Growth and nutritional status of children and adolescents with sickle cell anemia

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Background Sickle cell anemia (SCA) is a chronic condition that impacts the nutritional status and growth of patients through various mechanisms.

Objectives This case–control study aimed to determine the growth patterns and nutritional status of pediatric patients with SCA and to investigate the effects of selected clinical, hematological, and biochemical parameters on nutritional status.

Patients and methods The study included 168 children and adolescents with SCA (in a steady state) and 181 healthy children as a control group.
Data (anthropometry, complete blood count, and levels of lactate dehydrogenase, C-reactive protein, zinc, and copper) were evaluated for both groups. The WHO Child Growth Standards were used to assess the nutritional status of participants.

Results Underweight, stunting, and wasting were detected in 13.55, 25.25, and 12.5% of patients with SCA compared with 2.6, 2.75, and 2.20% of healthy children and adolescents, respectively ($P<0.05$). In contrast, 8.33% of patients and 7.18% of individuals in the control group were overweight and obese, respectively.
The weight curve at the age of 6–7 years in women and 9–10 years in men was significantly lower among patients with SCA than the control group. While the height curve started to decrease significantly at the age of 8–9 years in male patients and more than or equal to 11 years in female patients compared with the control group.
Age of patients and high C-reactive protein levels were independent risk factors for stunting. Meanwhile, number of hospital admissions/year were independent risk factors for wasting.

Conclusion A high prevalence of poor growth was observed in children with SCA, and the weight curve started to decrease earlier in women, while the height curve decreased earlier in men. Stunting was the most common nutritional problem and was positively associated with the age of patients.
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Introduction

Sickle cell anemia (SCA) is a well-known inherited disorder with a disruptive metabolic status causing pain and reduced life expectancy for the patient. Multiple deficiencies in some micronutrients, vitamins, antioxidants, and certain lipid constituents have been shown to be prevalent in patients with SCA and are associated with an increased severity of the disease [1].

Many complications associated with SCA, such as growth retardation, delayed sexual maturation, and low immunity, are likely partially due to nutritional deficiencies [2]. In addition, multiple external and internal factors are likely to interact with genetic, environmental, and socioeconomic factors to adversely affect the growth of patients with SCA. The main factors that have been reported to adversely affect growth of children with SCA are endocrine dysfunction, inadequate nutritional intake, micronutrient deficiencies, and hypermetabolism [2,3]. Abnormalities in the levels of growth hormone, insulin-like growth factor-I, and insulin-like growth factor-binding protein 3 also partially contribute to growth failure experienced by children with SCA [4].

Children with SCA have a poorer nutrient intake than children matched for age and race. This poor nutrient intake correlates with the poor growth observed among children with SCA [5]. Ill-health and frequent hospitalizations may also be associated with varying degrees of anorexia and reduced feeding times in children with SCA [6].

The circulating levels of interleukin-6, which acts within the brain to suppress appetite and subsequently decreases food intake and causes wasting, are elevated in individuals with SCA [7,8]. In addition, metabolic demands of increased erythropoiesis and cardiac energy consumption account for the excess protein and energy metabolism reported in these children [9].