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"COMORBIDITIES AMONG CHILDREN WITH SEVERE ACUTE MALNUTRITION ADMITTED TO NUTRITIONAL REHABILITATION CENTER ATTACHED TO TERTIARY CARE TEACHING HOSPITAL IN CENTRAL KARNATAKA INDIA"

Paediatrics

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ABSTRACT

Background: Globally 17.3(2.6%) million children are severely wasted. In India prevalence is 6.8%, approximately 8.4 million children are affected due to Severe acute malnutrition. Many cases of severe acute malnutrition are complicated by infective illness like acute respiratory tract infections/Pneumonia, acute watery diarrhoea, septicaemia, urinary tract infections, measles, anaemia, HIV, TB and Meningitis. These children are managed by hospital inpatient care. **Objectives:** Primary Objective: 1. To identify the co morbidities in hospitalized children with severe acute malnutrition,2. Secondary objective: To identify the risk factors for children with severe acute malnutrition. **Methodology:** The present study was descriptive cross-sectional study conducted children admitted in Nutritional Rehabilitation center attached to Chigateri District Hospital, Davangere with diagnosis of severe acute malnutrition. Study period: May 2023 to October 2024. Sample size: 125. **Results:** Mean age of presentation was 1 years 7 months. The sex ratio male: female is 0.6:1. 77% of children were from rural area. Commercial formula milk was used in almost half of the children and bottle feeding was practiced 64 % of the children. Anaemia (28.46%) was the commonest comorbidity followed by sepsis (8.46%). **Conclusion:** Anaemia (28.46%), sepsis (8.46%) acute respiratory infections (7.69%) are the major comorbid conditions in hospitalized severe acute malnutrition children followed by tuberculosis (5.38%), UTI (2.3%), acute gastroenteritis (0.76%). Early initiation of complimentary feeding (<6 months), use of other milk (cow milk/formula milk) and bottle feeding are risk factors in SAM.

KEYWORDS

Nutritional rehabilitation center, Childhood mortality, Risk factors.

INTRODUCTION

Severe acute malnutrition is associated with 1 million to 2 million childhood mortality every year. It is one of the most important preventable causes of childhood mortality each year.1 Hospitalized SAM children need many skilled and motivated staff and doctors for better recovery. SAM children have nine times higher mortality rate than well-nourished children. Averagely 8 million Indian children less than 5 years of age are dangerously undernourished to survive and lose their ability to develop and attain their full potential. If they are given proper management they will grow to their full potential.[1,2,3]

METHODOLOGY

Source of data: Children admitted in Nutritional Rehabilitation center attached to Chigateri District Hospital, Davangere with diagnosis of severe acute malnutrition.

- Study design: Descriptive cross-sectional study
- Study period: May 2023 to October 2024
- Place of study: nutritional rehabilitation center (NRC) attached to Chigateri District hospital, Davangere.
- Sample size: 125

Method Of Collection Of Data:

Inclusion Criteria:

Children of 6 to 59 months of age with severe acute malnutrition satisfying following criteria are included.

- Weight for height/length < -3 SD and/or
- Visible severe wasting and/or
- Mid upper arm circumference (MUAC) < 11.5 cm and/or
- Edema of both feet

Exclusion Criteria:

1. Cases of Severe Acute Malnutrition due to Cleft lip, Cleft palate, GERD, Pyloric Stenosis and other Surgical conditions, Chronic Renal Failure, Congenital Heart Diseases, Liver Disorders, Asthma, intellectual disability, Cerebral Palsy, suspected case of Inborn Errors of Metabolism etc.

2. Children of less than 6 month of age.

Statistical Analysis:

The data collected will be entered into the excel sheet and will be analyzed using SPSS version 25.0. Qualitative variables will be expressed as frequencies (percentages) and quantitative variables as mean ± SD. Chi square test or Fisher exact test will be applied for qualitative variables and Student's t test for quantitative variables. Any other necessary tests will be applied at the time of analysis based on distribution of data.

RESULTS

Age: Totally 130 hospitalized Severe Acute Malnutrition (SAM) children. Mean age of presentation was 1 year 7 months. Among 130 children, 79 (61%) children were between 1-3 years of age. 29(22%) children between 3-5 years of age, 22(17%) children.

Sex: Among the 130 hospitalized SAM children, 81 (62%) were female and 49 (38%) were male. With Male: Female ratio of 0.6:1

Table -1: Sex Distribution

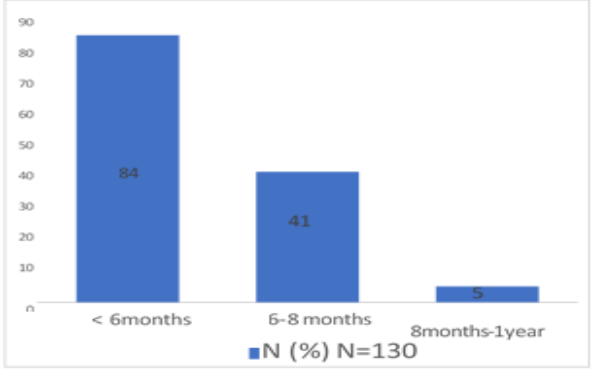
Sex	*Number (n=130)*	*Percentage*
Male	*49*	*38%*
Female	*81*	*62%*
Total	***130***	***100%***
	Mean ± SD	*1.78±0.96*

Locality:

Among 130 hospitalized Severe Acute Malnutrition (SAM) children, 100 (77%) children were from rural area and 30 (23%) were from urban area.

AGE Of Starting Complimentary Feeding:

Among 130 children, 65% were started complimentary feeding < 6 months, 31% at the age of 6-8 months, 4%at the age of 8 months- 1 year.



Graph – 1: Age Of Starting Complimentary Feeding

SOCIOECONOMIC STATUS:
Among 130 children 57% belongs to Lower Middle class of modified Kuppuswamy classification, 43% belongs to Upper Lower class.

Table – 2: Socioeconomic Status

Socioeconomic status	*Number (n=130)*	*Percentage*
Upper	*0*	*0*
Upper middle	*0*	*0*
Lower middle	*74*	*57%*
Upper lower	*56*	*43%*
Lower	*0*	*0*

Distribution Of Comorbidities:
Anemia:
Among 130 children, 37 (28.46%) had anaemia.

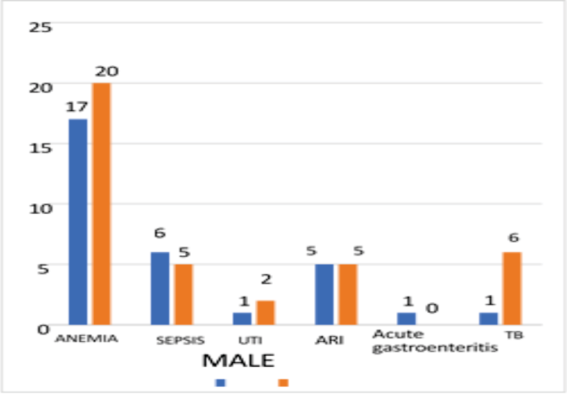
SEPSIS:
Among 130 SAM children, 11(8.46 %) had sepsis.

UTI (Urinary Tract Infection):
3 children out of 130 (2.3%) had Urinary Tract infection (UTI).

PNEUMONIA:
10 children out of 130 (7.69%) had Pneumonia.

Tuberculosis:
7 out of 130 children (5.38%) had Tuberculosis.

ACUTE Gastroenteritis:
1 out of 130 children (0.76%) had Acute Gastroenteritis



Graph – 2: Comorbidities In SAM

OUTCOME: Among 130 hospitalized SAM children, 129 (99%) were cured and discharged and 1 (0.77%) child went DAMA during study period.

Table – 3: Outcome

Outcome	*Number*	*Percentage*
DAMA	*1*	*0.77%*
Death	*0*	*0*
Discharge	*129*	*99.23%*
Total	***130***	***100%***

DISCUSSION
In this study of 130 hospitalised SAM children, it was found that Anaemia (28%) is the commonest comorbidity followed by Sepsis (8.46%), pneumonia (7.69%), Tuberculosis (5.38%), UTI (2.3%), Acute gastroenteritis (0.76%).

In our study Among 130 children, 79 (61%) children were between 1-3 years of age, The average age of presentation in all the studies is less than 24 months. This could be explained because rapid growth occurs in first 2-3 years, requirement of nutrition for energy and body building increases. Hence deficiency of protein and energy and other micronutrients will lead to SAM in this age group.

In our study, sex distribution is female predominant (Male: Female 0.6:1) (38% male, 62% female). It is consistent with Joshi et al and Singh and Rao et al study, Rajendra K Gupta et al.,[6] Rakesh Kumar et al.,[5] studies. But it is similar to Ashraf et al., Aneja et al., Syed Tariq et al.,[28] studies.

Female children are more commonly affected due to gender inequality, neglect of the female child, delayed health seeking of the parent, poverty, low socioeconomic status and low maternal education.

In our study, 77% children were from rural areas and 23% were from urban. These results are similar with Mukesh Choudry et al.,[29] and Syed Tariq et al.,[28] studies. This scenario is consistent with other Indian studies also. Children from rural areas are most commonly affected in SAM due to the less favorable living conditions like poor housing, poor drinking water source, inadequate antenatal, natal, postnatal checkups during pregnancy, early/late introduction of complimentary feeding, incomplete immunization status and low maternal education.
In our study, complimentary feeding was started very early (<6 months) in 67% of children and only 1% had delayed complimentary feeding (8 months -1 year). Singh et al.,[30] study reported that in only 24.7% of children, complimentary feeding was started before 6 months of age. Mukesh Choudry et al.,[29] study registered that in 25% of children complimentary feeding was started early and 9.86% children were started complimentary feeding after 1 year. early/delayed complimentary feeding is also important contributory factor for development of SAM. Prevalence of SAM was also more in children who were exclusively breast fed for prolonged duration because breast milk is nutritionally inadequate as age advances. Early introduction of complimentary feeding will lead to gastroenteritis.

Complementary feeding should be started along with breast feeding after 6 months because nutritional and calorie requirements of infants increase after 6months of age. After 6 months exclusive breast feeding does not provide adequate calories and nutrition which the child requires.

Most common type of other milk in our study is commercially available formula (55%) followed by 45% animal milk. The most common mode of feeding in our study was bottle feeding (64%) followed by Paladai (28%), cup and spoon (8%). This is not consistent with Mukesh Choudry et al14 study in which the most common mode of feeding was katori spoon and cup (75%) followed by bottle (17.3%), bottle and katori spoon (7.7%). Bottle fed children are more prone for infections due to poor cleaning practices, poor hygienic condition of bottle and nipple which is a source for infective microorganisms. Hence bottle feeding is most dangerous for infant health. Hence, we need intensive measures to stop bottle feeding.

In an Indian study done by Mukesh Choudry et al.,29 42.7% children were unimmunized, 44% were partially immunized and only 13.3% were fully immunized as per age. It is not consistent with our study, where 70% of children were fully immunized and 30% were partially immunized. Rajendra K Gupta et al.,[6] registered that 43.7% were completely immunized and 52% were partially immunized and 4.75% were never immunized. In Rakesh Kumar et al.,[5] study, 42.3% were completely immunized. Syed Tariq et al.,28 study showed that 62.3% children were immunized completely and 24.6% were unimmunized, only 13% were fully immunized. The reasons for the incomplete immunization in all the above studies are low socioeconomic status, difficult accessibility of health care system and unawareness about vaccination, wrong customs and belief regarding vaccination and low maternal education.

But our study results are not consistent with Anil Thappa et al.,[32] study which shows pneumonia 51%, AGE 21%, bacterial meningitis 8%. Also our study results are not consistent with another Indian study done by Rajendra K Gupta et al.,[6] which shows that ARTI was present in 37.3%, AGE 24.1%, TB 23%, pyogenic skin infections 14.7%, meningitis 4.9%, measles 4.2%, HIV 29.2% and malaria 21%. B.F.P Sunguya et al.,33 study shows that malaria is most commonly prevalent in hospitalized SAM children. Syed Tariq et al.,[28] show that diarrhea is the most common comorbidity. The reason for diarrhea being the most common comorbidity in all the above studies is that severe acute malnutrition affects immune system of the child and makes them more vulnerable to life threatening infections like AGE, pneumonia, sepsis and TB. In SAM children both humoral immunity and cell mediated immunity is depressed, there is defective skin barrier, defective mucosal defense mechanism, defective phagocytic and free radical scavenging function. Poor hygiene and handling of caretakers also makes SAM children susceptible to infection. Immune dysfunction syndrome is one of the reasons for life threatening infection in SAM children.

In our study, 28.46 % of children had anemia. This is not consistent

with Mukesh Choudry[29] study in which 85.3% of children had anemia, Soni et al., study in which 60% had anemia; Neha Thakur et al.,[34] study done in North India in which 81.1% had anemia. Anemia in SAM children is due to infections, blood loss due to worm infestations, nutritional inadequacy, malabsorption, hemolysis, erythroid hypoplasia, ineffective erythropoiesis due to folic and vitamin B 12 deficiency and anemia of chronic disease.

Sepsis is the most common and life-threatening comorbidity in SAM children. In our study 8.46% of children had sepsis. This is not similar to Sarada et al.,[35] study in which prevalence was 44.1% and B.F.P. Sunguya et al.,[33] study (6%). High prevalence of sepsis in SAM children could be explained by defective humoral immunity and cell mediated immunity, defective skin barrier, defective mucosal defense mechanism, defective phagocytic and free radical scavenging function and poor hygiene and handling of caretakers.

2.3% of SAM children had UTI in our study which is higher than Rakesh Kumar et al.,[1] study (1%). UTI in SAM could be explained by decreased fluid intake, prolonged hospital stay, iatrogenic causes and decreased immunity.

Case fatality rate of our study is 0%, it is not in contrast with Nigerian study done by Agozie C Ubesie et al.,[36] in which it was 40.1%. Syed Tariq et al.,[28] study also shows mortality to be 23.5%. The reason for the No mortality in our study compared to other study is improved hospital care and nutritional rehabilitation, timely detection and management of Comorbid conditions like acute watery diarrhea and pneumonia. Hence appropriate management of co infections is of paramount importance in reducing case fatality rate.

CONCLUSION

Anaemia (28.46%), sepsis (8.46%), Pneumonia (7.69%) are the major comorbid conditions in hospitalized SAM children followed by tuberculosis (5.38%), UTI (2.3%), acute gastroenteritis (0.76%).

SUMMARY

- Mean age of presentation was 1 years 7 months.
- The sex ratio male: female is 0.6:1.
- 77% of children were from rural area.
- Commercial formula milk was used in almost half of the children and bottle feeding was practiced 64 % of the children.
- 30% of the children were not completely immunized.
- 8.46 % of hospitalized SAM children had sepsis.
- Anaemia (28.46%) was the commonest comorbidity followed by sepsis (8.46%).

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