

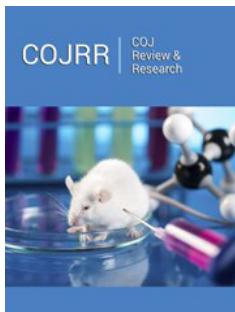
# Severe Acute Malnutrition- Low but Hurting Indian Children?

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## Abstract

The childhood undernutrition is an important public health and development challenge in developing countries including India. Despite multiple National Nutrition Programs implemented over last 50 years and supplementary feeding activity as a nutrition improving activity in Integrated Child Development Scheme since 1975, it is matter of concern that we still run nutrition rehabilitation centers for hospitalizing and managing Severe Acute Malnutrition (SAM) cases coming from poor-socio-economic families even in 2021. COVID-19 pandemic since early 2020 has further exacerbated the situation with shrinking food diversity and low intake combined with episodes of missing supplementary feeding at times. Over a million Anganwadi centres have identified nearly a million 'severely acute malnourished' children from six months to six years across the country as of November 2020. The recently published results of Phase I of the National Family Health Survey-5 have reported an increase in the incidence of SAM over the last 10 years.

Nutrition Rehabilitation Centres (NRCs) launched in 2014 as National Plan of Action for Children were meant to treat SAM cases at health facilities. However, there are studies that suggest that NRCs have not been highly effective. In many NRCs, SAM cases are being discharged early because either the caregivers could not stay for a requisite duration, or the centre could not keep the baby for requisite period, due to lack of oversight.

We report one such SAM case and its management in NRC, that was discharged without fulfilling the NHM criteria. One year and 5-month-old female baby was brought to Pediatric OPD, on 9/4/2021, with a complaint of 15 days of fever, progressing from mild grade to high grade, and loss of appetites, and a history of vomiting soon after feeds and fatigue for last 1 week to the District Hospital, Gadag, Karnataka, India. The baby weighing 7kg as against expected weight of 9.1kg for her age was shifted to Nutrition Rehabilitation Centre (NRC) and managed for 14 days as per NHM guidelines. She was put on Vitamin B12 injection 1000 mcg daily for seven days, Amoxiclav (Amoxicillin) injection 200mg morning and evening for 7 days, Paracetamol injection 100 mg morning and evening. Apart from the injections she was given oral drugs vitamins and minerals that included tablet folic acid 5 mg once a day for 14 days, Multi vitamin syrup 2.5ml, calcium syrup 5ml morning and evening, syrup of zinc 5ml morning one time for 14 days. Key nutritional therapy included

- a) F-75, 75ml every 2 hour on the first day,
- b) Second day 110 ml of F-75 3 hourly and
- c) 145ml -4<sup>th</sup> hourly on day 3.
- d) Fourth and fifth day catch up diet of F-100 150 ml along with the foods and
- e) another 2 days 250ml of F- 75 was given and continued for 14 days.

After 14 days patient's condition improved, she was active and taking adequate food, but had gained only 400G of weight and did not meet criteria for discharge. This proves the need to strengthen and monitor the outcomes of NRC's even in 2021-30 decade to achieve SDG pertaining to nutrition and country.

**Keywords:** SAM; NRC; Infection & nutrition therapy; Empowering for feeding at home

## Introduction

The childhood undernutrition is an important public health nutrition and development challenge in India. Children with severe acute malnutrition (SAM) have nine times higher risk of dying than well-nourished children in India. Undernourished children have significantly

higher risk of morbidity including growth retardation and impaired psychosocial and cognitive development. WHO and GOI classify undernutrition as stunting (low height for age), wasting (low weight for height), underweight (low weight for age) and micronutrient deficiencies (lack of minerals and Vitamins). While 159 million children under five years are stunted and 50 million are wasted as of April 2020, nearly 41 million children are estimated to be overweight or obese too [1].

The earliest nutritional program in India was started in Orissa on 1963, later extended Tamil Nadu and UP. Currently, major nutrition supplementation programs in India include:

- A. Integrated Child Development Services Scheme (ICDS).
- B. Mid-day meal Programs (MDM).
- C. Special Nutrition Programs (SNP).
- D. Wheat Based Nutrition Programs (WNP).
- E. Applied Nutrition Programs (ANP).
- F. Balwadi Nutrition Programs (BNP).
- G. National Nutritional Anaemia Prophylaxis Program (NNAPP).
- H. National Program for Prevention of Blindness due to Vitamin A Deficiency; and
- I. National Goitre Control Program (NGCP).

An estimated 9,27,606 'severely acute malnourished' children from six months to six years were identified across the country as on November 2020 according to the Women and Child Development Ministry's response to an RTI query from PTI. Of these, Uttar Pradesh counted for 3,98,359 out of 2,97,28,235 and Bihar 2,79,427, out of 1,85,82,229 children under 6 years (2011 Census) according to the figures shared by the ministry. Other states reporting SAM cases included Maharashtra 70,665 followed by Gujarat at 45,749, Chhattisgarh at 37,249, Odisha at 15,595, Tamil Nadu at 12,489, Jharkhand at 12,059, Andhra Pradesh at 11,201, Telangana at 9,045, Assam at 7,218, Karnataka 6,899, Kerala at 6,188 and Rajasthan at 5,732. Ladakh, Lakshadweep, Nagaland, Manipur, and Madhya Pradesh reported no severely malnourished children. It is surprising that Madhya Pradesh, one of India's largest states, reported any data on the matter [2].

The recently published results of Phase I of the National Family Health Survey-5 bring to the fore the urgency of the problem of SAM. As many as 16 out of the 22 states and union territories that were surveyed, showed an increase in the incidence of SAM over the last 10 years. The incidence of SAM is higher in urban areas than in rural areas of 8 states [3]. Facility (District & Medical College hospital) based Nutrition Rehabilitation Centres (NRCs) were established in 2014 to treat SAM cases. There are studies that suggest that NRCs have not been highly effective, as in many instances cases are discharged early either because the caregivers could not stay for requisite duration or the centre could not keep

them for an adequate period, for want of enough supervision by the higher ups [4].

COVID-19 pandemic has further exacerbated the situation with shrinking food diversity and low intake combined with episodes of missing food at times. "COVID-19 has been a big impediment in organizing community-based interventions. Therefore, both home-based and facility-based care are the need of the time and new ways/methods to disseminate info to the mothers and caregivers must be found out. "Since SAM has direct connection with food availability, utilization, and awareness - the immediate task is to appropriately build linkages with the government systems to ensure families receive not just ration/food but required education and support [5]. We report one such case managed in the NRC attached to the district hospital, Gadag, Karnataka in the month of April 2021.

### **Case**

One year and 5-month-old female baby was brought to the Pediatric OPD of the District Hospital, Gadag, Karnataka, India on 9/4/2021, with a complaint of 15 days mild to high grade fever, loss of appetites, vomiting soon after feeds and listlessness for last 1 week.

### **Physical examination**

On examination the baby was pale, irritable, unable to cry and feed. She had no visible wasting of muscles over the buttocks. Her height was 75cm. and weight is 7kg, as against an expected weight of 9.1kg. According to IMNCI guidelines this child was classified under second category of Very Low Weight. Since the baby had the -3SD grade malnutrition according to the WHO growth chart, she was Diagnosed as Severe Acute Malnutrition (SAM).

### **Investigations done**

CBC, Vitamin B 12, and urine microscopic examination were done. Hb was 7.7(gm/dl), MCV 108.8(FL), PLT 251 ( $10^3/\mu\text{l}$ ), RDW-CV 29.2 (%), Vitamin B12 was 61.00pg./ml, Urine Microscopy showed -pus cell was 1-2/ HPF.

### **Diagnosis**

Dimorphic megaloblastic anemia and urinary tract infection with SAM.

### **Treatment**

The patient was treated in NRC for 14 days.

1. For the first 7 days she was put on Amoxiclav (Amoxicillin) injection 200 mg morning and evening for 7 days Paracetamol injection 100mg morning and evening for Vitamin B12 injection 1000mcg daily for seven days.
2. Oral therapy for all 14 days Tablet folic acid 5 mg once a day for 14 days, Multi vitamin syrup 2.5ml, Calcium syrup 5ml morning and evening, Syrup of zinc 5ml morning one time for 14 days.
3. Key nutritional therapy included

- a) F-75, 75ml every 2 hour on the first day,
- b) Second day 110ml of F-75 3 hourly and
- c) 145ml -4<sup>th</sup> hourly on day 3.
- d) Fourth and 5<sup>th</sup> day catch up diet of F-100 150ml along with the foods and
- e) another 2 days 250ml of F- 75 was given.
- f) Continued the same till 14 days.

### **Progress**

On the day of discharge baby was active, weighing 7.4kg, general conditions improved, and was taking food. A review by us indicates that it did not meet the criteria for discharge.

### **Follow-up**

At a follow-up visit after 5 weeks (delayed due to Pandemic restrictions), the baby was weighing 9.1kg.

### **Discussion:**

Malnutrition is a major public health and nutrition challenge faced by many developing countries including India. The main reasons for such a situation are slow socioeconomic development, low improved the feeding practices that can prevent or treat malnutrition. We were happy to note that the standard guidelines of management were followed meticulously, but the discharge criteria were compromised. The details of the criteria include

- a) Oedema if any was resolved,
- b) child achieved weight gain of > 15% and
- c) had a satisfactory weight gain for 3 consecutive days (>5gm/kg/day),
- d) Child was eating an adequate amount of nutritious food that the mother can prepare at home,
- e) all infections and other medical complications were treated,
- f) child was provided with micronutrients and Immunization status updated [6].

All but the criteria of a 15 % weight gain, and empowering attendants for appropriate feeding and care at home were achieved. While the attendants knew how to prepare appropriate foods and to feed the child but were not clear how to give home treatment for diarrhea, fever, and acute respiratory infections and how to recognize the signs for which medical assistance must be sought, we consider it as a failure in counselling.

A comparison of nutritional status according to NFHS -4 stunted was 36.2% and NFHS-5, 35.4% a slight decrease. The wasted proportion was 26.1% in NFHS-4, and NFHS-5, 19.5% nearly 6.6% decrease as compared to NFHS-4. The proportion of underweight children was 35.2% in NFHS-4, 32.9% in NFHS-5, a 2.3% decrease and Anemia increased by 4.6% in the recent survey (60.9% in NFHS-4, 65.5% in NFHS-5).

Severe Acute Malnutrition (SAM) is 10.5% in our home state Karnataka [7]. At present the state has nearly 100,000 (62580 AWCS+ 3331 mini Anagnwadi centers) functioning in 204 ICDS projects, covering all the 175 taluks (181 rural projects & 12 tribal & 11 urban projects). The estimated beneficiaries would be around 6 million beneficiaries under the scheme. As of November 2020, Karnataka had 6,899 SAM cases giving a prevalence of 1.15 case per 1000 0-6-year children. The hospitals with NRCs in Karnataka and across the country are fighting the double whammy of COVID-19 Pandemic and malnutrition management.

A systematic review and meta-analysis, 19 of the 24 articles graded prevalence of malnutrition, as 44% stunting 35% wasting 28% with 95% in Ethiopia [8].

Nutritional megaloblastic anemia during childhood its common evolving and underdeveloped countries. the study included total 665 out of those 134 (20%) patients had nutritional megaloblastic anemia, 82% were younger the 2 years of age., The reason for the hospital admission were paleness 48%, high fever 29%, diarrhea 23%, irritability 1%, failure to thrive 10%, vomiting 16%, inability to walk 2%. In the study 94% of people were low socio economical background. (5), as was in our case study. Under-five Anemia and its associated factors with dietary diversity, in a systematic analysis of 561 studies and 16 articles indicated that magnitude of under-five anemia was extremely high in India. A prevalence of anemia of 44.8% in 2-5 years and 50.36% in the age group of less than 2 years and it also showed poor dietary diversity OR = 1.71 [9].

Anemia in children major public health challenge in most developing countries. The study conducted through demographic and health survey data from the 2008, the 78.4% overall prevalence in Ghana, 7.8% severe anemia, 40.8% moderate anemia, 22.6% mild anemia, the highest prevalence of region like upper east and upper west 88.9% to 88.1% respectively [10]. Association between malnutrition and anemia in under-five children and women of reproductive age, Bangladesh is one of the most anemia prone south Asia country. Higher anemia was found in under-five children with stunted and reproductive age of mother with low BMI (< 18.5 kg/m<sup>2</sup>), the higher prevalence of anemia in stunted more than the normal (56.5% vs 48.5%), the reproductive age mother less than normal BMI have more anemia than normal BMI of women (49.5% to 43.2%) [11].

Prevalence and determinants of undernutrition among under-five children in India, Sujatha Murakar et al. [12]. In a cross-sectional study in Maharashtra, of a total 3671 children, with mean age of children 2.38 years (+1.36). reported a stunting of 45.9%, wasting - 17.1% and underweight - 35.4%. the analysis of exclusive breastfeeding indicated rural as 78% and urban 15%. [9] in our study patient have not exclusive breastfeeding, complementary food as started at the age of 9 month along with breastfeeding of 3 to 4 times a day [12].

### **Conclusion**

Our case of 1.5-year-old girl with severe acute malnutrition, anemia, and infection, was treated in the NRC 14 days as per

national/state protocol. The patient's weight increased from 7kg to 7.4kg after 14 days, did not meet discharge criteria but reached 9 kg after 5 weeks. The nutrition supplement foods like egg, milk (f-75 and f-100 formula), banana, and other foods like ganji, kichadi, upma included green leafy vegetables, helps to increase the weight gain of the patient. And given the medical treatment to patient recovered from infection.

After the 14 days at NRC baby had recovered from the infection, was able to take the food properly, but weight gain had increased by 400 G only. The counselling to attendants about making appropriate feeds from locally available, low-cost, nutritious food items had helped as witnessed by weight gain after going home in 5 weeks. Though the mother was advised to come for follow up after 7 - days 1st follow up; 2<sup>nd</sup> follow up after 14 days and 3<sup>rd</sup> follow up after one month, they could return only after 5 weeks due to lockdown to contain the Covid19 Pandemic. Due to the Covid 19 pandemic and want of the cook's services freshly cooked food provision suffered a bit and may have influenced parents' decision for going home early.

### **Take home messages**

- A. Results of phase I of the NFHS-5 has reported an increase in the incidence of SAM over the last 10 years and reported identification of estimated 9,27,606 'severely acute malnourished' children from six months to six years as in November 2020 by the Women and Child Development Department, justify the need to strengthening Nutrition Rehabilitation Centers (NRCs) in facilities to reach the 2030 SDG goal.
- B. Malnutrition is caused mainly due to the social and economic factors such as lack of education, inadequate health care service and poor information on feeding and preparation of locally appropriate food and cultural influences.
- C. Low levels of exclusive breastfeeding and late introduction of complementary feeds that lack calories, proteins, and other nutrients are the reasons for SAM.
- D. Inefficient functioning of NRCs due to lack of supervision adds to the problem.

E. Both home-based and facility-based care are the need of the time and new ways/methods to disseminate info to the mothers and caregivers must be found out to prevent or treat malnutrition which continues to be a challenge.

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