

METABOLIC SYNDROME IN CHILDREN

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Abstract: Metabolic syndrome (MS) represents a clinical entity recently described in children. In 2007, the International Diabetes Foundation published a unique definition for children and adolescents. The authors present the definition according to age-groups, the prevalence and the methods of prevention and treatment of MS. Conclusions: the most important instrument for the prevention of MS is the prevention or the treatment of obesity. Educational programmes are needed for lifestyle optimization as a measure for the prevention of MS.

Keywords: metabolic syndrome, obesity, children

Rezumat: Sindromul metabolic (SM) reprezintă o entitate clinică relativ recent descrisă la copil. În 2007, International Diabetes Foundation a publicat definiția unică pentru copii și adolescenți. Autorii prezintă definiția pe grupe de vârstă, prevalența, modalitățile de prevenire și tratament ale SM. Concluzii: cel mai important instrument pentru prevenirea SM este prevenirea sau tratamentul obezității. De asemenea, sunt necesare programe educaționale pentru optimizarea stilului de viață ca măsură de prevenire a SM.

Cuvinte cheie: sindrom metabolic, obezitate, copil

INTRODUCTION

In the last decades the prevalence and severity of childhood obesity are increasing dramatically and are becoming a public health problem. The International Obesity Task Force (IOTF) reported that 10% of school-aged children (representing 155 million children) are overweight or obese and one third of overweight children and one half of overweight adolescents become obese as adults.(9)

Described by Reaven et al in 1998, MS is a frequent subject of attention and debate in medical research, because its linkages to the obesity on the one hand and both diabetes mellitus (DM) and cardiovascular disease on the other.(8) Although the components of the MS were first described over 40 years ago, it was only recently in 2007 that International Diabetes Foundation (IDF) published a unique definition valid for children and adolescents. The new IDF definition is inspired by the definition of MS in adults worldwide accepted. Similarly to the adult criteria, waist measurement is the main component because it is an independent predictor of insuline resistance, lipid levels and blood pressure – all

components of MS. IDF proposed a definition according to age-groups: age 6 years to younger than 10 years; age 10 years to younger than 16 years; 16 years and old (table 1). Because of insufficient data in children younger than 6 years, this age group was excluded from the definition.

A diagnosis of MS can be made with abdominal obesity and the presence of two or more of the other components mentioned in table 1. The prevalence of MS in children and adolescents is low (3-4%) when compared to the adult population, but is different in obese adolescents. The prevalence of MS in USA adolescents who participated in third National Health and Nutrition Examination Survey (NHANES III) was 6,8% in overweight and 28,7% in obese adolescents. (3) According to National Cholesterol Education Program – Adult Treatment Panel (NCEP-ATP III) criteria adapted for children, the prevalence of MS was 18,6%, with a higher rate among pubertal children (26,2%) than among prepubertal children (12,7%). There were no significant differences by sex.(2) The prevalence of MS increase with the severity of obesity and reach 50 percent in severe obesity. (5,9) For each increase in the age-specific body mass index (BMI) percentile of 10 points, the risk of adult MS increase with 24% and inversely.(6) Besides obesity, low birth weight, increased gain in body mass in early childhood, decreased pubertal insulin sensitivity and clinical markers of insulin resistance (acanthosis nigricans, polycystic ovarian syndrome, premature adrenarche) confer risk of MS.(1) The children with MS were about 13 times more likely to have cardiovascular disease and 6,5 times more likely to have T2DM than children who didn't have MS.(6,7)

Evaluating 5-to-19 years old children for MS and family history of diabetes could identify children at increased risk of adult MS and T2DM, allowing prospective primary prevention of these outcomes.(6)

In children with risk for MS we recommend the improvement of lifestyle by:

- moderate calories restriction with changes in dietary composition: decreased lipids consumption, especially of lipids of animal origin, limitation meat consumption, avoid hypercaloric fast-food products with high trans-fatty acids content;
- increase physical exercise (30-50 minutes per day, 4-5 times per week).

CLINICAL ASPECTS

Table no. 1. Criteria for the definition of MS in children and adolescents by IDF (9)

Age (years)	Obesity (WC)	Triglycerides	HDL-cholesterol	Blood pressure (mmHg)	Glycaemia or known type 2 diabetes mellitus(T2DM)
6-10	≥90 th percentile	MS cannot be diagnosed, but further measurements should be made if there is a family history of MS, T2DM, dyslipidemia, cardiovascular disease, hypertension and/or obesity			
10-16	≥90 th percentile	≥1,7 mmol/l or ≥150 mg/dl	<1,03 mmol/l or <40 mg/dl	Systolic ≥130 Diastolic ≥85	≥5,6 mmol/l or >100 mg/dl
Over 16	Use existing IDF criteria for adults				
	WC≥94cm in boys WC≥80cm In girls	≥1,7 mmol/l	<1,03 mmol/l or <40 mg/dl in boys <1,29 mmol/l or <50 mg/dl in girls	Systolic ≥130 Diastolic ≥85	≥5,6 mmol/l or >100 mg/dl known T2DM

In children with MS, the efficient treatment must address to different components of the disease. It is important the control of risk factors:

- the weight control with the maintaining of BMI in normal limits;
- the control of hypertension;
- decreased triglycerides under 150 mg/dl;
- maintaining glycaemia á jeun under 100 mg/dl;
- increased the value of HDL-cholesterol.

Clinical trials in adolescents found that Metformin induces weight reductions of about 3 kg or 1,5 BMI units.(4)

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CONCLUSIONS

1. The most efficient instrument for the prevention of MS in children is represented by prevention or treatment of obesity.
2. Educational programs are needed for children and their families for the improvement of lifestyle as measure of prevention of MS.
3. Correct management offers the possibility to reduce the risk for T2DM, high blood pressure and other associated diseases.

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