

A study on factors associated with outcome of SAM children admitted at NRC, PMCH, Patna

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ABSTRACT

Background: Nearly half of the deaths under 5 years of age is attributed to childhood undernutrition. According to NFHS-5, Bihar has 42.9% stunted, 22.9% wasted, 8.8% severely wasted and 41% underweight children under 5 years of age.

Objective: To determine factors associated with outcome of SAM children admitted and treated at NRC.

Methods: This is a hospital based descriptive study conducted at the Nutritional Rehabilitation Centre, Upgraded Department of Pediatrics, PMCH, Patna for 18 months between January 2021 to June 2022. 150 children aged 1 month to 5 years with complicated SAM were assessed on the basis of demography, diet, anthropometry, clinical complications and outcome at the time of discharge and follow up after treatment at NRC with standardized protocols.

Results: Final analysis was done on 150 children. The mean age of presentation was 17.5 months with a male preponderance. 79.3% belonged to rural areas. 58% children were exclusively breastfed. Major associated morbidities were anaemia (57.3%), diarrhoea (31.3%), pneumonia (26%), Vitamin A deficiency (18%). 78% had satisfactory outcome at discharge and 2% died. 61% children were considered to have good outcome at follow up. The factors significantly associated with failure or death of SAM children at NRC were presence of developmental delay (p-value <0.001), anaemia (p-value- 0.034), oedema (p-value <0.001) and tuberculosis (p-value <0.001). The major factors that significantly prolonged the NRC stay were presence of anaemia (p-value- 0.016), oedema (p-value <0.001) and sepsis (p-value- 0.024). The factors significantly associated with poor outcome of children after follow up were lack of exclusive breastfeeding (p-value- 0.033), presence of developmental delay (p-value- 0.002), illiteracy of mother (p-value- 0.023), presence of oedema (p-value- 0.019) and tuberculosis (p-value- 0.004). Children with satisfactory outcome at the time of discharge from NRC also had good outcome at the time of follow up (p-value <0.001).

Conclusion: Lack of breastfeeding and illiteracy in mother have surfaced as important modifiable factors that lead to poor outcome in children with SAM. Early identification of medical complications like oedema, sepsis can reduce mortality and hospital stay.

Keywords: SAM, Malnutrition, NRC, breastfeeding, anaemia.

INTRODUCTION

Childhood undernutrition incorporates around half of the under 5 mortality.¹ It has been projected by previous studies² that weight for height Z score <-3SD increases the death risk by 10 times as compared to non-wasted children. This risk is 20 times higher in children with weight for height Z score <-4SD. Mostly the low- and middle-income countries are affected. According to Joint Child Malnutrition Estimates,³ globally, there were 148.1 million stunted children, 45 million wasted children and 13.7 million severely wasted children below the age of 5 years in 2022. The worldwide affliction of malnutrition has extensive and long-lasting medical, developmental, economic, and social repercussions for children, their families, communities, and nations.

Stunting, wasting, underweight and vitamin & mineral deficiencies are important subgroups of undernutrition. Children are particularly vulnerable to mortality and morbidity due to undernutrition.

Nearly all nations in the world are dealing with one or more forms of malnutrition. Confronting malnutrition is one of the greatest worldwide health challenges. Improving nutrition early in life, specifically during the first 1000 days, delivers the ideal start in life with long-lasting advantages. Impoverishment escalates the risk of, and risks from, malnutrition. Malnutrition additionally drives up healthcare expenditure, lowers yield, and impedes economic progress, thereby fostering a cycle of deprivation and sickness.

According to NFHS 5 (2019-20) State Fact Sheet,⁴ Bihar has 42.9% stunted children (NFHS 4: 48.3%), 22.9% wasted and 8.8% severely wasted children (NFHS 4: 20.8% and 7% respectively) and 41% underweight children (NFHS 4-43.9%) below 5 years of age.

It is evident from these data that the burden of wasted and severely wasted children below 5 years of age has increased in Bihar. It is therefore important to look into the whereabouts of children suffering from severe acute malnutrition. Their socio-clinical profile has to be studied and the care at NRC in the form of outcome has to be assessed in order to reduce the current mortality rates due to malnutrition. NRC in the Upgraded Department of Pediatrics at PMCH having the Centre of Excellence established in the state of Bihar provides an added privilege for conducting the study.

The objective of the study was to determine factors associated with outcome of SAM children admitted and treated at NRC.

MATERIALS AND METHOD

This was a hospital-based descriptive study conducted at the Nutritional Rehabilitation Centre (NRC), PMCH, Patna. Study was conducted for 18 months from January 2021 to June 2022. Children attending the pediatric OPD and emergency fulfilling the diagnostic criteria of SAM formed the study population.

Inclusion criteria: All children between ≥ 1 to 59 months of age admitted at NRC according to WHO criteria of SAM

Exclusion criteria: Children < 1 month of age and children with birth defects/ congenital anomalies/ inborn errors of metabolism.

The sample size for the study was 150.⁵

After obtaining informed consent from the parents, name, age, sex and locality of children were enquired. A detailed history including birth, dietary, immunization, developmental milestones and socioeconomic status was obtained and noted in a pretested Proforma. Thorough clinical examination including anthropometry was done according to standardized methodology and documented. Relevant investigations were conducted as per case and noted down. The children were managed according to standard WHO case management protocol and f-SAM guidelines. Re-evaluation was done on daily basis during the period of hospital stay. The outcome at discharge from NRC was assessed and documented. Discharged patients were counselled for follow up and outcome at the follow up after 4 months was assessed and documented.

All anthropometric measurements were taken as per standardized guidelines and were inferred in the form of Z-scores with the help of WHO: MGRS charts⁶ and children were classified accordingly.

Evaluation of Outcome:

- 1) Outcome at the time of discharge from NRC: It was categorized into 3 groups-
 - i) Satisfactory outcome- Those children who achieved their target weight or those who were discharged after gaining at least 5g/kg/day for 3 consecutive days.
 - ii) Poor outcome- Those who died or suffered primary/secondary failure.
 - iii) Other outcomes- Those who were referred to higher centre or left against medical advice (LAMA).
- 2) Length of stay for all discharged patients were documented. It was categorized into two groups based on median value.
 - i) 10-14 days
 - ii) > 14 days
- 3) Outcome at the time of follow up: WHZ of all patients and MUAC of those whose WHZ was $\geq -3SD$ at the time of admission was documented after follow up of 4 months. It was categorized into 2 groups-
 - i) Good outcome- WHZ $\geq -1SD$ and MUAC ≥ 12.5 cm
 - ii) Poor outcome- not satisfying criteria for good outcome

Statistical analysis

Microsoft Excel 2016 was used to organize and tabulate the obtained data and SPSS version 25 (IBM Corp.) was used for statistical analysis. Chi-square test was used to compare categorical variables. A "p-value" < 0.05 was considered statistically significant.

Ethical considerations

The study was started after receiving approval from the ethical committee. Informed consent was obtained from parents or caretaker of patients.

RESULTS

240 children were admitted in the NRC of PMCH, Patna during the study period out of which 150 children met the inclusion criteria. 35 children had congenital defects and diseases and parents of 55 children did not give informed consent for study. Final analysis was done on 150 SAM children.

Table 1: Socio-demographic and clinical profile (N=150)

Parameters	Frequency	Percentage
<u>Age *</u>		
1-5 months	39	26
6-23 months	67	44.7
24-59 months	44	29.3
<u>Gender</u>		
Male	92	61.3
Female	58	38.7
Low Birth weight(N=112)	26	23.2
Rural Residence	119	79.3
NICU Admission	25	16.7
Exclusively breastfed	87	58
Proper initiation of complementary feeding(N=111)	23	20.7
Developmental delay(N=111)	44	39.6
Completely immunized for age	68	45.3
<u>Socioeconomic status</u>		
Upper class	7	4.7
Lower class	143	95.3
<u>Literacy of parents</u>		
Literate mother	81	54
Literate father	100	66.7
<u>Symptoms</u>		
Fever	112	74.7
Loss of appetite	64	42.7
Fast breathing	61	40.7
Loose stool	51	34.0
Lethargy	50	33.3
Vomiting	45	30.0
Ear discharge	28	18.7
Abdominal distension	22	14.7
<u>Signs</u>		
Skin and hair changes	95	63.3
Hypoglycemia	25	16.7
Convulsion	25	16.7
Oedema	20	13.3
Hypothermia	18	12
Others**	42	28.0

*Mean age (\pm SD) - 17.5 (\pm 15.5) months; Median age- 12 months ** include rash, paleness of body, black stool, passing worms, excessive crying, etc.

Out of the 20 cases in whom oedema was present, the proportion of mild (+), moderate (++) and severe (+++) oedema were 55%, 30% and 15% respectively.

Table 2: Distribution of study participants according to anthropometric findings (N=150)

Anthropometry (Z- scores)	Frequency	Percentage
Weight for height/ length (WHZ)		
$\geq -3SD$	46	30.7
$< -3SD$	104	69.3

MUAC (n=111)		
≥ 11.5 cm	16	14.4
<11.5 cm	95	85.6

69.3% had weight for height/ length Z score<-3SD and 85.6% had MUAC <11.5 cm.

Table 3: Frequency distribution of associated morbidities (N=150)

Associated morbidities	Frequency	Percentage
Anemia	86	57.3
Diarrhea	47	31.3
Pneumonia	39	26.0
Vitamin A deficiency signs	27	18.0
Meningitis	23	15.3
Sepsis	23	15.3
<i>E. coli</i>	14	9.3
<i>Staphylococcus</i>	12	8.0
Coagulase negative staphylococcus	5	3.3
<i>Acinetobacter</i>	1	0.7
Tuberculosis	18	12.0
UTI	15	10.0
Malaria	6	4.0
<i>Plasmodium vivax</i>	4	2.7
<i>Plasmodium falciparum</i>	2	1.3
Others*	22	14.7

* include SJS, GERD, viral hepatitis, celiac disease, pyopneumothorax, dengue, scrub typhus etc.

Table 4: Outcome at discharge from Nutritional Rehabilitation Centre (N=150)

NRC outcome	Frequency	Percentage
Satisfactory outcome	117	78.0
Achieved target weight	77	51.3
Weight gain @ 5g/kg/day for 3 consecutive days	40	26.7
Poor outcome	22	14.7
Failure	19	12.7
Death	3	2.0
Other outcomes	11	7.3
Referred	5	3.3
LAMA	6	4.0

Minimum duration of stay (N=136) was recorded to be 10 days and maximum duration as 35 days. The mean (\pm SD) length of NRC stay was 14.33 (\pm 4.57) days with a median stay of 14 days. A 60.3% of the children stayed between 10-14 days, while the remaining 39.7% had stay >14 days.

Of the 136 study participants who were discharged from the NRC, 123 (90.4%) attended the follow-up visit at the NRC after the stipulated time period.

Table 5: Anthropometric findings at follow-up visit

Anthropometry	Frequency	Percentage
Weight for height/ length (WHZ) (n=123)		
> median	16	13.0
Median to -1SD	62	50.4
<-1SD to -2SD	29	23.6
< -2SD	16	13.0
MUAC (n=43)		
≥ 12.5 cm	38	88.4
<12.5 cm	5	11.6

Based on anthropometric findings, 75(61%) children were considered to have good outcome and 48(39%) had poor outcome at the follow-up visit.

Table 6: Factors associated with Poor Outcome at discharge from NRC among the study participants (n=139)

Parameters	Satisfactory outcome at discharge (n=117) n (%)	Poor outcome at discharge (n=22) n (%)	p value*
Age			
1-5 months	29 (24.8)	7 (31.8)	0.637
6-23 months	55 (47.0)	8 (36.4)	
24-59 months	33 (28.2)	7 (31.8)	
Gender			
Male	69 (59.0)	17 (77.3)	0.151
Female	48 (41.0)	5 (22.7)	
Locality			
Rural	91 (77.8)	18 (81.8)	0.784
Urban	26 (22.2)	4 (18.2)	
Exclusive breastfeeding			
Yes	66 (56.4)	12 (54.5)	0.872
No	51 (43.6)	10 (45.5)	
Age of initiating complementary feeding (n=103)			
6 months	17 (22.9)	4 (25.0)	0.513
>6 months	71 (56.8)	11 (25.0)	
Developmental delay (n=103)			
No delay	63 (71.6)	2 (13.3)	<0.001
Delay	25 (28.4)	13 (86.7)	
Immunization			
Complete	56 (47.9)	8 (31.8)	0.165
Incomplete	61 (52.1)	15 (68.2)	
Literacy of mother			
Literate	64 (54.7)	10 (45.5)	0.425
Illiterate	53 (45.3)	12 (54.5)	
Literacy of father			
Literate	80 (68.4)	13 (59.1)	0.396
Illiterate	37 (31.6)	9 (40.9)	
Anemia			
Yes	62 (53.0)	17 (77.3)	0.034
No	55 (47.0)	5 (22.7)	
Oedema			
Yes	11 (9.4)	9 (40.9)	<0.001
No	106 (90.6)	13 (59.1)	
Diarrhoea			
Yes	36 (30.8)	7 (31.8)	0.922
No	81 (69.2)	15 (68.2)	
TB			
Yes	9 (7.7)	8 (36.4)	<0.001
No	108 (92.3)	14 (63.6)	
Length of NRC stay (n=136)			
10-14 days	78 (66.7)	4 (18.2)	<0.001
> 14 days	39 (33.3)	15 (81.8)	

* p value was calculated using Chi-square test and value <0.05 was considered as statistically significant.

The factors associated with poor outcome at the time of discharge from NRC were presence of developmental delay, anemia, edema, tuberculosis and longer duration of stay at NRC.

Table 7: Factors associated with length of stay at the NRC among the study participants (n=136)

Parameters	Length of stay between 10-14 days (n=82) n (%)	Length of stay > 14 days (n=54) n (%)	p value*
Age			
1-5 months	21 (25.6)	15 (27.8)	0.959
6-23 months	38 (46.3)	24 (44.4)	
24-59 months	23 (28.0)	15 (27.8)	
Exclusive breastfeeding			
Yes	48 (58.5)	29 (53.7)	0.578
No	34 (41.5)	25 (46.3)	
Anemia			
Yes	39 (47.6)	37 (68.5)	0.016
No	43 (52.4)	17 (31.5)	
Oedema			
Yes	4 (4.9)	15 (27.8)	<0.001
No	78 (95.1)	39 (72.2)	
Diarrhoea			
Yes	21 (25.6)	13 (24.1)	0.840
No	61 (74.4)	41 (75.9)	
Pneumonia			
Yes	21 (25.6)	13 (22.2)	0.652
No	61 (74.4)	42 (77.8)	
TB			
Yes	8 (9.8)	7 (13.0)	0.559
No	74 (90.2)	47 (87.0)	
Sepsis			
Yes	8 (9.8)	13 (24.1)	0.024
No	74 (90.2)	41 (75.9)	

* p value was calculated using Chi-square test and value <0.05 was considered as statistically significant.

The factors associated with longer duration of stay at the NRC (>14 days) were presence of anemia (p=0.016), oedema (p<0.001) and sepsis (p=0.024).

Table 8: Factors associated with poor outcome at follow-up visit among the study participants (n=123)

Parameters	Good outcome at follow-up (n=75) n (%)	Poor outcome at follow-up (n=48) n (%)	p value*
Age			
1-5 months	19 (25.3)	12 (25.0)	0.244
6-23 months	29 (38.7)	25 (52.1)	
24-59 months	27 (36.0)	11 (22.9)	
Gender			
Male	45 (60.0)	33 (68.8)	0.326
Female	30 (40.0)	15 (31.3)	
Locality			
Rural	55 (73.3)	42 (87.5)	0.060
Urban	20 (26.7)	6 (12.5)	
Exclusive breastfeeding			
Yes	49 (65.3)	22 (45.8)	0.033

No	26 (34.7)	26 (54.2)	
Age of initiating complementary feeding (n=92)			
6 months	15 (26.8)	4 (11.1)	0.069
>6 months	41 (73.2)	32 (88.9)	
Developmental delay (n=92)			
No delay	45 (80.4)	18 (50.0)	0.002
Delay	11 (19.6)	18 (50.0)	
Immunization			
Complete	39 (52.0)	17 (34.5)	0.072
Incomplete	36 (48.0)	31 (64.6)	
Literacy of mother			
Literate	47 (62.7)	20 (41.7)	0.023
Illiterate	28 (37.3)	28 (58.3)	
Literacy of father			
Literate	53 (70.7)	30 (62.5)	0.346
Illiterate	22 (29.3)	18 (37.5)	
Anemia			
Yes	40 (53.3)	30 (62.5)	0.317
No	35 (46.7)	18 (37.5)	
Oedema			
Yes	6 (8.0)	11 (22.9)	0.019
No	69 (92.0)	37 (77.1)	
TB			
Yes	4 (5.3)	11 (22.9)	0.004
No	71 (94.7)	37 (77.1)	
Outcome at discharge			
Satisfactory	71 (94.7)	34 (70.8)	<0.001
Poor	4 (5.3)	14 (29.2)	

* p value was calculated using Chi-square test and value <0.05 was considered as statistically significant.

The factors associated with poor outcome at the follow up visit were lack of exclusive breastfeeding, presence of developmental delay, edema and tuberculosis, illiteracy of mothers and poor outcome at the time of discharge from NRC.

DISCUSSION

This study was done on a total of 150 children with SAM who fulfilled the inclusion criteria at NRC of PMCH.

The mean age at presentation was 17.5 months. The number of boys admitted were 1.6 times more than girls. More than three-quarters (79.3%) of children were from rural areas. Exclusive breast feeding was carried out in 58% children in this study. It is higher in comparison to studies by Das K et al⁷ (20.9%) , Jain N et al⁸ (19.3%) and Pathak NN et al⁹ (16%). This might be due to active breast-feeding campaigns by government in the recent past. Initiation of proper complementary feeding at 6 months of age was done in 20.7 % children only. The mean age of starting complementary feeding was 8 months. The study by Das S et al¹⁰ has similar observations regarding this as 9.52% and 8.5 months respectively. Hossain A et al¹¹ found that good breastfeeding practice and adequate complementary feeding can lower the incidence of SAM.

In the present study, some form of developmental delay was found in 39.6% patients. This is comparable to the study by Das S et al¹⁰ in which 23.8% children had developmental delay. A higher proportion of SAM children (70%) had developmental delay as reported by Syed Tariq A et al.¹² The lower observation in this study may be due to exclusion of children with pre-existing neurological disabilities.

The number of children who were completely immunized according to National Immunization Schedule were 45.3% in this study. This is comparable to the study by Tiwari AK et al¹³ (45%). Das K et al⁷ report a lower number of completely immunized SAM children (13.7%). This difference might be regional.

The present study had 95.3% children belonging to families with lower class. This is consistent with studies of Das S et al¹⁰ (98.1%), Pathak NN et al⁹ (96%) and Das K et al⁷ (96.5%). Mothers of 46 % children and fathers of 33.3 % children were illiterate in this study. Studies by Tiwari AK et al¹³ (67%) and Pathak NN et al⁹ (78%) reported higher illiteracy in mothers of SAM children.

The common presenting symptoms were fever in 74.7%, loss of appetite in 42.7%, fast breathing in 40.7%, loose stool in 34%, lethargy in 33.3% and vomiting in 30% children in the present study. The study of Das K et al⁷ had similar observations in fever (70.6%) and cold and cough (47.6%) but higher in diarrhoea (56.8%) and lethargy (50.8%). The prevalence of hair and skin changes was 63.3%, hypoglycaemia and convulsion was 16.7% each, oedema was 13.3% and

hypothermia was 12% in this study. This is consistent with the study done by Das K et al⁷ where they reported hair and skin changes in 60.2%, hypothermia in 18.4% and hypoglycaemia in 14.7% cases but the proportion of oedematous SAM was higher (28.7%) in their study.

The present study revealed that 69.3 % patients had WHZ <-3SD. Among children between 6- 59 months, 85.6% had MUAC of <11.5 cm and 45% children in the age group of 6-59 months had both WHZ<-3SD and MUAC<11.5cm. Panigrahi BK et al¹⁴ reported 84% patients with WHZ <-3SD. Some studies^{15,16} suggest that MUAC <11.5mm and WHZ<-3SD are comparable in identifying SAM.

Anaemia (57.3%) was the most commonly associated morbidity in this study. This is comparable to the study by Das K et al⁷ (48.5%), Tiwari AK et al¹³ (53%). Pathak NN et al⁹ and Panigrahi BK et al¹⁴ reported higher prevalence of anemia as 86% and 94% respectively. Some major comorbidities present in the patients in this study were diarrhoea in 31.3%, pneumonia in 26%, signs of Vitamin A deficiency in 18%, meningitis and sepsis in 15.3% each, tuberculosis in 12% and UTI in 10%. A similar hierarchy of comorbidities, acute gastroenteritis (44.9%), ARI (44.4%) followed by sepsis (26.7%) and UTI (25.7%) was observed in the study by Das K et al.⁷ However, the proportion of children with tuberculosis was comparable to study by Pathak NN et al⁹ (16%) but higher than Das K et al⁷ (3%). Other studies^{9,10,13} also suggest acute gastroenteritis and pneumonia to be major comorbidities.

With standardized management done in NRC, satisfactory outcome was obtained in 78% children with SAM in this study. 51.3% patients achieved target weight gain and 26.7% gained 5g/kg/day for three consecutive days before discharge. Primary or secondary failure occurred in 12.7% patients and 2% died. Other studies report diverse recovery rates such as 75.24% by Das S et al,¹⁰ 95% by Tiwari AK et al,¹³ 85% by Panigrahi BK et al,¹⁴ 54% by Pathak NN et al⁹ and 92.4% by Das K et al.⁷ Death rates similar to this study was present in Tiwari AK et al¹³ (2%). Still lower death rates were reported in studies by Das S et al¹⁰ (0.63%) and Panigrahi BK et al¹⁴ (0).

In the present study, the mean length of stay in NRC was 14.33 days with a minimum and maximum stay of 10 and 35 days respectively. 60.3% patients stayed between 10-14 days while 39.7% had a stay of >14 days. This is comparable to the study by Panigrahi BK et al¹⁴ where the mean length of stay was 14 days. The studies by Pathak NN et al⁹ and Das K et al⁷ found this to be 10.28 days and 19.53 days respectively.

136 patients were discharged from NRC in this study out of which 90.4% children were followed up regularly whereas in the study by Panigrahi BK et al,¹⁴ there were only 72% patients who came for follow up. The probable reason for such difference could be the proper counselling of the parents that is done at our centre throughout their stay and on discharge. On follow up, 61% of them achieved the target anthropometric measurements and considered to have good outcome within 4 months of discharge.

In present study, 5 potential factors were identified that were significantly associated with failure or death of SAM children at NRC. These were presence of developmental delay (p-value<0.001), anaemia (p-value- 0.034), oedema (p-value<0.001), tuberculosis (p-value <0.001) and length of stay at NRC (p-value<0.001). Other factors like age, gender, locality, SES, feeding parameters, diarrhoea, etc. were not found to be significant. In a similar study by Das K et al,⁷ dietary risk factors, oedema, hypothermia, diarrhoea, dehydration, pneumonia and shock were found to be significantly associated with mortality in SAM patients (p-value <0.05). The probable reasons could be increased feeding problems in children with developmental delay and slow recovery in anaemia due to multiple vitamin deficiencies, worm infestation or concurrent malabsorption. Oedematous SAM children may require much more attention as they have reduced appetite, apathy, skin infections which take time to heal. They also have higher chances of developing cardiac decompensation or shock. Due to decreased immunity, children with SAM have risk of developing severe forms of tuberculosis or a co-infection with HIV. Also, the anti-tubercular drugs are hepatotoxic which may be difficult for their body to metabolise.

The major factors that significantly prolonged the NRC stay were presence of anaemia (p-value- 0.016), oedema (p-value <0.001) and sepsis (p-value- 0.024). Other factors like age, EBF, presence of diarrhoea, tuberculosis, etc. were not significantly associated with length of stay. Das K et al⁷ found that the length of stay was more in presence of shock, hypoglycemia, lethargy and sepsis at the time of admission.

The factors associated with poor outcome of children after follow up were lack of exclusive breast feeding (p-value- 0.033), presence of developmental delay (p-value- 0.002), illiteracy of mother (p-value- 0.023), presence of oedema (p-value- 0.019) and tuberculosis (p-value- 0.004). Children with satisfactory outcome at the time of discharge from NRC also had good outcome at the time of follow up (p-value <0.001). Other factors like age, gender, locality, SES, immunisation status, presence of anaemia, etc. were not found significant. Similarly, Lencha B et al¹⁷ found maternal educational status and anaemia to be the factors associated with recovery in SAM children. Other factors being deworming, child's age and NG tube use. Kudan ZB et al¹⁸ also found presence of admission anaemia other than presence of dermatosis, adequacy of RUTF and vaccination status to be associated with treatment outcome of SAM clinical management. These associations explicate that illiterate mothers are more influenced by socio-cultural practices and are difficult to motivate. Moreover, mothers who by any reason cannot breastfeed their children may often fail to maintain hygiene and proper preparation of feeds despite counselling thereby, making their children more prone for recurrent infections.

Limitation of study

This was a hospital-based study so the findings cannot be extrapolated to the community.

CONCLUSION

Malnutrition is detrimental to society. Despite so many efforts in the past, no significant difference in its prevalence could be achieved. This study identified various factors that affect the interim and final outcome of SAM children when managed by standard protocols at NRC. Medical complications like oedema, anaemia, sepsis, tuberculosis need be identified early and treated adequately in order to prevent deaths in children with SAM. Lack of breastfeeding and illiteracy in mother have emerged as important modifiable factors in this study that lead to poor outcome in children with SAM. These factors largely require awareness and monitoring.

Government has come up with so many schemes that pertain to address the deficiencies in strata of society but their successful implementation in the remotest areas is the need of the hour. Providing medical knowledge to avail facility based treatment, food supply and health care from the preconception period itself, monitoring babies throughout for proper growth, demonstration of feeding practices to mothers and educating them to identify sickness in their children can produce remarkable results. Steps should be taken to offer and strengthen 'community based treatment' of malnutrition in most affected areas.

RECOMMENDATIONS

Further studies with larger sample size are required to assess follow up outcomes of children discharged from NRC.

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