

Original Article

A Comprehensive Analysis of Complementary Feeding Practices in Children Under 2 Years with Severe Acute Malnutrition

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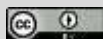


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ABSTRACT

Introduction: Malnutrition is a global public health issue that affects individuals of all age groups, particularly those who are poor and vulnerable. In developing countries, over 50% of preventable deaths among children under five are attributed to malnutrition. Inappropriate feeding practices are a significant contributor to malnutrition and its associated morbidity and mortality. **Aim of the study:** The study aimed to comprehensively analyze the feeding patterns of severely acutely malnourished children under the age of two. **Methods and materials:** This cross-sectional observational study was conducted at the Department of Pediatrics, Sir Salmimullah Medical College & Mitford Hospital (SSMC & MH) in Dhaka over 6 months, from October 2013 to March 2014. The study population consisted of 60 individuals. Data were collected through face-to-face interviews with the mothers of the children immediately after registration. The collected data were analyzed using the Statistical Package for Social Sciences

(SPSS) software, version-23.0. **Results:** The results showed that over 90% of the children were severely wasted, 18.3% were severely stunted, and 16.7% had bipedal edema. The majority of children had complications such as anemia, edema, dehydration, pneumonia, and gastrointestinal issues. There was no statistical significant link was observed between

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the pattern of complementary food consumption and the different types of malnutrition (p=0.141). Conclusion: The study concludes that there are significant concerns regarding complementary feeding practices in children with severe acute malnutrition. Exclusive breastfeeding rates for the first six months are low, and there is a high prevalence of poor-quality complementary foods.

Keywords: Feeding, Practices, Children, Under, Severe Acute Malnutrition, Comprehensive Analysis

INTRODUCTION

Malnutrition is a critical global public health issue that affects individuals of all age groups, particularly those who are poor and vulnerable (Delisle, 2008) [1]. Tragically, more than 50% of the 10.4 million preventable deaths of children under the age of five in developing countries each year are attributed to malnutrition (Caulfield et al., 2004) [2]. Additionally, malnutrition is closely linked to various infectious illnesses, such as acute respiratory infections and diarrhea [3]. Inappropriate feeding practices remain a significant contributor to malnutrition, accounting for at least one-third of cases and contributing substantially to morbidity and mortality among children under the age of five [4]. The detrimental connection between malnutrition and inappropriate feeding practices is well-established. Malnutrition directly or indirectly causes 60% of all deaths in children under five annually, with over two-thirds of these deaths associated with inappropriate feeding practices occurring within the first year of life. The World Health Organization (WHO) recommends exclusive breastfeeding for the first six months of life, with the addition of complementary feeds at six months with continued breastfeeds until at least the age of two [5, 6]. Complementary feeding, whether initiated prematurely or delayed, often involves the introduction of foods that are nutritionally inadequate and pose potential safety risks. When infants and young children are not fed properly,

which causes malnutrition, it can have serious consequences in the long term. These include problems with thinking and social skills, difficulties in school, and lower productivity when they grow up. Consequently, these feeding practices pose a significant threat to social and economic development, constituting major obstacles to achieving and maintaining the health of this crucial age group [7]. Protein energy malnutrition continues to be a significant health challenge in developing countries across the globe, especially among children. It serves as a major contributing factor to sickness and mortality. Globally, approximately 41% of children under the age of five are considered short for their age or stunted, with 15% classified as severely stunted (below -3 standard deviations). Furthermore, 16% of children are deemed wasted or too thin for their height, and 4% suffer from severe wasting. Wasting tends to peak between 18 and 23 months of age, affecting 17% of children. Moreover, 36% of children are underweight (low weight-for-age), with 10% severely underweight. The highest prevalence of underweight occurs between 36 and 47 months of age, affecting 43% of children (Bangladesh Demographic and Health [8]). Inadequate feeding practices contribute significantly to malnutrition among children under the age of five, leading to high mortality rates and long-term negative effects on development and well-being. The period from birth to two years is crucial for optimal growth

and development, making appropriate feeding practices essential. Inappropriate feeding practices hinder socioeconomic development and poverty reduction efforts and hinder the achievement of Millennium Development Goals. Optimal breastfeeding and complementary feeding have been shown to significantly reduce child mortality. Correcting feeding practices can prevent malnutrition and its long-term consequences, such as developmental delays and increased risk of chronic diseases [9]. Therefore, the study aimed to comprehensively analyze the feeding patterns of severely acutely malnourished children under the age of two.

METHODS & MATERIALS

The cross-sectional observational study was conducted at the Department of Pediatrics, Sir Salmimullah Medical College & Mitford Hospital (SSMC & MH) in Dhaka over 6 months, from October 2013 to March 2014. The study population consisted of 60 individuals. Data were collected through face-to-face interviews with the mothers of the children immediately after registration. A structured questionnaire was used as the research instrument, which included all the variables of interest. The questionnaire was pretested and

finalized before data collection. The collected data were analyzed using the Statistical Package for Social Sciences (SPSS) software, version-23.0. The statistical tests employed included the Chi-square test or Fisher's Exact Probability Test for comparing categorical data. A significance level of 0.05 ($p < 0.05$) was considered the level of significance with 95%CI. The ethical clearance of this study was obtained from the Ethics Committee of Sir Salmimullah Medical College & Mitford Hospital (SSMC & MH), Dhaka, Bangladesh.

Inclusion Criteria:

- Children less than 2 years of age.
- Children with severe acute malnutrition (SAM)

Exclusion Criteria:

- Secondary causes of malnutrition due to congenital heart disease, congenital metabolic disorder, genetic disorder, or chronic disease.
- Edema due to liver disease, nephrotic syndrome, or renal failure.
- Attendant (parent or caregiver) not willing to participate in the study.

RESULTS

Table I: Distribution of children by their nutritional status (N=60).

Nutritional status	Frequency	Percentage
Weight for Height/Length Z-score (Wasting)		
Normal	1	1.7
Moderate	4	6.7
Severe	55	91.7
Bipedal oedema	10	16.7
Height for age Z-score (Stunting)		
Normal	40	66.7
Moderate	9	15

Severe	11	18.3
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Over 90% of the children were severely wasted (Weight for height/length Z-score-3) and 18.3% were severely

stunted (height for age Z-score <-3). Besides 16.7% of children had bipedal oedema.

Table II: Distribution of children by their age (N=60).

Variable Age(months)	Frequency	Percentage
<3	8	13.3
3-6	13	21.7
7-12	23	38.4
13-18	8	13.3
19-24	8	13.3
Sex		
Male	32	53.3
Female	28	46.7

Among the participants, the peak age incidence of severely acutely malnourished children was 7-12 months. A decreasing trend is observed with either increasing or decreasing age. The mean age of the children was 9.9

months and the lowest and the lowest ages were 2 and 22 months respectively. Of the total children, 32 were male and 28 were female giving a male-to-female ratio of roughly 8:7.

Table III: Distribution of children by birth-related information (N=60).

Birth related information	Frequency	Percentage
Gestational age at birth (weeks)		
Term (≥ 37 weeks)	46	76.7
Preterm (≤ 37 weeks)	14	23.3
Place of delivery		
Home	55	91.7
Hospital	4	6.7
Clinical	1	1.7
Mode of delivery		
NVD	55	91.7
LUCAS	5	8.3
Postnatal condition of the baby		
Hospitalization needed	8	13.3
No hospitalization needed	52	86.7
Separation of the baby from mother after birth (if yes, how long)		
3	1	1.7
48	1	1.7

Over three-quarters, (76.7%) of the children were born at term. Most (91.7%) of children were delivered

normally at home. Only 13.3% needed hospitalization after delivery children were separated from their mothers after

birth -one after 3 hours and another after 48 hours.

Table IV: Distribution of children by problems/complications at entry (N=60*).

Problems/Complications	Frequency	Percentage	Mean \pm SD
Anaemia	53	88.3	
Jaundice	6	10	
Edema	9	15	---
Dehydration	12	20	---
Temperature(F)	---	---	100.2 \pm 3.2
Pulse(/min)	---	---	111 \pm 14
Pneumonia	31	51.7	
Eye change	1	1.7	---
Shock	2	3.3	
Diarrhea	17	28.3	
Vomiting	15	25	
Pain in the ear	1	1.7	

*Total will not correspond to 100% for multiple responses

The majority of the children were anemic (88.3%), and had edema (15%) and dehydration (20%). Around half of the children had pneumonia (51.7%). Diarrhea and vomiting were complained

of by 28.3 and 25% of mothers. The average temperature and pulse rate were higher than normal. The shock was evident in a few cases (3.3%).

Table V: Distribution of children by initiation of complementary feeding (N=60).

Initiation of complementary food (months)	Frequency	Percentage
1-3	11	18.3
4-5	10	16.7
6	30	50
7-9	9	15

Half (50%) of the children received complementary food at 6 months of age, 21(35%) received complementary food

earlier (18.3% at 1-3 months and 16.7% at 4-5 months of age) and 9(15%) started delayed weaning.

Table VI: Types of complementary food received by the children (N=60).

Types of complementary food	Frequency	Percentage
Suji/Barly/Rice/ powder without milk	27	45
Suji/Barly/Rice/ powder with milk	26	43.3
Khaichuri	7	11.7

45% of the children received Suji/Barly/Rice powder without milk, 43.3% with

milk, and 11.7% with khichuri as a complementary food.

Table VII: Association between initiation of complementary feeding and types of malnutrition (N=60).

Initiation of weaning	Types of malnutrition			P-value
	Wasting (n=43)	Bipedal oedema (n=9)	Wasting with stunting(n=8)	
Early	16 (37.2)	3 (33.3)	2 (25)	0.573
Right time	21 (48.8)	4 (44.5)	6 (75)	
Delayed	6 (14)	2 (22.2)	0 (0.0)	

Figures in the parentheses indicate the corresponding percentage

*Data were analyzed using *Chi-square(x)²Test*.

The table reveals that out of a total of 43 cases of wasting, 16 cases (37.2%) occurred when complementary feeding was initiated early, 21 cases (48.8%) happened at the right time, and 6 cases (14%) were associated with delayed initiation. For cases of bipedal edema, 3 cases (33.3%) were linked to early initiation, 4 cases (44.5%) to the right time, and 2 cases (22.2%) to delayed initiation. Lastly, for wasting with

stunting, 2 cases (25%) were observed with early initiation, 6 cases (75%) with the right time, and no cases (0.0%) with delayed initiation. Notably, the p-value for all three types of malnutrition exceeds 0.05 (specifically, 0.573), indicating that there is no significant association between the initiation of complementary feeding and the types of malnutrition analyzed in this study

Table VIII: Association between the pattern of complementary food and malnutrition.

The pattern of complementary food*	Types of malnutrition			P-value
	Wasting (n=43)	Bipedal oedema (n=9)	Wasting with stunting (n=8)	
Suji/Barly/Rice/ powder without milk	16 (37.2)	6 (66.7)	5 (62.5)	0.141
Suji/Barly/Rice/ powder with milk	22 (51.2)	3 (33.3)	1 (12.5)	
Khaichuri	5 (11.6)	0 (0.0)	2 (25.0)	

Figures in the parentheses indicate the corresponding percentage

*Data were analyzed using *Chi-square(x)²Test*.

The table shows that out of a total of 43 cases of wasting, 16 cases (37.2%) were associated with the consumption of suji/barley/rice powder without milk, 22 cases (51.2%) were linked to suji/barley/rice powder with milk, and 5 cases (11.6%) were associated with the consumption of khichuri. For cases

of bipedal edema, 6 cases (66.7%) were related to suji/barley/rice powder without milk, 3 cases (33.3%) were linked to suji/barley/rice powder with milk, and no cases (0.0%) were associated with khichuri consumption. Regarding wasting with stunting, 5 cases (62.5%) occurred with the

consumption of suji/barley/rice powder without milk, 1 case (12.5%) with suji/barley/rice powder with milk, and 2 cases (25.0%) were related to khichuri consumption. In this case, the p-value is 0.141, indicating that there is no statistically significant association between the pattern of complementary food and the types of malnutrition analyzed in this study.

DISCUSSION

The present study aimed to provide a comprehensive analysis of complementary feeding practices in children under 2 years with severe acute malnutrition. The results indicate important findings regarding the nutritional status of the children, their age distribution, birth-related information, problems/complications at entry, initiation of complementary feeding, and the types of complementary food received. In this study over 90% of the children were severely wasted, indicating a critical condition of acute malnutrition based on weight for height/length Z-score. Additionally, 18.3% of the children were severely stunted based on height for age Z-score, and 16.7% had bipedal edema. These findings highlight the severity of malnutrition among the study population. These results are consistent with previous studies [10, 11] that have shown a high prevalence of severe acute malnutrition and stunting in children under 2 years in similar settings. The age distribution of severely acutely malnourished children presented in this study is crucial for understanding the vulnerable periods for malnutrition. The peak age incidence was observed at 7-12 months, indicating that children in this age group are at a higher risk of severe acute malnutrition. The decreasing trend observed with increasing or decreasing age suggests that the risk of severe acute

malnutrition decreases as children grow older. These findings align with several studies [12, 13] that have identified the 6-24 months age group as a critical period for the development of malnutrition. In this study the birth-related characteristics of the children. The majority (76.7%) of the children were born at term, indicating that preterm birth was not a predominant factor in this population. Most children (91.7%) were delivered normally at home, which may imply limited access to institutional healthcare facilities during childbirth. The separation of children from their mothers after birth in some cases highlights potential gaps in immediate postnatal care. Studies [14, 15] have emphasized the importance of adequate maternal and neonatal care in preventing malnutrition. In this study, the problems and complications were observed at entry. Anemia was highly prevalent among the children (88.3%), indicating a significant burden of this nutritional deficiency. Edema and dehydration were observed in a substantial proportion of the children, emphasizing the critical nature of their condition. These findings are consistent with studies [16, 17] that have identified anemia and infections as common coexisting factors in children with severe acute malnutrition. The initiation of complementary feeding is a crucial factor in child nutrition, as highlighted in this study. Half of the children (50%) started receiving complementary food at 6 months of age, which is in line with the recommended age for the introduction of solid foods. However, a significant proportion (35%) received complementary food earlier, with 18.3% starting at 1-3 months and 16.7% at 4-5 months. This early initiation may be attributed to cultural practices or misconceptions regarding infant feeding. Delayed weaning was observed in 15% of the children, which may

indicate suboptimal feeding practices. Other studies [18, 19] have reported similar findings, emphasizing the need for appropriate timing of complementary feeding. In this study the types of complementary food received by the children. The majority (45%) received Suji/Barley/Rice powder without milk, followed by 43.3% with milk and 11.7% with khichuri. These findings suggest a limited diversity of complementary foods, as highlighted by the dominance of Suji/Barley/Rice powder without milk. This lack of dietary diversity may contribute to inadequate nutrient intake and potentially hinder optimal growth and development in these children. Studies [20, 21, 22] have consistently emphasized the importance of a diverse and nutrient-rich diet during complementary feeding to ensure adequate nutrient intake and promote healthy growth. The association between the initiation of complementary feeding and types of malnutrition is examined in this study. The results show that there is no significant association between the initiation of complementary feeding and the types of malnutrition analyzed in this study. Early initiation, right-time initiation, and delayed initiation did not demonstrate a clear relationship with wasting, bipedal edema or wasting with stunting. These findings differ from some previous studies [23, 24] which have reported associations between early initiation of complementary feeding and increased risk of malnutrition. In this study the association between the pattern of complementary food and malnutrition. The results indicate that there is no statistically significant association between the pattern of complementary food and the types of malnutrition analyzed in this study. The consumption of Suji/Barley/Rice powder without milk, with milk, or

khichuri did not demonstrate a clear relationship with wasting, bipedal edema or wasting with stunting. These findings suggest that the types of complementary foods alone may not be the primary determinant of malnutrition. Other factors, such as nutrient content, quantity, and overall dietary diversity, may also play crucial roles in influencing nutritional outcomes. Further studies [25, 26] investigating the nutritional composition and adequacy of different complementary foods can provide valuable insights into their impact on child growth and development.

LIMITATIONS OF THE STUDY

The study was conducted in a single hospital with a small sample size. So, the results may not represent the whole community.

CONCLUSION

This study highlights the severe acute malnutrition and stunting prevalence among children under 2 years, indicating the urgent need for interventions to improve their nutritional status. The findings underscore the importance of appropriate timing and diversity of complementary feeding practices for optimal child growth and development.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

RECOMMENDATIONS

The study recommends implementing targeted interventions to address nutritional challenges in children under 2 years with severe acute malnutrition. These interventions should include improved access to healthcare facilities

during childbirth, nutrition education programs for caregivers, and further research on the nutritional composition of complementary foods. Implementing these recommendations can improve the well-being of these children and reduce malnutrition prevalence.

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