Clinico-Demographic Profile and Outcome Assessment of Complications in Children Presented with Severe Acute Malnutrition (SAM)

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Abstract

Aim: The aim of the present study was to identify the children with SAM from the patients admitted in Department of Pediatrics, Indira Gandhi Institute of Medical Sciences (IGIMS), Patna.

Methods: This observational study was carried out on admitted patients in Department of Pediatrics, IGIMS, Patna, from January 2022 to February 2023. WHO criteria were used to define severe acute malnutrition. All children between 6 months to 5 years of age with severe acute malnutrition admitted in Department of Pediatrics were included.

Results: Out of 144 SAM children 69 (47.9%) children belongs to age groups 6-12 month while 45 (31.25%) belongs to age group 13-24 Month and rest 30 (20.9%) children of age group more than 24 month. A total of 79 children (54.86%) were male while 65 children (45.14%) were female. A total of 119 cases (82.63%) had their weight for height/length below – 3 SD. 43 cases (30%) had visible severe wasting and 30 cases (20.83%) had bilateral pedal edema. All the SAM cases in study population had MUAC < 11.5 cm (100%). Only 38.20 % of patient (55 cases) had received exclusive breast feeding upto to 6 months of age while 89 cases (61.80%) had received partial breastfeeding. In the partial breast-feeding group almost all (89) children received feeding by bottle. Almost all of bottle-feeding baby received diluted cow milk. A total of 84 cases (58.3%) had received complete immunization according to their age while 60 cases (41.7%) had received only partial immunization.

Conclusion: The current study has been an attempt to observe the prevalence and outcome of common complication of severe acute malnutrition in hospitalized children between 6 months to 5 years. Prevalence of Malnutrition is almost similar in both the sexes with slight male dominance. Most of the malnourished child are in the age group of 6 to 12 months, and mean age of presentation was 18.94 month.

Keywords: Severe Acute Malnutrition, Children.

Introduction

Malnutrition is a significant factor in approximately one-third of the nearly 8 million under-five deaths worldwide. [1] Severe acute malnutrition (SAM) affects nearly 20 million preschool-age children all over the world mainly from south-east Asia and Africa. [2] In India, prevalence of SAM is 6.4% in children <5 years as per National Family Health Survey 3 (NFHS-3) and is home to 8 million children with SAM (31.2% of the world's severely wasted children). [3] If the United Nations Millennium Development Goals of reducing children malnutrition and mortality by 50% by 2015 are to be met, SAM needs to be prevented and treated effectively. [4] The children with SAM usually come to the hospital with complains like diarrhoea, pneumonia or other medical problems and they are known as complicated SAM. As management of these patients is different since the time of admission, to reduce mortality and morbidity, it is required that cases of SAM are identified earliest, triaged and managed accordingly.

Malnutrition is a serious public health concern in low- and middle-income countries, and is the focus of the first World Health Organization (WHO) Millennium Development Goal. In its acute form, it affects about 50 million children under-5 worldwide, including 48 million in Africa and Asia. [5] Acute malnutrition is subdivided into 2 categories: (i) Moderate Acute Malnutrition (MAM), defined as mid-upper arm circumference (MUAC) between 115 and 125 mm in children aged 6–59 months; or a weight-for-height/length z-

score between –2 and –3 according to the 2006 WHO growth standards; with absence of edema; (ii) Severe Acute Malnutrition (SAM), defined by two distinct clinical entities: (a) non-edematous malnutrition (marasmus), defined as MUAC < 115 mm in children aged 6–59 months; or a weight-for-height/length z-score < –3 according to the 2006 WHO growth standards; (b) edematous malnutrition (kwashiorkor), defined by bilateral pitting edema. [6]

SAM is further classified according to the presence or absence of medical complications. Uncomplicated SAM is defined as SAM with no apparent signs of infection nor other signs requiring hospitalization, and with adequate appetite. Complicated SAM is defined as SAM with clinical signs of infection, metabolic disorders, severe edema, hypothermia, vomiting, severe dehydration, profound anemia or lack of appetite. [6] SAM impairs life, cognitive and neurodevelopmental prognosis of children, especially in in low- and middle-income countries. The shorter-term prognosis of SAM depends on the type of malnutrition. In uncomplicated SAM, the mortality rate is < 5% while it varies from 10 to 40% in complicated SAM. [7]

The aim of the present study was to identify the children with SAM from the patients admitted in department of Pediatrics, IGIMS, Patna.

Materials and Methods

This observational study was carried out on admitted patients in department of Pediatrics, Indira Gandhi Institute of Medical Sciences (IGIMS), Patna from January 2022 to February 2023.WHO criteria was used to define severe acute malnutrition. All children between 6 months to 5 year of age with severe acute malnutrition admitted in department of Pediatrics were included.

Exclusion criteria: Children having congenital malformation and those not interested in this study are not included in this study.

Consent: - A written & informed consent will be taken from parents of the participants. All participants had the option to withdraw from the study during anytime during this study. A detailed & complete history that also includes nutritional history was taken from their mother or nearby relative. Detailed physical examination and relevant investigation [like CBC, MT, ESR, Chest X-ray, Urine R/E, Stool R/E, HIV] was done as required. The clinical sign of micronutrient deficiency was assessed.

Materials:

(a)   Measuring tape
(b)   Infantometer
(c)   Stadiometer
(d)   MUAC tape
(e)   Electronic Weighing Machine
(f)   Weight and Height simplified WHO chart

Who Criteria Fulfilled By Child

1. Weight for height below - <3 SD of the median WHO growth reference
2. Visible severe wasting.
3. Presence of bipedal pitting oedema.
4. Mid upper arm circumference below 11.5 cm-Total number of criteria fulfilled by child

Feeding Practice -   Breast feeding /artificial feeding/top feed/early introduction of complementary feeding/ delayed introduction of complementary feeding.

Complication -

1. Respiratory tract infection (pneumonia/TB)
2. Diarrhea
3. Fever (sepsis/meningitis/malaria/measles)
4. Anemia

Results

Table 1: Prevalence of severe acute malnutrition in different age group

Age Group	Total Number (Percentage)
6-12 Months	69 (47.91%)
13-24 Months	45 (31.25%)
> 24 Months	30 (20.9%)
Total	144 (100%)

Out of 144 SAM children 69 (47.9%) children belongs to age groups 6-12 month while 45 (31.25%) belongs to age group 13-24 Month and rest 30 (20.9%) children of age group more than 24 month.

Table 2: Sex wise distribution in SAM children

Age Group	TotalNo.	Male (No. & %)	Female (No. & %)
6-12 Month	69	38 (55.07%)	31 (44.93%)
13-24 Month	45	26 (57.77%)	19 (42.23%)
> 24 Month	30	15 (50%)	15 (50%)
Total	144	79 (54.86%)	65 (45.14%)

A total of 79 children (54.86%) were male while 65 children (45.14%) were female.

Table 3: Study population fulfilling different criteria for diagnosis of SAM

Parameter	Total No.	Percentage
Weight for Height/ Length < -3 SD	119	82.63%
Severe Visible Wasting	43	Approx 30%
Bilateral Pedal Edema	30	20.83%
MUAC < 11.5 cm	144	100%

A total of 119 cases (82.63%) had their weight for height/length below – 3 SD. 43 cases (30%) had visible severe wasting and 30 cases (20.83%) had bilateral pedal edema. All the SAM cases in study population had MUAC < 11.5 cm (100%).

Table 4: Frequency of breastfeeding practice, status of immunization and socio-economic status in SAM population

Breast Feeding Practice	Total No.	Percentage
Exclusive Breast Feeding up to 6 months	55	38.20%
Partial Breast Feeding	89	61.80%
Immunization Status		
Complete Immunization	84	58.3%
Partial Immunization	60	41.7%
Socio-Economic Status		
Below Poverty Line	112	78%
Above Poverty Line	32	22%

Only 38.20 % of patient (55 cases) had received exclusive breast feeding upto to 6 month of age while 89 cases (61.80%) had received partial breast feeding. In the partial breast feeding group almost all (89) children received feeding by bottle. Almost all of bottle feeding baby received diluted cow milk. A total of 84 cases (58.3%) had received complete immunization according to their age while 60 cases (41.7%) had received only partial immunization. The families of around 78% SAM children belongs to lower socio-economic status (below poverty line) while 22% cases belong to above poverty line.

Table 5: Education status of below poverty line and above poverty line

BPL	Illiterate (No. and %)	Primary (No. & %)	Up to Xstandard (No. & %)
Mother	92	20	0
	(82.14%)	(17.85%)	
Father	44	68	0
	(39.28%)	(60.7%)	
APL			
Mother	20	8	4
	(62.5%)	(25%)	(12.5%)
Father	13	9	10
	(40.6%)	(28.1%)	(31.2%)

BPL: Out of 112 mother 92 (82.14%) was illiterate, while only 20 (17.85%) had received primary education. However out of 112 father 44 (39.28%) was illiterate and 68 (60.7%) has received only primary education.

APL: Out of 32 mother 20 (62.5%) was illiterate while 8 (25%) and 4 (12.5%) had received Primary education and education upto X standard respectively. However out of 32 father 13(40.6%) was illiterate and 9 (28.1 %) and 10 (31.2%) had received primary education and education upto X standard respectively.

Table 6: Prevalence of complications of SAM in study

Type Of Disease	Total No. & %	6-12 Month	13-24 Month	> 24 Month
Diarrhoea (D)	61 (42.4%)	32 (46.37%)	18 (40%)	11 (36.66%)
Pneumonia (P)	50 (34.7%)	25 (36.23%)	18 (40%)	7 (23.33%)
Tuberculosis (T)	43 (29.9%)	22 (31.88%)	16 (35.55%)	5 (16.66%)
Meningitis (M3)	14 (9.7%)	7 (10.14%)	4 (8.89%)	3 (10%)
Malaria (M1)	5 (3.4%)	0	3 (6.66%)	2 (6.66%)
Measles (M2)	0	0	0	0
Sepsis (S)	15 (10.41%)	11 (15.94%)	2 (4.44%)	2 (6.66%)
Anemia (Nutritional Deficiency)	124 (86.11%)	60 (86.95%)	39 (86.66%)	25 (83.33%)

Diarrhoea was found to be most common complication associated with severe acute malnutrition. 42.4% (61 cases) SAM children had Diarrhoea. Pneumonia was found second most common complication. 34.72% (50 Cases) had Pneumonia. Tuberculosis was found third most common complication 29.9 % (43 case). In the nutritional deficiency Anemia was found in 86.11% population. A total of 124 cases had different degree of Anemia.

Table 7: Outcome of the study

Parameter	No. & Percentage
Cured/Discharge	123 (85.41%)
Death	6 (4.1%)
Defaulter	15 (10.41%)

Out of total 144 children 123 children (85.4%) discharged successfully, no. of defaulter case was 15 (10.4%) and total no. of death was 6 (4.1%) respectively.

Discussion

Severe Acute Malnutrition affects nearly twenty million under five children, and contributes to one million child deaths yearly. [8] The mortality rate of children with complicated SAM that receive treatment in inpatient setups has remained unacceptly high. [9] Such high mortality in inpatient units has been attributed to complication such as infections, fluid overload, dehydration micronutrient deficiencies and severe anaemia with oedema. Our study was done to know the prevalence and outcome of common complications of SAM in hospitalized children between 6 months to 5 years.

In our study we recorded highest prevalence of SAM in age group of 6 months to 12 months. 69 children out of 144 (47.91%) were in the age group of 6 to 12 months, while 45 patients (31.25%) between 13 to 24 months and 30 patients (20.9%) between 24 months to 5 years. Highest number of children in age group of 6 to 12 month of age may be due to lack of exclusive breast feeding, use of diluted cow milk and lack of awareness about complementary feeding. This results correlates well with the findings of the study done by Kumar et al, where 59.6% of SAM children were in the age group of 6 months to 12 months. [10] In our study, we found slightly male predominance. A total of 79 patients (54.86%) were Males while 65 patients (45.14%) were Females. Similar pattern of male dominance was reported by study of Irena et al [11] (55.3% males) and Dr. John Fondo's study (56% males). [12]

Out of the parameters used, Weight for Height/Length <- 3SD was found in 82.63% cases. Severe visible wasting was found in 30% cases where as Bilateral pedal oedema was present in 20.83% cases. Study by Kumar et al[10] which shows weight for height <- 3SD in 75.8% cases, severe visible wasting in 24.03% cases and bilateral pitting oedema in 27% cases. Exclusive breast feeding and proper breast-feeding practices play a very important role in nutritional status of a child. In our study population 38.20% children were exclusively breast fed up to 6 months of age. This was much higher than the exclusive breast feeding of 6%as reported by study of Kumar et al [10] which was conducted in Madhya Pradesh in 2011-12. In our study 84 out of 144 (58.3%) had received complete immunisation according to their age, while 41.7% (60 cases) had received only partial immunisation. The increased percentage of partial immunization in my study group may be due to lack of awareness, gender bias and increased distance of hospital from home. The corresponding findings as reported by study of Kumar et al, are 42.3%, 52% respectively. [10] In other study by Tarachand Saini it was 31.14% and 51.75% respectively. [13]

Socio-economic status of a family has a major impact on child nutrition. Children with lower socio-economic background have more chances of developing malnutrition because lack of nutritious food, lack of awareness, unhygienic living conditions, poor feeding practices and lack of health seeking behaviour. Around 78% families in my study group belonged to lower socio-economic status (BPL), which is somewhat higher than a previous Indian study by Kumar, et al[10] (75%), but slightly lower than a study from Nepal by Thapa A et al[14] in which 87% SAM children belonged to lower socio-economic status. In a study in slum of Nairobi, shows mother education persist as a strong predictor of child nutritional status in urban slum setting, even after controlling for other factors. Given that stunting is a strong predictor of human capital, emphasis on girl child education may contribute to breaking the poverty cycle in urban poor setting. [15]

In a study at Serbia, shows maternal but not paternal education was associated with stunting and maternal literacy was significantly associated with wasting. [16] The maternal education is more important for prevention of malnutrition and micronutrient deficiency in children.

Diarrhoea was the most common complication found in children with SAM in our study. Among 144 SAM patients, we found 61 cases of acute diarrhoea on the basis of history and clinical

presentation, which was 42.4% of all cases. Findings are much less as found by study of Irena et al (2011) which was 67.1%. [11] Overlapping nature of protein-energy malnutrition and micronutrient deficiencies were well understood and it is seen that lack of one micronutrient is typically associated with deficiency of others. [17] Anemia (86.11%) the common micronutrient deficiency associated with malnutrition in our study, and this is consistent with the previous reports by Kumar et al of 88.3%. [10] In our study out of 144 children 123 (85.4%) children discharged successfully, No. of defaulter case was 15 (10.4%) and total no. of death was 6 (4.1%). In a study at west ethiopia [18] shows 66.8% cure rate 4.4% death, 16.6% defaulter and 12.2% children transferred out.

Conclusion

The current study has been an attempt to observe the prevalence and outcome of common complication of severe acute malnutrition in hospitalized children between 6 months to 5 years. Prevalence of Malnutrition is almost similar in both the sexes with slight male dominance. Most of the malnourished child are in the age group of 6 to 12 months, and mean age of presentation was 18.94 month. Prevalence of malnutrition was more in children with poor socio-economic background. Proper breastfeeding and regular immunization has a great role in preventing malnutrition. Mother's education persist as a strong predictor of child nutritional status. Diarrhoea was the most common complication followed by Pneumonia & tuberculosis.

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