



Original Research Article

A STUDY ON NUTRITIONAL STATUS OF MALNOURISHED CHILDREN ADMITTED AT NUTRITIONAL REHABILITATION CENTER.

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ABSTRACT

Background: Protein-energy malnutrition is a significant health issue for children under five in India. Severe acute malnutrition (SAM) is marked by a weight-for-height/length below -3 Z-scores, a mid-upper arm circumference under 11.5 cm, or the presence of nutritional bipedal oedema. SAM can directly lead to child mortality or indirectly elevate fatality rates by worsening outcomes of common childhood illnesses. **Aim:** This study assesses the nutritional status of children with SAM admitted to a Nutritional Rehabilitation Center (NRC).

Material and Methods: A descriptive, observational, hospital- and community-based longitudinal study was conducted from July 2022 to June 2023 at the NRC in the Department of Paediatrics at Baba Raghav Das Medical College, Gorakhpur, UP. SAM children admitted to the NRC, along with their caregivers, were included. Statistical analysis was performed using SPSS.

Results: Among SAM patients, most were aged 1-2 years (35.6%), male (61%), from rural areas (81%), Hindu (93%), and belonged to the OBC caste (54%). The majority were underweight at admission (86.4%), but this reduced by discharge (28.8%). Skin changes were common at admission (22%), and bleeding gums were rare at discharge (1.7%). On follow-up, 33.9% were still underweight, with minimal cases of oedema and bleeding gums.

Conclusion: SAM children in this study were predominantly male, aged 1-2 years, with illiterate caregivers. The NRC provided effective care, reducing severe wasting and oedema rates from admission to discharge.

Recommendation: The NRC at BRD Medical College Gorakhpur offers effective clinical, nutritional, and counselling support for malnourished children.

Key Words: Nutrition, Rehabilitation Center, Caregivers, Malnourished, Children.

INTRODUCTION

Protein energy malnutrition is identified as major health and nutritional problem in India amongst children under five years of age. Severe acute malnutrition is defined as weight for height/length (below -3Z score), a mid upper arm circumference of <11.5cm, or by the presence of nutritional bipedal oedema.^[1] Severe acute malnutrition can be a direct cause of child death, or it can act as an indirect

cause by dramatically increasing the case fatality rate in children suffering from such common childhood illnesses as diarrhoea and pneumonia.^[2] Children with severe acute malnutrition require immediate attention along with proper nutritional rehabilitation not only to decrease mortality but also to achieve full potential after recovery. Globally the prevalence of children under 5 years of age who are stunted is 23% and wasted is 7%. The prevalence of children under 5 years of age who are stunted is

38.7% and wasted is 19.7% in India.^[3] As per NFHS III in Uttar Pradesh 42% children under 3 years age are underweight for their age, 52% children under 3 years of age are stunted and 20% under 3 years of age are wasted.^[4] Under nutrition contributes to 53% of death in children of 0 to 5 years age group in India.^[5] For treatment of Severe Acute Malnutrition in Uttar Pradesh, nutritional rehabilitation centre has been started at B.R.D. Medical College Gorakhpur, Uttar Pradesh where admitted children are provided with medical and therapeutic care like timely adequate and appropriate feeding and mothers/caregivers are counselled regarding appropriate feeding practices, recognizing health and nutritional problems in children etc.

MATERIALS AND METHODS

A Descriptive observational, Hospital and community based Longitudinal study was conducted
Study Setting: From 1st July 2022 to 30th June 2023. The study was conducted at Nutritional Rehabilitation Center (NRC), Department of Paediatrics, at Baba Raghav Das Medical College Gorakhpur, UP. A total of 59 patients were seen in this study who visited during the study period.

Inclusion Criteria: Child admitted first time to NRC, who is a SAM Child as national guideline MUAC below 115 mm and/or weight for height, length z-score below -3SD, and/or visible severe wasting, and/or oedema in both feet.

Exclusion Criteria: Congenital heart disease, HIV, TB, Cerebral palsy, renal disease, Diabetes, Patient not residing in Gorakhpur district.

Sample size & Sampling technique: All the children admitted to the nutritional rehabilitation centre between November 2022 to January 2023.

Month	Total patient admitted in NRC	Total patient belonging to Gorakhpur	Total patient enrolled	Lost to follow up	Final patient
November	24	18	18	0	18
December	24	19	19	1	18
January	32	26	26	3	23
Total	80	63	63	4	59

Ethical Consideration: The Institutional Ethics Committee gave the approval for the study.

Statistical Analysis: Data entry was done; Descriptive analysis was performed & statistical analysis was done using SPSS.

RESULTS

Table 1 presents an analysis of socio-demographic characteristics among SAM (Severe Acute Malnutrition) patients. The majority were male (61.01%), with females accounting for 38.98%. Most children were in the 1–2 year age group (35.59%), and a significant number came from rural areas (81.35%) compared to urban regions

(18.65%). A large proportion were Hindu (93.22%) and from the OBC category (54.23%), followed by SC/ST (28.81%) and General category (16.94%). Regarding caregiver education, 35.59% were illiterate, while the rest had varying educational backgrounds, with only 1.69% reaching graduate or higher levels. The majority of caregivers were unemployed (81.35%), and most children came from nuclear families (66.10%). In terms of socioeconomic status, 44.06% of caregivers belonged to the lowest social class (earning less than 938 Rs per capita per month), with smaller proportions in higher classes; 27.11% were in the upper-lower class, 18.64% in the lower-middle class, and a few in upper-middle and upper classes. Overall, these findings highlight the socioeconomic and demographic vulnerabilities among SAM patients and their caregivers, emphasizing the need for targeted support in rural, low-income communities. [Table 1]

Table 2 provides insights into the nutritional and clinical assessments of 59 SAM (Severe Acute Malnutrition) children. At admission, 18.64% of the children had a very thin build, which improved to 13.55% after care at the NRC but rose again slightly to 15.25% during follow-up. Regarding hair health, 18.64% of children displayed issues such as depigmentation and thinning at admission, which remained unchanged by discharge but increased to 25.42% at follow-up. Facial observations showed that 5.08% of children had signs like pigmentation changes and moon face, with no improvement noted at discharge or follow-up. Ophthalmologic evaluation found 15.25% of children with xerophthalmia at admission, which reduced to 8.48% at discharge but increased to 13.55% later.

Angular stomatitis was seen in 5.08% of children at admission and reduced to 3.38% by discharge, with no further change. Spongy or bleeding gums affected 3.38% at admission, improved to 1.7% at discharge, but increased back to 3.38% at follow-up. Skin conditions improved, with affected cases dropping from 22.03% at admission to 11.86% at discharge and further to 10.16% during follow-up. Other conditions, such as koilonychia and rachitic changes, remained consistent from admission through follow-up, affecting 5.08% and 3.38% of children, respectively. Edema, present in 5.08% of children at admission, was resolved by discharge. [Table 2]

Table 3 outlines the progress of 59 SAM children in terms of weight, height, and mid-upper arm circumference (MUAC) following rehabilitation. Initially, 86.44% of the children were underweight at admission. With appropriate care and rehabilitation, this number significantly decreased to 28.81% at discharge but slightly rose again to 33.8% during follow-up visits. Additionally, 74.57% of the children were stunted at admission; this figure remained unchanged both at discharge and follow-up, indicating persistent growth challenges. The MUAC assessment showed that 61.01% of the

children had a measurement below 11.5 cm at admission, a condition that was reduced to 25.4% by discharge, with no further changes observed during the follow-up. These findings highlight substantial

improvements in weight and MUAC following rehabilitation, although stunting remained unaffected, underscoring the chronic nature of growth delays in malnourished children. [Table 3]

Table 1: Description of studied subjects according to their socio-demographic profile (N= 59)

VARIABLES		N (%)
AGE IN YEARS	< 1 year	19(32.2)
	1-2 year	21(35.59)
	2-3 year	6(10.16)
	3-4 year	6(10.16)
	4-5 year	7(11.86)
SEX	Male	36(61.01)
	Female	23(38.98)
AREA OF RESIDENCE	Rural	48(81.35)
	Urban	11(18.65)
	Total	59
RELIGION	Hindu	55(93.22)
	Muslim	4(6.77)
CASTE	General	10(16.94)
	OBC	32(54.23)
	SC/ST	17(28.81)
EDUCATIONAL QUALIFICATION of Caregiver/mother	Illiterate	21(35.59)
	Primary school	16(27.11)
	Middle school	12(20.33)
	High school	5(8.47)
	Intermediate	4(6.77)
OCCUPATION of care giver/mother	Graduate or above	1(1.69)
	Employed	11(18.64)
TYPE OF FAMILY	Unemployed	48(81.35)
	Nuclear	39(66.10)
SOCIOECONOMIC STATUS of family	Joint	20(33.89)
	Class I	2(3.38)
	Class II	4(6.77)
	Class III	11(18.64)
	Class IV	16(27.11)
Total	Class V	26(44.06)
	Total	59 (100)

Table 2: Nutritional assessment of SAM children on the basis of clinical signs and anthropometric measurements (N=59)

Clinical Signs	At the time of admission		At the time of discharge		At home visit	
	Present N (%)	Absent N (%)	Present N (%)	Absent N (%)	Present N (%)	Absent N (%)
Severe wasting	11(18.64)	48(81.36)	8(13.55)	51(86.45)	9(15.25)	50(84.75)
Dyspigmented/Thin And sparse/Easily pluckable/Flag sign present in hairs	11(18.64)	48(81.36)	11(18.64)	48(81.36)	15(25.42)	44(74.58)
Diffuse pigmentation/Nasolabial dyssebacea/Moon face present	3(5.08)	56(94.92)	3(5.08)	56(94.92)	3(5.08)	56(94.92)
Signs of xerophthalmia	9(15.25)	50(84.75)	5(8.48)	54(91.52)	8(13.55)	51(86.45)
Bleeding/spongy gums	2(3.38)	57(96.62)	1(1.7)	58(98.3)	2(3.38)	57(96.62)
Skin changes	13(22.03)	46(77.97)	7(11.86)	52(88.14)	6(10.16)	53(89.84)
Koilonychia	3(5.08)	56(94.92)	3(5.08)	56(94.92)	3(5.08)	56(94.92)
Oedema (In dependent parts)	3(5.08)	56(94.92)	0(0)	59(100)	2(3.39)	57(96.62)

Table 3: Anthropometry of SAM children (N=59)

Anthropometric Signs	At the time of admission		At the time of discharge		At home visit	
	Present	Absent	Present	Absent	Present	Absent
Underweight	51(86.44)	8(13.56)	17(28.81)	42(71.19)	20(33.89)	39(66.11)
Stunted	44(74.57)	15(25.4)	44(74.57)	15(25.4)	44(74.57)	15(25.4)
MUAC<11.5cm	36(61.01)	23(38.99)	29(49.15)	30(50.85)	32(54.23)	27(45.77)

DISCUSSION

In present study majority of SAM patients were males (36;61.01%) while 23 (38.98%) were females. A majority of SAM patients lie in the age group of

1-2 years (21; 35.59%). & almost similar finding was reported in previous studies.^[6,7] In our study also 67.79% SAM children were below 2 years of age. This finding indicates the need of exclusive breastfeeding up to 6 months; timely introduction of

complementary feeding; as well as to implement proper amount, frequency and dietary diversity of complementary feeding to our children, if we want to improve the nutritional status of our future generation.

In present study majority of SAM patients were from the rural population (48; 81.35%) as compared to the urban population (11; 18.65%) shown in previous studies, who studied Impact of feeding practices, socioeconomic, and demographic profiles of under five children with severe acute malnutrition and had reported that majority 61.54% belongs to the rural area.^[8,9] Therefore we should spread our preventive strategies more to rural area.

In present study large proportion of the SAM patients were Hindus (55; 93.22%). Similar to present study Harshpal Singh Sachdev et al (2017) who studied Survival and Recovery in Severely Wasted Under-five Children Without Community Management of Acute Malnutrition Programme and had reported that there was greater representation of Hindus (53%).^[10]

In present study majority of the SAM patients were from OBC category 32 (54.23%), followed by SC/ST 17 (28.81%) and the remaining belong to General category 10 (16.94%) and almost similar finding reported in previous studies done in various part of India.^[11]

In present study majority of Caregivers were illiterate 21 (35.59%). 16 (27.11%) were educated up to Primary school, 12 (20.33%) up to Secondary school, 5 (8.47%) up to Higher school, 4 (6.77%) up to Intermediate and 1 (1.69%) were Graduate or above and almost similar finding reported by previous studies.^[12]

In present study majority of the Caregivers were unemployed (48; 81.35%) while 11 (18.64%) were employed and almost similar finding reported by Harshpal Singh Sachdev et al (2017) who studied Survival and Recovery in Severely Wasted Under-five Children Without Community Management of Acute Malnutrition Programme had reported that Half the households were headed by unemployed or unskilled labourers and a quarter by semiskilled or skilled workers.^[9]

In present study majority of SAM patients 39(66.10%) were living in nuclear families while 20 (33.89%) were living in joint families. Largest proportion of the caregivers 26 (44.06%) belonged to Lower (V) social class i.e. <938Rs/capita/month followed by 16 (27.11%) in Upper lower (IV) social class i.e. 938- 1875 Rs/capita/month,^[11] (18.64%) in Lower middle class i.e. 1876- 3126 Rs/capita/month and very few to Upper middle i.e 3127- 6253 Rs/capita/month and 2 (3.38%) in Upper class i.e. > 6253 Rs/capita/month. Similar finding reported in previous studies also.^[13]

In the present study 18.64 % children were found severely wasted at the time of admission and after proper nutrition and rehabilitation this number got reduced to 13.5% at the time of discharge. Similar study done in previous studies revealed that

proportion of children with severe malnutrition ranges from 15 to 20%.^[13]

Hair changes are present among 18.64% of children at time of admission and this remains almost same at the time of discharge. The previous study also showed apart from marasmus and kwashiorkor deficiencies of micro nutrient like iron, vitamin A, iodine and zinc are the other manifestations of malnutrition in developing countries and all these factors finally affect the hair growth and color of the hair.^[14]

Xerophthalmia was observed among 15.25% of children in present study and it showed very significant improvement after the treatment as it got reduced to 8.5%. Previous studies has also shown that micronutrient deficiencies like vitamin A and others shows better results after treatment.^[14]

Skin changes were observed in about 22% of cases of malnourishment admitted at NRC at the time of admission and it improved to 11% after treatment. Oedema was observed in 5% of cases and it responded very well after treatment at NRC. The findings shown in this study was similar to that done in previous studies.^[7,12,13]

A large majority of cases (86.44%) patients were underweighted according to weight for age criteria and it shows very significant improvement as the proportion of underweight children got reduced to 28.81 % at the time of discharge and it sustained even after the discharge which shows that the counselling done during the stay at NRC have very positive effect on the knowledge attitude and practices related with nutrition of mother/caregivers of malnourished children.

CONCLUSION

The study found that most SAM patients were male (61.01%) and aged 1-2 years (35.59%), with 35.59% of caregivers being illiterate and only 1.69% reaching graduate education. At admission, 18.64% of children were severely wasted, improving to 13.55% at discharge but slightly increasing to 15.25% in follow-up. Edema, present in 5.08%, was fully resolved by discharge, while rickets persisted in 3.38% of children. Initially, 86.44% were underweight, which reduced to 28.81% after rehabilitation but rose to 33.8% later. Stunting affected 74.57% with no change, underscoring long-term malnutrition issues despite rehabilitation improvements.

Recommendation: The study suggests that the Nutritional Rehabilitation Centre at BRD Medical College, Gorakhpur, offers effective clinical, nutritional, and counseling support for malnourished children. However, enhanced counseling for caregivers on complementary feeding and community-level guidance during pregnancy is needed. Strengthening ANC, nutritional care by ASHA, AWWs, and ANMs, and special nutrition programs for economically weaker rural populations are recommended.

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