

# Co-morbidities in Children with Severe Acute Malnutrition - A Tertiary Care Centre Experience

Arun Kumar Arya<sup>1</sup>, Pavika Lal<sup>2</sup>, Pramod Kumar<sup>3</sup>

## ABSTRACT

**Introduction:** Co-morbidities are responsible for the high incidence of morbidity and mortality in children with severe acute malnutrition (SAM). There is paucity of data regarding pattern of co-morbidities in SAM children. Therefore this study was done to identify the co-morbidities in children with SAM admitted in nutritional rehabilitation centre.

**Material and Methods:** This was a prospective hospital based study done in the Department of Paediatrics, GSVM Medical College, Kanpur, from January 2014 to December 2015. It was carried in 200 children with SAM, diagnosed on the basis of WHO classification.

**Results:** The most common co-morbidity was acute gastroenteritis (36.5%) followed by acute respiratory tract infections (26.5%). Tuberculosis was also present in 21.5% cases. Most of the co-morbidities were confined to age group < 2 years of age. Anaemia was present in 95% cases. 25% children had clinical features of rickets and 12% had vitamin A deficiency. Malaria, measles and HIV infection were not found as significant co-morbid conditions.

**Conclusion:** Early detection and prompt management of co-morbidities is the key to decrease the mortality and improve overall outcome of SAM children.

**Keywords:** Co-morbidities, Nutritional Rehabilitation Centre, Severe Acute Malnutrition (SAM).

## INTRODUCTION

Severe acute malnutrition is defined by a very low weight for height (below -3 z scores of the median WHO growth standards), by visible severe wasting or by the presence of nutritional oedema.<sup>1,2</sup> Globally, it is estimated that there are nearly 20 million children who are severely acutely malnourished. Most of them live in south Asia and in sub-Saharan Africa.<sup>1,2</sup> According to NFHS-4 survey, 7.5% children under five are suffering from SAM in India.<sup>3</sup> According to WHO, children suffering from severe acute malnutrition are at 5–20 times higher risk of death compared to well-nourished children. Current estimates suggest that about 1 million children die every year from severe acute malnutrition.<sup>4</sup>

Severe acute malnutrition puts the children at a greater risk of dying from common infections, increases the frequency and severity of such infections and contributes to delayed recovery. In addition, the interaction between severe acute malnutrition and infections can create a potentially lethal cycle of worsening illness and deteriorating nutritional status. Poor nutrition in first thousand days of a child's life leads to stunted growth which is irreversible and is associated with impaired cognitive ability and school performance.

There is scarcity of data on co-morbidities associated with severe acute malnutrition. With this background we conducted a study on clinico-demographic profile and the co-morbidities

in severely malnourished children admitted to nutritional rehabilitation centre.

## MATERIAL AND METHODS

This study was a hospital based prospective observational study conducted from January 2014 to December 2015 in the department of Paediatrics, GSVM Medical College, Kanpur. A written and informed consent was obtained from the parents. All indoor admissions during the study period at our nutritional rehabilitation centre with the diagnosis of severe acute malnutrition (SAM) based on WHO classification in the age group 6mth-5year were included. The exclusion criteria were age < 6 months of age, children with mild to moderate malnutrition and children with congenital malformations. A detailed and thorough history along with complete anthropometry and physical examination was done and relevant investigations were done according to the clinical presentation.

## STATISTICAL ANALYSIS

Microsoft office 2007 was used for the statistical analysis. Mean and percentages were computed to interpret the data.

## RESULTS

A total number of 200 cases were enrolled over the duration of 24 months. Mean age of presentation was 15.4 months. Severe acute malnutrition was more common among males than females and majority of these children belonged to age group 6 months-24months (78.5%). Maximum number of cases of SAM in our study were of non-edematous type. 52% children were completely immunized, 40% were partially immunized and 8% were unimmunized (Table-1).

67% of the study group belonged to lower socio-economic class according to Modified Kuppaswamy classification. 66% of the mothers were illiterate or had only primary education and the fathers were mainly of labourer class (Table-2).

Majority of the children suffered from acute gastroenteritis (36.5%) followed by acute respiratory infections (26.5%). Tuberculosis was also present in 21.5% cases. Out of 200 children, 55.45% children had one co-morbidity, 25.35% had two, 9.2% had more than two and 10% had no co-morbidities. Most of the co-morbidities were confined to age group <2 years

<sup>1</sup>Associate Professor, <sup>3</sup>Junior Resident, Department of Pediatrics, <sup>2</sup>Assistant Professor, Department of Obstetrics and Gynecology, GSVM Medical College, Kanpur, India

**Corresponding author:** DR. Arun Kumar Arya, L-8, GSVM Medical College Campus, Kanpur, India

**How to cite this article:** Arun Kumar Arya, Pavika Lal, Pramod Kumar. Co-morbidities in children with severe acute malnutrition - a tertiary care centre experience. International Journal of Contemporary Medical Research 2017;4 (5):1086-1088.

age (Table-3).

The most common nutritional deficiency in our study population was anaemia (95%) followed by rickets (25%) (Table-4). In our study, 43.5% children with SAM were discharged after weight gain, 47.5% didn't gain targeted weight before discharge, 7% were defaulters and 2% expired.

S. No.	Demographic features	Number	Percentage
1.	Gender		
	Male	118	59%
	Female	82	49%
2.	Age in months		
	6-12	71	35.5%
	13-24	86	43.0%
	25-36	27	13.5%
	37-48	10	5%
	49-60	06	3%
3.	Type of malnutrition		
	Edematous	21	10.5%
	Non-edematous	179	89.5%
4.	Immunization Status		
	Fully immunized	104	52%
	Partially immunized	80	40%
	Unimmunized	16	8%

**Table-1:** Demographic profile of study population.

S. No.	Socio-economic factors	Number	Percentage
1.	Socio-economic class		
	Upper	2	1%
	Upper middle	12	6%
	middle	52	26%
	Upper lower	88	44%
	Lower	46	23%
2.	Maternal education		
	Illiterate	62	31%
	Primary	70	35%
	Secondary	39	19.5%
	Post secondary	29	14.5%
3.	Father's occupation		
	Farmer/labourer	127	63.5%
	Service/business	59	29.5%
	Skilled professionals	14	7%

**Table-2:** Socio-economic profile of study population.

## DISCUSSION

In our study, severe acute malnutrition was more common among 6-24 months age group, which was similar to other studies.<sup>5-7</sup> Severe acute malnutrition was more common among male children in our study but not statistically significant and corroborated with other studies.<sup>5,8,9,12</sup> This may reflect the health consciousness towards male child more than the female child by the family members. It was also found that SAM was more common in children whose mothers were either illiterate or only had primary education and whose fathers were labourers. This was consistent with the other reports.<sup>7,8</sup> This may be attributed to lack of awareness and ignorance among the lower socio-economic classes about the importance of exclusive breast feeding, protein rich diet and timely initiation of complementary feeding.

In our study, the common co-morbidity found was acute gastroenteritis (36.5%) followed by acute respiratory tract infections (26.5%). Other studies also reported acute gastroenteritis being the most common co-morbid condition followed by respiratory tract infection in their cohort of SAM.<sup>7,9-11</sup> Other co-morbid conditions like UTI, meningitis, malaria, measles, skin infections and HIV infections were present in very small proportion of cases. This shows that there are varied presentations of diseases in SAM but the two most common co-morbidities i.e. diarrhoea and pneumonia cases should be looked on priority basis at the time of hospitalization and managed appropriately and aggressively to bring down the high mortality associated with SAM. Tuberculosis was also present in 21.5% cases, which was comparable to the study conducted by Kumar et al.<sup>6</sup> This shows that tuberculosis is the most common chronic infection associated with severe malnutrition. Anaemia was found in 95% cases in our study, which is much higher than a study from Columbia (51%).<sup>13</sup> Nutritional factors along with helminthic infestations may be responsible for this high incidence of anaemia in these children. Vitamin D and Vitamin A deficiency were the two most common micronutrient deficiencies associated with SAM in our study, which is consistent with other studies.<sup>14</sup>

## CONCLUSION

Along with nutritional rehabilitation, timely identification and management of the co-morbid conditions and micronutrient deficiencies is very important to break the malnutrition-disease-

Type of co-morbidities	Age group in months					
	Total cases (n=200)	6-11 (n=71)	12-23 (n=86)	24-35 (27)	36-47 (10)	48-59 (6)
Acute gastroenteritis	73 (36.5%)	30 (41.09)	25 (34.25)	10 (13.69)	5 (6.84)	3 (4.10)
Acute respiratory tract infection	53 (26.5%)	34 (64.15)	9 (16.98)	5 (9.43)	2 (3.77)	3 (5.66)
Tuberculosis	43 (21.5%)	20 (46.51)	10 (23.25)	5 (11.62)	6 (13.95)	2 (4.65)
Skin infections	28 (14%)	12 (42.8)	10 (35.7)	3 (10.7)	3 (10.7)	1 (3.6)
Sepsis	22 (11%)	15 (68.18)	5 (22.72)	2 (9.09)	0	0
Meningitis	15 (7.5%)	7 (46.66)	5 (33.33)	2 (13.33)	0	1 (6.66)
Malaria	10 (5%)	6 (60)	2 (20)	0	2 (20)	0
UTI	8 (4%)	2 (25)	5 (62.50)	1 (12.50)	0	0
HIV infection	5 (2.5%)	1 (20)	2 (40)	0	1 (20)	1 (20)
Measles	4 (2%)	2 (50)	1 (25)	1 (25)	0	0
CSOM	4 (2%)	0	1 (25)	2 (50)	0	1 (25)

**Table-3:** Age-wise distribution of co-morbidities

Type of Deficiency	Total number	Percentage
Anaemia*	190	95%
Vitamin D deficiency	50	25%
Vitamin A deficiency	24	12%
Vitamin B deficiency	21	10.5%
Vitamin C deficiency	5	2.5%

\*Cut off value for anaemia in children aged 6–60 months was a Hb level <11gm/dl.<sup>15</sup>

**Table-4:** Nutritional deficiency in study population

malnutrition cycle, to decrease the mortality and to improve outcome in severely malnourished children.

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**Source of Support:** Nil; **Conflict of Interest:** None

**Submitted:** 20-04-2017; **Accepted:** 25-05-2017; **Published:** 03-06-2017