Clinical Profile and Socio-Demographic Characteristics of Children with Severe Acute Malnutrition (SAM) in Southern Odisha

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ABSTRACT

Introduction: Severe acute Malnutrition (SAM) is an important contributor to morbidity and mortality amongst less than five years of age. In the National Family health Survey (NFHS), it was seen that 10% of children with SAM would require hospital admission. Even with establishment of nationwide Nutritional Rehabilitation centres (NRC) and standard guidelines, the problem of SAM is high in Odisha. The present study was undertaken to look at the clinical profile of the children with SAM in southern Odisha.

Methods: A prospective observational study was conducted from one month to 60 months of age with SAM who were admitted to a tertiary teaching hospital. Demographics, clinical features, laboratory tests were recorded and tabulated.

Results: We enrolled 70 SAM children (screened = 3288) for our study who were primarily nutritional. Exclusive breast feeding till six months was present in 26%, and all had inadequate complementary feeding. The major clinical presentations of SAM were diarrhea (36%), fever (34%) and poor weight gain (29%).

Conclusions: Majority of SAM had low birth weight, and had poor rates of exclusive breast feeding, inadequate complementary feeding, and recurrent infections.

Keywords: childhood morbidity; nutrition rehabilitation centres; Severe acute malnutrition

INTRODUCTION

Severe acute malnutrition (SAM) is a severe form of protein energy malnutrition that results from inadequate proteins and calories, and is usually associated with infections. This severe form often results in growth faltering, increased susceptibility to infections. There is an increased chance of prolongation of suffering and death in the affected children. The affected children under five years of age account upto 20 million worldwide.[1] The reduction of underweight is an important component of Millenium Development Goals (MDG) by reduction of extreme poverty and hunger.[2] However with appropriate actions, by detection at early stages and treatment, the prognosis of these children is much better. But with progression to severe forms, the recovery is incomplete and affecting the stature and neurological development permanently. It is a medico-social disorder that requires intervention at various levels to control.[3] With the establishment of nutritional rehabilitation centers (NRC), the treatment of SAM has been revisited with standard protocols and has resulted in improved outcomes.[4] Due to the paucity of such data in southern Odisha, we have undertaken this study to look at the clinical and socio-demographic characteristics of the children with SAM.

METHODS

The present prospective study is a hospital based, undertaken at Paediatric Ward of a tertiary teaching hospital and NRC, City Hospital (Annex Hospital), during November 2015 to August 2017 following approval from Institutional Ethical Committee. All children between one month till 5 years of age were screened for following criteria (inclusion) of SAM as shown in table 1.1

Those who met above criteria were examined and those having congenital malformation, serious systematic illness and non nutritional causes of edema were excluded. Informed written consent was obtained from the parents. At enrolment, the data pertaining to complaints, birth weight, breast feeding, complementary feeding, social and demographic features, and clinical features was recorded in a Performa (Case recording sheet). The anthropometric assessment included weight, length / height, head circumference, and MUAC. The weight was measured with an electronic weighing scale, length by an infantometer, height by stadiometer (for children two years and above or measuring more than 87 cm), and MUAC by a non elastic tape. WHO multicentre growth charts were used in the entire study for identifying SAM. A detailed head to foot and systemic examination was done and recorded in performa. During admission and subsequently, complete blood count, thick and thin smears for malaria, blood sugar, blood and urine cultures, tuberculosis and HIV screening was done. The data was entered into a computer using IBM SPSS 23 and Microsoft Excel 2007, cleaned and analyzed using SPSS software.

Table 1. Inclusion criteria[1]

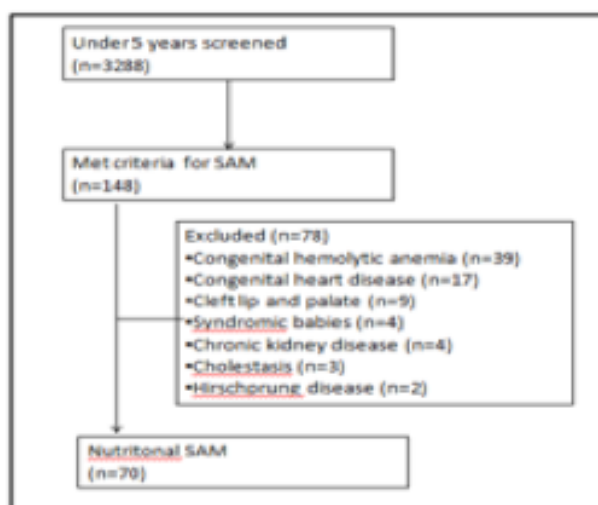| Infants six months to five years	Infants less than six months
Weight-for-height (Wt / Ht) < - 3 SD and / or Visible severe wasting and / or Mid upper arm circumference (MUAC) < 115 mm and/or Nutritional edema of both feet	a) Length > 45 cm Weight-for-length (Wt/L) < - 3 SD and/or Visible severe wasting and/or Nutritional edema of both feet. b) Length < 45 cm Severe visible wasting

Figure 1. The flowchart of the study

RESULTS

The ratio of male and female was 1:0.8. Maximum numbers of patients were in the age group of seven to 24 months (n = 47; 66%). The mean age of presentation was 15.67 months with standard variance of 11 months. Most of these babies (n = 53; 76%) were born at term and were weighing more than 2.5 kg at birth (n = 43; 43%). However, 25 (36%) children were having birth weights between 1.5 to 2 kg. Exclusive breast feeding (EBF) up to six months was given only in 18 (26%) children. Forty percent (27 children) were exclusively breastfed till three months. Only 17 (28%) of these were initiated on complementary feed (CF) between six to eight months. Twenty-six children (43%) were initiated with CF between nine to 10 months age and six had CF before six months. Out of all children who received complementary feeds (n = 56), adequacy was present in only 12 (27%) children. In this study 50% (n = 35) children were given liquid feeds as complementary food. Diluted rice water, diluted ragi, and diluted sago were the most common diluted CF. The complete immunization coverage as per NIS schedule was present in only 17 (24%) children. In 46% (n = 33) of household, number of children was three or more. Seventy five percent (n = 53) of the cases belong to lower socioeconomic strata as per modified Kuppuswamy status. Sanitation facility was not available in 70% (n = 49) families. In this study, the mean weight / age was - 3.36 ± 0.46 SD, and the mean length / height / age were - 2.36 ± 0.94 SD. The anthropometry, clinical symptoms and signs are enumerated in table 2.

DISCUSSION

SAM is a social and economical problem affecting the under five year children with recurrent infections, poor growth and early childhood mortality. In our study, there was 52% of secondary SAM, much higher than other studies due to the high rates of admission of congenital hemolytic anemia.[5] In our study, 17 cases (24%) were preterm and 30 (43%) were LBW babies, different from a Bangladesh study with high prevalence (84%) of malnutrition in babies with low birth size (Historical data was used in the study).[6] Developmental delay was noticed in 19 (27%) of

Table 2. The clinical features and complications

Features		
Anthropometry	**< Six months (n = 10)**	**Six months to five years (n = 60)**
MUAC	NA	34
Weight / height or length < - 3 SD	9	50
Weight for age < - 3 SD	10	43
Height / length for age < - 3 SD	9	14
Edema	1	4
Severe visible wasting	3	10
Symptoms	**Number (n = 70)**	**Frequency (%)**
Diarrhea	25	36
Fever	24	34
Poor weight gain	20	29
Vomiting	18	26
Cough	14	20
Edema	5	7
Diarrhea	25	36
Developmental delay (Gross motor)	51	73
Signs and complications	**Number (n = 70)**	**Frequency (%)**
Pallor	34	49
Hepatomegaly	18	26
Skin changes	16	19
Hair changes	15	17
Splenomegaly	10	14
Glossitis / Angular cheilitis	9	13
Eye changes of vitamin A deficiency	8	11
Sepsis	14	20
Dyselectrolytemia	9	13
Dehydration	7	10

MUAC: mid upper arm circumference

children in our study. There was a similar rate (23%) of developmental delay observed by Das et al in Kolkata.[7] The developmental delay (Especially gross motor delay) is associated with malnutrition due to the decreased muscle mass,

micronutrient deficiencies, and electrolyte imbalances.

The mean age of EBF was 3.6 months with a standard variance of 1.7, and only 26% had EBF till six months. Various studies undertaken by different researchers have shown the rate of exclusive breastfeeding for the first six months as 32%, 49%, 12%, and 3% in SAM, which is in accordance with present study.[5,7-9] The absence of exclusive breast feeding, consumption of animal milk, and / or formula feed (which was in all cases over diluted preparation) in the initial six months deprives the baby of all nutrients, and renders them susceptible to frequent infections, spiraling into the cycle of infections and malnutrition.

In this study, 49% children (n = 30) had CF started after eight months. The mean age of starting complementary feeding is 7.7 months with a standard variance of 2.5. Similar result was obtained by researches in other parts of India where the age of initiation of CF was between seven to 11 months.[5,7,9] Delayed introduction of CF beyond six months with inadequate quantity and improper dilution is a risk factor for malnutrition. When this is compounded with inadequate breast feeding, the child is more vulnerable for further deterioration. Though in our study, CF was initiated at mean age of 7.7 months, however, it was served to children with inadequate amount and / or frequency and / or consistency. There was very poor intake of diverse food groups. This keeps the baby bereft of both macro and micronutrients that grossly effect the child's nutritional status. A very small percentage was given animal source food other than dairy products. This could be due to the lack of awareness of the requirements of the growing infant in form of the consistency, amount, and frequency of feeds.

In the present study, 17% of the children were not immunized and 58% of children were partially immunized as per National Immunization Schedule (NIS). Similar results of immunization rates were obtained in others, where the malnourished children were unimmunized in 10% and partial immunized in 45%.[7] In our study 75 % (n = 53) belong to lower socio economic strata and cases of malnutrition were higher (47%) in the family with three or more

children which is in conformity with findings in earlier studies.[5,7,9] This is due to lower per capita income and poor child rearing practices. Sanitation facility was not available for 70% of cases in our study. Similar result was obtained by Devi et al where such facility was available only in 8% of cases.[5] This could be due to the high prevalence of open field defecation, and poor literacy rates in Ganjam and nearby places of Odisha.

In children > six months age, 83% had severe wasting, and 56% had MUAC below 11.5 cm. The mean MUAC was 11.08 cm with the standard variance of 1 cm. Similarly, the mean MUAC was 10.35 $\pm$ 1.18 cm in study by Das et al.[7] In a study from Uttar Pradesh (UP), there was MUAC < 11.5 cm in 80% of total SAM (n = 1013).[10] However, the sensitivity of using MUAC in diagnosis of SAM has showed disparity in various studies.[5,11] In a study done by Das et al on 582 children, only 9.4% children had MUAC below 11.5 cm. Das et al had MUAC 11.5 cm criteria alone in only 9.4% of total SAM children (n = 582).[7] Hence screening children with MUAC alone can miss many number of cases.

The commonest mode of presentation were diarrhea (36%), fever (34%) and poor weight gain (29%) which is in conformity with other studies.[9,12] Pallor was the commonest clinical sign (49%) observed in our study. Out of them, 30% had severe anemia and 12% children were given blood transfusion. In a similar study done by Neha Thakur et al in Delhi, 66% children had severe anemia, and 20% of them received a blood transfusion.[13] Skin changes and hair changes were present in 17% (n = 12) and 25% respectively similar to 30% and 34% respectively in study undertaken by Das et al (n = 630).[7] Major co-morbid conditions in this study were acute diarrheal disease (36%), pneumonia (30%), malaria (10%), tuberculosis (TB) (9%) and urinary tract infection UTI (8%). In a similar study in Madhya Pradesh, 54% suffered from diarrhea and 28% children suffered from respiratory tract infection.[14] Sharma M reported 50% diarrhea, and 30% malaria in a private urban hospital setting.[15] Such variability in the proportion of cases of malaria could be due to the differences in prevalence (endemic) at various

places.TB was reported in 9% of children in the index study and similar trend was found by Devi et al, where 7% of children had TB.[5] Although ours is a study with relatively larger number of children, it is a single centric study involving a limited geographic region. This fact would render this study to generalize to the entire nation.

CONCLUSIONS

Ours was a hospital-based study to look at the various socio-epidemiological and clinical profiles of SAM children admitted due to nutritional causes. Most of those affected were born having low birth weight, poor rates of EBF, inadequate CF, and recurrent infections. Most of these have come from poor socioeconomic status, families with > two children, and incomplete immunization coverage. There is an urgent need to address the issues of EBF till six completed months and timely initiation of appropriate CF to prevent malnutrition and its impact on morbidity and mortality of under five years children.

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