

# Demographic and Clinical Profile of Children with Severe Acute Malnutrition – An Experience from Nutritional Rehabilitation Centre in Jammu

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## Abstract

**Background:** Childhood undernutrition remains a key public health challenge in India and is a significant contributor of Under-5 mortality as these children have significantly higher risk of mortality and morbidity. Nutritional rehabilitation centres have been set up by Government of India at facility level to provide medical and nutritional care to Severe Acute Malnourished children under the age of 5 years who have medical complications.

**Materials and Methods:** Retrospective record based observational study conducted in NRC located at SMGS Hospital, GMC Jammu. All the children upto 60 months of age, admitted in NRC during the study period, from September 2018 to February 2019 were included in the study.

**Aims and Objectives:** To know the demographic details and clinical profile of comorbidities in children with Severe Acute Malnutrition and to assess the outcome of these children.

**Results:** A total of 118 children were admitted in the Nutritional Rehabilitation Center during the study period 60% were females. 60% of the children were less than 12 months of age 20 % were between 13 and 24 months of life. Children belonged to all the districts, 22% from Jammu, 18% Reasi, 16% Udhampur, 15% Rajouri, 8% Kathua, 7% Poonch and 6% Samba. Bronchopneumonia (39.8%), Diarrhoea (30.5%) and skin infections (11%) were the commonest morbidities. 73.5% of the children had associated anemia. Other comorbidities were septicemia (10.1%), CSOM (5.9%), UTI (5%), measles (5%) and tuberculosis (2.5%).

**Conclusion:** Early diagnosis and standardized protocol based treatment in the NRCs has been very effective in reducing the morbidity and mortality in SAM patients.

**Key words:** Malnutrition, Wasting, Nutritional rehabilitation centre

## INTRODUCTION

Childhood undernutrition remains a key public health challenge in India and is a significant contributor of under-5 mortality as these children have significantly higher risk of mortality and morbidity.<sup>[1]</sup> The strongest and most consistent relation between malnutrition and an increased risk of

death has been observed for diarrhea and acute respiratory infection, although evidence also suggests a potentially increased risk of death from malaria and measles.<sup>[2]</sup> Data from developing countries indicate that 56% of child deaths are attributable to the malnutrition's potentiating effects, and 83% of these were attributable to mild-to-moderate malnutrition.<sup>[3]</sup> In India, National Family Health Survey-4 shows that about 35.7% of the children in India under 5 years of age are underweight, 38.4% are stunted, and approximately 21% are moderately to severely wasted.<sup>[4]</sup> Malnutrition not only increases the likelihood of acute and chronic diseases but also reduces long-term physical development, cognitive skills, and, consequently, has a negative effect on school enrollment and productivity in later life.<sup>[5]</sup>

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In the early 1990s, the mortality rate in severe acute malnutrition (SAM) was as high as 49%, which is now reduced due to trained staff and the presence of standardized World Health Organization (WHO) guidelines for the management of SAM.<sup>[6]</sup>

SAM is an important preventable and treatable cause of morbidity and mortality in children <5 years of age in India. Considering high mortality rate among malnourished children in India, Indian Academy of Pediatrics (IAP) undertook the task of developing guidelines for the management of SAM based on adaptation from the WHO guidelines in the year 2006. If these guidelines are carefully followed, the mortality rate can be brought down to <5%, even in areas with a high prevalence of HIV/AIDS.<sup>[7]</sup>

Government of India has initiated various programs to combat the challenges of malnutrition in the country. Nutritional Rehabilitation Centres (NRCs) have been set up at facility level to provide medical and nutritional care to severe acute malnourished children under the age of 5 years who have medical complications. In these centers, children with SAM receive therapeutic care following protocols based on the guidelines for the management of SAM by the IAP and WHO. In addition, counseling of the mothers/caregivers is done regarding proper feeding and once they are on the road to recovery, they are sent back home with regular follow-up.<sup>[8]</sup>

As a part of this initiative of Government of India, one such center was established in Sri Maharaja Gulab Singh (SMGS) Hospital, Government Medical College (GMC), Jammu, where the children with severe malnutrition from whole of Jammu Province are treated.

### Objectives

The objectives of this study were as follows:

1. To know the demographic details and clinical profile of comorbidities in children with SAM.
2. To assess the outcome of these children.

## METHODS

This is a retrospective record-based observational study.

The present study was conducted in NRCs located at SMGS Hospital, GMC, Jammu, from September 2018 to February 2019 after taking permission from the Institutional Ethical Committee. All the children up to 60 months of age admitted in NRC during the study period were included in the study. The criteria for admission for inpatient treatment in an NRC are as follows:

### Children 6–59 Months

Any of the following:

1. Mid-upper arm circumference <115 mm or 11.5 cm with or without any grade of edema.
2. Weight for height <−3 standard deviation (SD) with or without any grade of edema.
3. Bilateral pitting edema +/+++ (children with edema +++ always need inpatient care).<sup>[8]</sup>

With any of the following complications:

- I. Anorexia (loss of appetite)
- II. Fever (39°C) or hypothermia.
- III. Persistent vomiting
- IV. Severe dehydration base
- V. Not alert, very weak, apathetic, unconscious, convulsions
- VI. Hypoglycemia
- VII. Severe anemia (severe palmar pallor)
- VIII. Severe pneumonia
- IX. Extensive superficial infection requiring intramuscular medications
- X. Any other general sign that a clinician thinks requires admission for further assessment or care.

### Infants <6 Months

Infant is too weak or feeble to suck effectively (independently of his/her weight for length)

Or

Weight for length <−3 SD (in infants >45 cm)

Or

Visible severe wasting in infants <45 cm

Or

Presence of edema both feet

At the NRC, a pediatrician conducts a clinical examination in children to detect the presence/absence of medical complications (altered alertness, respiratory tract infections, diarrhea/severe dehydration, high fever, tuberculosis, and/or severe anemia). Following tests were done in all patients such as blood glucose, hemoglobin/complete blood count, serum electrolytes (sodium, potassium, and calcium), kidney functions test, liver function tests, serum Vitamin B12 levels, and stool R/E. Screening for infections: Total and differential leukocyte count, erythrocyte sedimentation rate, C-reactive protein, blood culture, urine routine examination, urine culture, chest X-ray, Mantoux test, gastric lavage for acid-fast bacilli, and screening for HIV after counseling (only when suspected, based on history and clinical signs and symptoms). At NRCs, children with SAM receive therapeutic care following protocols based on the guidelines for the management of SAM by the IAP and the WHO.<sup>[5-7]</sup>

Children were discharged from the NRC when they met the following discharged criteria:

1. The child was active or alert;
2. The child had no signs of bilateral pitting edema, fever, and/or infection;
3. The child had completed all age appropriate immunizations;
4. The child was being fed 120–130 kcal/kg weight/day; and
5. The primary caregiver knew the care that the child needed to receive at home.

The data were entered into Microsoft Excel spreadsheet and results were calculated by percentages.

## RESULTS

- A total of 118 children were admitted in the Nutritional Rehabilitation Centre during the study period.
- 60% of the children were <12 months of age, 20% were between 13 and 24 months of life.
- Children belonged to all the districts, 22% from Jammu, 18% Reasi, 16% Udhampur, 15% Rajouri, 8% Kathua, 7% Poonch, and 6% Samba.
- 60% were female and 40% were male [Table 1].
- Bronchopneumonia (39.8%), diarrhea (30.5%), and skin infections (11%) were the most common morbidities. 63.5% of the children had associated anemia, while 10.1% had severe anemia with CCF. Other comorbidities were septicemia (10.1%), chronic suppurative otitis media (CSOM) (5.9%), urinary tract infection (UTI) (5%), measles (5%), and tuberculosis (2.5%).
- In the present study, investigations revealed anemia in 73%, serum Vitamin B12 deficiency 18%, hypothermia 10%, hyponatremia 10%, hypokalemia 8%, hypoglycemia 4%, hypernatremia 3%, and hyperkalemia 1%.
- Children stayed for inpatient treatment and nutritional rehabilitation in the hospital for 15–30 days. All the patients were kept in NRC and they were fed according to guidelines, play therapy was also encouraged during stay.
- 87% of the admitted patients were discharged, 5% defaulted, 5% left against medical advice, and 3% expired [Figures 1-3 and Tables 2-4].

## DISCUSSION

SAM cases from all the districts of Jammu Province report to the department of pediatrics with comorbidities.

In the present study, 118 children were admitted in NRC Department of Paediatrics, SMGS Hospital, Government Medical College, Jammu, over a period of 6 months. 60%

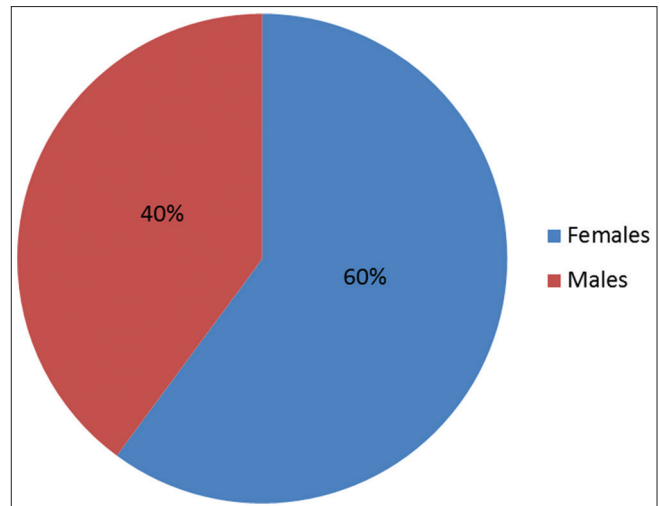


Figure 1: Male - Female ratio

Table 1: Sex-wise distribution of cases

Sex	Number of cases (n=118) (%)
Females	71 (60)
Males	47 (40)

Table 2: Comorbid conditions in children with SAM

Comorbidity	Number (n=118) of cases (%)
Anemia	75 (63.5)
Bronchopneumonia	47 (39.8)
Diarrhea	36 (30.5)
Skin infections	13 (11.0)
Anemia with CCF	12 (10.1)
Septicemia	8 (6.7)
CSOM	7 (5.9)
UTI	6 (5.0)
Measles	5 (4.2)
Tuberculosis	3 (2.5)

CSOM: Chronic suppurative otitis media, UTI: Urinary tract infection, SAM: Severe acute malnutrition

Table 3: Age-wise distribution

Age group (months)	Number of cases (n=118) (%)
<12	71 (60)
13–24	24 (20.3)
25–36	18 (15.2)
37–48	3 (2.5)
49–60	2 (1.6)

of the study groups were female and 40% of males. 60% of the total children belonged to 6–12 months of age, 30% to 13–24 months, and 10% were more than 25 months of age group. Our results are comparable to Shah *et al.*,<sup>[1]</sup> who observed that in their study group of SAM children, 80% were female. Majority of the children were aged <2 years and the predominant age group affected was 6–12 months. Our study is also comparable to Kumar

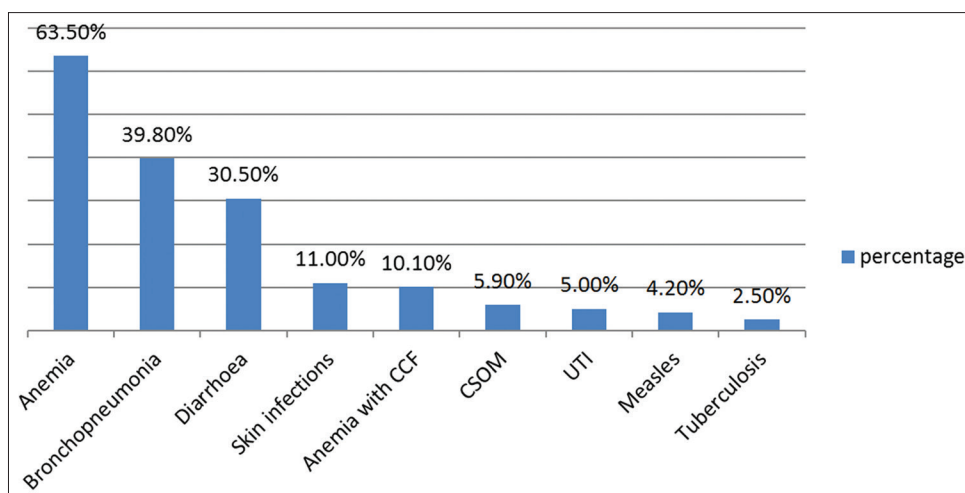


Figure 2: Comorbid conditions in children with Severe acute malnutrition

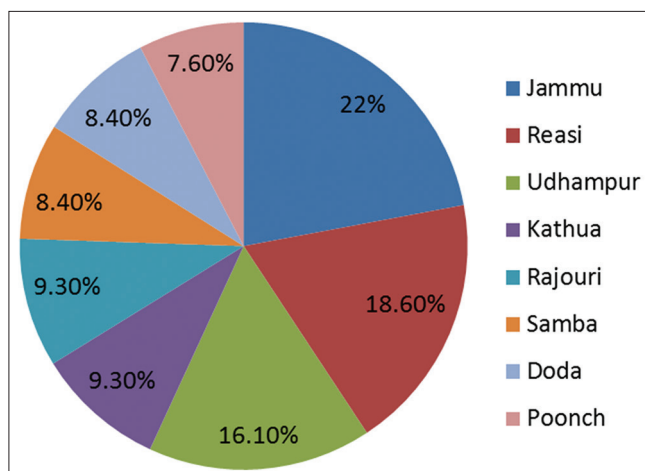


Figure 3: Demographic details of the patient

Table 4: Demographic details of the patients

District	Number of cases (n=118) (%)
Jammu	26 (22)
Reasi	22 (18.6)
Udhampur	19 (16)
Kathua	11 (9.3)
Rajouri	11 (9.3)
Samba	10 (8.4)
Doda	10 (8.4)
Poonch	9 (7.6)

*et al.*, who had reported 51.9% of females and 59.6% of children in the age group of 6–12 months.<sup>[10]</sup> The present study is also in conformity with Bernal *et al.* who had reported that 58% of SAM children were younger than 1 year old.<sup>[11]</sup> Patients presented to NRC with and illnesses such as bronchopneumonia (39.8%), diarrhea (30.5%), and skin infections (11%). 87% of the children had associated anemia. Other comorbidities were septicemia, CSOM, UTI, and tuberculosis.

Baskaran *et al.* in a study of comorbidities in 200 children hospitalized with SAM observed that acute gastroenteritis was the most common (57.5%) followed by pneumonia (44.5%), anemia (27%), systemic illness (17%), worm infestation (13.5%), skin infection (8%), measles (6%), and tuberculosis (1%).<sup>[12]</sup> Kumar *et al.* in a study of 104 severe acute malnourished children observed that 54% had diarrhea and 27.8% had acute respiratory tract infections. Tuberculosis was diagnosed in 22% of cases, malaria and measles in 3.8% each, and HIV in 2.9%.<sup>[10]</sup> Syed *et al.* also reported acute gastroenteritis as the most common morbidity (30%) followed by respiratory tract infections.<sup>[13]</sup>

The present study is comparable with Shah *et al.*, they reported fever in 65%, diarrhea 40%, pallor 96.6%, and associated comorbidities such as bronchopneumonia followed by acute gastroenteritis. In the present study, investigations revealed severe anemia in 64%, serum Vitamin B12 deficiency 18%, hypothermia 10%, hyponatremia 10%, hypokalemia 8%, hypoglycemia 4%, hypernatremia 3%, and hyperkalemia 1%. Shah *et al.* had reported in their study hypoglycemia 5%, hypothermia 1.66%, severe dehydration 13.33%, hyponatremia 13.33%, hypokalemia 8.33%, hypernatremia 5%, hyperkalemia 1.66%, septic shock 11.6%, severe anemia 58.33%, and congestive cardiac failure 28.5%.<sup>[9]</sup> Syed *et al.* reported dehydration 31.5%, hypoglycemia 6.8%, hypothermia 11%, sepsis 15%, hyponatremia 11%, hypernatremia 8.2%, hypokalemia 9.58%, and hyperkalemia 0.68%.<sup>[13]</sup> All the patients were kept in NRC and they were fed according to guidelines, play therapy was also encouraged during stay. The hospital ranged from 15 to 30 days. 87% of the admitted patients were discharged, 5% absconded, 5% left against medical advice, and 3% expired. Patients expired of septic shock. Among three patients who

expired due to septic shock also had other morbidities such as hypothermia, hypoglycemia, bronchopneumonia, and severe anemia. According to the WHO, a case fatality rate of more than 20% is considered to be unacceptable in the management of severe malnutrition, 11–20% is poor, and 5–10% is moderate, 1–4% is good, and <1% is excellent.<sup>[6]</sup> Hence, in our study, the case fatality rate is 3% which shows effectiveness of NRC protocol-based management. Following the WHO/IAP guidelines is efficacious and cost effective in resource-limited settings. Early discharge of patients is possible with limited complication and mortality. Many authors have reported that mortality of SAM patients has been decreased by the following these guidelines.

## CONCLUSION

- SAM can be managed effectively in the NRCs.
- Early diagnosis and standardized protocol-based treatment in the NRCs has been very effective in reducing the morbidity and mortality in SAM patients.
- NRCs provide a very good platform for educating parents/caretakers to give frequent energy-rich locally available foods, proper immunization, and by maintaining hygienic lifestyle.
- Telemedicine and networking with the local community centers and Anganwadi centres should be made available in the NRCs as this can not only decrease further morbidity and mortality of SAM patients but also help mild-to-moderate malnourished children in the community.

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