Corresponding Author
Zakkam Havila Monalisa,
Department of Pediatrics, Government Medical College, Nandyal, Andhra Pradesh, India

Author Designation
[1]Associate Professor
[2]Junior Resident
[3]Assistant Professor
[4]Senior Resident

The Clinical Profile of Severe Acute Malnutrition in Hospitalized Children in the Age Group of 6 Months to 5 Years

[1]M. Sanjeevappa, [2]Jangam Chandrasekhar, [3]P.N. Mamatha and [4]Zakkam Havila Monalisa
[1-3]*Department of Pediatrics, Government Medical College, Anantapuram, Andhra Pradesh, India*
[4]*Department of Pediatrics, Government Medical College, Nandyal, Andhra Pradesh, India*

ABSTRACT
Severe acute malnutrition is one of the treatable and preventable causes of childhood morbidity and mortality. Under nutrition is an important public health problem and development challenge in India. Untreated SAM stunts development at a critical life-stage, diminishing life-long productivity. Around 45% of deaths in children under five years of age are linked to under nutrition. Children between the age group of six months to five years, who are admitted in the NRC, Department of Pediatrics, with SAM are included in the study after obtaining consent from the parent or guardian. Detailed history about the mother, birth, feeding status, socioeconomic class are taken. distribution of signs of malnutrition among the study population revealed, pallor in 67, hypopigmented hair in 65, hypo/hyper pigmented patches in 63, Vitamin B deficiency in 45, perianal excoriation in 43, sparse hair in 30, Vitamin A deficiency in 20, koilonychia in 20, brittle nails in 17, dermatosis in 7, easily pluckable hair in 6, Zinc deficiency in 1 child, lymphadenopathy in 1 child.

INTRODUCTION

Severe Acute Malnutrition (SAM) is a leading cause of global mortality and morbidity among children under-five years of age that is unlikely to significantly dissipate without more concerted action. Severe acute malnutrition is one of the treatable and preventable causes of childhood morbidity and mortality. Under nutrition is an important public health problem and development challenge in India[1].

Untreated SAM stunts development at a critical life-stage, diminishing life-long productivity. SAM remains a global problem and a persistent threat to millions of children's lives. According to the sustainable development goal (SDG) 3 of UNICEF, target 3.2 talks about to end the deaths that can be prevented in children under five years of age and to reduce under-5 mortality to as low as 25/1000 live births by 2030 in all countries[2].

Along with increasing the burden of death and disease, under nutrition also leads to growth retardation, impaired psycho-social and cognitive development. With appropriate nutritional and clinical management, many of the deaths due to severe wasting can be prevented. Globally in 2020, 149 million children under 5 were estimated to be stunted (too short for age), 45 million were estimated to be wasted (too thin for height) and 38.9 million were overweight or obese[3].

Around 45% of deaths in children under five years of age are linked to under nutrition. Asia carries 69% of the global burden of underweight children, 58% of the global burden of stunted children and 70% of the global burden of wasted children because of the combination of large population size and high prevalence. According to NFHS IV data, under five mortality rate in INDIA is 27 per 1000 live birth, wherein 45% of under 5 mortality is accounted by malnutrition alone and it remains a key public health challenge[4].

Fetal growth restriction along with suboptimal breastfeeding during the first few months of life contribute to 19% of all deaths in children less than 5 years. When the combined effects of stunting, wasting and vitamin A and zinc deficiencies are also considered, they jointly contribute to 45% of global child deaths (3.1 million deaths/year) and many more are disabled or stunted for life[5]. According to UNICEF, every year, one million children under five, die due to malnutrition related causes in India.

As per the WHO classification of the severity of malnutrition, the statistics are alarming and far above the emergency threshold for malnutrition. According to the Global Hunger Index (GHI) for 2019, India ranked 102 among 118 developing nations, 15.2% of Indians are undernourished and 38.7% of under-five children are stunted[6]. NFHS IV survey shows the prevalence of wasting is 19.7%, severe wasting is 7.9%, stunting is 27% and underweight is 23.8%. Maximum prevalence of wasting was seen in Jharkhand (29%) and minimum in Kerala. Only one-fifth of children were stunted in Kerala as compared to nearly half (48.3%) in Bihar. Malnutrition in India is not just related to calorie intake but India's dependence on a carbohydrate-based diet, which is deficient in protein and fat.

The 1st thousand days of life, from conception to 24 months of age, is the period where there is more risk for under nutrition (underweight, stunting, wasting, and micronutrient deficiencies). The early damage to growth and development can have adverse consequences in the later part of life, on health, school achievement, intellectual ability, work productivity and earnings[3]. Therefore, interventions to focus on this critical window of opportunity has been advised. Nutritional Rehabilitation Centres are set up in the health care facilities for inpatient management of children with severe acute malnutrition, with counselling of mothers for proper feeding and once they are recovering, they are sent back home with advise to follow up regularly[7].

MATERIELS AND METHODS

Study Design: Prospective observational study.

Duration of Study: 18 months (January 2022 to June 2023).

Place of Study: Department of Pediatrics.

Study Population: All the children admitted in NRC in the age group of 6 months to 5 years with SAM.

Sample Size: All the children admitted in NRC between 6 months to 5 years of age with SAM.

Inclusion Criteria: All the children admitted in the NRC, Department of Pediatrics, in the age group of 6 months to 5 years with severe acute malnutrition.

Exclusion Criteria:

- Children with co morbidities like congenital heart disease, inborn errors of metabolism are excluded
- Children who have undergone recent major surgery are excluded
- Children with syndromes are excluded

Data Collection: Children between the age group of six months to five years, who are admitted in the NRC, Department of Pediatrics, with SAM are included in the study after obtaining consent from the parent or guardian. Detailed history about the mother, birth,

feeding status, socioeconomic class are taken. Anthopometric measurements like weight for height, height for age, mid upper arm circumference are taken by following the standard techniques recommended by Jelliffe. Three readings of height, weight are taken and the mean of the last 2 readings is considered as final. The weight of the infants and children is measured using electronic weighing scales with an error margin of ±100 grams. The weighing scale is regularly checked with known standard weights.

Length of the infants is measured with infantometer and length is read from the scale to the nearest 0.1 cm. In older children who can stand, height is measured using a stadiometer. MUAC is measured to the nearest 0.1cm with a foldable, non stretchable measuring tape while left arm hanging freely at its midpoint between acromion process of scapula and olecranon process of ulna. Clinical examination is done for clinical signs of malnutrition like bilateral symmetrical edema, bitot spots, conjunctival xerosis, anemia, parotid enlargement, angular chelosis, fluorosis, caries, goiter, tropical ulcers, hepatomegaly and splenomegaly. Outcome is measured in the form of number of children with severe acute malnutrition who are getting discharged i.e., after achieving target weight gain, who are succumbed to death, who are defaulters.

RESULTS

Table 1 shows, only 1 (0.8%) child presented with oedema, 126 (99%) presented without oedema i.e., wasting. Table 2 shows distribution of co-morbidities among the study population, it shows anaemia in 67 (52.7%) children, vitamin deficiencies in 65 (51.1%) children, pneumonia in 57 (44.8%), diarrhoea in 27 (21.2%) children. Table 3 shows frequency of single parameter to define SAM, it shows weight for height <-3 SD in 101 (79.5%), MUAC <11.5 cm in 45 (35.4%), edema in 1 (0.8%).

Table 4 shows distribution of signs of malnutrition among the study population, pallor in 67, hypopigmented hair in 65, hypo/hyper pigmented patches in 63, Vitamin B deficiency in 45, perianal excoriation in 43, sparse hair in 30, Vitamin A deficiency in 20, koilonychia in 20, brittle nails in 17, dermatosis in 7, easily pluckable hair in 6, Zinc deficiency in 1 child, lymphadenopathy in 1 child. Table 5 shows duration of hospital stay among the study population, it shows 95 (75%) of them stayed for 14 days, 32 (25%) stayed for <14 days. Table 6 show the outcome among the study population, it shows 119 (94%) children achieved weight gain, 8 (6%) children went LAMA.

Table 1: Analysis of children presenting with edema among study population

Oedema	Frequency (N)	Percentage
Yes	1	0.8
No	126	99.2
Total	127	100

Table 2: Analysis based on the co-morbidities at the time of presentation

Comorbidity	Frequency (N)	Percentage
Anaemia	67	52.7
Vitamin deficiencies	65	51.1
Pneumonia	57	44.8
Diarrhoea	27	21.2

Chi Square value -19.037 $p<0.001$ (Significant)

Table 3: Analysis based on single parameter to define sam

Parameter to define SAM	Frequency (N)	Percentage
Weight for height <-3 SD	101	79.5
MUAC <11.5 cm	45	35.4
Oedema	1	0.7

Chi Square value-102.531 $p<0.001$ (Significant)

Table 4: Distribution of signs in the study population

Sign	Frequency(N)	Percentage
Pallor	67	52.7
Hypopigmented hair	65	51.1
Hypo/Hyper pigmented patches	63	49.6
Vitamin B deficiency	45	35.4
Perianal excoriation	43	33.8
Sparse hair	30	23.6
Vitamin A deficiency	20	15.7
Koilonychia	20	15.7
Brittle nails	17	13.3
Dermatosis	7	5.5
Easily pluckable hair	6	4.7
Zinc deficiency	1	0.7
Lymphadenopathy	1	0.7

Table 5: Descriptive analysis of duration of hospital stay in the study population

Duration of hospital stay	Frequency (N)	Percentage
Less than 14 days	32	25
14 days	95	75
Total	127	100

Table 6: Descriptive analysis of outcome among study population

Outcome	Frequency(N)	Percentage
Improved	119	94
LAMA	8	6
Total	127	100

DISCUSSIONS

In this study, only 1 (0.8%) child presented with oedema, 126 (99%) presented without oedema i.e., wasting. In the previous trends, kwashiorkor was more prevalent than marasmus but now marasmus is more common than kwashiorkor. In a study done by Dilip Kumar et al.[8] edematous malnutrition was more common than wasting type. In the present study, co-morbidities seen were anaemia in 67 (52.7%) children, vitamin deficiencies in 65(51.1%) children, pneumonia in 57 (44.8%), diarrhoea in 27 (21.2%) children. In study done by Rajendra et al.[9] which shows that ARTI was present in 37.3%, AGE 24.1%, TB 23%, pyogenic skin infections 14.7%, meningitis 4.9%, measles 4.2%, HIV 29.2% and malaria 21%. In the study done by Das et al.[10] common co-morbidities were acute gastroenteritis (n = 89, 44.9%), respiratory tract infection (n = 88, 44.4%) and septicemia (n = 54, 26.7%).

In this study, it was seen that calorie and protein deficits was utmost associated with every child with malnutrition. Similarly Das *et al*.[10] told that taking unbalanced diet is the most common cause of malnutrition. Majority of the study population, 102 children were Hindus which accounted for 80%, Muslims and Christians were 19 (15%) and 6 (5%) respectively. In the present study, weight for height <-3 SD is seen in 101 (79.5%) children, MUAC <11.5 cm is seen in 45 (35.4%) children, edema is seen in 1 (0.8%) child. This study found that weight for height can be used as single best parameter for defining SAM. In this study, pallor in 67, hypopigmented hair in 65, hypo/hyper pigmented patches in 63, Vitamin B deficiency in 45, perianal excoriation in 43, sparse hair in 30, Vitamin A deficiency in 20, koilonychia in 20, brittle nails in 17, dermatosis in 7, easily pluckable hair in 6, Zinc deficiency in 1 child, lymphadenopathy in 1 child were noted. Vitamin A deficiency was noted in the form of phrynoderma. Vitamin B deficiency was noted as angular stomatitis in 24 children and glossitis in 21 children. Zinc deficiency was noted in 1 child in the form of acrodermatitis enteropathica. In a study conducted by Dilip *et al*.[8] vitamin A and B deficiencies were most commonly noted.

In the study population, 95 children stayed for 14 days that accounted for 75%. Rest of the 32 children stayed for less than 14 days. Out of which 8 children left against medical advice, 24 children were discharged in between 10-14 days after achieving weight gain[11]. In this study, out of 127 children, in 119 children achieved target weight gain and 8 children went LAMA.

CONCLUSION

- Only 1 (0.8%) child presented with oedema, 126 (99%) presented without oedema
- 95 children stayed for 14 days that accounted for 75%. Rest of the 32 children stayed for less than 14 days
- 119 children achieved target weight gain and 8 children went LAMA

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