Nutritional Status in Congenital Heart Disease

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Abstract: Background : Congenital heart disease (CHD) is the most common congenital anomaly, affecting □8 in 1000 children. Nutritional status of patients with CHD is influenced nutrient inputs, energy requirements, dietary components. Objective : To describe the prevalence of malnutrition in children with cyanotic and acyanotic congenital heart disease . Method : This report is part of ongoing study of association between nutritional status and congenital heart disease. A cross-sectional study was conducted from January to July 2018. All patients aged 1 month to 18 years who were came to pediatric cardiology outpatient clinic with congenital heart disease were included. Echocardiography was evaluated in first coming. Patients were categorized according to cyanotic and acyanotic congenital heart disease. The data were taken in the form of gender, age, weight and height as well as nutritional status. Result : During the study period, 65 children were admitted, consisting of 31 (47.7%) males and 34 (52.3%) females, with a median age of 61.8 months. There were 40 (41.5%) patients with malnutrition and 14 (21.5%) patients with severe malnutrition. Conclusion : Children with CHD develop malnutrition and growth failure. Further studies studying its usefulness as correlation between nutritional status and CHD are still needed.

1 INTRODUCTION

Congenital heart disease (CHD) is the most common congenital anomaly, which affects □8 in 1000 children (Linde, 2011). In addition to the management of the specific heart defect, practitioners are often challenged by issues related to the facilitation of normal growth and development in this population. Growth status in these vulnerable children may be associated with neurodevelopmental outcomes in addition to adult height and weight (Gale, 2004; Galle, 2006; Yang, 2011).

Malnutrition in children with CHD has been associated with increased morbidity and mortality indicated by frequent hospitalization, poor surgical outcomes, and increased death (Forchielli, 1994; Freeman, 1994). Children with CHD are become to malnutrition for several reasons including decreased energy intake, increased energy requirements, or both (Schuurmans, 1998). For instance, children with malnutrition due to cyanotic CHD like ventricular septal defects (VSD) need more energy (Varan, 1999; Leitch, 2000).

Considering the close association between congenital heart disease and malnutrition. In children, the commonly used growth charts are CDC 2000 and WHO 2006. The aim of this study was to describe the prevalence of malnutrition in children with congenital heart disease.

2 METHODS

This report is part of ongoing study of association between nutritional status and congenital heart disease. A cross-sectional study was conducted between February to July 2018 in pediatric cardiology outpatient clinic at the Haji Adam Malik Hospital, Medan. The inclusion criteria were all patients younger than 18 years, with diagnosed congenital heart disease from echocardiography. Patients with congenital syndrome were excluded. Informed consent was obtained from subjects' parents or guardian after explanation of the study was given.

Purposive sampling was done on patients who met the inclusion criteria. Patients were categorized based on cardiac diagnosis from echocardiography: cyanotic and acyanotic congenital heart disease.

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Standardized measurements of weight and length were taken by nurse was classified as mild - moderate and severe malnutrition when patient weight was 90 - 70%, and <70% of ideal weight for length based on the CDC 2000 standard for child above 5 years old, and which is same <-2 SD >-3, and <-3 SD based on WHO 2006 standard for child below 5 year old.

Data were analyzed using *SPSS version 18.0*. The quantitative variable was expressed as means and standard deviations. The categorical variables were described by their absolute (n) and relative (%) frequencies. This study was approved by the Ethics Committee of the University of North Sumatra Medical School.

3 RESULTS

During the study period, 65 patients met the inclusion criteria and were eligible for analysis. Of the 65 patients in this study, 47.7% were males. Sixty-one point five patients developed malnutrition. Tetralogy of Fallot (TOF) was a major cardiac lesion among all cases of CHD (43.1%) and accounted for 77.8% of cases in the cyanotic group. Ventricular septal defect (VSD) was the most frequent acyanotic defect among all cases of CHD (20.0%) and among the acyanotic group (68.9%) (Table 1).

Of the 65 CHD patients, 36 of 65 patients were severe malnutrition. In this study, nutritional classes were classified into normal, mild – moderate, and severe malnutrition groups comprising of 20, 9, and 7 subjects, respectively in cyanotic patients (Table 2).

Table 1: Characteristics of subjects

Characteristics	
Mean age (SD), months	61.8 (56.9)
Gender, n (%)	
Male	31 (47.7)
Female	34 (52.3)
Diagnosis, n (%)	
VSD	13 (20)
ASD	5 (7.7)
PDA	11 (16.9)
TOF	28 (43.1)
DORV	4 (6.2)
PA – VSD	4 (6.2)
Nutritional status, n (%)	
Normal nutrition	25 (38.5)
Malnutrition	40 (61.5)

Table 2: Nutritional classes of subjects with CHD

Nutritional classes	Cyanotic CHD (n= 36)	Acyanotic CHD (n = 29)
Normal	20	6
Mild – moderate	9	16
Severe	7	7

4 DISCUSSION

The prevalence of malnutrition in our study was 61.5%, similar to the prevalence in South India (59%) (Vaidyanathan, 2008). Previous reports indicated that malnutrition caused by CHD is common in developing countries, but prevalence varies from 27% up to 90.4%. Another study from Turkey reported prevalence of malnutrition in children with CHD was 27% (Mehrizi, 1962), while a more recent Turkish study described a prevalence of 85% (Tokel, 2010). However study in Nigeria found higher prevalence of malnutrition in children with uncorrected symptomatic CHD (90.4%) (Okoromah, 2011).

In this study showed that severe malnutrition was common in acyanotic CHD (24.1%). The case – control observational study in Nigeria showed that children with acyanotic CHD were more likely to be wasted, while those with cyanotic CHD were more likely to be stunted (Okoromah, 2011). Previous reports on the patterns of malnutrition in acyanotic and cyanotic CHD vary widely (Linde, 1967; Salzer, 1989; Varan, 1999). In contrast to this study, Linde and colleagues reported that malnutrition were more common in cyanotic CHD (Linde, 1967)

The cause of malnutrition in CHD is multifactorial (Unger, 1992). Inadequate caloric intake, increased energy requirements caused by increased metabolism, and malabsorption may all contribute. However, the most important cause of malnutrition in CHD was inadequate caloric intake (Krieger, 1970).

There were some limitations in our study. We had relatively small sample size and this was single center study, which may have led bias due to specific environmental characteristics in the population. Additionally, we have to analyze the association between nutritional status and congenital heart disease.

5 CONCLUSION

Children with CHD develop severe malnutrition and growth failure. Further studies studying its

usefulness as correlation between nutritional status and CHD are still needed.

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