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## INCIDENCE OF OVERWEIGHT AND OBESITY IN CHILDREN AGED 7-10 AT NATIONAL AND INTERNATIONAL LEVEL

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**Abstract.** *In the 21st century, childhood obesity has become a major public health problem. According to data reported by the European Commission for 2014, over 22 million children in the European Union are considered overweight or obese and this number increases every year by 400,000. The increased incidence of childhood obesity is a very dangerous trend because in the long run it can cause serious health problems such as cardiovascular disease, type 2 diabetes, high blood pressure, various forms of cancer and other major chronic diseases. In the last 10 years, various initiatives and actions have been launched in Europe to combat childhood obesity. However, progress in combating childhood obesity has been slow and inconsistent across the region. Thus, in 2019, over 398,000 children aged between 6 and 9 were severely obese in Europe. In 2009, according to the World Health Organization (WHO), the Republic of Moldova was on the last place in the top of European countries with the lowest rate of severe obesity. In 2019, we proposed a study on the incidence of obesity among children aged 7-10 years and found that compared to WHO data in 2009 their number increased from 1% (2009) to 10.6% (2019).*

**Keywords:** *epidemiology, prevalence, obesity, children aged 7- 10 years.*

### Introduction

Childhood obesity is one of the worst health problems of the 21st century. The World Health Organization (WHO) reports that the number of overweight people has tripled in the last two decades. In 2014, more than 500 million obese patients were registered in European Union countries, of which 30 million overweight children and adolescents and 15 million obese children and adolescents [1].

Globally, in 2016, there were over 340 million children and adolescents aged 5 to 19 who were overweight or obese [8].

WHO defines obesity as a chronic eating disorder characterized by an increase in body weight, over 25% of normal weight, due to the accumulation of a large amount of fat in the

subcutaneous tissue and around the viscera, which can have a negative effect on health, which involves low life expectancy and / or impaired quality of life.

Understanding childhood obesity trends is important because it has many adverse health effects in both children and adults. Many of the severe somatic diseases associated with obesity, which were previously considered adult diseases, now affect children as well. Childhood obesity includes high blood pressure, type 2 diabetes, dyslipidemia, left ventricular hypertrophy, non-alcoholic steatohepatitis, obstructive sleep apnea and orthopedic problems, as well as social and psychological problems. Obese children are also 3 times more likely to have high blood

pressure than children of normal weight. [2, 4, 6].

The WHO officially recognized the global nature of the obesity epidemic as early in 1993. And the progressive growth of this disease, both among children and adults, has led to widespread demands for systematic monitoring of changes in overweight and obesity prevalence in all countries. In 2006, the WHO set up the European Childhood Obesity Surveillance Initiative (COSI) – a unique anthropometric index collection system that monitors the incidence of overweight and obesity in the European region among the primary school-age population [11].

Studies on the risks associated with obesity show that 50% of obese children will become obese adults [6]. The risk of children who developed obesity in the first years of life is 80% to become obese adults (for those with both parents obese) and 40% for children with one obese parent [2].

Obesity among adults in Europe is responsible for about 80% of cases of type 2 diabetes, 35% of ischemic heart disease and 55% of cases of hypertension [4].

Thus, it is important to monitor childhood obesity in terms of its incidence, as well as risk factors, which develop throughout life and influence the health and quality of life of those individuals.

### Materials and methods

A secondary study was conducted, a narrative review of scientific bibliographic sources dedicated to the problem of the prevalence of childhood obesity. The analysis is based on specialized literary sources of national and foreign authors (USA, Romania, Russia, etc.) and reports of the World Health Organization, published between 2006 and 2020. The analyzed sources were classified in the following sections: context, definition overweight and obesity in children, the incidence of childhood obesity in European Union countries including the Republic of Moldova.

Also, the analysis, processing and interpretation of data obtained based on its own study on the incidence of obesity among school-age children (7-10 years) in Chisinau conducted between 2018 and 2019.

### Research results and discussions

In the last century, most research and nutrition policies have focused on assessing and monitoring the incidence of overweight and obesity in children and adolescents.

Based on the analysis of the national and international literature and the reports of international organizations on the incidence of overweight and obesity in children aged 7-10, we found the following situation.

According to the results obtained and published in the first three rounds of COSI (2007 - 2012), Moldova ranks last in the top of European countries with the lowest rate of childhood obesity. Out of the total number of 2,573 (children aged 6-7 years) included in the study, 1% of children were diagnosed with severe obesity, of which 0.6% - girls and 1.4% - boys, respectively. The highest incidence of severe obesity among children (aged 6-8 years) was found in Greece, followed by San Marino, where 4.8% and - 4.6% of children with severe obesity were detected. [9].

In Russia, a study was conducted comparing data on the dynamics of the incidence of excess body mass in young children of school age (8-11 years) between 2008 and 2017. As a result of the study, it was found that during the age of 10, the incidence of obesity among young school children increased 2.4 times, respectively in 2008 it was found that 6.7% of the children examined were obese, while in 2017 their number increased to 15.8%. It turned out that, depending on the age of the children, the prevalence of obesity among boys is higher than among girls in both 2008 and 2017. Respectively, the prevalence of obesity in boys ranged from 8.7% to 20.2% compared to prevalence variations in girls ranged from 4.6% to 11.7% [10].

Within 10 years in Romania the number of obese children has constantly increased from 2.2% to 13.9%. These results are presented in the report on childhood obesity surveillance COSI in round I (2007 - 2008) and, respectively, the national report of Romania in the fifth round of COSI (2018 - 2019). According to COSI data from the first round in Romania, 4,274 children (aged 6-9 years) were examined and 2.2% of obese children were identified, of which 3.8% were boys and respectively 0.5% - girls [9]. According to the national report of Romania, in the fifth round of COSI, 10,393 children aged 7-9 years were examined, of which 16.4% were obese - boys and 11.6% respectively - girls and a total of 13.9% obese children [3].

In the second round of COSI data collection (2009 - 2010), 22 member states of the European Union participated, including the Republic of Moldova. According to the results obtained, the Republic of Moldova is on the last place in the top of the European countries with the lowest rate of obesity among children. The prevalence of obesity in Moldovan children aged 6-7 years is 1%, of which 0.6% - girls and 1.4% - boys, respectively [9].

Analyzing the reports of international and national organizations on the incidence of overweight and obesity among children aged 7-9 years, we can report with regret that in the Republic of Moldova there are no reports and statistics for targeted identification of overweight and obesity in young school children.

We present the results of two national studies that included over 400 young school

children [5, 14], in which both anthropometric indices and the incidence of obesity (based on the BMI defined by the WHO) in children were assessed and analyzed the adolescents from the Republic of Moldova.

According to the results of the study published in 2014 by Zavalîșca A., Demcenco P. and others, out of 742 young school children, the share of obese children varies from 5.3% (1.6 - 6.6) among girls, respectively up to 7.8% (1.7 - 8.3) among boys.

In the period 2014 - 2016, the authors Friptuleac G. and Cernelev N., conducted a selective study, with the participation of 1368 students from various pre-university institutions in Chisinau. Based on the analysis and processing of the data of this study, it was found that in the age group 7 - 10 years (N = 459) children with excess body mass constitute 23.6%, of which  $16.8 \pm 1.7\%$  children are overweight and  $6.8 \pm 1.2\%$  are obese [5].

Between 2018 and 2019, we set out to conduct a study that included 695 children aged 7 to 10 from three pre-university institutions in Chisinau. The study aimed to assess nutritional status and determine the incidence of overweight and obesity among the children included in the study, comparing the body mass index (BMI, kg / m<sup>2</sup>) using the 2000 growth charts developed by the Center for Disease Control and Prevention (CDC, 2000) in the USA and the growth curves issued by the WHO in 2006 and 2007. The description of the quantitative data was made using the average values (5th - 95th percentile) and (z - scores) BMI depending on age (years) and gender (Table 1).

**Table 1. Standardization of nutritional status in children by BMI percentages (CDC 2000, WHO 2007)**

STATE OF NUTRITION	BMI PERCENTAGE
Obesity	BMI $\geq$ 95th percentile (+2DS) / sex / age
Overweight	$85 \leq$ BMI < 94th percentile (+1 and + 2DS) / sex / age
Normal weight	$5 \leq$ BMI < 85th percentile (+ 1DS) / sex / age
Underweight	BMI < 5th percentile (- 3 and -2DS) / sex / age

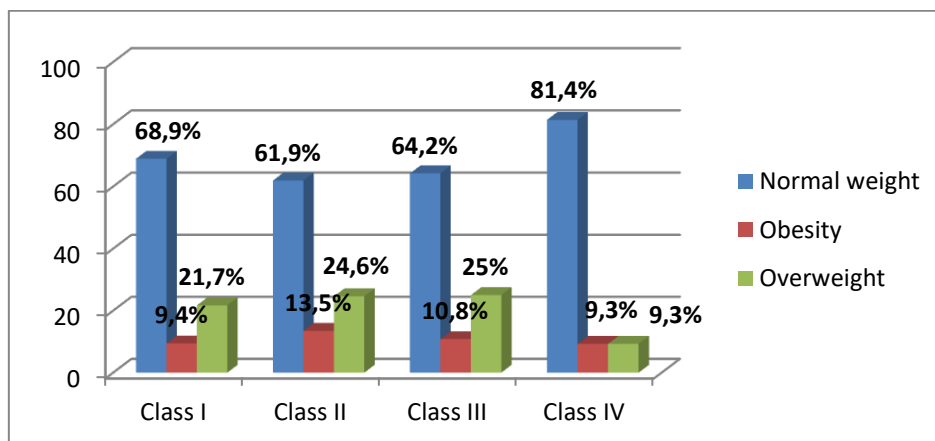
As a result of this study, we found that out of the total number (N = 695) of children included in the study, 482 (69.4%) are normal weight children, 139 (20%) - overweight and 74 (10.6%) - obese, of which 39 (10.9%) - boys and 35 (10.4%) - girls, respectively. In the first class, out of 212 children, 68.9% are normal weight, 21.7% are overweight and 9.4% are obese (of which 8.4% - girls and 10.2% - boys). In the second class, out of 163 children, 61.9% are normal-weight, 24.6% are overweight and 13.5% are obese, of which 12.2% are girls and 15.1% are boys. In class III of 148 children - 95 (64.2%) are normal weight, 37 (25%) are overweight and 16

(10.8%) are obese, of which 10 (14%) - girls and 6 (7.6%) - boys. In the fourth class of 172 - 140 (81.4%) are normal weight, 16 (9.3%) - overweight and 16 (9.3%) obese, respectively, of which 7.2% - girls and 11, 2 boys. Starting from the above, it can be deduced that during the years 2018 - 2019, the incidence of obesity among children aged 7-10 years, from pre-university institutions in Chisinau, varies from 9.3% to 13.5% depending on the age and gender of the children (Figure 1). The cumulative incidence of overweight and obesity is higher in boys - 32.4%, compared to girls - 18.1% (Table 2).

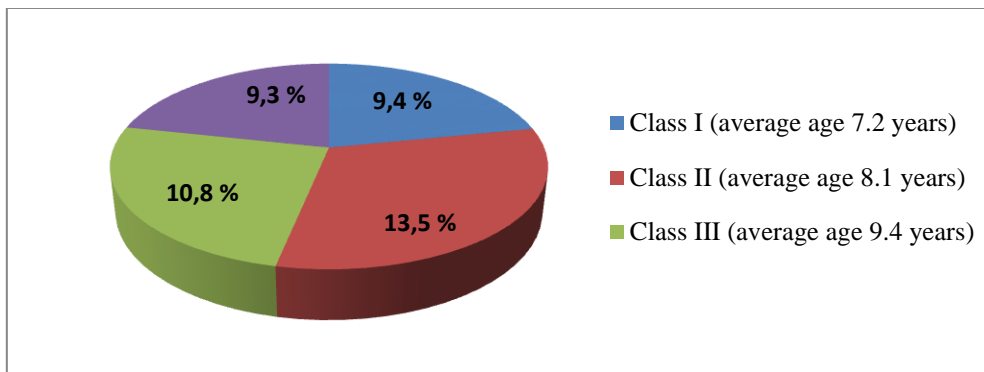
**Table 2. BMI variation in children aged 7 to 10 years (n = 695)**

Class	Gender	Normal weight n (%)	Overweight n (%)	Obese n (%)
I <sup>st</sup>	G (n = 95)	73 (76,9)	14 (14,7)	8 (8,4)
	B (n = 117)	73 (62,4)	32 (27,4)	12 (10,2)
	Total (n = 212)	146 (68,9)	46 (21,7)	20 (9,4)
II <sup>nd</sup>	G (n = 90)	59 (65,6)	20 (22,2)	11 (12,2)
	B (n = 73)	42 (57,5)	20 (27,4)	11 (15,1)
	Total (n=163)	101 (61,9)	40 (24,6)	22 (13,5)
III <sup>th</sup>	G (n = 69)	40 (58)	19 (27,5)	10 (14,5)
	B n= (79)	55 (69,6)	18 (22,8)	6 (7,6)
	Total (n= 148)	95 (64,2)	37 (25)	16 (10,8)
IV <sup>th</sup>	G (n= 83)	68 (81,9)	9 (10,9)	6 (7,2)
	B (n=89)	72 (80,9)	7 (7,9)	10 (11,2)
	Total (n=172)	140 (81,4)	16 (9,3)	16 (9,3)
Total	G (n=337)	240 (71,2)	62 (18,4)	35 (10,4)
	B (n=358)	242 (67,6)	77 (21,5)	39 (10,9)
	Total (n=695)	482 (69,4)	139 (20)	74 (10,6)

Note\* n - number of children; G - girls; B - boys



**Fig. 1 Incidence of overweight and obesity in students in grades I - IV**



*Fig. 2 Prevalence of obesity depending on children's age and school class*

Comparing the results obtained in our study, we observe that the incidence of obesity prevails in the second class pupils, the average age being 8.1 years and constitutes 13.5%, and the lowest incidence of obesity was found to be in the pupils from class IV, the average age being 10.3 years and respectively constitutes 9.3% (Figure 2). The incidence of obesity in children aged 7 to 10 years (N = 695) in pre-university institutions in Chisinau is 10.6%.

#### **Conclusions:**

Based on the results of studies published in national and foreign journals on the incidence of obesity in children aged 6-10 years in the Republic of Moldova, we can conclude that in 2009-2019 the number of obese children in our country increased from 1%

in 2009 gradually and progressively up to 10.6% according to the results obtained in our study.

According to the results obtained in our study which included 695 children aged 7-10 years, we found that the incidence of obesity varies between 9.3% and 13.5% depending on the age of the children. The cumulative incidence of overweight and obesity is higher in boys - 32.4% compared to girls - 18.1%. Of the total number of children included in the study, 10.6% are obese.

Thus, we can say with certainty that childhood obesity remains an important public health problem at the national level, as its incidence among children continues to increase and, respectively, affects the health and quality of life of the young generation.

#### **References:**

1. Branca F., Nikogosian H., Lobstein T. (2007). The challenge of obesity in the European Region and the strategies for response. Summary. World Health Organization 2007. Disponibil: [https://www.euro.who.int/\\_data/assets/pdf\\_file/0008/98243/E89858.pdf](https://www.euro.who.int/_data/assets/pdf_file/0008/98243/E89858.pdf)
2. Bray G., Bouchard C. (2014). Handbook of Obesity. Clinical Applications. Volume 2. Fourth Edition. CRC Press Taylor & Francis Group. ISBN-13: 978-1-84184-982-9 (eBook- PDF)
3. Evaluarea stării de nutriție a copiilor din ciclul primar conform OMS prin participarea la proiectul „European childhood obesity surveillanse initiative (COSI)”, Raport Național România (2020) Disponibil: [https://insp.gov.ro/download/cnepss/stare-de-sanatate/rapoarte\\_si\\_studii\\_despre\\_starea\\_de\\_sanatate/sanatatea\\_copiilor/rapoarte-nationale/COSI-2019-raport-final.pdf](https://insp.gov.ro/download/cnepss/stare-de-sanatate/rapoarte_si_studii_despre_starea_de_sanatate/sanatatea_copiilor/rapoarte-nationale/COSI-2019-raport-final.pdf)
4. Flynn M.A., McNeil D.A., Maloff B. et al. (2006). Reducing obesity and related chronic disease risk in children and youth: a synthesis of evidence with 'best practice' recommendations. In: *Obes Rev*; 7 Suppl 1:7-66. doi: 10.1111/j.1467-789X.2006.00242.x.

5. Friptuleac, G., Cernelea, N. (2017). Studiul obezității la studenții instituțiilor preuniversitare din mediul urban și evaluarea unor indicatori ai sănătății. În: Sănătate Publică, Economie și Management în Medicină, nr. 1(71), p. 8-12. ISSN 1729-8687
6. Mladovsky, P., Allin, S., Masseria, C. et al. (2009). Health in the European Union. Trends and analysis. Copenhagen: WHO Regional office for Europe. ISBN 9789289041904
7. Nittari G., Scuri St., Sagaro G., Petreli F., Grappasonni I., Epidemiology of Obesity in Children and Adolescent. DOI:10.5772/intechpen.93604
8. Ogden C.L., Carroll M.D., Curtin L.R., McDowell M.A., Tabak C.J., Flegal K.M. (2006). Prevalence of overweight and obesity in the United States, 1999-2004. JAMA; 295:1549-1555. doi:10.1001/jama.295.13.1549
9. Spinelli A., Buoncristiano M., Kocacs V., Yngve A. (2019). Prevalence of Severe Obesity among Primary School Children in 21 European Countries anuary. In: Obesity Facts 12(2): 244-258 DOI:10.1159/000500436
10. Suplova L., Smetanina S., et al. (2019). Dynamics of overweight and obesity in children of young school age in the Tyumen Region. In: Obesity and metabolism.; 16(1): 34-38
11. Trudy M.A. Wijnhoven și colab. (2014). WHO European Childhood Obesity Surveillance Initiative: School Nutrition Environment and Body Mass Index in Primary Schools. In: Int. J. Environ. Res. Public Health, 11(11), 11261-11285 <https://doi.org/10.3390%2Fijerph11111261>
12. WHO European Ministerial Conference on Nutrition and Noncommunicable Diseases in the Context of Health 2020, 4-5 July 2013, Vienna, Austria.
13. Zavalisca A., Corman M. (2019). Study On The Impact Of Obesity On Physical Development Of Primary Classes In The Republic Of Moldova. În: Sport & Society / Sport si Societate, Vol. 19 Issue 1, p.107-111. DOI: 10.36836/UAIC/FEFS/10.42
14. Zavalisca, A., Demcenco, P. și col. (2014). Rezultatele cercetării științifice din cadrul proiectului instituțional „Tendințe contemporane pentru menținerea unui stil de viață sănătos, prin profilaxia și recuperarea deficiențelor musculo-scheletice la populația de vârstă școlară prin metode fizice”. Chișinău, 2014. ISBN 978-9975-51-597-9
15. BMI-for-age of girls using z-scores, WHO 2007, Disponibil: [http://www.who.int/growthref/cht\\_bmifa\\_girls\\_z\\_5\\_19years.pdf?ua=1](http://www.who.int/growthref/cht_bmifa_girls_z_5_19years.pdf?ua=1).