Preoperative nutritional parameters in children with congenital heart diseases under two years of age

To the Editor: Congenital heart diseases (CHD) may affect the growth of children and lead to malnutrition. The speed of growth is more rapid during the first three years and nutritional needs are greatest at this point. These years are a critical period for future cognitive ability. The treatment of emergency problems in children with CHD needing surgery are a priority, but nutritional restoration usually does not take place in these protocols.

In the preoperative period, 24 children with CHD hospitalized for cardiac or secondary pulmonary problems were evaluated. Subjects were children younger than two years of age. Z-scores for weight and height were calculated using data from percentile charts for Turkish children. Wasting criteria, stunting criteria and Wellcome scores were used to evaluate nutritional status. Waterlaw's scores define the stages of acute and chronic nutritional status and include growth stunting and wasting. Cyanotic and non-cyanotic cases were compared. Half of the patients were female. The average birthweight was 2932±603 gram, the average age was 10.19±1.12 months, weight was 5951±2201 grams and height was 63.7±8.5 centimeters. Of these cases, 21 had a normal birthweight for gestational age and three had low birthweight. When we evaluated the patients for protein-energy malnutrition, the severely acute malnutrition ratio with wasting was 66.6% and chronic malnutrition according to growth stunting was 83.3%. Out of 24 patients, 33.3% (n=8) were diagnosed with marasmus by Wellcome scores (Table 1).

Malnutrition is the most important risk factor in mortality and morbidity in childhood. It affects life quality of children negatively. Its detection and treatment are important components in the clinical management of many conditions.[1] We also believe that the nutritional evaluation of children with CHD is often ignored during the first admission. Hornbya et al suggest that incorporating simple anthropometric and functional measurement into protocols of nutritional assessment for patients with CHD can identify patients at risk.[1]

Cardiac malformations may be responsible for malnutrition and the degree of malnutrition is related to hemodynamic status.[2] Based on these data, children with CHD were classified as cyanotic or non-cyanotic. Chronic malnutrition is a common and serious problem in infants with CHD and was more common in cyanotic patients (92.3%) than in non-cyanotic patients (72.7%). Nearly all of the cyanotic patients were affected by acute and chronic malnutrition and their Z-scores for both weight and height were under –2 SD. Chronic malnutrition was more severe in children with CHD below 2 years of age.[3] Daily energy expenditure was also higher in children with CHD between 2 and 8 months of age.[4]

In some studies, symptomatic infants (73%) had higher rates of chronic malnutrition than asymptomatic infants (46%) and the percentile scores of cyanotic CHD patients were lowest.[5] Among children hospitalized with CHD, the rates of acute and chronic malnutrition were 33% and 64%, respectively.[6] In patients with cyanotic CHD and/or congestive heart failure (CHF), acute or chronic malnutrition occurs in 70%. The rate was 30% among noncyanotic patients without CHF.[6] In our study, it was determined that the younger the patients were, the worse their malnutrition. In another study, hypoxia and pulmonary hypertension were

Table 1. Nutritional parameters in hospitalized children with congenital heart disease before surgery.

	Total (n=24)	Cyanotic group (n=13)	Non-cyanotic group (n=11)
Waterlaw's Criteria:			
Wasting			
Severe malnutrition	66.6 (16)	69.2 (9)	63.6 (7)
Moderate malnutrition	16.6 (4)	15.4 (2)	18.2 (2)
Mild malnutrition	4.2 (1)	0	9.0 (1)
Normal	12.5 (3)	15.4 (2)	9.0 (1)
Stunting			
Chronic malnutrition	83.3 (20)	92.3 (12)	72.7 (8)
Wellcome Scores			
Underweight	45.8 (11)	38.5 (5)	54.5 (6)
Marasmus	33.3 (8)	46.2 (6)	18.2 (2)
Kwashiorkor	0	0	0
Normal	20.8 (5)	15.4 (2)	27.2 (3)

Data are percentage and number of patients.

the most important addictive factors for growth failure and malnutrition.[2]

According to our results using Wellcome scores, 46.2% of the cyanotic group had marasmus and 38.5% were underweight. As shown, infants under 2 years of age with CHD needing an operation had malnutrition in different degrees and if they were cyanotic, malnutrition was worse. The adverse effects of hospitalization on nutritional status were shown in undernourished children.[7,8] This effect was highest between 2 and 6 years (32%).[7] In different studies, rates of malnutrition have been reported in 30% to 50% of hospitalized children.[9] Nutritional support reduces the time of hospital stay in patients with critical illness.[10] Because of the hospital stay, the life quality of mothers was reduced and breastfeeding was affected. Of our patients, 66.6% were breastfeeding. It is clear that special attention should be given to children under 2 years of age in whom surgery is planned. Nutritional support should be added after the first emergency therapy.

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REFERENCES

1. Hornby ST, Nunes QM, Hillman TE, Stangab Z, Neal KR, Rowlands BJ, Allisond SP, Lobo DN. Relationships between structural and functional measures of nutritional status in a normally nourished population. Clinical Nutrition 2005; 24(3): 421-426.
2. Varan B, Tokel K, Yılmaz G, Malnutrition and growth failure in cyanotic and acyanotic congenital heart disease with and without pulmonary hypertension. Arch Dis Child 1999; 81(1): 49-52.
3. Thommessen M, Heiberg A, Kase BF, Feeding problems in children with congenital heart disease: the impact on energy intake and growth outcome. Eur J Clin Nutr 1992; 46: 457-64.
4. Van der Kuip M, Hoos MB, Forget PP, Westerterp KR, Gemke RJBJ, Meer K, Energy expenditure in infants with congenital heart disease, including a meta-analysis. Acta Paediatr 2003; 92: 921-927.
5. Venugopalan P, Akinbami FO, Al-Hinai KM, Agarwal AK, Malnutrition in children with congenital heart defects. Saudi Med J 2001; 22(11): 964-7.
6. Cameron JW, Rosenthal A, Olson AD, Malnutrition in hospitalized children with congenital heart disease. Arch Pediatr Adolesc Med 1995; 149(10): 1098-102.
7. Ozturk Y, Buyukgebiz B, Arslan N, Ellidokuz H, Effects of hospital stay on nutritional anthropometric data in Turkish children. J Trop Pediatr 2003 ;49(3): 189-90.
8. Kyle U, Morabia A, Unger P, Slosman D,Pichard C, Contribution of body composition to nutritional assessment at hospital admission in 995 patients: a controlled population study. Brit J Nutr 2001; 86(6): 725-31.
9. Lobo DN, Allison SP. Nutritional support and functional recovery. Curr Opinion Clin Nutr Metab Care 2000; 3(2): 129-34.
10. Scrimshaw NS, Nutrition and health from womb to tomb. Nutrition Today 1996; 31: 55-67. Reprinted in Food Nutr Bull 1997;18(1):1-19.