Original Research Article

DOI: http://dx.doi.org/10.18203/2349-3291.ijcp20172113

Co-morbidities and micronutrient deficiencies in children with severe acute malnutrition

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Received: 01 May 2017 Accepted: 06 May 2017

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ABSTRACT

Background: To study the co-morbidities and nutritional deficiencies in hospitalized children of severe acute malnutrition (SAM).

Methods: One year retrospective chart review of 150 cases of SAM was done in Paediatric unit of a medical college of northern India.

Results: The mean age of study group was 17.3 months (6 months to 60 months' age group). Diarrhoea (34.7%) and respiratory tract infection (31.33%) were the most common co-morbid conditions associated with this study. Tuberculosis was seen in 20% of cases whereas Measles was associated in 6.7% cases. Anaemia and Vitamin A deficiencies were common micronutrient deficiencies. A very high prevalence of intestinal helminthic infestation was present in this study. *Ascaris lumbricoides* being the most common parasite involved. Polyparasitism was present in 20% of cases.

Conclusions: Early identification and management of co-morbidities can improve overall outcome and survival.

Keywords: Co-morbidities, Diarrhoea, Micronutrient

INTRODUCTION

Severe acute malnutrition (SAM) is a major cause of morbidity and mortality in children under 5 years of age, especially in developing countries. It is supposed to be responsible for more than one million child death yearly worldwide. Co-morbid conditions such as infections, micronutrient deficiencies and parasitic infestation are mainly responsible for this high mortality in SAM.

Soil transmitted helminthes are among the most common chronic infection, especially in tropical region which further aggravate this mortality. Polyparasitism is a rule in tropics, when involved increases the risk of tuberculosis and other infections like Malaria and HIV.

Here, we are describing the same in a study conducted at a medical college of Bihar.

METHODS

A retrospective chart review (from April 2015 to March 2016) of children diagnosed with SAM at department of Paediatrics, Government Medical College, Bettiah and its nearby Nutrition Rehabilitation Centre (NRC) was done. All the children of age group 6 months to 5 years who came under WHO definition of SAM were included in this study.³ Children with congenital malformation and other diseases were excluded from this study. Ethical clearance was taken from institute ethical committee for this study.

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Detailed history and clinical examination were done to assess the clinical signs and symptoms of micronutrient deficiencies. Socioeconomic status was measured by modified Kuppuswamy Classification of socioeconomic status scale. Fresh stool samples for 3 consecutive days were taken for routine and microscopic examination specially to find out parasitic infestation. Blood examination was done to assess the degree of anaemia.

A case of acute diarrhoea was defined as increased stool frequency compared with the usual pattern occurring in children under 5 years old for whom parents shout cares for treatment of diarrhoea. Persistent diarrhoea was defined as persistence of increased stool frequency more than 14 days. Different co-morbid conditions associated with this population were noted.

RESULTS

A total of 150 children of SAM were admitted during this time period. 53% were female and 47% were male. 69.3% were in the age group of 6 months to twenty-four months. Mean age of presentation was 17.3 months.

73.3% cases had their weight for height below -3SD whereas 26.7% cases had severe visible wasting and 25.3% cases presented with bilateral pitting oedema. 94.7% patients belonged to lower socioeconomic status as per modified Kuppuswamy scale. Only 6.7% children were exclusively breast fed whereas 36.7% were on breast fed as well as top fed. Immunization status of children with severe acute malnutrition was very poor as only 25.3% children were completely immunized as per their age. Diarrhoea either acute or persistent was the most common comorbid condition associated with severe acute malnutrition followed by acute respiratory tract and skin infections (Table 1).

Table 1: Co-morbid conditions in children with severe acute malnutrition.

Clinical features	Number n=150(100%)
Acute gastroenteritis	52 (34.7%)
Persistent diarrhoea	18 (12%)
Acute RTI	47 (31.3%)
UTI	07 (4.7%)
Tuberculosis	30 (20%)
Measles	10 (6.7%)
Skin infections	28 (18.7%)
Pyogenic infections	16 (10.7%)
Fungal infection	07 (4.7%)
Scabies	05 (3.3%)

Anaemia was commonest nutritional deficiency with severe acute malnutrition. Evidence of other multivitamin deficiencies were present in most of the cases (Table 2). Rate of Parasitic infestation was very high (46.7%) in this study population. Ascaris was found to be most common intestinal parasitic infestation followed by *Hook worm*

and *Entamoeba histolytica*. Polyparasitism (mixed parasitic infestation) was present in 20% cases (Table 3).

Table 2: Nutritional deficiencies in severe acute malnutrition cases

Deficiencies	Number n=150 (100%)
Anaemia	138 (92%)
Vitamin A	42 (28%)
Vitamin D	32 (21.3%)
Vitamin B	38 (25.3%)
Vitamin C	04 (2.7%)

Table 3: Distribution of intestinal parasitic infestation in Severe acute malnutrition cases.

Intestinal Parasites	Number n=70 (100%)
Ascaris lumbricoides	40 (57%)
Hook Worm	12 (17.14%)
E. histolytica	10 (6.7%)
E. giardia	03 (2%)
H. nana	02 (2.8%)
Trichuris trichiura	03 (2%)

DISCUSSION

It is a supposed that co-morbid conditions and micronutrient deficiency is a major factor contributing to morbidity and mortality among malnourished children. In this study diarrhoea and acute respiratory tract infections were the most common co-morbid conditions associated with severe acute malnutrition which is similar to other previous studies which has also reported that malnourished children had higher incidence of gastroenteritis and acute respiratory tract infections.⁴ In other developing countries of Africa the incidence of mucosal surface infection in SAM is very high, even more than 50%.^{5,6}

Incidence of tuberculosis in admitted malnourished children was 20% in our study which is similar to other studies from developing countries. Associated measles infection or resent past history of measles was a bit higher (6.7%) in our study than previous studies. Surprisingly no case of Malaria and HIV was present in this study, whereas previous studies shows a higher proportion of 20 to 30%. Anaemia and Vitamin A deficiency were the two most common micronutrient deficiencies in this study. Relatively a low proportion of Vitamin D deficient cases were noted in this study.

High incidence of anaemia and multivitamin deficiency is supposed to be due to a higher rate of parasitic infestation. Intestinal parasitosis is a major public health problem in developing countries. This study shows a very high parasitosis (46.7%) in severe acute malnourished children comparable to results of other study groups done across underdeveloped countries. Now a days polyparasitism is a very common finding in diseased as well as healthy children. This polyparasitism increases

the risk of tuberculous infection and severe anaemia by modulating the immune system of the host.¹²

CONCLUSION

This study signifies overlapping nature of severe acute malnutrition and micronutrient deficiency and typically it was observed that lack of one micronutrient was associated with others. To decrease the mortality in severe acute malnutrition it is important to break this vicious cycle of malnutrition, comorbid condition, micronutrient deficiencies and helminthic infestation at the early stage of illnesses.

Funding: No funding sources Conflict of interest: None declared

Ethical approval: The study was approved by the

Institutional Ethics Committee

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Cite this article as: Saurabh K, Ranjan S, Narayan JP. Co-morbidities and micronutrient deficiencies in children with severe acute malnutrition. Int J Contemp Pediatr 2017;4:1225-7.