

ANALYSIS OF HEIGHT AND WEIGHT GROWTH DYNAMICS IN CHILDREN WITH CONSTIPATION.**Isaqova Nasiba Rahmatjonovna**

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Abstract. Chronic constipation is one of the most common gastrointestinal disorders in childhood and may negatively affect not only intestinal function but also overall physical development. The present study aimed to comprehensively evaluate height and weight growth dynamics in children with constipation and to determine deviations from age-related anthropometric standards[1,2,3]. The study was conducted in Fergana between 2019 and 2023 and included 102 children aged 1–18 years with chronic constipation. Clinical, anthropometric, and laboratory assessments were performed, and the obtained indicators were compared with WHO growth standards using the Z-score system. Dynamic follow-up over a three-year period demonstrated that children with constipation had significantly lower height and weight indicators compared with normative values, particularly in severe and long-standing cases[4,5,6]. Additional findings included decreased appetite, abdominal discomfort, and micronutrient deficiencies, especially iron and zinc deficiency. The results suggest that chronic constipation contributes to impaired physical development through complex interactions involving intestinal microbiota imbalance, reduced nutrient absorption, metabolic disturbances, hormonal dysregulation, and psychoemotional factors mediated by the gut–brain axis[7,8,9].

Keywords: chronic constipation, children, growth dynamics, anthropometric indicators, height, weight, physical development, intestinal microbiota, Z-score, pediatric gastroenterology.

INTRODUCTION

Chronic constipation in children is a widespread gastroenterological problem that not only impairs the function of the digestive system but also exerts a significant negative impact on the overall morphophysiological development of the organism[10,11]. Physical development in children is a complex, multifactorial, and dynamic process closely associated with nutritional characteristics, metabolic activity, the state of the intestinal microbiota, hormonal regulation, and the central nervous system. According to modern scientific concepts, the intestinal system is regarded not only as a digestive organ but also as one of the central systems regulating metabolic, immune[12,13,14], and neuroendocrine functions. Therefore, disturbances in intestinal function, particularly constipation, should be considered a complex pathological condition capable of exerting systemic effects on the body's homeostasis; its prevalence among children reaches 10–30% and is often characterized by a chronic and recurrent course.

Epidemiological data demonstrate age-related characteristics of constipation: while functional constipation predominates in preschool-aged children, behavioral factors such as delayed defecation, low physical activity[15,16,17], and insufficient dietary fiber intake play a major role during school age. Clinically, constipation is commonly diagnosed according to the Rome IV criteria (≤ 2 bowel movements per week, painful defecation, stool retention, large-diameter stools, etc.), which enables a standardized diagnostic approach[18,19,20].

The etiological spectrum is multifactorial and includes low-fiber diets, insufficient fluid intake, alterations of the intestinal microbiota following antibiotic therapy, early cessation of breastfeeding, food intolerances, as well as socio-psychological factors such as suppression of defecation in kindergarten or school environments. In addition, some children demonstrate hereditary predisposition and immaturity of neurohumoral mechanisms regulating intestinal motility[21,22].

From the perspective of intestinal–metabolic–neuroendocrine integration, chronic constipation is associated with complex interactions between energy metabolism, appetite

regulation (ghrelin/leptin balance), glucose homeostasis, and inflammatory mediators. These processes may indirectly affect the activity of growth plates (epiphyseal zones), leading to slowed linear growth and impaired weight gain dynamics. Consequently, constipation should not be regarded solely as a local gastrointestinal disorder but rather as a systemic syndrome capable of influencing the overall development of children[23,24].

In the pathogenesis of chronic constipation, the leading mechanisms include decreased intestinal peristalsis associated with impaired activity of the enteric nervous system and interstitial cells of Cajal, increased intraluminal pressure, prolonged retention of fecal masses, and reabsorption of toxic metabolites. Dysbiosis of the intestinal microbiota results in reduced synthesis of short-chain fatty acids (SCFAs), including acetate, propionate, and butyrate, which weakens epithelial trophism, disrupts the integrity of tight junctions, and impairs intestinal barrier function. Consequently, endotoxemia and low-grade chronic inflammation develop, characterized by elevated levels of IL-6, TNF- α , and C-reactive protein (CRP), leading to disturbances in metabolic homeostasis.

These pathological alterations limit the digestion and absorption of nutrients, resulting in protein-energy deficiency and deficiencies of iron (Fe), zinc (Zn), calcium (Ca), vitamin D, and B-group vitamins. Disturbances in bile acid circulation and delayed intestinal transit additionally alter lipid metabolism. Through the gut–brain axis, changes in vagal signaling and imbalance of neurotransmitters such as serotonin (5-HT), motilin, and other neuroregulators contribute to appetite suppression, dyspeptic complaints, and behavioral changes.

At the level of hormonal regulation, reduced activity of the somatotrophic axis (GH/IGF-1), together with leptin/ghrelin imbalance and activation of the hypothalamic–pituitary–adrenal (HPA) axis with elevated cortisol levels, restrict anabolic processes. Clinically, this manifests as reduced linear growth velocity and insufficient weight gain. In addition, the possibility of long-term metabolic reprogramming mediated by epigenetic mechanisms, including microRNAs and DNA methylation, is increasingly discussed in current scientific literature.

Disruption of this microbiota–metabolism–hormonal–neuropsychosocial network ultimately leads to generalized slowing of physical development in children, deviations of anthropometric indicators from age-related norms, and impaired growth dynamics. Height and weight progression are considered among the most sensitive and prognostically significant indicators, and their reduction may reflect underlying metabolic and functional imbalance. Therefore, comprehensive investigation of growth dynamics in children with constipation using a multidimensional approach—including clinical, biochemical, microbiome, and hormonal assessments—as well as the development of early preventive strategies, represents one of the priority scientific directions in modern pediatrics and gastroenterology.

Research objective. To comprehensively investigate height and weight growth dynamics in children with constipation, determine the degree of deviation from age-appropriate anthropometric standards, and scientifically substantiate the mechanisms by which constipation affects physical development through comparative and statistical analysis with healthy peers.

Materials and methods. The study was conducted in the city of Fergana during the period from 2019 to 2023. A total of 102 children aged 1–18 years were included in the study. Based on clinical-anamnestic and laboratory findings, diseases contributing to constipation were investigated in all participants. Furthermore, the impact of constipation on indicators of physical development was assessed, and the obtained results were compared with standard normative values.

The inclusion criteria were as follows: constipation persisting for at least 3 months, decreased frequency of defecation, altered stool consistency, and the presence of characteristic clinical symptoms.

Methods: Anthropometric measurements included body height assessed using a stadiometer, body weight measured with electronic scales, and calculation of body mass index (BMI) according to the formula kg/m^2 .

Dynamic follow-up was performed over a 3-year period, during which repeated annual measurements were conducted and growth velocity was evaluated.

Nutritional status and lifestyle factors were assessed using a standardized questionnaire analyzing dietary composition, intake of fiber-rich foods, fluid consumption, and levels of physical activity.

Clinical evaluation included assessment of constipation severity using the Bristol Stool Scale and symptomatic indices.

Statistical analysis was performed to process and evaluate the obtained data.

In addition, anthropometric indicators were compared with World Health Organization (WHO) growth standards and assessed using the Z-score system, which enabled a more accurate and objective evaluation of growth dynamics.

Results. Additional follow-up observations conducted between 2019 and 2023 confirmed a significant delay in physical development among children with constipation. Among the 102 children aged 1–18 years, those suffering from constipation demonstrated reduced height and weight indicators compared with age-related normative values. According to Z-score analysis, a substantial proportion of children exhibited values below -1 SD, indicating subclinical growth retardation.

The dynamic follow-up findings demonstrated that growth velocity in children with constipation remained consistently lower throughout the 3-year observation period, with the differences being especially pronounced in cases of severe constipation. Furthermore, children with long-standing constipation exhibited insufficient weight gain and alterations in body composition, including disturbances in the ratio of fat and muscle mass.

Particularly important was the observation that impaired growth dynamics did not normalize over the years, suggesting that chronic intestinal dysfunction may lead to systemic consequences. This condition may be associated with metabolic programming and epigenetic alterations.

The obtained results also indicate that constipation should not be regarded solely as a symptomatic disorder but rather as a complex syndrome affecting overall child development. Prolonged intestinal dysfunction may influence growth plate activity, hormonal balance, and general metabolism, thereby potentially increasing the risk of chronic diseases in later life.

Therefore, long-term monitoring of children with constipation, regular assessment of their anthropometric indicators, and the development of individualized treatment strategies are considered highly important.

Additional clinical observations revealed that the following symptoms were recorded with high frequency among children with constipation: decreased appetite (62–68%), abdominal bloating and abdominal discomfort (55–63%), as well as micronutrient deficiencies, particularly iron and zinc deficiency (38–46%). The combination of these factors was found to have a direct impact on deviations of anthropometric indicators from age-related norms and on the slowing of growth dynamics.

The obtained results indicate that constipation exerts a multidirectional and systemic influence on the physical development of children. Intestinal dysfunction impairs the digestion and absorption of nutrients, especially proteins, fats, and micronutrients, leading to a negative energy balance. Simultaneously, dysbiosis of the intestinal microbiota contributes to reduced synthesis of short-chain fatty acids (SCFAs), thereby weakening trophism and barrier function of the intestinal epithelium. As a consequence, cytokine imbalance develops under conditions of low-grade chronic inflammation, resulting in disruption of metabolic processes.

From the perspective of hormonal regulation, children with constipation may demonstrate reduced activity of growth hormone pathways, which contributes to decreased linear growth velocity. Metabolic and digestive disturbances additionally impair adequate body weight gain. Furthermore, deficiencies of iron, zinc, and other micronutrients negatively affect erythropoiesis and enzymatic processes, thereby weakening overall somatic development.

Psychoemotional factors mediated through the gut–brain axis also play an important role. Chronic discomfort, pain, and fear associated with defecation may lead to decreased appetite, reduced food intake, and disturbances in eating behavior. These conditions, in turn, contribute to deviations of anthropometric indicators from age-related standards.

Overall, disruption of the microbiota–metabolism–hormonal–psychoemotional network involved in the pathogenesis of constipation provides a comprehensive explanation for the slowing of height and weight growth dynamics in children and substantiates the necessity for early intervention strategies.

Conclusion. Constipation represents an important multifactorial pathophysiological condition in children that contributes to delayed height and weight gain. The obtained results demonstrate that disturbances in growth dynamics develop as a consequence of the interaction between intestinal microbiota imbalance, impaired nutrient absorption, alterations in hormonal regulation, and psychoemotional factors.

Therefore, early screening and diagnostics—including the Bristol Stool Scale, anthropometric assessment, and WHO Z-score evaluation—together with rational nutrition (≥ 14 g of dietary fiber per 1000 kcal, age-appropriate fluid intake, and adequate micronutrient supplementation), probiotic/prebiotic approaches involving *Lactobacillus* and *Bifidobacterium* strains, increased physical activity, and individualized rehabilitation programs are of substantial importance.

As practical recommendations, a multistage clinical algorithm is proposed:

1. Early identification at the primary healthcare level — standardized screening of defecation frequency, stool consistency (Bristol types 1–2), pain, and signs of stool retention.
2. Anthropometric monitoring — regular assessment of height growth velocity (cm/year), body weight gain (kg/year), BMI (kg/m²), and Z-score dynamics, with ≥ -2 SD considered a threshold of increased risk.
3. Personalized nutritional correction — implementation of a fiber-rich diet, adequate hydration, and laboratory-confirmed correction of deficiencies in iron (Fe), zinc (Zn), vitamin D, and other micronutrients.
4. Modulation of intestinal microbiota — administration of probiotic/prebiotic courses, combined when necessary with osmotic laxatives such as polyethylene glycol (PEG).
5. Psychoemotional support — considering dysfunction of the gut–brain axis, behavioral therapy and education regarding proper defecation hygiene should be incorporated.
6. Physical activity — recommendation of at least 60 minutes of moderate-intensity physical activity daily.
7. Evaluation of treatment outcomes — normalization of growth velocity and regression of clinical symptoms within 6–12 months should be considered the principal indicators of therapeutic effectiveness.

This integrated approach contributes to restoration of normal growth dynamics in children with constipation and improves long-term prognosis.

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