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Clinical Profile and Major Co-Morbidities among Hospitalized Children with Severe Acute Malnutrition: A Tertiary Care Hospital Experience

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Abstract

***Background*:** Malnutrition is a general term and often refers to under nutrition resulting from inadequate consumption, poor absorption, or excessive loss of nutrients, but the term also encompasses over nutrition. ***Aim of the Study*:** Aim of the study was to find out the clinical profile and major co-morbidities among hospitalized children with severe acute malnutrition at a tertiary care hospital. ***Methods*:** A prospective observational study was conducted in the Department of Pediatrics, Khulna Medical College and Hospital, Khulna, Bangladesh, over one year from January 2019 to December 2019. ***Result*:** A total of 1810 children were enrolled and analyzed in this study. Table 1 shows the baseline data of our study. Most 59.67% of patients were from the age group 1-12 months, 588(32.49%) patients were from the age group 13-24 months, and 142(7.85%) patients were from the age group 25-59 months. ***Conclusion*:** Determinants of severe malnutrition include faulty feeding practices, ignorance about nutritional needs, repeated infections, large family size, and low socioeconomic status. The weight-height ratio is one of the best among the criteria for identifying SAM, and hence, every child should be screened adequately on presentation.

Keywords: SAM, Complementary feeding, Co-morbidities, Outcome.

INTRODUCTION

Malnutrition or malnourishment is a condition that results from eating a diet in which nutrients are either not enough or are too much such that the diet causes health problems [1, 2]. Not enough nutrition is called under nutrition or undernourishment while too much is called over nutrition. According to the World Health Organization (WHO), malnutrition essentially means “bad nourishment” and can refer to the quantity as well as the quality of food eaten [3, 4]. Severe acute malnutrition affects an estimated 20 million children under 5 years of age and is associated with 1-2 million preventable child deaths each year [5]. Severe acute malnutrition (SAM) results from a nutritional deficit that is often complicated by marked anorexia and concurrent infective illness [6]. Similarly, malnutrition increases one’s susceptibility to and severity of infections and is thus a major component of illness and death from disease. Globally, comorbidities such as diarrhea, acute respiratory tract infections and Malaria, which result from a relatively defective immune status, remain the major causes of death among children with SAM [7]. Severe acute malnutrition (SAM) is a unique type of malnutrition and is different from severe underweight and severe stunting. It is a medico-social disorder. Lack of exclusive breastfeeding, late introduction of complementary feeds, feeding diluted feeds containing less amount of nutrients, repeated enteric and respiratory tract infections, ignorance, and poverty are some of the factors responsible for SAM [8]. Malnutrition is believed to contribute to nearly half of the deaths of children under five years of age in Asian and African continents [9]. The high mortality among SAM children is believed to be due to associated co- morbidities. Therefore, timely identification of the comorbid conditions and timely intervention can ensure a better outcome as these children are at a higher risk of poorer prognosis as compared to healthier individuals. As multiple outcomes have been studied separately in different studies in our part of the world but the combined outcome has never been stratified in this specific age group ranging from 6ms to 5 years. This study was carried out to find out the clinical profile and

major co-morbidities among hospitalized children with severe acute malnutrition at a tertiary care hospital.

METHODOLOGY & MATERIALS

A prospective observational study was conducted in the Department of Pediatrics, Khulna Medical College and Hospital, Khulna, Bangladesh, over one year from January 2019 to December 2019 after obtaining approval from the Institute's ethics committee. All children aged six months to 5 years with SAM were admitted to the pediatric ward and underwent treatment.

- **Inclusion Criteria**

Included weight for length/height <3 SD of World Health Organization (WHO) growth standards and bilateral pitting pedal edema of nutritional origin and mid-upper arm circumference <115 mm and/or presence of visible severe wasting.

- **Exclusion Criteria**

The study excluded children less than six months and more than five years of age, children with gross congenital malformations, cerebral palsy, chronic renal/liver failure, congenital heart disease, an inborn error of metabolism, and refusal of consent by parents.

All children were admitted and managed in the pediatric ward medically and nutritionally. A total of … cases of severe PEM were screened, and in the final analysis …. of these fulfilling, the inclusion criteria were enrolled in the study. A detailed history regarding socio-demographic factors and feeding history, including details of breastfeeding, complementary feeding, and present and prior illnesses, were noted in a pretested structured Performa and later recorded in a Microsoft Excel sheet. Socioeconomic status was classified according to the modified Kuppuswami index [8]. A paediatrician did a wholly general and systemic examination, and a complete medical diagnosis with the presence/absence of clinical co-morbidities and nutritional deficiencies was recorded. Data were recorded in a Microsoft Excel sheet. Data analysis was done with SPSS software version 16. The statistical tests used were chi-square and $p<0.05$ was considered statistically significant.

RESULT

A total of 1810 children were enrolled and analyzed in this study. Table 1 shows the baseline data of our study. Most 59.67% of patients were from the age group 1-12 months, 588(32.49%) patients were from the age group 13-24 months and 142(7.85%) patients were from the age group 25-59 months. The male-female ratio is almost 1:1. In our study we found second-birth babies most of 36.08%. Only 7.85% of the patients had a low birth weight and the majority of them were normal (92.15%). Most of the children were belong to lower-class families which are 92.10%. In this large percentage majority of children recovered. 69.17% of children were completely immunized for age, 28.84% of children were incomplete and only 1.99% of children were unimmunized. According to feeding practice, the majority of 1347(47.42%) patients had exclusive breastfeeding for 6 months and 25.58% of children had none (Table 2). Table 3 shows the major clinical co-morbidities in children with severe acute malnutrition, mostly 56.85% of children had severe anemia, 27.51% of children had diarrhea, 19.67% of children had lower respiratory tract infections and 9.83% of children had dehydration respectively.

Table 1: Baseline data of children with severe acute malnutrition (N=1810)

Variables	Recovered		Not Recovered		Total	
	N	%	N	%	N	%
Age (months)						
6-12	920	85.19	160	14.81	1080	59.67
13-24	535	90.99	53	9.01	588	32.49
25-59	142	100.00	0	0.00	142	7.85
Sex						
Male	783	87.98	107	12.02	890	49.17
Female	813	88.37	107	11.63	920	50.83
Birth order						
First	463	92.97	35	7.03	498	27.51
Second	528	80.86	125	19.14	653	36.08
Third	303	100.00	0	0.00	303	16.74
Fourth	178	100.00	0	0.00	178	9.83
Fifth	107	75.35	35	24.65	142	7.85
Sixth	18	50.00	18	50.00	36	1.99
Low birth weight (<2.5 kg)						
Yes	124	87.32	18	12.68	142	7.85
No	1472	88.25	196	11.75	1668	92.15
Socio-economic Status						
Upper	18	100.00	0	0.00	18	0.99

Upper middle	18	100.00	0	0.00	18	0.99
Lower middle	89	100.00	0	0.00	89	4.92
Upper middle	18	100.00	0	0.00	18	0.99
Lower	1453	87.16	214	12.84	1667	92.10
Immunization status for age						
Complete	1092	87.22	160	12.78	1252	69.17
Incomplete	451	86.40	71	13.60	522	28.84
Unimmunized	36	100.00	0	0.00	36	1.99

Table 2: Feeding practices in children with severe acute malnutrition (SAM) (N=1810)

Variables	Recovered		Not Recovered		Total	
	N	%	N	%	N	%
Exclusively Breastfed for 6 months						
Yes	1169	86.79	178	13.21	1347	74.42
No	427	92.22	36	7.78	463	25.58
Delayed Complementary feeding						
Yes	1187	83.71	231	16.29	1418	78.34
No	392	100.00	0	0.00	392	21.66

Table 3: Major clinical co-morbidities in children with severe acute malnutrition (N=1810)

Co-morbidities	Frequency	Percentage
Severe anemia (Hb<7gm %)	1029	56.85
Diarrhea	498	27.51
Lower respiratory tract Infections	356	19.67
Blood culture-positive sepsis	213	11.77
Dehydration	178	9.83
Rickets	142	7.85
Generalized edema	89	4.92
Congestive heart failure	89	4.92
Seizures	71	3.92
Nutritional tremors syndrome	53	2.93
Sub-acute intestinal obstruction	36	1.99
Hypothermia	36	1.99
Urinary Tract Infection	36	1.99
Enteric fever	18	0.99
Scurvy	18	0.99
Tuberculosis	18	0.99
Meningitis	18	0.99
Shock	18	0.99
Measles	18	0.99

DISCUSSION

This was a prospective observational study which included children aged 6 months to 5 years admitted to a pediatric ward with SAM over a period of one year. There was no sex predilection among males and females about the prevalence of SAM. It was similar to the findings of Das, Aguayo, Ubesie and Gernaat *et al.*, [10-13]. The majority of the children with SAM belonged to the age group of 6-12 months (59.67%) followed by 13-24 months (32.49%). This suggested a predominant number (80% of the study population) was below 2 years of age which was similar to past studies by Jena *et al.*, and Mahgoub *et al.*, [14, 15]. This could well be explained given inadequate and delayed complementary feeding documented in a significant number of children in the study population. This is consistent with the findings of Jena *et al.*, who had observed delayed complementary feeding in 65% of malnourished children [14]. Continuation of breastfeeding for a long time without adequate addition of complementary feeding is detrimental to a child's health after six months of age as caloric and nutritional requirements are not met by breast milk alone during the period. Also, inadequate diversification of diet with high-calorie foods and unhygienic methods for the preparation of complementary feeds could be corroborating factors as suggested by diarrhea in 27.51% of the study population. Another important factor was that 92% of children with SAM belonged to low socioeconomic status and only 1% to upper socio-economic status by the Kuppuswami index [16]. This is similar to the findings by Singh *et al.*, and Kumar *et al.*, [17, 18]. This is due to inadequate food availability, poor purchasing capacity and illiteracy among lower socio-economic strata. In our study, 69.17% of children

were completely immunized for age, 28.84% had incomplete immunization and only 1.99% were unimmunized which is in contrast to the results of Das, Jena and Sharma *et al.*, [10, 14, 19]. It might be due to better coverage and a greater number of diseases covered in the revised national immunization schedule as compared to past studies. Among clinical complications, severe anemia (Hb <7gm) was found to be the most common co-morbidity (56.85%) followed by diarrhea (27.51%) and lower respiratory tract infection in 19.67% which was similar to the observations of Das and Kumar *et al.*, [10, 18]. The prevalence of blood culture-positive sepsis in 213 patients (11.77%) and LRTI in 19.67% can be very well explained as malnourished children have a poor immune status thus predisposing them to various invasive infections. Edema was seen in only 4.92% of children in our study while Kumar *et al.*, observed a higher prevalence of edema in their studies [18]. Nutritional tremor syndrome was observed in 2.93% of children in our study which has not been reported by any other study from this part of the country. Florid clinical rickets was observed in 142 patients thereby stressing the need for routine vitamin D3 supplementation in children. The majority of children (1579, 87.23%) in our study showed good outcomes (recovered) while 231(12.76%) children showed an adverse outcome. However, out of these 233 children, only 18 deaths were reported, the rest of the children either left treatment against medical advice or did not turn in for a follow-up. This was comparable to similar studies of the recent past by Das and Kumar *et al.*, [10, 18].

Limitations of the Study

Every hospital-based study has some limitations and the present study undertaken is no exception to this fact. One limitation of the study on the clinical profile and major co-morbidities among hospitalized children with severe acute malnutrition at a tertiary care hospital is that the findings may not be generalizable to children with severe acute malnutrition who are treated at other types of healthcare facilities or in different geographic regions with different populations and healthcare systems. Additionally, the study may not provide a comprehensive understanding of the complex factors contributing to severe acute malnutrition in children, as it only focuses on children who were hospitalized for this condition.

CONCLUSION AND RECOMMENDATION

Our study concludes that the most vulnerable group for severe malnutrition is 6-12 months, and most belong to low socioeconomic status. The most common factor associated with them was delayed/improper complementary feeding. This is self-explanatory, as weaning starts post-6 months in most children. The most common co-morbidities were anemia and diarrhea.

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