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To determine the etiological factors responsible for severe acute malnutrition in children admitted to Nutritional Rehabilitation Centre.

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Abstract

Background: ***Methods:*** The aim of the study is to determine the etiological factors responsible for severe acute malnutrition in District Teaching Hospital, Koppal institute of medical sciences (KIMS), Koppal. Severe Acute Malnutrition is a clinical syndrome caused by an imbalance between the supply and demand for proteins, micronutrients, and energy content, along with the intricate interplay of numerous pathological mechanisms. In India, childhood undernutrition is a significant public health and development issue.
Results: The study included 50 children with severe acute malnutrition (SAM), predominantly aged 12–23 months (36.0%), with a near-equal gender distribution (52% female, 48% male) and a majority from rural areas (84.0%). Most children came from lower-class families (64.0%), with parental illiteracy prevalent (40.0% fathers, 36.0% mothers) and fathers primarily employed as unskilled workers (40.0%) or farmers (32.0%), while most mothers were housewives (74.0%). Common symptoms included fever (58.0%), poor appetite (50.0%), diarrhea (42.0%), and weight loss (42.0%). Most mothers were married young (58.0% ≤20 years), and 72.0% of children were exclusively breastfed for 6 months. Faulty feeding practices were noted in 30.0% of cases. Common symptoms included fever (58.0%), poor appetite (50.0%), diarrhea (42.0%), and weight loss (42.0%). Anemia was diagnosed in 82.0% of children, and 60.0% had abnormal serum protein levels. Calorie deficiency >50% was observed in 46.0% of children, and protein deficiency (21–45%) was noted in 32.0%. ***Conclusion:*** Severe acute malnutrition (SAM) is most prevalent in rural children aged 6–35 months. Faulty feeding practices and delayed breastfeeding initiation worsen nutritional status. Infections (fever, diarrhea) are major comorbidities in malnourished children.

Keywords: diet, severe, NRC, acute & malnutrition.

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INTRODUCTION

According to WHO definition of malnutrition refers to deficiencies, excesses, or imbalances in a person's intake of energy and/or nutrients.1 Undernutrition is one of the most concerning health and development issues in India as in other parts of the world. Undernutrition encompasses stunting (chronic malnutrition), wasting (acute malnutrition) and deficiencies of micronutrients (essential vitamins and minerals).2

The high mortality and disease burden resulting from undernutrition call for urgent imple-mentation of interventions to reduce their occurrence and consequences and this would include determined action on the social determinants of undernutrition.2

In 2022, an estimated 148 million children under 5 years of age globally were affected by stunting (too short for age) and 45 million were affected by wasting (too thin for height), revealing the vast extent of under nutrition among the youngest population.3

The global prevalence of stunting is 22.3% in 2022, and the prevalence of wasting is 6.8%. The prevalence of wasting continued to be the highest across all who regions despite having declined from 17.1% in 1990 to 14.7% in 2022.3
Malnutrition is the leading cause of immunodeficiency across the globe. In India, weight-for-age measurements tend to be lower compared to international benchmarks, reflecting widespread nutritional concerns. This trend highlights the prevalence of undernutrition, which can lead to issues like stunting, wasting, and underweight conditions, significantly impacting overall health and development.4

A significant number of children affected by undernutrition experience mild to moderate forms that often go unnoticed. Early childhood is particularly vulnerable, and malnutrition at this stage can lead to irreversible effects on growth and development.5&6

In the present study an attempt will be made to determine the underlying factors contributing to severe acute malnutrition and impact of nutritional rehabilitation center.

MATERIALS AND METHODS

Study Design: prospective observational study.

Approval was obtained from the Institutional Scientific and Ethical Committee of Koppal Institute of Medical Sciences, Koppal. Children admitted to Nutritional Rehabilitation Centre at District Teaching Hospital, Koppal, during the study period will be evaluated for inclusion and exclusion criteria. Those meeting the criteria will be enrolled in the study following the acquisition of informed consent.

- Etiological factors were gathered through the use of history. An extensive his-tory was taken, along with a clinical and systemic examination.
- Anthropometric data (weight, height/length, mid upper arm circumference, weight for height, edema) taken at admission were used to determine the nutritional status.

Sources of data: Children admitted to Nutritional Rehabilitation Centre at District Teaching Hospital, Koppal.

Participants Inclusion Criteria:
Children aged 6 months - 5 years with presence of any of the following

a. Weight for length/height<-3 standard deviation (SD) [World Health Organisation (WHO) median height].
b. Bilateral pedal edema.
c. Grossly visible severe wasting.
d. Mid upper arm circumference.

Exclusion criteria:
Children with non-nutritional causes of Severe acute malnutrition:

RESULTS

Table No.1: Father's and mother's educational status wise distribution

Educational status	Fathers		Mothers	
	No.	%	No.	%
Graduation	2	4.0	0	0.0
Higher Secondary	14	28.0	17	34.0
Higher primary	5	10.0	5	10.0
Primary	9	18.0	10	20.0
Illiterate	20	40.0	18	36.0
Total	50	100.0	50	100.0

The majority of children's fathers and mothers had an educational level of illiteracy, with 20 (40.0%) and 18 (36.0%) respectively. This was followed by 14 (28.0%) fathers and 17 (34.0%) mothers who had completed higher secondary education.

Table No.2: Father's occupation wise distribution of children

Father's occupation	Number of children	Percentage
Unskilled workers	20	40.0
Farmers	16	32.0
Skilled workers	10	20.0
Business	3	6.0
Fishing	1	2.0
Total	**50**	**100.0**

The majority of fathers (40.0%) held occupations as unskilled workers, followed by 32.0% who were involved in farming, and 20.0% who were skilled workers. It is evident that a significant portion of fathers in the study were employed in manual labor or agricultural roles.

Table No.3: Socio-economic status wise distribution

Socio-economic status	Number of children	Percentage
Upper class	0	0.0
Upper middle class	0	0.0
Middle class	4	8.0
Lower middle class	14	28.0
Lower class	32	64.0
Total	**50**	**100.0**

The majority of children from lower-class families make up 64.0% of the sample. Additionally, 28.0% of children come from lower-middle-class families, while 8.0% belong to the middle class. Interestingly, no children from upper-class or upper-middle-class families were included in the study. This distribution highlights the socioeconomic diversity within the sample population.

Table No.4: Chief complaints wise distribution of children.

Chief complaints	Number of children	Percentage
Fever	25	50.0
Loose stools	21	42.0
Vomiting	11	22.0
Clod and cough	10	20.0
Poor weight gain	5	10.0
abdominal distension	3	6.0
Generalized swelling	1	2.0
Edema of limbs	1	2.0
Reduced apatite	1	2.0

The most prevalent complaints reported by participants. Fever was the most common complaint, with 25 individuals (50.0%) experiencing this symptom. Loose stools followed closely behind, with 21 individuals (42.0%) reporting this issue. Vomiting was reported by 11 individuals (22.0%), while cold and cough were experienced by 10 individuals (20.0%). Poor weight gain was the least common complaint, with only 5 individuals (10.0%) reporting this symptom.

Table No.5: Maternal and neonatal history wise distribution

Maternal history	Categories	Number of chil-dren	Percentage
Maternal age	≤ 20 years	17	34.0
	>20 years	33	66.0
Age at marriage	≤ 20 years	29	58.0
	>20 years	21	42.0
Birth order	1—2	34	68.0
	≥ 3	16	32.0
Birth weight	Normal	50	100.0
NICU Admission	No	50	100.0
Breastfed	< 1 hour of life	31	62.0
	> 1 hour of life	19	38.0
Prelacteal feeds given	Yes	9	18.0
	No	41	82.0
Faulty feeding	Cow milk	14	28.0
	Goat milk	1	2.0
	No	35	70.0
Exclusively breast-fed for 6 months	Yes	36	72.0
	No	14	28.0
Immunization	Immunized	44	88.0
	Partially Immunized	6	12.0
Developmental history	Developmentally normal child	50	100.0

The maternal and neonatal history of children in the study. It was observed that 17 out of 50 mothers (34.0%) were aged 20 years or younger, 29 out of 50 mothers (58.0%) were married at the age of 20 or younger, and 34 out of 50 babies (68.0%) were first or second in birth order. All 50 children (100.0%) had a normal birth weight, and none of them were admitted to the Neonatal Intensive Care Unit (NICU). Additionally, 31 babies (62.0%) were breastfed within the first hour of life, while only 9 babies (18.0%) received prelacteal feeds. Furthermore, 15 babies (30.0%) were observed to have faulty feeding practices. A majority of the babies, 36 out of 50 (72.0%), were exclusively breastfed for the first 6 months of life. Moreover, 44 children (88.0%) were fully immunized, while 6 children (12.0%) were only partially immunized. All 50 children (100.0%) were found to be developing normally.

DISCUSSION

In the present study, the majority of children (36.0%) were between the ages of 12 to 23 months. This was followed by 30.0% in the 24 to 35-month age group, while 28.0% were aged between 6 and 11 months. A smaller proportion, only 6.0%, were between 36 to 59 months. The youngest child was 8 months old and the oldest was 52 months, with the mean age recorded as 19.64 months7.

These findings are consistent with the study conducted by Kumar et al., who observed that 40.2% of children with Severe Acute Malnutrition (SAM) were within the age range of 6–23 months, underscoring the heightened vulnerability during early childhood due to increased nutritional needs and transitional feeding practices. Their data also indicated a slightly higher prevalence of SAM in children aged 6–11 months (35.0%) compared to the current study (28.0%), possibly reflecting regional variations in breastfeeding patterns and early nutritional interventions8.

Our study revealed that a significant proportion of fathers (40.0%) and mothers (36.0%) were illiterate, with 28.0% of fathers and 34.0% of mothers having completed higher secondary education. Occupational data indicated that the majority of fathers were en-gaged as unskilled workers (40.0%), followed by those in farming (32.0%) and skilled labor (20.0%), suggesting a predominantly labour intensive livelihood. Most mothers were housewives (74.0%), with a smaller proportion involved as daily wage workers (12.0%) or in agriculture (8.0%), reflecting limited economic engagement among mothers. In terms of socioeconomic classification, a substantial 64.0% of the children be-longed to lower-class families, followed by 28.0% from lower-middle-class and 8.0% from the middle class, with no representation from upper or upper-middle socioeconomic strata. This distribution underscores the strong association between lower socio-economic status and the incidence of Severe Acute Malnutrition in children.

A study by Arya et al.9 similarly reported that the majority of children with Severe Acute Malnutrition (SAM) belonged to the upper lower (44%) and lower (23%) socio-economic classes, with only 1% from the upper class. Regarding maternal education, 66% of mothers were either illiterate (31%) or had received only primary education (35%), reflecting limited educational attainment. Most fathers were engaged in manual labour, including farming or unskilled work (63.5%), followed by those in service or business (29.5%), with a small proportion being skilled professionals (7%).
Other studies have also found that SAM is more prevalent among children whose mothers are either illiterate or have only primary education and whose fathers are labourers findings consistent with other reports10-11. This pattern may be attributed to a lack of aware-ness and inadequate knowledge among lower socioeconomic groups regarding essential child nutrition practices such as exclusive breastfeeding, timely initiation of complementary feeding, and the importance of protein-rich diets.

Our study illustrates that fever was the most commonly reported presenting complaint among children admitted to the Nutrition Rehabilitation Centre (NRC), with 25 individuals (50.0%) experiencing this symptom. Loose stools were the second most common complaint, reported by 21 individuals (42.0%). Vomiting was experienced by 11 children (22.0%), followed by cold and cough in 10 children (20.0%). Poor weight gain was the least frequently reported complaint, noted in only 5 children (10.0%).

According to Verma DK et al.12, the most common presenting symptoms among children admitted to NRCs were fever and diarrhea, each affecting 46.0% of the sample. Fever was reported in 44.2% of girls and 43.7% of boys, while diarrhea was slightly more prevalent among girls (47.7%) than boys (40.1%). Anorexia was observed in 24.7% of children (25.6% of girls and 21.4% of boys), followed by respiratory symptoms in 12.6% and vomiting in 12.1%.

Our study observed that 34.0% of mothers (17 out of 50) were aged 20 years or younger, and 58.0% (29 out of 50) were married by the age of 20. Regarding birth order, 68.0% of babies (34 out of 50) were first or second in the birth order. All 50 children (100.0%) had a normal birth weight, and none required admission to the Neonatal Intensive Care Unit (NICU). Breastfeeding practices were also evaluated: 62.0% of infants (31 out of 50) were breast-fed within the first hour of life, while 18.0% (9 out of 50) received prelacteal feeds.

Faulty feeding practices were noted in 30.0% (15 out of 50) of cases. A majority of infants (72.0%, or 36 out of 50) were exclusively breastfed for the first six months. Immunization rates were high, with 88.0% (44 out of 50) fully immunized and 12.0% (6 out of 50) partially immunized. All 50 children were found to be developing normally. In contrast, Solanki TK et al.13 reported that among 90 children, 15 were unimmunized (including 3 with Severe Acute Malnutrition [SAM], 1 with Moderate Acute Malnutrition [MAM], and 1 normal), 65 were partially immunized (3 SAM, 60 MAM, 2 normal), and 10 were completely immunized (none with SAM or normal status). Statistical analysis showed no significant association between immunization status and nutritional outcome ($p = 0.365$), and notably, no child from the completely immunized group was categorized as having SAM or normal nutrition. Sen S et al.14 reported poor adherence to recommended infant feeding practices: only 6.5% of children were exclusively breastfed for six months, and 30.1% received prelacteal feeds. A large proportion (79.6%) were bottle-fed. Complementary feeding began before 6 months in 1.1% of children, at 6 months in 11.8%, between 6–7 months in 63.9%, and after 7 months in 21.9%15.

CONCLUSION

Severe acute malnutrition (SAM) is most prevalent in rural children aged 6–35 months. Faulty feeding practices and delayed breastfeeding initiation worsen nutritional status. Infections (fever, diarrhea) are major comorbidities in malnourished children. Low Parental Education, Poverty and unskilled labor contribute significantly to malnutrition. Early Intervention proper, feeding and IYCF feeding practices can reduces SAM cases.

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