



"A CASE REPORT ON SUCCESSFUL MANAGEMENT OF SEVERE ACUTE MALNUTRITION IN A CHILD WITH HYPERKERATOSIS AND DERMATOSIS"

Community Medicine

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ABSTRACT

Severe acute malnutrition (SAM) continues to pose significant health risks to children under five, contributing to mortality and morbidity globally. This case report highlights the successful management of a 3-year-old boy from the Union Territory of Puducherry, who presented with grade 3 SAM, dermatosis, and hyperkeratosis, and weighed only 9 kg at diagnosis. The intervention spanned 11 months and included comprehensive dietary adjustments, improved hygiene practices, and socioeconomic support to elevate the family's living conditions. **Case Selection:** A male child aged 3 years was identified during routine health surveys in urban Puducherry, displaying classic signs of SAM along with skin complications. **Methods:** 1) Clinical Assessment: Initial assessments confirmed SAM without complications as per WHO criteria. 2) Dietary Assessment: A deficit of essential nutrients was addressed by introducing a tailored diet plan. 3) Socioeconomic and Environmental Assessment: The child's poor health was linked to inadequate family income, poor sanitation, and suboptimal use of local health services. **Intervention:** Nutritional rehabilitation was supported by local health services, incorporating home-based, nutrient-rich recipes. Simultaneously, efforts were made to improve family income and educate the parents about nutrition and hygiene. **Measurements:** The child's growth was meticulously tracked through regular monitoring of weight, height, and other anthropometric data, alongside the resolution of dermatosis and hyperkeratosis. **Results:** The child experienced significant weight gain, reaching a healthy weight for his age within 11 months. Alongside this, notable improvements in skin health and overall physical condition were observed, with the child's developmental milestones aligning with his age group. Enhanced cooperation from the family and better utilization of community health resources further contributed to the child's sustained health and recovery. **Conclusion:** This case illustrates the efficacy of a multidimensional approach in managing SAM, emphasizing the importance of addressing both medical and socioeconomic factors. Continued efforts are necessary to reduce the prevalence of SAM, aligning with Sustainable Development Goals to ensure health and well-being for all children.

KEYWORDS

INTRODUCTION:

It is indisputable that children have a right to safe and sufficient food, and achieving this right is crucial to maintaining the best possible level of health. [1] The essential period for both rapid physical growth and overall child development occurs in children under the age of 59 months. Undernutrition manifests itself in several ways in children when the nutritional needs are not met. Globally, one of the main causes of child mortality and also a major contributor to the global illness burden is undernutrition in children. [2]

Severe Acute Malnutrition (SAM) in children aged 6 to 59 months is defined by the World Health Organization (WHO) as a weight-for-height (WHZ) less than minus 3 standard deviations (WHZ < -3 SD) or a Mid-Upper Arm Circumference (MUAC) of less than 115 mm. [3] Severe malnutrition is both a medical and a social disorder. The child's medical issues are partly attributable to the social challenges present in their home environment. Malnutrition is the end result of chronic nutritional and emotional deprivation, when care-givers out of ignorance, poverty or family problems, are unable to provide a child with adequate nutrition and care. [4]

Clinical evaluation, biochemistry parameters, and anthropometric data are used to classify malnutrition as mild, moderate, or severe. Even while the degree of undernutrition is directly linked to the risk of mortality in children with SAM, death predominately occurs due to compromised immune systems. [5]

In India, Severe Acute Malnutrition (SAM) is often caused by a combination of socio-economic and cultural factors that can perpetuate malnutrition across generations. Poverty and large family

sizes lead to inadequate nutrition, with families prioritizing cheaper, less nutritious food. Limited access to healthcare, especially in rural areas, delays treatment of illnesses that worsen malnutrition. Cultural practices, such as early weaning, inadequate maternal nutrition, and poor sanitation, further contribute to the problem. Additionally, a lack of awareness about proper nutrition and the cyclical nature of malnutrition within families make addressing SAM particularly challenging in India. [6-8]

Thus the management of Severe Acute Malnutrition needs tailor made intervention, regular monitoring along with family counselling and raising the awareness. In concordance in this study, the main goals were to develop a plan for successfully managing a child suffering from Severe Acute Malnutrition who also had dermatosis and hyperkeratosis, and address the underlying cause of the family's undernourishment.

Case Report:

On a routine house to house visit, it was found that a 3-year-old child who weighed 9 kg and belonged to socioeconomic class 4 according to Modified B. G. Prasad socio-economic classification had complaints of weariness along with scaly, hyperpigmented rash, typically on sun-exposed areas (figure:1) along with mild hair fall. He has poor appetite with mild abdominal distension. The mother also mentioned that he had recurrent gastrointestinal illness and acute fungal infections since one year old. On eliciting family history, it was found that his 9-year-old sibling was underweight as well with history of poor appetite and lethargy (Figure 2). Both the children were irritable and it was inferred that both the children were lacking social interaction.

Further investigation revealed a history of low birth weight of 2.46kgs, immunized up to age with occasional abdominal distension since one year of age (figure: 3) and pain throughout the previous year. Despite a history of frequent vomiting during the first two years of life, her mother described uncommon but exceptionally massive vomits over the last few months, at times containing food consumed 2-3 days before.

Their meager monthly income of 5000k was preventing the family from receiving enough nourishment. The Anganwadi services were not utilized properly. The sanitary conditions in and around the house were very poor surrounded by multiple vector breeding places. The family was consuming unfiltered water without even boiling the water for consumption. The family of the case could not boast of any household amenities. The mother also mentioned that she was diagnosed to have moderate anaemia from antenatal period and was found that malnutrition is being observed in the family.

On clinical examination, the child was irritable, pale with wrinkled skin and the hair appeared sparse (Figure:1) He had low pulse and seemed to gasp for breath sometimes. On systemic examination, the abdomen was distended (Figure:3) with no organomegaly with mild crackles on chest auscultation and hyporeflexia. The appearance of his feces was normal.

Not to mention that it was a follow-up every month. Multivitamins, albendazole given once every six months, and additional symptomatic treatment were given during each follow-up along with modified diet plan once in every 2 months.



Figure: 1 Physical appearance of child:
The image displays a pale, wrinkled child lacking subcutaneous fat



Figure: 2 Child with his sibling
The image showing irregular, hyperpigmented skin lesions.



The image showing signs of malnourishment in the child's sibling.

The kid and his sister were prescribed the model diet chart below at the beginning of their follow-up, which was ten months ago. Model diet chart was obtained from the nutrition department and was begun gradually and changed every two to three months according to improvement in growth.

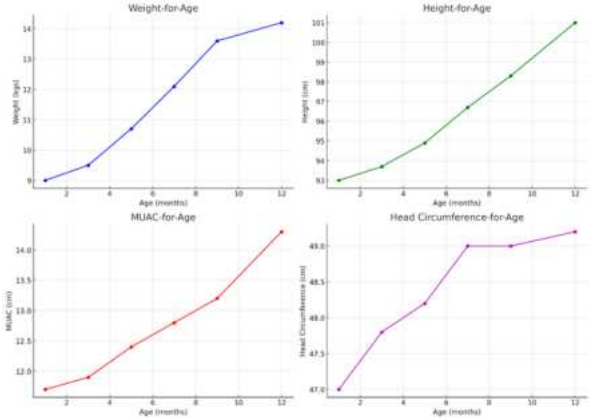
Chart: 1 Diet chart [1100 kcal/10 g protein – required]

Name: Sarvesh		Height: 95cm
Sex: male		(24.12.2023)
1 glass = 200 ml		Weight: 9 kg
1 cup = 250 gm		(24.12.2023)
		Expected weight: 12.96 kg
Time	Food item	Quantity
Morning 6.30 am	Milk	100ml
Morning 8.00 am	Pongal/kichadi/adai /idli/dosa/sambar/chutney [coconut/groundnut]	150 g/ 2
Morning 10.30 am	Fruits/ragi puttu	100 g
Afternoon 1.00 pm	Rice/any curry [vegetables or chicken or fish]/curd	1 cup [250g]
Evening 4.00 pm	Milk/milk shake/sundal/omlette	100 ml 100 g
Night 7.00 pm	Rice/chapatti/idli/egg fry/veg salad	200 g
Night 9.00 pm	Milk	100 ml

The child's rate of growth has increased. (Figure:4): The weight of the child from beginning to the end of following the case is plotted in Fig. 1 below. In 4-5 months 1.7 kgs gained, after 7 months 12.1kgs, now 14.2kgs . Growth chart of the kid shown in the below table and Graph:1. The hyperkeratotic skin lesions were also healing slowly with no new lesions (Figure 5)

Table: 1 Growth rate of the study case

Mon ths	Dates	Gained weight	Height	Mid upper arm circumference	Head Circumference
1	24.12.2023	9 kgs	93 cm	11.7 cm	47 cm
3	20.03.2024	9.5 kgs	93.7 cm	11.9 cm	47.8 cm
5	17.05.2024	10.7 kgs	94.9 cm	12.4cm	48.2 cm
7	09.07.2024	12.1kgs	96.7 cm	12.8 cm	49 cm
9	30.09.2024	13.6kgs	98.3 cm	13.2 cm	49 cm
12	27.12.2024	14.20 kgs	101 cm	14.3 cm	49.2 cm



Graph: 1 Graphical representation of significant growth rate during follow up:



Weight of the child before intervention



Weight of the child after intervention

Figure : 4 Weight gained by child



Figure 5 : Skin changes before and after intervention

DISCUSSION:

This case report highlights the complex interplay of socioeconomic factors and nutritional deficiencies in the management of Severe Acute Malnutrition (SAM) in a child with concurrent hyperkeratosis and dermatosis.

The child's socioeconomic background significantly impacted his nutritional status and access to healthcare. The family's low income of 5000 INR per month limited their ability to access appropriate medical care for fungal and respiratory infections. This economic strain, coupled with inadequate sanitation and poor utilization of Anganwadi services, exacerbated the child's malnutrition and overall health.[8] The mother's low educational level further compounded the situation, as lower maternal education has been linked to poorer nutritional outcomes in children under five years old. These socioeconomic barriers are consistent with findings from previous studies which emphasize the role of economic and educational factors in malnutrition [9]

The management of SAM in this case included a tailored diet plan and regular follow-ups. The diet chart provided was rich in essential nutrients and avoided iron due to its potential to exacerbate infections in severely malnourished children.[10] The WHO recommends multivitamins as a suggested diet for a severely malnourished patient usually utilize only in the beginning or stabilization stages of the course of treatment or when hospitalized. The youngster receiving treatment in this case study was given multivitamins. The mineral composition of multivitamins includes salt, potassium, magnesium, copper, and zinc, but no iron. This nutritional composition is consistent or satisfies the dietary nutrient needs of the severely acutely malnourished child. All malnourished children have a potassium deficiency, which has a negative impact on stomach emptying and heart function (WHO, 2022). [10] Multivitamins were included to address deficiencies in potassium and magnesium, crucial for cellular functions and metabolic processes. The exclusion of iron was deliberate, as iron can promote microbial growth in the context of severe malnutrition [11]. Frequent feedings, both during the day and at night, were crucial to prevent the child's intestines, liver, and kidneys from being overburdened. This is because youngsters who are extremely malnourished may die from overloading their atrophied organs. [12]

The gradual improvement in the child's weight and overall health, as shown by the growth chart, underscores the effectiveness of a structured nutritional intervention combined with regular monitoring.

The resolution of hyperkeratosis and dermatosis over time highlights the importance of addressing both nutritional deficiencies and concurrent infections in the treatment of SAM [13] As shown in Fig. 2 for most times the child had abnormal skin texture however, on 3rd month, the child went into a serious hyperkeratosis and dermatosis state. It is not strange that the child went into this state of hyperkeratosis because all severely malnourished children are at elevated risk of hyperkeratosis especially in the presence of concurrent infections and denuded skin, due to a lowered metabolic rate and decreased body fat [14] Attention is drawn to the fact that it was around the same period that respiratory infection was diagnosed and lack of response to treatment was detected. Prevention of hyperkeratosis and dermatosis in the treatment of severe malnutrition is therefore very crucial. However, in the presence of dermatosis, it is recommended that skin lesions be screened and managed. There were, however, no records of management of dermatosis in this case study.

The child's initial clinical presentation, including irritability, pale skin, and sparse hair, reflected the severe nature of his malnutrition. Follow-up examinations and the implementation of a modified diet plan were crucial for monitoring progress and making necessary adjustments to the treatment protocol. The improvement in physical appearance and weight gain was evident, demonstrating the positive impact of comprehensive nutritional and medical care.

The child's parents were pleased with the outcome, noting that their child's weight gain was significantly better than with regular feedings. They expressed deep gratitude to the nutrition department for providing a specialized diet plan.

Despite India's high prevalence of undernutrition, there is limited data on the use of diet charts providing 1100 kcal for children. To the best of our knowledge, this is the first study from an urban area in the Union Territory of Puducherry, India, documenting the use of such a diet plan to support growth recovery in malnourished children.

CONCLUSION:

Effective management of Severe Acute Malnutrition (SAM) requires a comprehensive approach, combining tailored dietary interventions, continuous monitoring, and addressing underlying socioeconomic factors. The case findings emphasize the importance of socioeconomic support, proper utilization of nutritional resources, and targeted medical interventions in managing SAM. This case also highlights the need for continued research and development of strategies to address malnutrition, particularly in urban settings where socioeconomic disparities can significantly impact health outcomes.

Attention to key nutrients like potassium and magnesium, while avoiding iron, is critical in managing SAM. Close monitoring of physical and clinical indicators, alongside careful feeding management, is essential for successful outcomes. By addressing both the nutritional and socio-economic factors, this case study provides valuable insights into the holistic management of SAM, contributing to the broader understanding of effective treatment strategies in similar contexts.

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