Journal of Cardiovascular Disease Research

ISSN:0975 -3583,0976-2833 VOL 15, ISSUE 01, 2024

Original research article

Socio-demographic determinants of Severe Acute Malnutrition in hospitalized children in the age group of 6 months to 5 years

[1]Dr. Gajjala Maruthi Siva Praneeth, [2]Dr. Khimavath Prathyusha, [3]Dr. Syed Babjan, [4]Dr. Sane Radhika

[1,2,3,4] Assistant Professor, Department of Pediatrics, Government Medical College, Anantapuram, Andhra Pradesh, India

Corresponding Author:
Dr. Sane Radhika

Abstract

LBW accounted for 15% of births in low and middle income countries. Rates of LBW are highest (26%) in southern Asia, which are twice those of sub-Saharan Africa. India accounts for approximately 40% of the world's low weight births. Children who have had a diet which is insufficient in energy and nutrients relative to their needs end up in severe acute malnutrition. Children between the age group of six months to five years, who are admitted in the NRC, Department of Pediatrics with SAM are included in the study after obtaining consent from the parent or guardian. Detailed history about the mother, birth, feeding status, socioeconomic class are taken. In this study, it was noted that 87 (68.5%) children belong to lower class, 40(31.5%) children belong to upper lower class. This study found that socio- economic class is an independent factor that influences the occurrence of SAM.

Keywords: Socio-demographic determinants, Severe Acute Malnutrition, Children

Introduction

Micronutrient deficiencies are another dimension of undernutrition. Vitamin A, iodine, iron, and zinc deficiency have public health significance.

Vitamin A deficiency is caused by a low intake of retinol or beta -carotene. The prevalence of clinical deficiency is assessed from symptoms and signs of xerophthalmia [1].

Vitamin A deficiency is the leading cause of preventable blindness in children. It is also associated with a higher morbidity and mortality among young children.

Iodine deficiency is the main cause of preventable mental impairment. An enlarged thyroid is a sign of iodine deficiency.

Severe deficiency of iodine during pregnancy may cause fetal loss.

In surviving children, iodine deficiency can cause permanent damage to the central nervous system, i.e, cretinism [2].

Iodine supplementation before conception or during the first trimester of pregnancy can prevent fetal loss & cretinism. Postnatal iodine deficiency causes impaired mental function and growth retardation.

Iron-deficiency anaemia is common in childhood. It is either due to low iron intake, poor absorption, illness or parasite infestation.

Zinc deficiency increases the risk of morbidity and mortality from diarrhoea & pneumonia. It also has an adverse effect on linear growth.

Under nutrition is a condition where there is inadequate consumption or poor absorption or excessive loss of nutrients [3].

Many poor nutritional outcomes begin in utero which manifests as low birth weight (BW < 2500 g). LBW is mainly due to preterm delivery and fetal growth restriction.

Prematurity is relatively more common in richer countries and fetal growth restriction is relatively more common in poorer countries [4].

LBW accounted for 15% of births in low and middle income countries. Rates of LBW are highest (26%) in southern Asia, which are twice those of sub-Saharan Africa.

India accounts for approximately 40% of the world's low weight births.

Children who have had a diet which is insufficient in energy and nutrients relative to their needs end up in severe acute malnutrition.

Depending upon the duration of inadequacy, quantity and diversity of food taken, individual variation in requirements and number & severity of coexisting infections and their duration, the magnitude of the deficits will differ [5].

The heterogeneity in the extent and nature of the deficits and imbalances among each child explains the

ISSN:0975 -3583,0976-2833 VOL 15, ISSUE 01, 2024

differences in the clinical presentation and degree of metabolic disturbance, reflecting the diverse pathways which lead to severe acute malnutrition.
Oedematous malnutrition is more due to exposure to noxae that in turn leads to generation of oxidative stress and/or to have greater deficits in free radical scavenging antioxidants like glutathione, vitamins A, C, and E, and essential fatty acids or cofactors like zinc, copper, selenium.[6]

Methodology
Study design: Prospective observational study.
Duration of study: 18 months (January 2022 to June 2023)
Place of Study: Department of Pediatrics
Study Population: All the children admitted in NRC in the age group of 6 months to 5 years with SAM.
Sample size: All the children admitted in NRC between 6 months to 5 years of age with SAM.

Inclusion criteria
All the children admitted in the NRC, Department of Pediatrics, in the age group of 6 months to 5 years with severe acute malnutrition.

Exclusion criteria
1. Children with co morbidities like congenital heart disease, inborn errors of metabolism are excluded.
2. Children who have undergone recent major surgery are excluded.
3. Children with syndromes are excluded.

Data collection
Children between the age group of six months to five years, who are admitted in the NRC, Department of Pediatrics with SAM are included in the study after obtaining consent from the parent or guardian.
Detailed history about the mother, birth, feeding status, socioeconomic class are taken.
Anthopometric measurements like weight for height, height for age, mid upper arm circumference are taken by following the standard techniques recommended by Jelliffe.
Three readings of height, weight are taken and the mean of the last 2 readings is considered as final.
The weight of the infants and children is measured using electronic weighing scales with an error margin of ±100 grams. The weighing scale is regularly checked with known standard weights.
Length of the infants is measured with infantometer and length is read from the scale to the nearest 0.1cm. In older children who can stand, height is measured using a stadiometer.
MUAC is measured to the nearest 0.1cm with a foldable, non-stretchable measuring tape while left arm hanging freely at its midpoint between acromion process of scapula and olecranon process of ulna.
Clinical examination is done for clinical signs of malnutrition like bilateral symmetrical edema, bitot spots, conjunctival xerosis, anemia, parotid enlargement, angular chelosis, fluorosis, caries, goiter, tropical ulcers, hepatomegaly and splenomegaly.
Outcome is measured in the form of number of children with severe acute malnutrition who are getting discharged i.e., after achieving target weight gain, who are succumbed to death, who are defaulters.

Results

Table 1: Analysis based on socio-economic class

Socioeconomic status	Frequency (N)	Percentage (%)
Upper class	Nil	Nil
Upper middle	Nil	Nil
Lower middle	Nil	Nil
Upper Lower class	40	31.5
Lower	87	68.5
Chi Square value – 17.394		
P value - < 0.001 (Significant)		

Table 1 shows socio-economic class among the study population, it shows 87 (68.5%) belong to lower class, 40(31.5%) children belong to upper lower class.

Table 2: Analysis based on the demographic area

Demographic area	Frequency (N)	Percentage (%)
Rural	76	60%
Urban	26	20.4%
Urban slum	25	19.6%
Total	127	100%
Chi Square value – 40.173 P value - < 0.001(Significant)		

ISSN:0975 -3583,0976-2833 VOL 15, ISSUE 01, 2024

Table 2 shows demographic area of the study population, it shows 76 (60%) belong to rural area, 26 (20.4%) belong to urban area, 25 (19.6%) belong to urban slums.

Table 3: Analysis based on the type of living

Type of house	Frequency (N)	Percentage (%)
Kutcha	75	59%
Pucca	52	41%
Total	127	100%
Chi Square value – 4.165 P value – 0.041 (Significant)		

Table 3 shows type of living among the study population, it shows majority of them 75 (59%) live in kutcha house, 52 (41%) live in pucca house.

Table 4: Analysis based on the availability of safe drinking water

Availability of safe drinking water	Frequency (N)	Percentage (%)
Present	45	35%
Absent	82	65%
Total	127	100%
Chi Square value – 10.780 P value - 0.001 (Significant)		

Table 4 shows the availability of safe drinking water among the study population, it shows 82 (65%) have no access to safe drinking water, only 45 (35%) have access to safe drinking water.

Table 5: Analysis based on age of the mother at the time of conception

Age at the time of conception	Frequency (N)	Percentage (%)
< 20 years	27	21.3
20-30 years	64	50.3
>30 years	36	28.4
Total	127	100
Chi Square value – 17.591 P value - < 0.001 (Significant)		

Table 5 shows age of the mother at the time of conception, it shows 27 (21.3%) are in < 20 years, 64 (50.3%) are in between 20-30 years, 36 (28.4%) are > 30 years.

Table 6: Analysis based on maternal education status

Maternal education	Frequency (N)	Percentage (%)
Uneducated	78	61.4%
Upto high school	40	31.4%
Intermediate	9	7. 2%
Graduation	Nil	Nil
Chi Square value – 56.425		
P value - < 0.001 (Significant)		

Table 6 shows the maternal education status among the study population, it shows 78 (61.4%) are uneducated, 40 (31.4%) studied upto high school, 9 (7.2%) studied upto intermediate.

Table 7: Analysis based on paternal education status

Paternal education status	Frequency(N)	Percentage (%)
Uneducated	32	25.2%
Upto high school	69	54.3%
Intermediate	23	18.1%
Graduation	3	2.4%
Total	127	100%
Chi square test – 55.42 P value < 0.001 Significant		

Table 7 shows paternal education status of the study population, it shows 32 (25.2%) are uneducated, 69 (54.3%) studied upto high school, 23(18.1%) studied upto intermediate, 3(2.4%) studied upto graduation.

Table 8: Analysis based on the gestational age

Type of delivery	Frequency (N)	Percentage (%)
Preterm	2	1.5%
Term	125	98.5%

ISSN:0975 -3583,0976-2833 VOL 15, ISSUE 01, 2024

Total	127	100%
Chi Square value – 119.126		
P value - < 0.001 (Significant)		

Table 8 shows based on the gestational age, it shows that 2 (1.5%) are preterm, 125(98.5%) are term gestation.

Table 9: Analysis based on the birth weight

Birth Weight	Male	Female
ELBW (< 1 kg)	Nil	Nil
VLBW (1-1.5 kg)	Nil	Nil
LBW (1.5 – 2.5 kg)	22	18
Normal (> 2.5kg)	39	48
Total	61	66
Chi Square value – 4.738		
P value - 0.03 (Significant)		

Table 9 shows birth weight of the children included in the study, it shows 40(31.4%) children were < 2.5 kg, 87 (68.6%) children were >2.5 kg at the time of birth.

Table 10: Analysis based on the religion

Religion	Frequency (N)	Percentage (%)
Hindu	102	80.3
Muslim	19	15.0
Christian	6	4.7
Total	127	100

Table 10 shows religion wise distribution among the study populatio, it shows 102 (80%) belong to Hindhu community, 19 (15%) belong to Muslim community, 6 (4.7%) belong to Christian community.

Table 11: Analysis based on age at the time of presentation

Age	Frequency (n)	Percentage (%)
6 mo – 1 year	52	41%
1-3 years	66	52%
3-5 years	09	7%
TOTAL	127	100
Chi Square value – 41.685		
P value - < 0.001 (Significant)		

Table 11 shows the age distribution of the study population, it demonstrates that 52 (41%) are < 12 months, 66 (52%) are in between 1 – 3 years, 9 (7%) are in between 3-5 years.

Table 12: Age and gender distribution of the study population

Age	Male	Female
6 mo – 1 year	27	25
1-3 years	32	34
3- 5 years	4	5
TOTAL	63	64
Chi Square value – 0.24		
P value – 0.886 (Not Significant)		

Table 12 shows age and gender distribution of SAM, no significant difference is noted between males and females.

Table 13: Immunisation status among the study population

Immunisation status	Frequency (n)	Percentage (%)
Fully immunised	40	31%
Partially immunised	87	69%
Total	127	100%
Chi Square value – 17.394 P value - < 0.001 (Significant)		

Table 13 shows immunization status among the study population, it shows that 87(69%) are partially immunized, 40(31%) are fully immunized.

ISSN:0975 -3583,0976-2833 VOL 15, ISSUE 01, 2024

Discussion

A total of 127 children were included in the study after excluding the children who are fitting into the exclusion criteria.

In this study, it was noted that 87 (68.5%) children belong to lower class, 40(31.5%) children belong to upper lower class. This study found that socio- economic class is an independent factor that influences the occurrence of SAM.

In lower socio-economic class, SAM is more seen due to poor sanitation, improper dietary habits.

In the study conducted by Das *et al*7, Syed *et al* 8, Pravati *et al*. [9], Edem *et al*. [11], Deepak *et al*. [11] malnutrition is associated with low Socio Economic Class.

This study shows 76 (60%) children belong to rural area, 26 (20.4%) belong to urban area, 25 (19.6%) belong to urban slums. The study found that demographic area is an independent factor that affects the occurrence of SAM.

In studies conducted by Pravati *et al*. [9] and Syed *et al*. [8] SAM was more prevalent in children coming from rural areas.

This study shows 75 (59%) children live in kutcha house, 52 (41%) live in pucca house. SAM was found more in children living with kutcha houses. In this study safe drinking water was available for 45 (35%) children, 82 (65%) children have no availability of safe drinking water. This study found that environment factors like type of house, safe drinking water are significant independent factors for SAM. Similar results were seen in a study conducted by Das *et al*. [7].

This study shows in 27 (21.3%) children, age of the mother is < 20 years, in 64 (50.3%) children age of the mother is in between 20-30 years and in 36 (28.4%) children age of the mother is > 30 years. In this study, maternal age is significant factor for occurrence of SAM. But in the study conducted by Das *et al*. [7], maternal age is not a significant factor. Two other studies Mukuku *et al*. [12], and Pravana *et al*. [13] noted maternal age < 25 years was a risk factor for SAM.

This study shows that in 78 (61.4%) children, mothers are uneducated, in 40 (31.4%) children, mothers studied upto high school, in 9 (7.2%) children, mothers studied up to intermediate. Maternal education is an independent factor that determines the risk for developing SAM. Sara *et al* 14 in her study reported that low maternal education status is the most important step towards eliminating malnutrition. She also said that promoting women health and education is the most important step to decrease mortality from SAM, worldwide. Edem *et al*. [10] claimed that malnutrition is not associated with maternal educational status and employment.

This study shows in 32 (25.2%) children, fathers are uneducated, in 69 (54.3%) children, fathers studied upto high school, in 23(18.1%) children, fathers studied up to intermediate, in 3(2.4%) children, fathers studied up to graduation. Paternal education is an independent factor that affects the occurrence of SAM.

In the present study, 2 (1.5%) children were preterm, 125(98.5%) children were term. In this study, 40(31.4%) children were born with birth weight of < 2.5 kg, 87 (68.6%) children were born with birth weight of >2.5 kg.

About 41% of the children in the study are under 12 months of age, 52% of the children are in between 1 to 3 years, 7% of the children are in between 3 to 5 years. This study found that SAM was more common in children less than 3 years of age. Syed *et al* 8 reported that SAM was more common in age group between 1 -2 years. In a study conducted by Pravati *et al* 9 SAM was more common in children age 6 months to 1 year. Binu *et al.* 14 reported prevalence of SAM increases up to 12 to 24 months and then decreases.

In this study, almost there is an equal incidence of SAM among males and females, 63 male children and 64 female children are in the study. Similarly in a study conducted by Das *et al* 7 there was no variation in sex. Syed *et al*. [8] and Pravati *et al*. [9] reported males are more commonly affected in SAM.

Around 40 children of the study population were only fully immunized till age, that accounted for 32%, rest of the 87 children, were not fully immunized that accounted for 69% of the total study population. Immunization status has a significant role in children developing SAM. Similar results were noted by Das *et al*. [7].

Conclusion

The determinants of SAM include illiteracy, low SEC, age at marriage, malnourished mother, LBW, faulty feeding practices, improper complementary feeding, ignorance about nutritional needs of infants and young children, repeated infections, etc.

Educating the parents, especially mothers about the importance of breast feeding, introduction of complementary feeding, nutritive diets, birth spacing, family planning and sensitizing them regarding the consequences of malnutrition and focusing on regular follow up of this children will help us to win the battle against malnutrition

References

1. Amsalu S. The outcome of severe malnutrition in North-West Ethiopia: a retrospective analysis of

ISSN:0975 -3583,0976-2833 VOL 15, ISSUE 01, 2024

admissions. Ethiop. Med. J. 2008;44:151-157.
2. Nzioki C, Irimu G, Musoke R, English M. Audit of care for children aged 6 to 59 months admitted with severe malnutrition at Kenyatta National Hospital, Kenya. International Health. 2009;1:91-96.
3. Moges T, Haidar J. Management and outcome of severly malnourished children admitted to Zewditu Memorial Hopital, Ethiopia. East Afr J Public Health. 2009;6:162-167.
4. Shukla Y, Verma P, Tiwari R, Kasar PK, Tomar SP. Association of severe acute malnutrition with infections in under-five children admitted to Nutritional Rehabilitation Center—study from central India. Int J Med Sci Public Health. 2016;5:758-763
5. Kumar D, Rao SK, Singh TB. Clinico-biochemical profile of sick children with severe acute malnutrition. J Family Med Prim Care. 2020 May 31;9(5):2269-2272. doi: 10.4103/jfmpc.jfmpc_1236_19. PMID: 32754486; PMCID: PMC7380782.
6. Nzioki C, Irimu G, Musoke R, English M. Audit of care for children aged 6 to 59 months admitted with severe malnutrition at Kenyatta National Hospital, Kenya. International Health. 2009;1:91-96.
7. Das K, Das S, Mohapatra S, Swain A, Mohakud NK. Risk and Adverse Outcome Factors of Severe Acute Malnutrition in Children: A Hospital-Based Study in Odisha. Cureus. 2021 Sep 28;13(9):e18364. doi: 10.7759/cureus.18364. PMID: 34737917; PMCID: PMC8557996.
8. SyedTariq A, *et al*. Demographic, clinical profile of severe acute malnutrition and our experience of nutrition rehabilitation centre at children hospital Srinagar Kashmir -. International Journal of Contemporary Pediatrics. 2015;2:233- 237.
9. Jena P, Rath S, Nayak MK, Satapathy D. Study of social and demographic determinants of severe acute malnutrition in children aged 6-59 months in a tertiary care centre of Odisha, India. Int J Contemp Pediatr. 2018;6:46-51
10. Tette EM, Sifah EK, Nartey ET. Factors affecting malnutrition in children and the uptake of interventions to prevent the condition. BMC Pediatr. 2015 Nov 19;15:189. doi: 10.1186/s12887-015-0496-3. PMID: 26586172; PMCID: PMC4653928.
11. Sharma, Deepak Clinical Profile of Severe Acute Malnutrition in Western Rajasthan: A Prospective Observational Study from IndiaVL - 2 - 10.15406/jpnc.2015.02.00057 Journal of Pediatrics & Neonatal Care
12. Mukuku O, Mutombo AM, Kamona LK, *et al*. Predictive model for the risk of severe acute malnutrition in children. J Nutr Metab. 2019, 2019:4740825. 10.1155/2019/4740825
13. Pravana NK, Piryani S, Chaurasiya SP, Kawan R, Thapa RK, Shrestha S: Determinants of severe acute malnutrition among children under 5 years of age in Nepal: a community-based case-control study. BMJ Open. 2017;7:e017084. 10.1136/bmjopen-2017-017084
14. Areekal, Binu, *et al*. "Prevalence of malnutrition among underfive children in a semi urban area in Kottayam, Kerala." Journal of Evolution of Medical and Dental Sciences. 2014;3(24):6762+.