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CLINICAL AND ANTHROPOMETRIC CHARACTERISTICS OF NUTRITIONAL STATUS IN CHILDREN WITH CONGENITAL HEART DISEASE AND CHRONIC HEART FAILURE

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Abstract

Nutritional status impairment is one of the most common comorbid conditions in infants with congenital heart disease (CHD), especially when accompanied by chronic heart failure (CHF) [1,6]. Increased energy expenditure, chronic hypoxia, and limited feeding tolerance create conditions for early development of protein–energy deficiency during the first year of life [6–8].

The aim of this study was to evaluate the clinical and anthropometric characteristics of nutritional status in infants with CHD complicated by CHF. A total of 50 children aged 1–12 months were examined. Nutritional assessment was performed using WHO growth standards, anthropometric indices, and clinical evaluation of heart failure severity [1,9].

The results demonstrated a high prevalence of moderate and severe malnutrition, primarily manifested by body weight deficit and depletion of muscle and fat stores. More pronounced nutritional disorders were observed in children with cyanotic CHD and higher functional classes of CHF. The obtained data confirm the importance of early identification of nutritional deficiency in infants with CHD to prevent progression of growth retardation and adverse clinical outcomes.

Keywords: Congenital heart disease, chronic heart failure, nutritional status, malnutrition, anthropometry, infants.

Introduction

Congenital heart disease remains one of the leading causes of morbidity in infancy and early childhood. Along with hemodynamic disturbances, children with CHD often develop secondary metabolic disorders, among which nutritional deficiency occupies a central place [2–5]. Impaired physical development in this patient population is considered a multifactorial condition resulting from increased metabolic demands, reduced caloric intake, and chronic tissue hypoxia [6,8].

According to international and national studies, signs of nutritional deficiency are detected in 40–90% of children with CHD, with the highest prevalence observed during the first year of life [6,9]. The presence of chronic heart failure significantly aggravates nutritional disturbances by increasing energy expenditure and limiting feeding capacity [7,8].

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Chronic hypoxemia in cyanotic forms of CHD disrupts oxidative metabolism and leads to activation of catabolic processes, while venous congestion and mesenteric hypoperfusion impair digestion and nutrient absorption [6,8]. Feeding difficulties, prolonged feeding time, tachypnea, and early fatigue further reduce effective caloric intake in infants with CHF [9–11].

Despite the well-recognized clinical importance of nutritional status, standardized approaches to its assessment in infants with CHD remain limited. Anthropometric evaluation based on WHO growth standards remains the most accessible and informative method for early detection of malnutrition [1,9]. Therefore, detailed analysis of clinical and anthropometric indicators is essential for optimizing the management of this vulnerable group of patients.

Clinical and Anthropometric Characteristics of Nutritional Status

The study included 50 infants with congenital heart disease complicated by chronic heart failure. The mean age of the examined children was 5.8 months, corresponding to a critical period of intensive growth and high nutritional requirements [6]. Cyanotic forms of CHD were diagnosed in 46% of patients, while acyanotic defects accounted for 54%.

Anthropometric assessment revealed significant deviations from WHO reference values in the majority of children [1]. The mean body weight was 4.1 ± 0.9 kg, and the mean weight-for-age Z-score was −2.3 SD, indicating moderate to severe undernutrition. Body weight deficit was the most pronounced anthropometric abnormality and was observed more frequently than length retardation.

Linear growth impairment was less severe, with a mean length-for-age Z-score of −1.6 SD. However, children with cyanotic CHD demonstrated significantly lower length-for-age values compared with patients with acyanotic defects, reflecting the adverse effect of chronic hypoxia on longitudinal growth [6,8].

Indicators of acute malnutrition were prevalent. Weight-for-length Z-scores below −2 SD were recorded in more than two-thirds of infants, while severe wasting (below −3 SD) was identified in over 40% of cases [1]. Mid-upper arm circumference values were markedly reduced, indicating depletion of muscle mass and protein stores [9]. Decreased triceps skinfold thickness reflected exhaustion of fat reserves and insufficient energy supply.

Clinical evaluation showed that the severity of nutritional deficiency increased in parallel with the functional class of chronic heart failure. Infants with advanced CHF exhibited the lowest anthropometric indices, confirming the close relationship between cardiac dysfunction and nutritional status deterioration [6,7].

Conclusion

The results of this study demonstrate that nutritional deficiency is highly prevalent among infants with congenital heart disease complicated by chronic heart failure. Malnutrition in this population is primarily characterized by significant body weight deficit, depletion of muscle and fat reserves, and delayed physical development [6,9].

The most severe nutritional disorders were observed in children with cyanotic CHD and advanced functional classes of CHF, highlighting the role of chronic hypoxia and increased metabolic demands in the progression of malnutrition [6,8].

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Anthropometric assessment based on WHO growth standards provides an effective and accessible tool for early detection of nutritional deficiency in infants with CHD [1]. Systematic evaluation of nutritional status should be considered an integral component of comprehensive management of children with congenital heart disease, allowing timely initiation of targeted nutritional support and improvement of clinical outcomes [9–11].

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