorite sport of 5 (10%) of the respondents, dancing is the favorite sport of 10 (20%) of the respondents, 3 (6%) of the respondents deal with martial arts and 5 (10%) of the respondents do other sports (Figure 8).

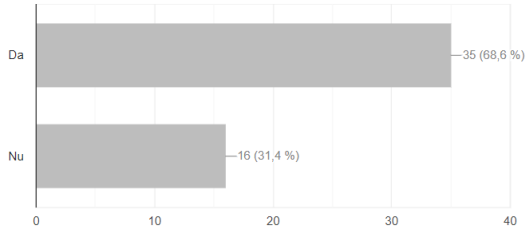

Fig. 7 The percentage of students who do physical activities but not regularly

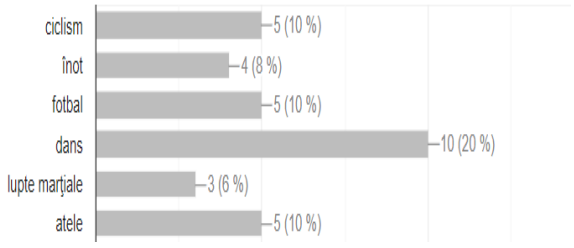

Fig. 8 The percentage of sports practiced in free time by the students included in the study

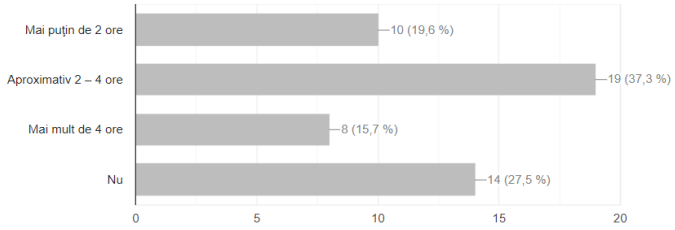

Fig. 9. The time spent daily by the students involved in studying in front of the television, computer or video games

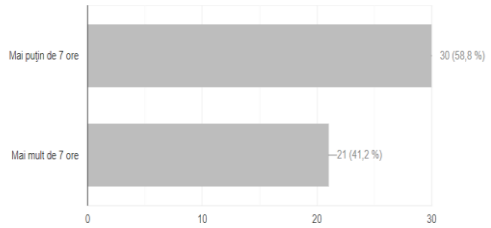

Fig. 10. Duration of time spent on physical activities during free time per week

Time spent in front of the TV, computer or video games by the students included in the study: 10 (19.6%) of the respondents spend less than 2 hours/day, approximately 2-4 hours/day – 19 (37.3%) , more than 4 hours/day – 8 (15.7%) of the respondents and 14 (27.5%) of the respondents answered negatively (Fig. 9).

Duration of time devoted to physical activities during free time per week: less than 7 hours/week 29 (58.8%) of the respondents and more than 7 hours/week were answered by 21 (41.2%) of the respondents (Fig. 10).

Discussions

Childhood is the period in which a person forms eating and behavioral habits, which are preserved until adulthood. Deficiencies in the diet and lack of physical activity increase the risk of developing a number of serious somatic diseases. Thus, the policies developed and promoted by the WHO, together with the national ministries of health in the European Region, claim that early intervention with the annual monitoring of the BMI, simultaneously evaluating the diet and the level of physical activity, is of particular importance for combating obesity in childhood for all children aged between 5 and 18 [17].

The results obtained from the survey, which estimates the way of life of obese students aged 8-9, demonstrate that 92.2% of students regularly participate in physical education lessons, and 66.6% of respondents are additionally engaged in sports sections 2-3 times a week, but in their free time only 47.1% dedicate to physical activity. Daily, approximately from 2 to 4 hours of their free time, 37.7% of the respondents spend it in front of the TV, computer and video games, favoring a sedentary lifestyle. Regarding the dietary behavior of the investigated students, it is revealed that: the majority of respondents, 61.4%, respect the daily regime with 3 main meals and 2 snacks. But their daily diet is poor in cereals, fruits and fresh vegetables. Thus, only 66% consume cereals daily, while only 24% consume fruits daily, while only 22% of respondents consume fresh vegetables. For snacks, 38.8% of respondents prefer baked goods and candies, 28.6% carbonated drinks and 16.3% fast food.

Thus, we observe that, in the first years of school, children radically change both their eating behavior and locomotor regime. Due to the specificity of the instructional-educational process, most of the time children spend at school is in a static position, reducing their physical activity a lot. According to the guidelines promoted by the WHO, developed by specialists in physical activity and nutrition, school-age children are recommended to do daily physical activity, up to 60 minutes. Types of physical activity include: dynamic games, sports games, walking and cycling, travelling, swimming, activities in school sports clubs, etc. It is also necessary to limit the time in front of the TV, computer and video games to less than 2 hours a day. Regarding the child's diet, the main responsibility lies with the parents, who decide what to feed their children for breakfast, dinner and snacks. Thus, they must know that the school-age child's daily diet must include: 5 portions of cereal products (40%), 3-4

portions of vegetables and fruits (35%), 1-2 portions of dairy products and a proportion of meat and meat products (20%), and regarding sugar, pastry and fast food to be reduced to limited quantities (5%).

Conclusions:

1. Some of the most important threats to health, at the current stage, are represented by chronic non-communicable diseases including obesity. There is indisputable scientific evidence that proves that a large part of these diseases can be prevented by changing the person's lifestyle.

2. An important landmark for children's healthy lifestyle education is kindergarten and school, but the essential role is played by the family.

3. The key to health in adulthood can be by eradicating harmful eating habits and optimizing the locomotor regimen of the daily routine and stimulating the child's own motivation for a healthy lifestyle.

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