Scholars Journal of Applied Medical Sciences
Abbreviated Key Title: Sch J App Med Sci
ISSN 2347-954X (Print) | ISSN 2320-6691 (Online)
Journal homepage: https://saspublishers.com

OPEN ACCESS

Paediatric Cardiac Anesthesia

The Prevalence of Malnutrition and its Impact on Children with Congenital Heart Disease in Post Cardiac Surgery

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DOI: 10.36347/sjams.2021.v09i12.002 | **Received:** 29.10.2021 | **Accepted:** 01.12.2021 | **Published:** 08.12.2021

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Abstract **Original Research Article**

Background: Children with congenital heart disease (CHD) require adequate nutrition for growth and development. Children with CHD are often malnourished and with dyspnea, leading to failure to thrive. Children with CHD have a high basal metabolic rate leading to high caloric requirement. ***Objective:*** To evaluate the prevalence ofmalnutrition and its impact on children with congenital heart disease in post cardiac surgery. ***Method:*** This cross-sectional study was carried out at Bangladesh Shishu Hospital and Institute, Bangladesh. Data were collected from January 2019 to January 2020. A total of 40 pediatric patients with CHD admitted for cardiac surgery were included in the study. Sample were collected through purposive sampling as per inclusion criteria. ***Results:*** During the study, most of the children belonged to 1 year to 5 years of age group and 60% were male. The nutritional status of the patients before surgery was defined as normal 55%, malnutrition 45%. In malnutrition group heart defect cases was higher than that of normal group. Mean z score for A/W(SEM) was -1.05 in normal group and -3.06 in malnutrition group. Malnourished patients clearly showed a tendency (P=0.005) to have a longer length of intubation, i.e., mean 35.67 hours when compared with those with a normal nutritional status who have mean intubation time of 27.51 hours. The other morbidity factor measured was the length of ICU stay, which also showed a significant result. ***Conclusion:*** In Bangladesh, malnutrition is frequent among children with congenital cardiac defects which increases risk of morbidity related with prolonged mechanical ventilation and ICU stays. To minimize potentially harmful effects, the health care system should be able to screen and identify these individuals early on.

Keywords: Malnutrition, Congenital heart disease, Post cardiac surgery, PRISM (Paediatric Risk Mortality).

INTRODUCTION

Congenital heart diseases (CHDs) are among the most frequent congenitalanomalies presented at birth, with areported incidence of 8 to 11/1,000 live births, and with a high impact on children morbidityand mortality (up to 33%) [1]. Additionally, several studies have consistently reported that malnutrition, ranging from mild undernutrition to complete failure to thrive [2], is a common cause of morbidity in children with CHD [3-5].

Multiple factors contribute to growth impairment and malnutrition in infants and children with CHDsuch as prenatal and genetic factors e.g.hypoxia and hemodynamic factors such as congestive heartfailure, inadequate nutritional intake, swallowing dysfunction, gastroesophageal reflux, immaturity ofthe gastrointestinal tract, a hypermetabolic state and nutrient malabsorption [6-8], as well as psychosocial and hormonal factors [9, 10]. However, in medically partially underserved nations such as Indonesia, poor access to care leads to late presentation of patients with CHD and also contributes to malnutrition.

In this study our main goal is to evaluate the prevalence malnutrition and its impact on children with congenital heart disease in post cardiac surgery.

OBJECTIVE

- To asses malnutrition and its impact of children with congenital heart disease in post cardiac surgery.

METHODOLOGY

Types of study: It was a cross-sectional type study.

Place and period of the study:

This study was carried out at Bangladesh Shishu Hospital, Bangladesh. Data were collected from January 2019 to January 2020.

Study Population

A total of 40 pediatric patients with CHD, admitted for cardiac surgery were included in this study. Sample were collected through purposive sampling as per inclusion criteria.

Data analysis

All collected data were coded and input in SPSS-25 for further analysis. Both descriptive and inferential statistics done. Descriptive statistics included frequency distribution, percent, mean, standard deviation; graph, tables, figures and inferential statistics.

RESULTS

In table-1 shows age distribution of the children where the children belonged to 1 yearto 5 years age group.15 (37.5%) were from 1-2 years age group, 8 (20%) from 2-3 years age group, 5 (12.5%) from 3-4 years age group and 12 (30%) were of 4-5 years age group. The following table is given below in details:

Table 1: Age distribution of the children

Age group	%
1 year – 2 years	37.5%
2 years – 3 years	20%
3 years – 4 years	12.5%
4 years – 5 years	30%

Figure-1 shows gender distribution where majority were female n=21 (53%). The following figure is given below in detail:

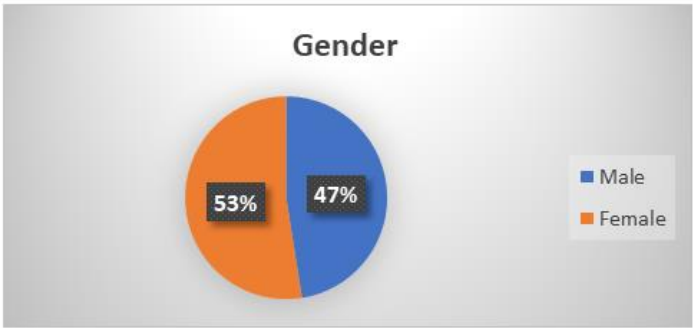

Figure 1: Gender distribution

Figure-2 shows the nutritional status of the patients before surgery was defined as normal 57%, malnutrition 43%. The following figure is given below in detail:

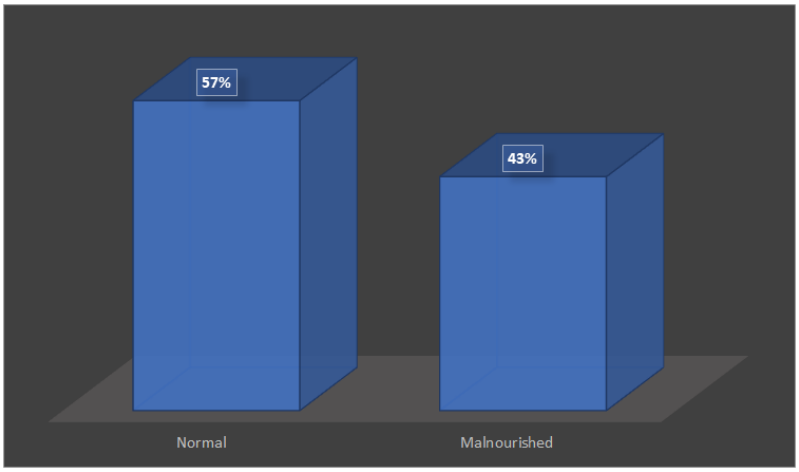

Figure 2: The nutritional status of the patients before surgery

In table-2 shows clinical status of the infants where in malnutrition group heart defect cases was higher than normal group. Mean z score for A/W(SEM) was -1.05 in normal group and -3.06 in malnutrition group. The following table is given below in details:

Table 2: Clinical status of the infants

Clinical status	Normal	Malnourished	P value
Mean z score for A/W(SEM)	-1.05	-3.06	0.02
Heart defect, % ASD VSD TOF	 30% 40% 30%	 60% 93% 97%	0.01
Surgical procedures (%) ASD closure VSD closure ICR for TOF	 30% 40% 30%	 50% 30% 10%	0.03
Mean PRSM III score	3.88	5.16	
Mean CPB time (min)	98.55	97.50	

Table-3 shows outcomes observed based on the nutritional status where malnourished patients clearly showed a tendency (P=0.005) to have a longer length of intubation, i.e., mean 35.67 hours when compared with those with a normal nutritional status who have mean intubation time of 27.51 hours. The other morbidity factor measured was the length of ICU stay, which also showed a significant result. The following table is given below in detail:

Table-3: Outcomes observed based on the nutritional status

Length of intubation	Normal	Malnourished
Mean SEM hours	27.51	35.67
Min- Max hours	3.0 - 295.0	3.5 – 545.0
Length of ICU stay	Normal	Malnourished
Mean SEM hours	2.78	4.50
Min- Max hours	1.0 – 25.0	1.0 – 61.0

DISCUSSION

Our results clearly showed that malnourished patients had a statistically significant higher length of mechanical ventilation and ICU stay after a corrective cardiac surgery procedure despite comparable baseline characteristics. On average, our malnourished patients tended to be extubated 12 hours after those counterpart patients with normal nutritional status. This is consistently reported in many different sets of patients [5, 10].

In comparison to our study, a study investigated the influence of the nutritional status based on skinfold thickness, instead of weight for age.According to the study, a lower total body fat mass, as well as acute and chronic malnourishment were associated with worse clinical outcome, assessed by the length of ICU stay, duration of mechanical ventilations, and duration of dopamine and milrinone infusion [9].

The other characteristics of our cohort were that malnourished patients were of younger age, presented more often with acyanotic heart defects at the time of congenital heart surgery, and had higher PRISM III score.

A previous study reported that heart failure, older age at corrective surgery and lower growth potential (lower birth weight, small for gestation, lower parental anthropometry and associated genetic syndrome) emerged as significant predictors of malnutrition at the presentation of the patients [7].

The fact that our cohort of malnourished patients presented at younger age and more often with acyanotic types of CHD indicate that they suffered from earlier and more pronounced congestive heart failure due to unrestrictive pulmonary blood flow, that might be complicated postoperatively by more severe pulmonary hypertension.[4] In general, this group of patients requires earlier corrective surgery. The severity of illness as depicted by PRISM III score has also been reported to be associated with prolonged mechanical ventilation with a similar odds ratio as our study [6].

CONCLUSION

In Bangladesh, malnutrition is frequent among children with congenital cardiac defects which increases risk of morbidity is related with prolonged mechanical ventilation and ICU stays. To minimize potentially harmful effects, the health care system should be able to screen and identify these individuals early on.

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