

Research Article

Demographic, clinical profile of severe acute malnutrition and our experience of nutrition rehabilitation centre at children hospital Srinagar Kashmir

Syed Tariq A¹, Suhail Ahamad Naik^{1*}, Wasim Rafiq A¹, Rehana Saleem²

¹Department of Pediatrics, GB Pant Hospital, GMC, Srinagar, Kashmir, India

²Medical Officer NRC, GB Pant Hospital, GMC, Srinagar, Kashmir, India

Received: 24 June 2015

Revised: 08 July 2015

Accepted: 26 July 2015

*Correspondence:

Dr. Suhail Ahamad Naik,

E-mail: suhailpediatrics@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Malnutrition in children is widely prevalent in India. Children with Severe Acute Malnutrition (SAM) have nine times higher risk of dying than well-nourished children. Objective of current study was to know the demographic and clinical profile of patients with SAM, and assess the effectiveness of NRC in providing therapeutic care for children with SAM in Kashmir.

Methods: A prospective hospital based study, carried out in the Nutritional Rehabilitation Centre (NRC) Department of Pediatrics, G.B. Pant Hospital Government Medical College and Research Institute, Srinagar India from April 2014 to March 2015. All the children who were admitted to NRC ward of hospital during study period. All children with SAM were enrolled in this study. Variables recorded were demographics, anthropometry, clinical presentation, laboratory tests, and medical complications, outcome indicators and hospital course.

Results: A total of 146 children were admitted for SAM. Among these patients 80 (54.8%) were males, 39.7% were in the age group of 1 to 2 years. 61.6% children were from lower socioeconomic strata and 85% from rural Kashmir. The most common co morbidity in SAM patients was acute gastroenteritis (30%) followed by acute respiratory infection (26.3%). 75.3% was recovery rate and only one patient died during study period.

Conclusions: NRCs provide live-saving care for children with SAM as demonstrated by the high survival rates of the program. Community-based therapeutic care for children with uncomplicated SAM needs to become a key component of the continuum of care for children with SAM.

Keywords: Severe acute malnutrition, Malnutrition, NRC, SAM, WHO

INTRODUCTION

Severe Acute Malnutrition (SAM) is defined as a weight-for-height measurement of 70% or less below the median, or three SD or more below the mean National Centre for Health Statistics reference values, the presence of bilateral pitting edema of nutritional origin, or a mid-upper-arm circumference of less than 110 mm in children age 1-5 years.¹ Childhood undernutrition is an important

public health and development challenge in India. Childhood undernutrition is an important public health and development challenge in India. Undernourished children have significantly higher risk of mortality and morbidity. Besides increasing the risk of death and disease, undernutrition also leads to growth retardation and impaired psychosocial and cognitive development. Children with Severe Acute Malnutrition (SAM) have nine times higher risk of dying than well-nourished

children. In India, the prevalence of SAM in children remains high despite overall economic growth. The National Family Health Survey-3 revealed that 6.4 percent of all children under-five years of age are severely wasted. With appropriate nutritional and clinical management, many of the deaths due to severe wasting can be prevented.

Malnutrition in children is widely prevalent in India. It is estimated that 57 million children are underweight (moderate and severe). More than 50% of deaths in 0-4 years are associated with malnutrition.² The median case fatality rate is approximately 23.5% in severe malnutrition, reaching 50% in edematous malnutrition.³ India's third National Family Health Survey (NFHS-3) indicates that the prevalence of severe wasting is 7.9% as per WHO Child Growth Standards.⁴ Severe Acute Malnutrition (SAM) remains a major killer of children as mortality rates in children with severe wasting - a widespread form of SAM - are nine times higher than those in well-nourished children.⁵ Therefore, at any point in time, an average eight million Indian children under age five years are severely wasted and are dangerously undernourished to survive, grow and develop to their full potential.⁶

There is a need for standardized protocol-based management to improve the outcome of severely malnourished children. Severe Acute Malnutrition is an important contributing factor for most deaths amongst children suffering from common childhood illness, such as diarrhea and pneumonia. Deaths amongst SAM children are preventable, provided timely and appropriate actions are taken.

Nutritional Rehabilitation Centres (NRCs) are being set up in the health facilities for inpatient management of severely malnourished children, with counseling of mothers for proper feeding and once they are on the road to recovery, they are sent back home with regular follow up.

At Nutrition Rehabilitation Centers (NRCs), children with SAM receive therapeutic care following protocols based on the guidelines for the management of SAM by the Indian Academy of Pediatrics (IAP) and World Health Organization (WHO).^{7,8}

Objectives

1. To, know the demographic and clinical profile of patients with SAM.
2. To, assess the effectiveness of NRCs in providing therapeutic care for children with SAM in Kashmir.

METHODS

The present study was conducted in NRC located at GB Pant Children Hospital; GMC Srinagar Kashmir India

from April 2014 to March 2015 with the study group comprised the study of children 0-60 months of age, admitted in NRC. All the children with SAM admitted in the NRC during the study period were included in the study. At the NRC, age, weight, height/length, MUAC, presence or absence of bilateral edema and appetite were assessed in all the children.

Admission criteria: The criteria for admission for inpatient treatment in a NRC are as follows:

Children 6-59 months any of the following:

1. MUAC < 115 mm or 11.5 cm with or without any grade of edema.
2. WFH < -3SD with or without any grade of edema.
3. Bilateral pitting edema +/+ (children with edema +++ always need inpatient care)⁹

With

Any of the following complications:

- I. Anorexia (Loss of appetite)
- II. Fever (39 degree C) or Hypothermia.
- III. Persistent vomiting
- IV. Severe dehydration based on history and clinical examination.
- V. Not alert, very weak, apathetic, unconscious, convulsions
- VI. Hypoglycemia
- VII. Severe anemia (severe palmar pallor)
- VIII. Severe pneumonia
- IX. Extensive superficial infection requiring IM 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 suckle effectively (independently of his/her weight-for-length) or WFL (weight-for-length) < -3SD (in infants >45 cm) or Visible severe wasting in infants.

At the NRC, a pediatrician conducted 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: blood glucose, hemoglobin/CBC, serum electrolytes (sodium, potassium, and calcium), KFT, LFT, Stool R/E, Screening for infections: Total and differential leukocyte count, ESR, CRP, blood culture, urine routine examination, urine culture, chest X-ray Mantoux test, screening for HIV after counseling (only when suspected, based on history and clinical signs and symptoms) any other specific test required based on geographical location or clinical presentation e.g. celiac disease, cystic fibrosis etc.

At Nutrition Rehabilitation Centers (NRCs), children with SAM receive therapeutic care following protocols based on the guidelines for the management of SAM by the Indian Academy of Pediatrics (IAP) and World Health Organization (WHO).⁶⁻⁸

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.

A detailed data of the patients including name, age, sex, address, anthropometric and outcome indicators were taken over the predesigned performa. Weight at the time of admission and discharge and daily weights were recorded from the NRC registers; average weight gain was calculated to see if it was in accordance with the available guidelines.

The data were entered into Microsoft excel spreadsheet and descriptive statistical analyses was done by SPSS Softonic.

RESULTS

Table 1 showing demographic and anthropometric profile of patients with severe acute malnutrition.

Table 2 showing mean age, MUAC and hemoglobin of SAM patients.

Table 3 showing comorbidities in SAM patients.

Table 4 showing percentage of complications among SAM patients.

Table 5 showing outcome of nutritional rehabilitation program.

Table 1: Showing demographic and anthropometric profile of patients with severe acute malnutrition.

Demographic and anthropometric profile of patients with severe acute malnutrition		
Sex	Male n (%)	80 (54.79)
	Female n (%)	66 (45.21)
Age	0-12 n (%)	53 (36.3)
	13-24 n (%)	58 (39.7)
	25-36 n (%)	22 (15.4)
	37-48 n (%)	10 (6.8)
	49-60	3 (2.05)
Birth order	1 st	58 (39.7)
	2 nd	56 (38.3)
	3 rd	20 (13.6)
	4 th	12 (8.21)
Immunization	Complete	19 (13)
	Incomplete	91 (62.3)
	Unimmunized	36 (24.6)
Development	Normal	42 (28.76)
	Delayed	102 (70)
	Regressed	2 (1.36)
Residence	Rural	124 (85)
	Suburban	16 (11)
	Urban	6 (4)
Socioeconomic status	Upper middle	3 (2.05)
	Lower middle	21 (14.3)
	Upper lower	90 (61.6)
	Lower lower	32 (22)
Feeding pattern	EBF	60 (41.0)
	PBF	48 (32.8)
	MIXED	38 (26.2)
Anthropometry	WFH <3SD	93 (63.6)
	MUAC <11.5	86 (59)
	B/L edema	22 (15)

EBF=Exclusive breast feeding, PBF=Predominantly breast feeding, WFH=Weight for height, MUAC=Mid upper arm circumference.

The above table depicts that SAM is more common in males, in the age group 13 to 24 months, lower class socioeconomic strata and in rural Kashmir.

Table 2: Showing mean age, MUAC and hemoglobin of SAM Patients.

	Mean	Standard error	CI (95%)
AGE	22.5 months	2.2	18.2 (26.9)
MUAC*	10.32 cm	0.073	10.2 (10.5)
Hemoglobin	7.75 gm/dl	0.142	7.5 (8.0)

*Mid upper arm circumference

The above table depicts that mean age of SAM patients was 22.5 months, mean MUAC 10.32 cm, and mean hemoglobin 7.75gm/dl.

Table 3: Showing comorbidities in SAM patients.

Type of disease	N (%)	Age groups		
		< 12 mo (n=62)	13-24 mo (n=32)	>24 mo (n=10)
Acute gastroenteritis	44 (30.1)	24 (54.5)	18 (41)	2 (4.5)
Acute respiratory tract infection	38 (26.3)	27 (71)	8 (18.1)	3 (7.9)
Sepsis	22 (15)	20 (91)	2 (9)	0
Urinary tract infection	4 (2.7)	3 (75.0)	1 (25)	0
Meningitis	5 (2)	5 (100)	0	0
Measles	4 (3.8)	3 (75.0)	1 (25.0)	0
Tuberculosis /LTBI*	6 (4)	2 (33.3)	3 (33.3)	1(16.4)
Barter syndrome	1 (0.7)	1 (100)	0	0
Cerebral palsy	4 (2.73)	0	3 (75)	1 (25)
Rickets	1 (0.7)	0	0	1 (100)
#RTA	1 (0.7)	1 (100)	0	0
Cystic fibrosis	2 (1.4)	1 (50)	0	1 (50)
Pyoderma	14 (9.58)	9 (64.2)	4 (28.5)	1 (7.15)
Ascariasis	24 (16.4)	2 (8.4)	12 (50)	10(41.6)
Scabies	10 (6.8)	5 (50.0)	3 (30)	2 (20)

*LTBI=Latent tubercular infection, #RTA=Renal tubular acidosis.

The above table depicts that gastroenteritis; respiratory tract infections, sepsis, skin infections and parasitic infestation with ascariasis were common comorbidities in SAM patients.

Table 4: Showing percentage of complications among SAM patients.

Complication	N (%)
Dehydration	46 (31.5)
Hypoglycemia	10(6.8)
Hypothermia	16 (11)
Sepsis	22 (15)
Hyponatremia	16 (11)
Hypernatremia	12 (8.2)
Hypokalemia	14 (9.58)
Hyperkalemia	1 (.68)

The above table depicts that dehydration, hypothermia, hypoglycemia, hyponatremia, hypernatremia, hypokalemia were significant complications present in Patients with SAM on admission. All patients with SAM must be screened for these complications.

Table 5: Outcome of nutritional rehabilitation program.

Indicators	Our observations
Recovery rate	110 (75.3)
Death rate	1 (0.68)
Defaulter rate	2 (1.36)
Referred	4 (2.7%)
Not recovered	29 (20)
Average weight gain (g/kg/d)	5.5 g

The above table depicts there is good recovery rate in SAM patients (75.3%) if nutritional rehabilitation program is properly implemented.

DISCUSSION

Severe acute malnutrition is preventable and treatable cause of childhood morbidity and mortality. The Mean age, mid upper arm circumference, and hemoglobin was 16.5, 10.32 and 7.75 respectively as shown in Table 2. There were 54.8% males and 45.2% females and difference was not statistically significant as shown in Table 1. In our study we found SAM was very common in rural children belonging to lower socioeconomic strata. These findings were consistent with other previous studies. In our study as depicted in Table 3 Diarrhea (30.1%) and acute respiratory infection (26.3) were the two most common co morbid diseases in SAM patients. These findings were consistent with study done by Rakesh Kumar.⁹ Previous studies have also reported that malnourished children suffer in greater proportion from bacterial gastrointestinal and respiratory infections. In a Colombian study, 68.4% of malnourished children were suffering from diarrhea and 9% had sepsis at the time of admission.¹⁰ In our study dehydration was the most common complication in SAM patients 31.1% patients followed by sepsis, hypothermia, hypoglycemia and hyponatremia. These findings were consistent with study done by Rinki H. Shah.¹¹

In our study the recovery rate, death rate and defaulter rate was 75.3%, 0.68% and 1.36% respectively as depicted by Table 5. These outcome indicators were in accordance with national standards (recovery rate more than 75% and death rate less than 5%).^{12,13} This is important as the primary objective of NRCs is to reduce fatality rates among children with SAM. Thus this study indicates that following WHO and modified IAP guidelines, it has become easier to manage SAM in hospital settings, with least possible stay at hospital. Average weight gain in our study was 5.5 gm/kg/day, and average duration of stay in hospital was 16 days. International guidelines recommend that children with uncomplicated SAM be cared for through a community-based program for the management of SAM as these children are at a significantly lower risk of death than children with complicated SAM and can be cared for at home if an appropriate community-based therapeutic feeding program is in place.¹³

The proportion of children who defaulted (1.36%) was also within national and international standards of care (<15%).^{10,11} The average weight gain (5.5 g/kg/day) of these children while in the NRC was less than the nationally and internationally-agreed upon minimum average weight gain (≥ 8 g/kg body weight/day) for programs that treat children with SAM.^{10,11} However, 76% of the 146 children discharged gained at least 15% of their initial weight, the minimum weight gain recommended by WHO and India's Ministry of Health to discharge children as recovered.^{9,10}

Thus, NRCs provide life-saving care for children with SAM as demonstrated by the high survival rates of the program. Community-based therapeutic care for children with uncomplicated SAM needs to become a key component of the continuum of care for children with SAM. Large number of the children with SAM can be treated in their communities as they had uncomplicated SAM with traditionally available energy dense foods.¹⁴ Global evidence shows that good quality ready-to-use therapeutic foods are effective in supporting rapid catch-up growth in children with SAM¹⁵ and can be safely used in community-based programs.¹³ With an effective community-based program for early detection and treatment, most children with SAM can be cared for by their mothers and families at home while Nutrition Rehabilitation Centers (NRCs) are reserved for children with SAM and medical complications. Hence strengthening of centrally sponsored community based ICDS program is essential in early detection and management of SAM.

ACKNOWLEDGEMENTS

We are grateful to the clinical and nursing staff of NRC GB Pant Children Hospital GMS Srinagar Kashmir India and the census staff.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the institutional ethics committee

REFERENCES

- Collins S, Dent N, Binns P, Bahwere P, Sadler K, Hallam A. Management of severe acute malnutrition in children. *Lancet.* 2006;368(9551):1992-2000.
- Pelletier DL, Frongillo EA Jr, Schroeder DG, Habicht JP. The effects of malnutrition on child mortality in developing countries. *Bull World Health Organ.* 1995;73:443-8.
- Ashworth A, Khanum S, Jackson A, Schofield C. Guidelines for the inpatient treatment of severely malnourished children. Geneva: World Health Organisation; 2003.
- International Institute for Population Sciences (IIPS) and Macro International. National Family Health Survey (NFHS-3), 2005-2006. Mumbai: IIPS; 2007.
- United Nations Children's Fund (UNICEF). Tracking progress on child and maternal nutrition. A survival and development priority. New York: United Nations Children's Fund (UNICEF); 2009.
- World Health Organization (WHO). Guidelines for the inpatient treatment of severely malnourished children. Geneva: WHO; 2003.
- Indian Academy of Pediatrics (IAP). IAP guidelines 2006 for hospital-based management of severely malnourished children (adapted from WHO guidelines). *Indian Pediatr.* 2007;44:443-61.
- World Health Organization (WHO), United Nations Children's Fund (UNICEF). WHO Child Growth Standards and the identification of severe acute malnutrition in infants and children. Geneva, Switzerland: World Health Organization and the United Nations Children's Fund; 2009.
- Rakesh Kumar, Jyoti Singh, Karan Joshi. Comorbidities in hospitalized children with severe acute malnutrition. *Indian Pediatr.* 2014;51:125-7.
- Bernal C, Velásquez C, Alcaraz G, Botero J. Treatment of severe malnutrition in children: experience in implementing the world health organization guidelines in turbo, Colombia. *J Pediatr Gastroenterol Nutr.* 2008;46:322-8.
- Rinki H. Shah, Bakul B. Javdekar. Management of children with severe acute malnutrition: experience of nutrition rehabilitation centre at Baroda, Gujarat. *Int J Contemp Pediatr.* 2014;1(1):3-6.
- Ministry of Health and Family Welfare, Government of India. Operational guidelines on facility-based management of children with severe acute malnutrition. New Delhi, India: National rural Health Mission, Ministry of Health and Family Welfare; 2011.
- World Health Organization (WHO), World Food Program (WFP), United Nations Standing Committee on Nutrition (UNSCN), United Nations Children's Fund (UNICEF). Community-based management of severe acute malnutrition. Geneva, Switzerland: WHO, the World Food Program, the United Nations Standing Committee on Nutrition and the United Nations Children's Fund; 2007.
- Mamidi RS, Kulkarni B, Radhakrishna KV, Shatrugna V. Hospital-based nutrition rehabilitation of severely undernourished children using energy dense local foods. *Indian Pediatr.* 2010;47:687-93.
- Diop El HI, Idohou Dossou N, Ndour MM, Briend A, Wade S. Comparison of the efficacy of a solid ready-to-use food and a liquid, milk-based diet for the rehabilitation of severely malnourished children: a randomized trial. *Am J Clin Nutr.* 2003;78:302-7.

Cite this article as: Syed Tariq A, Naik SA, Wasim Rafiq A, Saleem R. Demographic, clinical profile of severe acute malnutrition and our experience of nutrition rehabilitation centre at children hospital Srinagar Kashmir. *Int J Contemp Pediatr* 2015;2:233-7.