

Outcomes of SAM children: A retrospective study at NRC district hospital Vijayapura

Renuka Patil*, Ravikumar Baradol, Shridhar Walikar and Pavan Harnal

Department of Paediatrics, Vijayapura District Hospital, Shastri Nagar, Athani Road, Vijayapura-586108, Karnataka, India

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Abstract: *Background:* Severe Acute Malnutrition (SAM) is a major global health problem associated with childhood morbidity, delayed milestone with intellectual disability and mortality. *Objective:* To study and describe the nutritional outcomes of SAM children. *Methods:* The retrospective study was conducted by reviewing medical records and data was taken of SAM children admitted at NRC District Hospital Vijayapura from April 2025 to March 2026. Outcomes were assessed and parameters were recovery rate, Average weight gain, Average length of stay, Relapse, Socio-economic status, Death rate and Follow-up. *Results:* A total of 358 SAM children were admitted during the study period April 2025 to March 2026. Males were 51.3% and Females were 48.7%, slight dominate of male gender. Associated with co-morbidities were diarrhea, lower respiratory tract infection, anemia etc. The recovery rate was 85.08% which was good indicator along with total number of beneficiaries reaching discharge criteria was 86% among admitted SAM Children. *Conclusion:* Strengthening early identification, treating co-morbidities, caregiver counseling, regular follow-up prevents the relapse, reduce mortality rates, breaks the under nutrition disease cycle. It resulted in substantial improvement both in nutritional, emotional and mental status among admitted children. **Keywords:** Severe acute malnutrition, Nutritional outcomes, Child Development, Treatment.

Introduction

Severe Acute Malnutrition (SAM) is a major contributor to childhood morbidity and mortality is 9 times higher than those in well-nourished children [1]. According to the National Family Health Survey 5 (NHFS-5) (2019-21) nearly one third (32.10%) of the children under five years of age are underweight (low weight for age), 35.5% Stunted (low height for age) and nearly one fifth (19.30%) are wasted (low weight for height). Among those with wasting 7.70% of these children are severely wasted (weight for height/length <3SD) [2,17].

Malnutrition or undernutrition resulting from inadequate consumption, poor absorption or excessive loss of nutrients. A healthy balanced diet is not consumed for an extended period of time [3]. UNICEF frame work for nutrition states that proximal determinants of nutrition are care, health and food [4]. In some SAM children electrolyte derangement seen like hypoglycemia and hypokalemia [2, 5]. Growth during infancy is

rapid, critical for neuro cognitive development and has the highest energy and nutrient requirements relative to body size compared with any other period of growth [6].

SAM is defined by very low weight for height/length (Z-score below - 3SD) of median WHO child growth standards or a mid upper arm circumference <115 mm or by presence of nutritional edema. SAM can be measured by three commonly used anthropometric indices are;

1. Weight for age (WFA)
2. Height/ length for age (HFA)
3. Weight for Height/length (WFH)

Three indices are used to identify three nutrition conditions: Underweight, Stunting and Wasting respectively. Each of three nutrition indicators is expressed in standard deviation units (Z scores) from the median of the reference population based on which under nutrition may be classified as moderate

or severe. Overlapping nature of protein energy malnutrition and micronutrient deficiency were well understood and seen that lack of one micronutrient is typically associated with deficiency of others [7]. It is practical and effective to manage complicated SAM children as per government of India guidelines [8]. SAM is both medical and social disorder.

Factors causing SAM could be;

1. Low birth weight
2. Lack of exclusive Breast feeding
3. Late introduction of Complimentary feeds
4. Feeds with low nutrients
5. Repeated Enteric and respiratory tract infections
6. Ignorance
7. Poverty
8. Irregular Antenatal checkups of mother

Children suffering from wasting have weakened immunity susceptible to long term developmental delay and face increased risk of death. NRC are established for optimal management of SAM children [9]. NRCs also help mothers to improve the overall well-being of child [10]. SAM was significantly high in illiterate and unskilled parents than literate and professionals [11]. When the breast milk alone is no longer sufficient to meet all their nutrition requirements and complimentary feeding must be started [1,12]. Improvement in sanitation were associated with higher weight for height score [1,13]. Pregnancy at an early age when the nutritional status of the mother is inadequate, can lead to children developing into SAM [1,14].

Several studies from Bangladesh, Pakistan and our country observed a correlation between a low parental education and increased of wasting in children [1,15]. Impact of infants and young child feeding as well as water, sanitation and hygiene on wasting and improvements in these parameters have been observed with better nutritional outcome, they concluded that integrated interventions targeted to these risk factors would have greater impact than single interventions [1,16]. Wasting denotes acute malnutrition in these children are set to have SAM [17]. Reasons for bringing children to the hospital were associated with co-morbidities like diarrhea, lower respiratory tract infections, anemia [1,18].

SAM significantly increases the risk of death in children under 5 years of age. To manage SAM, Nutritional Rehabilitation Center (NRC) are setup in all District and Taluka Hospitals. NRC is a unit in the department of Pediatrics where 0-6 months of age of children are admitted as SAM children according to WHO admission criteria mentioned earlier.

SAM children are provided with;

1. Nutrition care like balanced food, Supplements, F-75 starter diet, F-100 catch up diet (as per WHO guidelines).
2. Appropriate treatment for medical complication.
3. Daily Mother, Father, Grandparent's counseling regarding the cause of SAM.
4. Demonstration through Audiovisuals, Charts of SAM and its complications.
5. Demonstration of preparation of F-75, F-100 and healthy recipes.
6. Personal and hand hygiene practices counseling etc.

At NRC, treatment of SAM children are divided in three phases – from 0 to 14 days Stabilization, Transition and Rehabilitation. Later children are followed up to prevent relapse of SAM at NRC and community levels. Retrospective evaluation of clinical characteristics and treatment outcomes helps to assess the effectiveness of current management of strategies and identify the area for improvement.

Material and Methods

It is retrospective study done at NRC, District Hospital, Vijayapura from April 2025 to March 2026. Study done on SAM children in the age group of 0-6 months. Data were extracted from Hospital records including anthropometric measurements, clinical profile, co-morbidities and outcomes.

Outcomes were categorised as;

1. Recovery
2. Defaulter / relapse rate
3. Average length of stay in weeks
4. Referred
5. Follow up
6. Death

Descriptive statistics were used to summarize findings.

Results

A total of 358 SAM children were admitted during the study period April 2025 to March 2026 (figure-1). Males were 51.3% and Females were 48.7% (figure-2), Slight dominate of male gender. Associated with co-morbidities were diarrhea, lower respiratory tract infection, anemia etc. The recovery rate was 85.08% (figure-3) which was good indicator along with total number of beneficiaries reaching discharge criteria was 86% among admitted SAM Children. With above results/ outcomes NRC, District Hospital, Vijayapura secured first place among the 38 Districts in Karnataka state for the year 2025-26.

Fig-1: Monthly admissions (Insert high-resolution graph)

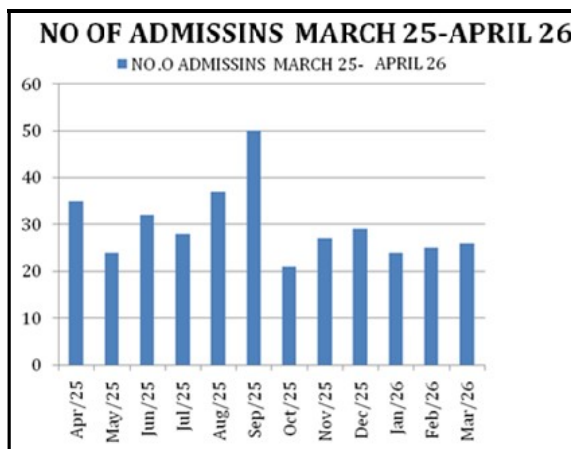


Fig-2: Male-to-female ratio (Insert high-resolution graph)

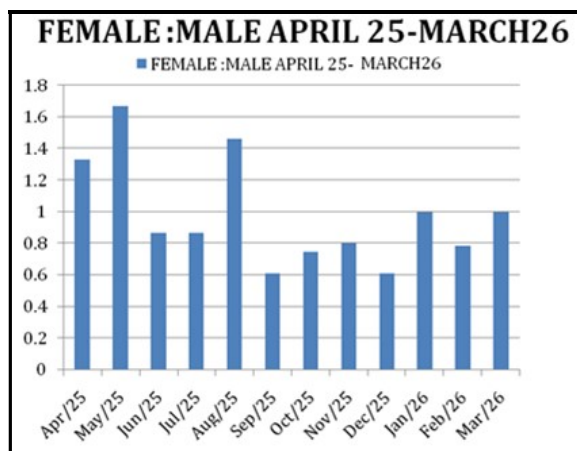
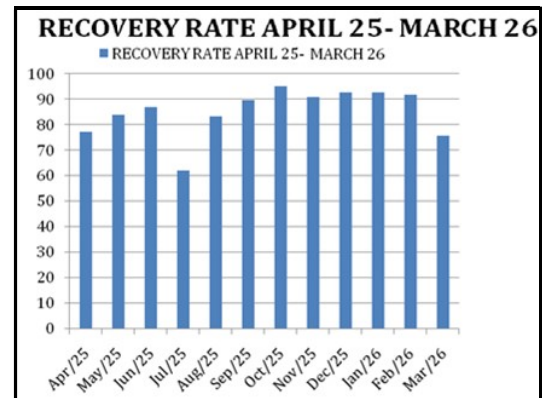


Fig-3: Recovery rate (Insert high-resolution graph)



Discussion

The present retrospective study evaluated the outcomes of 358 children SAM with medical complications. SAM is preventable and treatable cause of childhood mortality and morbidity [1]. At NRC along with nutritional and therapeutic treatment, special care given on play, occupational therapies to improve the intellectual skills, cognitive and motor developments during rehabilitation phase.

1. Recovery rate in present study is 85.08% which is higher when compared with other state- Bihar, UP Gujarat [6-8] which indicates good number of children reaching discharge criteria within the reporting period- 86%
2. Average weight gain was 85.7% which was satisfactory of similar observation was made from NRC – Bihar, UP and Hyderabad [1, 6-8]. Dhanalakshmi K et al observed weight gain of more than 59m/kg/day in 62.2% of children.
3. Males were 51.3% and females were 48.2% with mild dominance of male gender was seen. Similar studies observed by Bande BA et al [9].
4. Average length of stay was more than one week which was acceptable range of national standard (1-4 weeks). Similar observation seen in studies of Bihar [1].
5. Zero rate was observed in Relapse, Referred and Death categories.

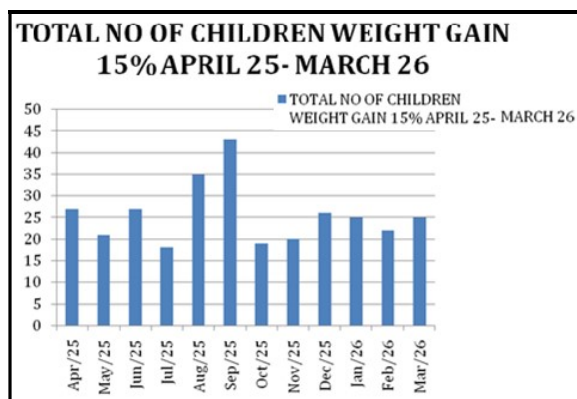
Follow-up was good with slight decrease in month of September 2025 and average was 114.93%.

Criteria for discharge were [4]:

For child:

1. Achieved weight gain of >15% (Figure 4), Satisfactory weight gain for 3 consecutive days (>5gm/kg/day).
2. Oedema has resolved.
3. Child eating good amount of nutritious food /good appetite.
4. All infections and other medical complications have been treated.
5. Child is provided with micronutrients.
6. Immunization is updated.

Fig-4: Weight gain >15% (Insert high-resolution graph).



For Mother:

1. Knows how to prepare appropriate foods and to feed the child.

2. Knows how to make appropriate toys and play with child.
3. Knows how to give home treatment for diarrhea, fever, when to visit Doctor.
4. Follow-up plan is completed-
 - a) 1st visit at 1 week after discharge.
 - b) 2nd visit at 2 weeks.
 - c) 3rd visit at 4 weeks, thereafter until child reaches -1SD/ above score.
5. The average weight gain was 85.7% of SAM Children with 5-8 gm/kg/day which was more than 15% of national standard.
6. Average length of stay was more than one week (1.171) which helped in the weight gain and overall development of child, improving the recovery rate.
7. Relapse / defaulters, Death parameters were not seen proving the good facilities, Motherly nursing care, play and occupational therapies were provided.
8. Follow-up SAM children first 2 visits at one and two weeks were regular good weight gain. Monthly follow-up were directed at community level and parents were not willing because of economic status or children were doing well.
9. Among 358 admissions, 322 (89.9%) children had BPL cards showing the lower socioeconomic class suffered SAM the most.

The result has been shown in Table 1 (Statistics from APRIL 2025 TO March 2026).

Table-1: Statistics from April 2025 to March 2026						
Months	BOR	ALOS	Cure rate	Defaulter Rate	Mortality Rate	Weight Gain
April	81.7	1	77	0	0	27
May	60	1.063	84	0	0	21
June	85.3	1.18	87	0	0	27
July	79.68	1.217	62.1	0	0	18
August	103	1.09	83	0	0	35
September	130.3	1.164	89.6	0	0	43
October	52.6	1.16	95	0	0	19
November	69	1.344	90.9	0	0	20
December	65.484	1.035	92.86	0	0	26
January	98.06	1.608	92.6	0	0	25
February	68.21	1.137	91.7	0	0	22
March	79.03	1.061	75.8	0.03	0	25
Total	81.03033	1.171583	85.13	0.0025	0	308
BOR-Bed occupancy rate, ALOS-Average length of stay						

Conclusion

Strengthening early identification, treating co-morbidities, caregiver counseling, regular follow-up prevents the relapse, reduce mortality rates. Breaks the under nutrition disease cycle. It resulted in substantial improvement both in nutritional, emotional and mental status among admitted children.

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Take away message: To decrease the SAM children more NRC units should be established in developing nations.

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Conflicts of interest: There are no conflicts of interest.

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*All correspondences to: Dr. Renuka Patil, Department of Paediatrics, District Hospital, Shastri Nagar, Athani Road, Vijayapura-586108, Karnataka, India. Email: drrenukapatil@gmail.com