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Prevalence of malnutrition in children with congenital heart disease

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Abstract---Objectives: To determine the prevalence of malnutrition in children with congenital heart disease (CHD). Methods: A cross-sectional study was conducted among 300 children diagnosed with CHD who were being managed in pediatric cardiology clinics. As part of the study, various anthropometric measurements such as height, weight, and mid-upper arm circumference (MUAC) were recorded for each child. The assessment of malnutrition was determined based on the Z score, where a Z score below -2 denoted moderate to severe malnutrition, and a Z score below -1 indicated mild malnutrition.

Results: There were 300 participants in the research who had been diagnosed with congenital cardiac disease, and 59% of them were men. The median age ranged from 17.8 to 14 months. The study population had an overall malnutrition prevalence of 86.7%. 13.3% of the total individuals were malnourished-free, 27% had minor malnutrition, 36.6% had middle-range malnutrition, and 23% had severe malnutrition. Analysis of group 1, which included patients with cyanotic illness and pulmonary hypertension, revealed that all of the patients were malnourished. 6.6% of the individuals in this category had moderate malnutrition, whereas 93.3% had severe malnutrition. Patients in Group 2 had cyanotic illness but no pulmonary hypertension. In this group, 49.3% were malnutrition-free, 26.6% had just minor deficiency, 12% had moderate deficiency, and another 12% had severe deficiency. Patients with pulmonary hypertension and acyanotic illness made up group 3. Only 3.3% of the participants in this specific group were determined to be completely malnourished, compared to 20% who had mild malnutrition, 30% who had moderate malnutrition, and 46.6% who had severe malnutrition. Individuals with acyanotic diseases but without pulmonary hypertension made up the fourth group. While just 1.1% of people were malnourished, 50.5% of people had moderate malnutrition, and 30.5% had mild malnutrition. In conclusion, a very severe instance of malnutrition affected 17.7% of the cohort. Conclusion: The study was carried out to ascertain the extent of malnutrition among patients with congenital heart disease (CHD). A cross-sectional review of 300 kids receiving the disease's treatment in pediatric cardiology clinics was part of the research. Several anthropometric measures, including height, weight, and mid-upper arm circumference (MUAC), were made for each subject. According to Z scores, light malnutrition was indicated by values under -1 and moderate to severe malnutrition by values below -2.

Keywords---CHD, Malnutrition, PIC, PH.

Introduction

Infants may have a structural heart abnormality known as "congenital heart disease" (CHD) from the time of their birth. The enormous morbidity and death rates brought on by this illness have a significant influence on global scales. CHD, which affects around 1% of babies worldwide, is a disease that often results in malnutrition (1). basic complications that often impede their growth and development. Malnutrition brought on by an insufficient environment has a significant impact on one's wellbeing. The problem of balancing the body's nutritional needs with consumption poses a significant societal concern. The World Health Organization (WHO) has found that by estimating the scope of a global health concern. Around 815 million people suffer from malnutrition (3). Malnutrition may vary in severity among people with CHD. The reported frequencies of this condition have ranged from 17% to 75% in several investigations (4-6). There are contradictions in the study since the statistics are

dispersed. Variations in research might be explained by variations in study population characteristics. Malnutrition can be identified using diagnostic standards and planning, yet it still has a significant incidence. Considering the frequency of malnutrition among CHD patients, implementation is crucial. Effective problem-solving and prevention strategies may be very useful. Numerous risk factors for CHD may affect the development of malnutrition. When treating patients, it's important to take into account their existing health and the severity of their CHD. The surgical procedures used to treat digestive system disorders and these variables are closely connected. Interventions may be impacted by family socioeconomic position. Interventions may also be impacted by other variables. Malnutrition throughout development may have an influence on one's ability to get enough nutrition and healthcare 7 and 8 services. The main topic of this extensive research is malnutrition in children with CHD. The research will help in the creation of specialized plans for the efficient treatment and prevention of malnutrition in CHD patients, thereby enhancing the quality of life and health outcomes for people who suffer from the disease.

Methodology

A cross-sectional research was carried out at the Peshawar Institute of Cardiology's Department of Pediatric Cardiology from January to December 2022. The study's primary objective was to examine the diagnosis of children with congenital heart disease (CHD). 300 kids were treated at pediatric cardiac hospitals and clinics for CHD. Those who took part were considered study participants.

Data collection

A standardized questionnaire that was given to the children's guardians or parents. The questionnaire included questions on socioeconomic level, food preferences, clinical characteristics, and demographic traits. Each child's anthropometric data, including height, weight, and mid-upper arm circumference (MUAC), was also collected. The Z score method was used to categorize malnutrition; a Z score of -2 or below indicated moderate to severe malnutrition, while a Z score of -1 or lower indicated mild malnutrition. The research Informed permission was obtained from the children's parents or guardians to make sure they understood and wanted to take part. Strict attention was paid to the research population's clinical and demographic features throughout. Measures were taken to protect the participants' confidence and privacy while still using established criteria, such as weight-for-height z-scores, to determine the prevalence of malnutrition.

Data analysis

The research investigated the association between various CHD subtypes and related diseases in order to examine the prevalence of malnutrition in children with congenital heart disease (CHD). At pediatric cardiology clinics, 300 patients' height, weight, and mid-upper arm circumference (MUAC) were measured anthropometrically. Z scores were used to assess malnutrition, with scores under -2 indicating moderate to severe malnutrition and values under -1 suggesting mild malnutrition. The examination's cross-sectional design sought to identify the

prevalence of malnutrition among this particular group of young people used descriptive statistics to describe height-for-age and weight-for-age in a study using SPSS v26.

Ethical approval

In order to conduct research with human subjects ethically and responsibly, while also considering the participants' safety, rights, and well-being into mind, it is essential to get ethical permission. Before doing any study, it is customary to get ethical permission from an Institutional Review Board (IRB), Ethics Committee, or study Ethics Board (REB). This permission is given after a careful examination of the study design, methods, and any possible risks or rewards for the participants before beginning, permission from the institutional review board (IRB)

Results

A total of 300 patients were involved in this investigation among them, 123 (41%) of them were female and 177 (59%) of them were men. The patients' ages ranged from one month to five years, with a mean age of 17.8 14 months of the 300 patients, 40 (13.3%) were malnourished, 81 (27%) were mildly malnourished, 110 (36.6%) were moderately malnourished, and 69 (23%) were severely malnourished. Based on the patients' conditions, four groups were created: Patients in Group 1 had cyanotic congenital disease and pulmonary hypertension, those in Group 2 had cyanotic congenital disease but no pulmonary hypertension, those in Group 3 had acyanotic congenital heart disease and pulmonary hypertension, and those in Group 4 had acyanotic congenital heart disease but no pulmonary hypertension. There were 15 patients in Group 1, of whom 9 (60%) were men and 6 (40%) were women. This group's average age was 10.4 3.9 months. It was discovered that every patient in this group was malnourished, with one (6.6%) having moderate malnutrition and 14 (93.3%) having severe malnutrition. (Table 1)

Table 1: Cyanotic congenital disease with pulmonary hypertension (Group 1)

	Number (N)	Percentage(%)
Male	9	60%
Female	6	40%
No Malnutrition	0	0
Mild Malnutrition	0	0
Moderate Malnutrition	1	6.6%
Severe Malnutrition	14	93.3%

There were 75 patients in Group 2, of whom 32 (42.7%) were female and 43 (57.3%) were male. This group's average age was 20.6 15.2 months. Of the 75 patients, 37 (49.3%) showed no signs of undernourishment, 20 (26.6%) had mild undernourishment, nine (12%) had moderate undernourishment, and nine (12%) had severe undernourishment. (Table 2)

Table 2: Cyanotic congenital disease without pulmonary hypertension (group 2)

	Number (N)	Percentage(%)
Male	43	57.3%
Female	32	42.7%
No Malnutrition	37	49.3%
Mild Malnutrition	20	26.6%
Moderate Malnutrition	9	12%
Severe Malnutrition	9	12%

There were a total of 30 patients in Group 3, with 16 (53.3%) men and 14 (46.7%) women. This group's average age was 32.8 11.6 months. One (3.3%) of the 30 patients showed no signs of malnutrition, followed by mild malnutrition in six (20%) cases, moderate malnutrition in nine (30%) cases, and severe malnutrition in fourteen (46.6%) cases (Table 3)

Table 3: Acyanotic congenital heart disease with pulmonary hypertension (Group 3)

	Number(N)	Percentage(%)
Male	16	53.3%
Female	14	46.7%
No Malnutrition	1	3.3%
Mild Malnutrition	6	20%
Moderate Malnutrition	9	30%
Severe Malnutrition	14	46.6%

180 patients made up group 4, of whom 109 (60.5%) men and 71 (39.5%) women. The average age was 14.8 12.4 months. Out of 180 patients, 2 (1.1%) exhibited no signs of malnutrition, 55 (30.5%) had mild malnutrition, 91 (50.5%) had moderate malnutrition, and 32 (17.7%) had severe malnutrition. (Table 4)

Table 4: Acyanotic congenital heart disease without pulmonary hypertension (Group 4)

	Number (N)	Percentage(%)
Male	109	60.5%
Female	71	39.5%
No Malnutrition	2	1.1%
Mild Malnutrition	55	30.5%
Moderate Malnutrition	91	50.5%
Severe Malnutrition	32	17.7%

Discussion

According to studies on congenital heart disease (CHD), starvation affects children with CHD often. Malnutrition is 86.7% prevalent overall, and the severity seems to vary based on the particular CHD combinations and contributory variables. Malnutrition incidence in babies without pulmonary hypertension is a serious

issue. It has been shown that CHD has a significant impact on both developed and developing areas. Studies show that babies with CHD have a higher prevalence of malnutrition. This fact is supported by several case studies, such as. A startling 84.0% of CHD patients were found to have the syndrome in a research by Hassan et al. (9), which was done. Prior to their operations, it was determined that these individuals had a malnutrition issue. Researchers from South India, under the direction of Vaidyanathan, discovered that 59.0% of children with CHD were underweight. According to a research conducted in Uganda, 42.5% of children with CHD needed surgery, and 31.5% of them withered away. Last but not least, it should be remembered that France was among developed countries. 63.6% of children in developing nations had normal weight, compared to 28.8% who were overweight. A significant 45.4% of these kids had stunted development. The research by Blasquez et al. (11) showed decreased incidence rates. Surprisingly, 15% of babies with CHD who were < 6 months old were malnourished. The lack of sufficient nourishment before to surgery is one potential cause for this variability. Surgery procedures may sometimes be postponed because of resource limitations. These findings about children's malnutrition are supported by recent research from the UK and Australia. Due to the almost equal distribution of instances of wasted, stunted, and underweight people, malnutrition is quite common. The degree of starvation associated with congenital heart disease is widespread and pervasive. According to earlier research, there are several factors that impact Coronary Heart Disease (CHD). The research also looked at participating participants' geographic distribution of heart lesions. Notably, the group experiences serious issues, such as CHF. It was found that the treatment standards were subpar at a well-known teaching hospital focused on tertiary care. The hospital is commonly used since it is well known for evaluating significant CHD patients and associated problems. Based on the results, left-to-right cardiac anomalies were shown to be the most common. Our study's findings support that, as shown by related studies. Infants with PH and cyanosis have reduced heights, weights, and ages as a consequence of the disorders' effects on growth. Malnutrition was shown to be more common accompanying measures in Varan et al.'s investigation. Between the first and the forty-fifth month of life, 89 newborns with congenital heart disease (CHD) were under careful observation. Researchers found that children with both PH and cyanosis had a greater risk of malnutrition than did infants without either condition. It's interesting to note that 88% of acyanotic newborns with PH had moderate malnutrition. In contrast, cyanotic newborns with PH were more likely to have moderate or severe malnutrition. Additionally, short height rather than low body weight was more often seen in cyanotic newborns without PH. These results were disseminated in a reliable publication with references 13 and 14. The research may not have adequately represented the greater community since it only used data from one tertiary teaching hospital, which is one possible drawback. The group in issue was mostly made up of congenital heart disease patients who had been referred for evaluation, which may have led to a selection bias that limited the results' application to all CHD patients. The investigation's breadth was further constrained by the study's failure to examine the precise nutritional components that cause malnutrition in these circumstances. The study also omitted assessing the long-term impacts of malnutrition on the kids' general wellbeing, which calls for further research on the topic.

Conclusion

The significant prevalence of malnutrition among kids with congenital cardiac disease in this research is a worrying result. The four patient groups in the research had varying degrees of malnutrition, with patients with cyanotic illness and pulmonary hypertension showing the greatest rates of severe malnutrition. These results highlight how crucial it is to pay careful attention to how well-nourished infants with congenital heart disease are, especially those who have cyanotic illness and pulmonary hypertension. To improve these patients' overall results, healthcare practitioners should include dietary treatments in their management regimens. The goal of future research should be to develop efficient methods for managing and preventing malnutrition in this at-risk group.

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