The American Journal of Medical Sciences and Pharmaceutical Research ISSN 2689-1026 Volume 08 - 2026

Diagnostic Criteria for Recognition of Obesity and Metabolic Disorders in Children

Valihadjayeva Umida Hakimhadjayevna
Assistant, departments Propedeutics of Pediatric Diseases (Part 2)" Tashkent State Medical University, Uzbekistan

Received: 06 Feb 2027 | Received Revised Version: 20 Feb 2026 | Accepted: 08 Mar 2026 | Published: 31 Mar 2026

Volume 08 Issue 03 2026 | Crossref DOI: 10.37547/tajmspr/Volume08Issue03-18

Abstract

This article provides a comprehensive analysis of diagnostic criteria for obesity and metabolic disorders in children from the perspective of modern clinical medicine and evidence-based pediatrics. Anthropometric, biochemical, and hormonal indicators that allow for the detection of early stages of metabolic dysfunction are considered. It is shown that the use of isolated criteria (e.g., body mass index alone) limits diagnostic accuracy and does not reflect the true degree of visceral obesity and insulin resistance.

Keywords: Childhood obesity, metabolic syndrome, body mass index, insulin resistance, lipid profile, visceral fat, pediatrics, diagnostics, HOMA-IR, glycemia.

Cite This Article: Valihadjayeva Umida Hakimhadjayevna. (2026). Diagnostic Criteria for Recognition of Obesity and Metabolic Disorders in Children. The American Journal of Medical Sciences and Pharmaceutical Research, 8(03), 176–179. https://doi.org/10.37547/tajmspr/Volume08Issue03-18

1. Introduction

The increasing prevalence of obesity among children creates a serious medical and social problem that affects not only the current level of health, but also the long-term risks of chronic non-communicable diseases. Epidemiological studies show a steady trend towards an increase in the proportion of children with overweight: in a number of countries the figure exceeds 20%, and in urbanized regions it reaches 25–27%. Metabolic disorders are registered in 30–40% of obese patients already in prepubertal age.

The physiological characteristics of the child's body, including active growth and hormonal changes, make it difficult to use universal diagnostic scales used in adults. This requires the development of age-specific criteria based on percentile distributions and developmental dynamics.

The modern concept of obesity considers it as a chronic metabolic disease involving neuroendocrine mechanisms, inflammatory processes and genetic factors. Visceral obesity plays a key role in the formation of insulin resistance, dyslipidemia and arterial hypertension.

The purpose of the study is to systematize diagnostic criteria for obesity and metabolic disorders in children, taking into account modern clinical and laboratory approaches.

The study is based on the analysis of data from clinical observations, epidemiological studies and international recommendations (WHO, IDF, ADA). A comparative analytical method was used to assess the diagnostic significance of various indicators.

The sample includes the results of examinations of children aged 6 to 17 years, stratified by gender and age.

Anthropometric parameters were assessed using body mass index (BMI) with interpretation using percentile tables:

• ≥85th percentile – overweight

• ≥95th percentile – obesity

Additionally analyzed:

• waist circumference (WC)

• waist/height ratio (WHtR ≥ 0.5)

• bioimpedansometry to assess fat mass

Biochemical studies included:

• fasting glucose (≥5.6 mmol/l - violation)

• insulin level

• HOMA-IR index (>3.16 in children - a sign of insulin resistance)

• lipid profile (TG ≥1.7 mmol/l, HDL <1.03 mmol/l)

Statistical processing was performed using correlation analysis and regression models.

2. Results

The analysis showed that using BMI alone underestimates the risk of metabolic disorders in 18–25% of children. It was found that about 32% of patients with normal BMI, but increased waist circumference, had signs of insulin resistance.

Among the obese children examined:

• insulin resistance was detected in 41%

• dyslipidemia - 37%

• arterial hypertension - in 18%

There is a strong correlation between the level of visceral fat and the HOMA-IR index (r = 0.62), which confirms the pathogenetic role of abdominal obesity.

Biochemical analysis showed an increase in triglyceride levels by 28–35% in children with severe obesity compared to the control group. At the same time, a decrease in HDL by 15–20% was recorded, which indicates the formation of an atherogenic profile. Of particular importance is the identification of subclinical inflammation: the level of C-reactive protein in obese children was 2-3 times higher than normal, which indicates a chronic inflammatory process.

An analytical comparison of the results obtained with international clinical guidelines demonstrates that the diagnosis of obesity in children requires a multicomponent approach, since excess body weight is only an external manifestation of underlying metabolic disorders. Using body mass index (BMI) exclusively limits diagnostic sensitivity because this indicator does not reflect the distribution of adipose tissue and does not identify visceral obesity, which has the greatest pathogenetic significance.

In the study sample, up to 24% of children with normal BMI values had elevated waist circumference and signs of metabolic dysfunction, which confirms the need to expand diagnostic criteria. The pathophysiological mechanisms of obesity in children are formed under the influence of a complex of factors, including genetic predisposition, physical inactivity and eating disorders. Visceral adipose tissue functions as an endocrine organ that secretes adipokines and proinflammatory cytokines, including leptin, resistin, TNF-α, and interleukin-6.

Their excess production leads to a decrease in the sensitivity of insulin receptors, which triggers a cascade of metabolic changes, including hyperinsulinemia and impaired glucose utilization. It has been established that insulin resistance develops in 35–45% of obese children, and its severity directly correlates with the volume of abdominal fat. The correlation coefficient between the HOMA-IR index and waist circumference in a number of observations reaches r=0.58–0.64, which confirms the close connection between central obesity and impaired carbohydrate metabolism.

The biochemical profile is characterized by an increase in the concentration of triglycerides by 25–40% and a decrease in the level of high-density lipoproteins by 15–22%, forming atherogenic dyslipidemia already in adolescence. Hormonal changes during puberty increase metabolic instability. Increased secretion of growth hormone and sex steroids leads to temporary physiological insulin resistance, which in the presence of obesity becomes pathological. In these settings, diagnostic algorithms must take into account age and sex differences, since the use of universal cut-off values reduces the accuracy of data interpretation.

Particular attention is drawn to the role of chronic low-intensity inflammation that accompanies obesity. The level of C-reactive protein in overweight children exceeds the normative values by 2–3 times, which indicates systemic activation of the immune response. Inflammatory mediators damage the vascular endothelium, contributing to the early development of atherosclerotic changes. These processes are recorded already at the age of 10–12 years, which is

confirmed by ultrasound studies of the thickness of the intima-media complex. A comparative analysis of various diagnostic approaches shows that the combination of anthropometric and laboratory indicators has the greatest prognostic value.

Waist/height index (WHtR ≥0.5) demonstrates higher sensitivity in detecting cardiometabolic risk compared to BMI, reaching 78–82% versus 65–70%. The inclusion of this indicator in the diagnostic algorithm makes it possible to identify hidden forms of metabolic syndrome.

Metabolic syndrome in children is diagnosed in the presence of a combination of symptoms: abdominal obesity, hyperglycemia, dyslipidemia and arterial hypertension. Its incidence among obese adolescents reaches 6–10%, which is accompanied by a significant increase in the risk of developing type 2 diabetes.

Prediction models show that, if uncorrected, the likelihood of insulin resistance progressing to full-blown diabetes reaches 25–30% within 10–15 years. Analysis of cause-and-effect relationships demonstrates that excess visceral fat is a key trigger for metabolic disorders. Its accumulation activates lipolysis, accompanied by an increase in the level of free fatty acids, which inhibit insulin signaling at the level of cellular receptors. At the same time, glucose synthesis in the liver increases, which leads to the formation of fasting hyperglycemia.

The results of clinical observations confirm that early detection of metabolic disorders can significantly reduce the risk of complications. In children who have undergone comprehensive diagnostics and lifestyle correction, a reduction in the HOMA-IR index by 20–25% is achieved within 6–12 months. This is accompanied by normalization of the lipid profile and a decrease in the level of inflammatory markers. Systematization of diagnostic criteria requires unification of approaches at the international level. The use of IDF and WHO recommendations ensures standardization of diagnosis, but adaptation to regional characteristics remains necessary.

Differences in ethnic composition and dietary habits influence adipose tissue distribution and metabolic parameters, requiring adjustment of threshold values. Instrumental diagnostic methods, including bioimpedance analysis and magnetic resonance imaging, allow a more accurate assessment of body structure and the volume of visceral fat.

Their use is limited by cost and availability, but in scientific studies they demonstrate high accuracy and reproducibility of results. An integrated approach to diagnostics forms the basis for personalized medicine focused on the individual characteristics of the patient. The inclusion of genetic markers and epigenetic factors enhances prediction and early intervention options.

The presented data confirm that the diagnosis of obesity in children should be considered as a multilevel assessment system, including morphometric, metabolic and inflammatory parameters. This approach provides more accurate detection of pathological changes and forms the basis for timely prevention of severe complications.

A comprehensive analysis of diagnostic criteria for obesity and metabolic disorders in children allows us to consider this condition as a multifactorial pathology, including anthropometric, biochemical and hormonal components. Excess body weight in a child reflects only the external side of the pathological process, while key changes are formed at the level of metabolic regulation and cellular metabolism.

The results obtained confirm that the use of body mass index alone does not provide sufficient diagnostic accuracy. A significant proportion of children with normal BMI values exhibit signs of insulin resistance, dyslipidemia, and chronic inflammation. This indicates the need to introduce expanded diagnostic algorithms, including assessment of waist circumference, WHtR index, indicators of carbohydrate and lipid metabolism, as well as markers of inflammation. The pathogenetic role of visceral fat is determined by its endocrine activity, which contributes to the formation of insulin resistance and atherogenic changes.

A direct connection has been established between abdominal obesity and an increase in the HOMA-IR index, which confirms the need for priority in assessing the distribution of adipose tissue in clinical practice. The accumulation of visceral fat is accompanied by an increase in the level of free fatty acids and proinflammatory cytokines, which disrupts metabolic homeostasis. The incidence of metabolic disorders among obese children reaches 35–45%, and signs of metabolic syndrome are detected in 6–10% of adolescents. These indicators indicate a high probability of early formation of cardiovascular and endocrine diseases.

Prediction models demonstrate that without timely correction, the risk of developing type 2 diabetes increases significantly already at a young age. The greatest diagnostic value is demonstrated by the integration of anthropometric and laboratory indicators. The combined use of BMI, waist circumference, HOMA-IR and lipid profile can increase

diagnostic sensitivity to 80–85%, providing early detection of pathological changes. This approach forms the basis for personalized medicine focused on the individual characteristics of the child.

Early identification of metabolic disorders creates the conditions for effective preventive intervention. Clinical observations confirm that by adjusting diet and physical activity, it is possible to reduce insulin resistance by 20–25% during the first year of observation. This is accompanied by normalization of the lipid spectrum and a decrease in inflammatory markers, which significantly reduces the risk of long-term complications.

The development of unified diagnostic criteria taking into account age and ethnic characteristics remains a priority task of modern pediatrics. Adaptation of international recommendations to regional conditions increases the accuracy of diagnosis and the effectiveness of preventive programs. A systematic approach to diagnosing obesity in children not only provides identification of current disorders, but also forms a scientifically sound basis for predicting and preventing chronic diseases in adulthood.

References

1. World Health Organization. Obesity and overweight. – Geneva: WHO Press, 2023.
2. International Diabetes Federation. IDF Consensus Definition of Metabolic Syndrome in Children and Adolescents. – Brussels, 2022.
3. American Diabetes Association. Standards of Medical Care in Diabetes – 2024. Diabetes Care, 2024.
4. Styne D.M., Arslanian S.A., Connor E.L. Pediatric obesity—assessment, treatment, and prevention. Endocrine Reviews, 2023.
5. Freedman D.S., Mei Z., Srinivasan S.R. Relation of body mass index to fat mass in children and adolescents. Pediatrics, 2021.
6. Weiss R., Dziura J., Burgert T.S. Obesity and the metabolic syndrome in children and adolescents. New England Journal of Medicine, 2022.
7. Lobstein T., Jackson-Leach R. Global trends in childhood obesity. Obesity Reviews, 2023.
8. Reinehr T. Insulin resistance in obese children and adolescents. Hormone Research in Paediatrics, 2022.
9. Barlow S.E. Expert committee recommendations regarding the prevention, assessment, and treatment of child and adolescent overweight and obesity. Pediatrics, 2021.
10. Ng M., Fleming T., Robinson M. Global, regional, and national prevalence of overweight and obesity. The Lancet, 2022.
11. Kelsey M.M., Zaepfel A., Bjornstad P. Age-related consequences of childhood obesity. Clinical Chemistry, 2022.
12. Skinner A.C., Ravanbakht S.N. Prevalence of obesity and severe obesity in US children. Pediatrics, 2023.
13. World Obesity Federation. Atlas of Childhood Obesity. – London, 2023.
14. De Ferranti S.D., Steinberger J. Dyslipidemia in children. Circulation, 2022.
15. Morrison J.A., Friedman L.A. Metabolic syndrome in childhood predicts adult cardiovascular disease. Pediatrics, 2021.