



## Prevalence of Hypocalcemia in Severe Acute Malnutrition

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Submitted: 15-06-2021

Revised: 27-06-2021

Accepted: 30-06-2021

### ABSTRACT:

#### OBJECTIVE:

To determine the prevalence of hypocalcaemia in 6 months to 2 years of children hospitalized with severe acute malnutrition.

#### DESIGN:

A retrospective study of cases for prevalence of hypocalcaemia in children hospitalized with severe acute malnutrition at Pravara rural hospital, tertiary care center.

#### SETTING :

At Pravara rural hospital, a tertiary care hospital. (June 2020 to September 2020).

#### PARTICIPANTS:

Thirty patients with age group between 6 months to 2 years.

#### RESULTS:

Out of 30 cases, 8 cases were diagnosed with hypocalcaemia, which amounts for 26.66%.

#### CONCLUSION:

1. Hypocalcaemia is common in children with severe acute malnutrition.
2. Routine supplementation of calcium should be considered in severely acute malnourished children.
3. Hypocalcaemia has a good outcome when adequately treated.

### I. INTRODUCTION

Severe acute malnutrition (SAM), currently affecting nearly 20 million pre-school-aged children globally, is a significant factor in approximately one-third of the nearly 8 million deaths of under-five children<sup>(1)</sup>. In India, almost 7.5% under-five children are severely wasted (weight-for-height < -3SD) and 21% are wasted (weight for height < -2SD) according to the National Family Health survey - 4 (NHFS-4) data.<sup>(2)</sup>

SAM is a clinical syndrome due to an imbalance between the demand and supply of energy content, proteins and micronutrients, with a complex interplay of various pathological mechanisms. Severely malnourished children have increased total body water and sodium, while there is deficiency of K, Mg and phosphate stores<sup>(3-5)</sup>. However, there is paucity of data regarding serum

Ca levels in severely malnourished children. Chisti et al.<sup>(6)</sup> found that hypocalcaemia was prevalent in 26% of severely malnourished children aged<sup>(6-9)</sup>.

According to the WHO and Indian Academy of Pediatrics (IAP) guidelines on hospital-based management of severely malnourished children, all severely malnourished children should be given supplemental K, Mg, vitamin A, folic acid, Zn, Cu, Fe and multivitamins routinely<sup>(10,11)</sup>. The multivitamin supplement should preferably contain vitamins A, C, D, E and B12 besides thiamine, riboflavin and nicotinic acid. There is no recommendation on routine supplementation of Ca or vitamin D, although the F-75 and F-100 diets in the stabilisation and nutritional rehabilitation phases, respectively, contain approximately 320 mg Ca/l, and ready-to-use therapeutic food (RUTF) contains some vitamin D (15 µg per sachet, with each child receiving 1.5-5.0 sachets per day according to body weight)<sup>(12)</sup>. Intake from these sources may not be sufficient to consistently elevate the circulating concentrations of serum 25-hydroxycholecalciferol (25-(OH)D) in children with SAM, considering a high prevalence of vitamin D deficiency in this group<sup>(13-15)</sup>. Systemic inflammatory response may also dysregulate vitamin D metabolism and increase requirement of the same.<sup>(16)</sup>

A better understanding of the prevalence and clinical predictors of hypocalcaemia in children with SAM shall contribute to more focused strategies, reducing hypocalcaemia-related morbidity, especially in resource-poor settings.

### OBJECTIVE

To determine the prevalence of hypocalcaemia in 6 months to 2 years of children hospitalized with severe acute malnutrition.

### DESIGN

A retrospective study of cases for prevalence of hypocalcaemia in children hospitalized with severe acute malnutrition at Pravara rural hospital, tertiary care center.



## PARTICIPANTS:

Thirty patients with age group between 6 months to 2 years those who fulfill the admission criteria of SAM.

## II. METHODS :

This was a retrospective study conducted in children aged between 6 months to 2 years hospitalised with SAM in the paediatrics ward of a tertiary care hospital in rural medical college , Loni.

SAM was defined as weight-for-length/height < -3SD z-score of the WHO growth standards, or bilateral pedal oedema of nutritional origin, or mid-upper arm circumference (MUAC) < 11.5cm, (for children aged 6–59 months)

Severely malnourished children with hypocalcaemia presented with diarrhoea, vomiting, lethargy, shock, convulsion, respiratory distress , sepsis, abdominal distension.

Patient's information, case history and relevant examination, laboratory investigations, treatment received, duration of admission and final diagnosis at the time of discharge, death were recorded in a predesigned case record form. Biochemical parameters analysed included serum Ca.

a. Formulae for calculated parameters are as follows<sup>(18)</sup>:

1. Corrected total Ca (mg/dl) = Total Ca (mg/dl)  $\times$   $0.8 \times (4 - \text{serum albumin in g/dl})$

2. Corrected total Ca (mmol/l) = Corrected total Ca (mg/dl)  $\times$  0.25

Hypocalcaemia was defined as serum Ca (albuminadjusted) < 2.2mmol/l<sup>(19)</sup>

## Patient management :

All enrolled children were managed as per WHO and IAP guidelines(10–12), including supportive care, intravenous fluids, oral rehydration salts solution, antibiotics depending on the local resistance pattern and availability, oxygen therapy, blood transfusions if required, frequent monitoring and assessment and nutritional supplements. We used local preparations of F-75 and F-100 diets in the stabilisation and rehabilitation phases. In the emergency treatment of children presenting with hypocalcaemic seizures intravenous 10 % calcium gluconate was administered slowly at a dose of 2 ml/kg (maximum 10 ml) followed by an infusion of calcium gluconate (1–5 ml/kg per day) titrated to maintain eucalcaemia. Those children with asymptomatic hypocalcaemia were supplemented with oral Ca (500–800 mg/d)<sup>(23)</sup>

## III. RESULTS:

Out of 30 cases, 8 cases were diagnosed with hypocalcaemia , which amounts for 26.66%.

## IV. DISCUSSION:

We have done a retrospective study in 30 participants fulfilling the criteria of admission according to severe acute malnourishment. They had different chief complaints as an evidence of hypocalcaemia.

For example diarrhea , lethargy, seizures , desaturation, respiratory distress etc. Depending upon the calcium level children were given oral or intravenous calcium as soon as possible.

After treatment with adequate calcium from appropriate route of administration , child was monitored for clinical improvement. And almost all of them showed clinical improvement.

## V. CONCLUSION:

1. Hypocalcaemia is common in children with severe acute malnutrition.
2. Routine supplementation of calcium should be considered in severely acute malnourished children.
3. Hypocalcaemia has a good outcome when adequately treated

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