

Malnutrition and Growth Status in Patients with Congenital Heart Disease

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ABSTRACT:

BACKGROUND:

Different congenital heart diseases could affect children growth.

AIM OF STUDY:

To assess the growth (Weight, height and head circumference) in patients with different types of congenital heart disease (CHD).

METHODS:

The growth of one hundred ninety six patients with CHD, attending the out patient department of the Central Teaching Hospital of Pediatrics and Ibn Al Betaar Center for Cardiac Surgery, aged 0-24 months, between February and June 2002 was assessed.

They were grouped according to cardiac diagnosis:

Group I: Acyanotic CHD without heart failure (HF) or pulmonary hypertension(PH);

Group II: Acyanotic CHD with HF;

Group III: Acyanotic CHD with PH;

Group IV: cyanotic CHD.

RESULTS:

It was found that 29.6 % of patients with CHD had acute malnutrition (AM) and 21.9% had chronic malnutrition (CM). The acute malnutrition was more in group I of CHD (39.2%) while chronic malnutrition was more in group III of CHD (26.3%). The acute malnutrition was more obvious in infants (31.7%) than in those in the second year, while chronic malnutrition was more obvious in second year of life (34.7%).

CONCLUSION AND RECOMMENDATIONS:

In all patients with congenital heart disease(cyanotic and a cyanotic),the growth is affected. Because of the delay in surgical correction in our patients, so we suggest a better nutritional counseling and possible earlier surgical correction to optimize the growth in our patients.

KEY WORDS : malnutrition . congenital heart disease. growth status

INTRODUCTION:

Congenital heart diseases (CHD) is defined as gross structural abnormality of the heart and great vessels that acutely or potentially of importance.⁽¹⁾

The incidence of haemodynamically significant congenital cardiac abnormalities is about 0.8 of live births.^[2] They can be divided into two major groups based on the presence or absence of cyanosis, then, these two groups can be further subdivided based on whether the chest radiology shows evidence of increased, normal or decreased pulmonary vascular markings.⁽³⁾

CHD are often associated with failure to thrive (FTT).⁽⁴⁾ The prevalence being as high as 64% in developed countries of the world.⁽⁵⁾ The problem

is more severe in the developing regions, where malnutrition is common even in otherwise normal children.^(6,7) There are several possible explanations for poor growth in those children, they may include:

- < Low caloric intake.
- < Type of cardiac lesion.
- < Chronic hypoxemia.
- < Malabsorption.
- < Hypermetabolism.
- < Others.

< 1. **Inadequate caloric intake** appears to be the most important cause of growth failure in CHD.^[7]

It may be due to:

- a. anorexia
- b. dyspnea and tachypnea

2. **Type of cardiac lesion** Cameron et al show that acute on chronic malnutrition occurred in 70% or more of patients with cyanotic CHD and those with congestive HF but only in 30% in patients with neither,⁽⁵⁾ and those with cyanotic CHD with PH and congestive HF have an

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increase prevalence of growth failure and malnutrition which put this group of patients at greater risk for operative morbidity and mortality.⁽⁷⁾

Surgical correction result in catch-up growth for most individuals, and it is positively correlated with the severity of the initial growth disturbance and not with age at the moment of surgical correction.⁽⁸⁾

3. Chronic hypoxaemia is reported to affect growth. It is an important factor in anorexia and inefficient processing of nutrients at the cellular level.⁽⁷⁾

4. Malabsorption: Anoxia or venous congestion of bowel which occur in HF may result in malabsorption.⁽⁹⁾

5. Hypermetabolism: The energy demands of children with CHD may be high because of increase in cardiac & more importantly respiratory work.⁽¹⁰⁾

PATIENT AND METHODS:

A descriptive study was done on 196 patients with CHD, their ages ranged between 0-24 months, they were taken from out patient department of The Central Teaching Hospital of Pediatrics and Ibn Al Betaar Center for Cardiac Surgery between February and June 2002. They were grouped according to age into 4 groups, 0-4 months (43 patients), 5-7 months (46 patients), 8-12 months (84 patients) and 12-24 months (23 patients).

Patients with a history of prematurity, intrauterine growth retardation, known genetic malformation, Dysmorphic features, and neurologic disability were excluded. In all patient's, cardiac diagnosis was made on the basis of clinical history and examinations, electrocardiography, and echocardiography with Doppler. Patients were assigned to four groups according to their diagnosis:

Group I (N=130), acyanotic patients without HF or PH including ventricular septal defect (VSD), atrial septal defect (ASD), patent ductus arteriosus (PDA); group II (N=24), acyanotic patients with HF (HF diagnosis was based on cardiomegaly, hepatomegaly and tachycardia); Group III (N=19), acyanotic patients with PH (when pulmonary arterial pressure was above 40 mmHg).⁽¹¹⁾

Group IV (N=23), cyanotic patients without HF or PH include transposition of great arteries (TGA), tetralogy of Fallot (TOF).

Information on socioeconomic level (monthly income or father's job), patient's birth weight,

nutrition history And the time when diagnosis was established.

Anthropometric measurements was carried for all patients. The body weight was taken using (Secca, Germany made), its maximum capacity 15kg. The length was taken using tape measure when patients were lying in supine position on hard table with fully extended legs with the help of the mother of patient to keep the legs extended.

The head circumference was taken using soft tape measure (not elastic one).

The malnutrition was described as acute (AM) if the weight was below the 3rd centile for age and sex, and chronic (CM) if both weight and length were below the 3rd centile for age and sex. If head circumference is also affected the condition is described as severe chronic malnutrition (SCM).⁽¹²⁾

The results were analyzed statistically using chi square and p. value.

P .value below 0.05 was considered statistically significant.

RESULTS:

Of the 196 patients, 58 (29.5%) were below the 3rd centile for weight (AM), 43 (21.9%) were below the 3rd centile for both weight and length (CM), and 42 (21.4%) were below the 3rd centile for all the weight, length and head circumference (SCM) (table 1). The remaining 53 (27.4 %) were normal for weight , length and head circumference.

Acute malnutrition was more obvious in group I (39.2%) as show in (table 2). While in group II was (12.5%), in group III was zero and in group IV is (17.3%). While chronic malnutrition was more obvious in group II and III (25%, 26.3% respectively) in comparison with group I and IV which show (20.7%, 21.7% respectively). And this was more obvious when head circumference was affected also (SCM), which show (52.6%), (37.5%) in group III and II respectively. In comparison with group I and IV which show (13.8%), (21.7%) respectively.

The acute malnutrition was more obvious in infants than patients above 12 months of age (31.7%), (13%) respectively, as shown in (table 3).

Chronic malnutrition was more in those ≤12 months of age (22.5%) than in those > 12 months of age (17.3%). While severe chronic malnutrition was more obvious in patients >12 months old than for those ≤ 12 months (34.7%), (19.6%) respectively, Also acute malnutrition

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was more significant in patients whose age ranged from 5-7 months (47.8%) ($P=0.001$), and in those between 0-4 months (44%) ($P<0.05$). While chronic malnutrition was significant only in age group 4-7 (23.9%) ($P=0.020$) (table 3).

It was difficult to see the impact of low socioeconomic status of the family and adequacy of nutrition in our children because of poor compliance of the mothers.

Table 1: The distribution of acute and chronic malnutrition in patients with CHD.

	No	%
AM	58	29.61
CM	43	21.93
SCM	42	21.42
Normal	53	27.04
TOTAL	196	100%

Table 2: Comparison of frequencies of acute, chronic and severe chronic malnutrition in different groups of CHD.

	Group I (n=130)		Group II (n=24)		Group III (n=19)		Group IV (n=23)	
	No	%	No	%	No	%	No	%
AM	51	39.2	3	12.5	-	-	4	17.3
CM	27	20.7	6	25.0	5	26.3	5	21.7
SCM	18	13.8	9	37.5	10	52.6	5	21.7
Normal	34	26.3	6	25.0	4	21.1	9	39.3

$\chi^2=30.16$, d.f=9, $P=0.0004$

$\chi^2=22.34$, d.f=6, $P=0.001$

Table 3: Comparison of frequencies of acute and chronic malnutrition in different age groups of patients with CHD.

	<4 months (n=43)		5-7months (n=46)		8-12 months (n=84)		>12-24 months (n=23)	
	No	%	No	%	No	%	No	%
AM	19	44.0	22	47.8	14	16.6	3	13.0
CM	6	13.9	11	23.9	22	26.1	4	17.3
SCM	2	4.6	5	10.8	27	32.1	8	34.7
Normal	16	37.5	8	17.5	21	25.2	9	35.0

$\chi^2=36.25$, d.f=9, $P=0.0001$

DISCUSSION:

It is well known that malnutrition accompanies and contributes to morbidity in CHD.⁽⁴⁾

Fifty eight patients of total 196(29.5%) had weight below the 3rd centile for age and sex, and 43/196 (21.9%) were below the 3rd centile for weight and length. These results are similar to that reported by Venugopalon and Akinbami⁽¹³⁾, (27% for acute malnutrition and 24% for chronic malnutrition). and also similar to another study reported by Varan B, Tokel K, Yilmaz G⁽⁷⁾, (52% were below the 16th centile weight and 27% were below 3rd centile for both weight and length

In this study, acute malnutrition was more in patients with an acyanotic CHD without HF or PH (39.2%), while chronic malnutrition was

more in patients with HF (25%) and (26.3%) for patients with PH than other groups.

These results are similar to that reported by Linde and colleagues⁽¹⁴⁾, who found a more pronounced retardation in both height and weight in children with cyanosis than in those with acyanotic hart disease,

Also for severe chronic malnutrition was found more in patients with PH (52.6%) and patients with HF (37.5%) this is similar to astudy done by De staebel⁽¹⁵⁾ which shows that chronic malnutrition was more in children with heart failure, cyanosis or combination of both . While in other study in Turkey by Varan⁽⁷⁾, the frequency of acute and chronic malnutrition have been reported as 65% and 42%, this may be

explained as their patients were hospitalized and being more severely affected than the out patient patients we had studied.

Another study done by Leite HP and colleagues,⁽¹⁶⁾ shows that the presence of PH was associated with higher nutritional disturbance , the nutritional assessment may be good way to identify diagnostic groups at particular risk of failure to thrive .

This can be useful in planning a management which ensures these patients to achieve a adequate nutritional supplementation in early life

In this study, we found that acute malnutrition was more obvious in infants (31.7%), while in 2nd year of age was (13%), but severe chronic malnutrition was (19.6%) for patients in first year of age and (34.7%) in patients in second year of age, which differed from results found by Venugopalan^[13] who found that infants were more severely affected than older children, this may be due to early surgical intervention for their heart disease in this study, while there was delay in surgical intervention in our patients which made the long term impact of the disease more pronounced.

CONCLUSION:

1. The acute malnutrition is more obvious than chronic malnutrition in patients with CHD (29.5%), (21.9%) respectively.
2. The acute malnutrition is more common in patients with a cyanotic CHD without HF or PH (39.2%), while chronic malnutrition is more obvious in patients with PH and HF (26.3%) and (25%) respectively.
3. The severe chronic malnutrition is (52.6%), (37.5%) for patients with PH and patients with HF respectively.
4. The acute malnutrition is more obvious in infants with CHD (31.7%) than older children (13%).
5. The severe chronic malnutrition is more obvious in second year of age than in first year of age (34.7%) and (19.6%) respectively.

Recommendations

1. Intensive nutritional treatment is considered to optimize the outcome.
2. Early surgical correction of cardiac lesion reduce the effect of chronic malnutrition in our patients.

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