

Co-morbidities in Hospitalized Children with Severe Acute Malnutrition

RAKESH KUMAR, JYOTI SINGH, KARAN JOSHI, H P SINGH AND S BIJESH

From Department of Pediatrics, Gandhi Memorial Hospital, Shyam Shah Medical College, APS University, Rewa, MP, India.

Correspondence to:

Dr H P Singh, Department of Pediatrics,
Gandhi Memorial Hospital, Shyam
Shah Medical College, APS University,
Rewa, Madhya Pradesh, India.
drhpsingh1@rediffmail.com

Received: May 06, 2013;

Initial review: May 07, 2013;

Accepted: July 19, 2013

Objective: To study the co morbidities in hospitalized children with severe acute malnourishment. **Methods:** 104 severe acute malnourished children were included. **Results:** 54% had diarrhea and 27.8% had acute respiratory tract infections. Tuberculosis was diagnosed in 22% of cases (60.8% cases in children 6-12 mo old). Malaria and Measles were diagnosed in 3.8% each, and HIV infection was seen in 2.9% cases. Signs of vitamin B and vitamin A deficiency were seen in 14.4% and 5.8% cases, respectively. Malaria and HIV were not found to be major co morbid conditions. **Conclusions:** Timely identification and treatment of various co-morbidities is likely to break undernutrition-disease cycle, and to decrease mortality and improve outcome.

Keywords: Co-morbidities, Hospitalization, India, Management, Severe acute malnutrition.

Published online: August 05, 2013. PII: S097475591300461

Severe Acute Malnutrition affects nearly twenty million under-five children, and contributes to one million child deaths yearly [1]. The mortality rate of children with complicated SAM that receive treatment in inpatient set ups has remained unacceptably high [2]. Such high mortality in in-patient units has been attributed to co-morbidities such as infections and micronutrient deficiencies [3].

There is a lack of systematic reporting of clinical and laboratory data on admission or during hospital stay to identify baseline risk factors that allow comparative studies of the burden, spectrum and outcome of co-morbidities of severe malnutrition. Here we present a description of co-morbid findings in children admitted to a tertiary level hospital in central India.

METHODS

This descriptive study was carried out in the Department of Pediatrics, Gandhi Memorial Hospital, Rewa from August 2011 to July 2012. All children between six to sixty months of age with severe acute malnutrition (SAM) admitted in the Nutritional Rehabilitation Ward were included. WHO criteria were used to define severe acute malnutrition [4]. Children suspected to have congenital malformation and diseases were excluded.

Detailed history and systemic examination were done and the clinical signs of micronutrient deficiencies were assessed. Frequencies of various co morbid conditions in study population were recorded.

Ethical issues: A written, informed consent was obtained from parents. Clearance from Departmental Ethics Committee was taken prior to the start of the study. All participants had the option to withdraw from the study anytime during their hospital stay.

RESULTS

Out of 104 SAM children (51.9% females), 59.6% were in age group six to twelve months. Mean age of presentation was 14.3 months. 75.8% cases had their weight for height below -3SD, 24.03% cases had severe visible wasting, and 27% had bilateral pitting edema. Around 75% families belonged to lower socio-economic status, 6% of babies were exclusive breastfed while breast feeding was not at all initiated in 24.3% of children. 42.3% children were completely immunized and 52% had partial immunization. 72.1% children had achieved normal milestones for the age.

Diarrhea was found to be the most common co morbid disease associated with SAM. 54% SAM children had diarrhea and 27.9% of children suffered acute respiratory tract infections (**Table I**). Nutritional deficiencies are detailed in **Table II**. 11.5% children had normal hemoglobin level, 7.6% mild anemia, 55.7% had moderate anemia and 24% had severe anemia.

DISCUSSION

Mean age of children reporting with malnutrition was similar to other studies and there was no significant sex

TABLE I DISTRIBUTION OF CO-MORBIDITIES IN THE STUDY POPULATION

Type of disease	N (%)	Age groups		
		< 12 mo (n=62)	13-24 mo (n=32)	>24 mo (n=10)
Acute gastroenteritis	35 (33.6)	18 (51.4)	15 (42.9)	2 (5.7)
Acute respiratory tract infection	29 (27.9)	20 (69.0)	8 (27.6)	1 (3.4)
Sepsis	10 (9.6)	9 (90.0)	1 (10.0)	0
Urinary tract infection	1 (1.0)	1 (100.0)	0	0
Meningitis	9 (8.6)	5 (55.6)	3 (33.3)	1 (11.1)
Malaria	4 (3.8)	3 (75.0)	1 (25.0)	0
Measles	4 (3.8)	3 (75.0)	1 (25.0)	0
HIV infection	3 (2.9)	1 (33.3)	1 (33.3)	1 (33.3)
Tuberculosis	23 (22.1)	14 (60.9)	5 (21.7)	4 (17.4)
<i>Skin infection</i>				
Pyoderma	12 (11.5)	8 (66.7)	3 (25.0)	1 (8.3)
Tinea/Candidiasis	3 (2.9)	2 (66.7)	1 (33.3)	0
Scabies	4 (3.8)	3 (75.0)	1 (25.0)	0

TABLE II NUTRITIONAL DEFICIENCIES IN STUDY SUBJECTS

Deficiency	SAM n (%)	TB n (%)	HIV Infection n (%)
Vitamin B	15 (14.4)	3 (2.9)	1 (1)
Rickets	16 (15.4)	5 (4.8)	1 (1)
Scurvy	2 (1.9)	0	0
Vitamin A	6 (5.8)	3 (2.9)	0
Anemia	92 (88.3)	22 (70)	3 (24.8)

predominance in malnourished children [5]. Diarrhea and acute respiratory infection were the two most common co morbid diseases followed closely by tuberculosis. Previous studies have also reported that malnourished children suffer in greater proportion from bacterial gastrointestinal and respiratory infections [6]. Absence of a comparative group, no biochemical evaluation for micronutrient deficiencies and non-assessment of contributing factors for these deficiencies were the main lacunae of the study.

In a Colombian study, 68.4% of malnourished children were suffering from diarrhea and 9% had sepsis at the time of admission [7]. Two African studies also showed high incidence of diarrhea in SAM children of 49% and 67% [8,9]. Though previous reports have described malnutrition as an important risk factor for pneumonia than for diarrhea [10], diarrhea was the major co-morbid condition found in our study. A study from Africa [11] also reported a comparable incidence of respiratory illness and tuberculosis (18% each) in admitted SAM

children. Measles has severe consequences on the nutritional status. A previous Indian study [12] showed only 3- 4% of children with past history of measles but we found a higher proportion. Malaria and HIV infection were previously reported as major co-morbidities with total prevalence of 21% and 29.2%, respectively [11] but data from our hospital showed a comparatively lesser incidence.

Overlapping nature of protein–energy malnutrition and micronutrient deficiencies were well understood and it is seen that lack of one micronutrient is typically associated with deficiency of others [13]. Anemia and vitamin D deficiency were the two most common micronutrient deficiencies associated with malnutrition in our study, and this is consistent with the previous reports [14]. The high incidence of anemia in these children could be due to nutritional factors as well as incidental helminthic infections. Other micronutrient deficiencies seen in this study have also been previously reported [15].

Apart from nutritional rehabilitation, timely identification and treatment of co-morbidities like diarrhea, acute respiratory tract infection, anemia and micronutrient deficiencies is vital in malnourished children, so as to break undernutrition-disease cycle, and to decrease mortality and to improve outcome.

Contributors: RK: collected the data and conducted the study; KJ: supervised the study; HPS and JS: conceived the study and finalized the manuscript and will be the guarantors.

Funding: None; *Competing interests:* None stated.

WHAT THIS STUDY ADDS?

- Diarrhea, respiratory tract infections and tuberculosis are the most common co-morbid conditions in admitted severe acute malnourished children in this region.

REFERENCES

1. Black RE, Allen LH, Bhutta ZA, Caulfield LE, de Onis M, Ezzati M, *et al.* Maternal and child undernutrition: global and regional exposures and health consequences. *Lancet*. 2008;371:243-60.
2. Heikens GT. How can we improve the care of severely malnourished children in Africa? *PLoS Med*. 2007;4: e45.
3. Heikens GT, Bunn J, Amadi B, Manary M, Chhagan M, Berkley JA, *et al.* Case management of HIV-infected severely malnourished children: challenges in the area of highest prevalence. *Lancet*. 2008;371:1305-7.
4. World Health Organization. Management of Severe Malnutrition: A Manual for Physicians and Other Senior Health Workers, World Health Organization, Geneva, Switzerland, 1998.
5. Bachou H, Tylleskär T, Deogratias H, Mulindwa K, Tumwine JK. Bacteraemia among severely malnourished children infected and uninfected with the Human immunodeficiency virus-1 in Kampala, Uganda. *BMC Infect Dis*. 2006;6:160.
6. De Onis M, Monteiro C, Akre J, Clugston G. The worldwide magnitude of protein-energy malnutrition: An overview from the WHO global database on child growth. *Bull World Health Organ*. 1993;71:703-12.
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.
8. Talbert A, Thuo N, Karisa J, Chesaro C, Ohuma E, Ignas J, *et al.* Diarrhoea complicating severe acute malnutrition in Kenyan children: A prospective descriptive study of risk factors and outcome. *PLoS One*. 2012; 7:1.
9. Irena AH, Mwambazi M, Mulenga V. Diarrhea is a major killer of children with severe acute malnutrition admitted to inpatient set-up in Lusaka, Zambia. *Nutrition J*. 2011;10:110.
10. Berkowitz FE. Infections in children with severe protein-energy malnutrition. *Pediatr Infect Dis J*. 1992;11:750-9.
11. Sunguya BF, Koola JI, Atkinson S. Infections associated with severe malnutrition among hospitalised children in East Africa. *Tanzania Health Research Bulletin*. 2006;8: 189-92.
12. Bhaskaram P. Measles and malnutrition. *Indian J Med Res*. 1995;102:195-99.
13. Olaf Müller, Michael Krawinkel. Malnutrition and health in developing countries *CMAJ*. 2005;173:279-86.
14. Ejaz MS, Latif N. Stunting and micronutrient deficiencies in malnourished children. *J Pak Med Assoc*. 2010;60:543-7.
15. Chainani N, Sharma P, Meena N, Sharma U. Pattern of vitamin deficiencies among the malnourished preschool children in ICDS blocks of Jaipur city. *Indian J Matern Child Health*. 1994;5:109-11.