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Original Research Article

A CROSS SECTIONAL STUDY ON EPIDEMIOLOGICAL PROFILE OF SEVERE ACUTE MALNUTRUTION AMONG UNDER FIVE CHILDREN

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Abstract

Background: Malnutrition includes two major forms marasmus (wasting) and kwashiorkor (edematous malnutrition), with or without associated stunting. Assessment of a child with malnutrition includes the type of malnutrition the child falls in, assessing the severity, and identifying acute life-threatening complications, including sepsis and acute dehydration and associated micronutrient deficiencies, as detailed in a separate topic review. In general, this study is aimed to find whether socioeconomic factors or other factors that can lead to severe acute malnutrition such as child health status, time of cessation of breast feeding and dietary intake can lead to severe acute malnutrition. **Materials and Methods:** This study was done as a Cross sectional study for a period of one and a half year in all children aged 6 months to 59 months admitted to the Paediatrics ward of tertiary care teaching hospital during the study period were included in the study. Children with weight for height/length less than -3SD and/or visible severe wasting and/or presence of oedema of both feet and/or mid arm circumference less than 11.5 cm were included. Weight will be measured by Digital weighing machine, Height and mid arm circumference are measured by infantometer / stadiometer and a measuring tape. A predesigned questionnaire will be used to record the details. **Result:** In this study most of the children is underweight 78%. Also 15 % of the children had normal weight for age and only 6% were severely underweight. In our study 60% of the children had, family history of malnutrition 40% did not have any family history of malnutrition. In children with undernutrition diarrhoea was found to be more frequent - 43%followed by acute respiratory tract infection -12%, worm infestation 11%, skin infection 11%. **Conclusion:** This study identified some of the new risk factors in relation to previous studies. Most of the malnourished were <2 years of age, male gender, belonging to nuclear family. In this study, both maternal as well as paternal illiteracy were found to be associated with SAM. Low birth weight was present and is a significant risk factor in causing SAM. Duration of breastfeeding and early cessation of breastfeeding is significantly associated with diarrhea and other infections.

INTRODUCTION

Malnutrition is a critical determinant of morbidity and mortality in young children worldwide. Among all deaths from under 5 age group, 45 % has been attributed to malnutrition alone. The term "malnutrition" in its traditional sense is used to refer undernutrition (wasting, stunting, or micronutrient deficiencies), but in a broader sense it has a wider meaning and includes also over nutrition/obesity. Low-income countries which faces both the extremes are sometime said to face the double burden of malnutrition.[1]

Malnutrition includes two major forms marasmus (wasting) and kwashiorkor (edematous malnutrition), with or without associated stunting. Assessment of a child with malnutrition includes the type of malnutrition the child falls in, assessing the severity, and identifying acute life-threatening complications, including sepsis and acute dehydration and associated micronutrient deficiencies, as detailed in a separate topic review.[2,3]
Since malnutrition is a major public health and child health problem worldwide, it remains a major killer among under-5 children who are the most vulnerable and most exposed to acute malnutrition1 Worldwide, the frequency of malnutrition is 50.3 million malnourished children in 2018 with a very high

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number of deaths estimated at 45%2-4. Approximately more than 17 million children suffer from acute malnutrition and these children with AM are more likely to die than well-nourished children. Moderate acute malnutrition is more common than severe acute malnutrition and affects about 60% of all people classified as acutely malnourished.[5,6]

At the clinical level of AM, bilateral edema, weight loss and inappropriate physical and psychological development are observed. The presence of these edema or emaciation makes it possible to determine SAM5. Acutely malnourished children who have survived the disease are at high risk of developing stunting-related disorders and various diseases like measles, tuberculosis, pneumonia, etc. in adulthood. Children at high risk of AM are at risk for associated morbidity and negative effects on their growth and cognitive development later in adulthood.[7]

Severe acute malnutrition is both a medical and social disorder. The medical problem is often due to social problems at home. According to UNICEF, malnutrition is caused by multiple factors. The immediate causes were diseases and inadequate intake of food. The underlying causes of malnutrition include the inability of households to grow and purchase sufficient food for their needs, poor maternal and child-care practices, including inadequate provision of food for adolescent girls and pregnant and lactating women, delays in recognizing the signs of malnutrition or disease and in seeking care for children and women, inadequate access to quality healthcare services like family planning and immunization. Given the fact that many studies on the risk factors of severe acute malnutrition among under 5 children have been conducted, there is a need to examine if the same factors are responsible for Severe acute malnutrition among children under 5 in our place.[8]

In general, this study is aimed to find whether socioeconomic factors such as father's education level, child's age, child's sex and family income or environmental factors such as source of water, household food security and household sanitation, or direct factors that can lead to severe acute malnutrition such as child health status, time of cessation of breast feeding and dietary intake can lead to severe acute malnutrition. The results of this study may be used as a part of evidence for coming up with programs with better interventions on how management of malnourished children can be improved and maintained.[9]

MATERIALS AND METHODS

This study was done as a Cross sectional study for a period of one and a half year in all children aged 6 months to 59 months admitted to the Pediatrics ward of tertiary care teaching hospital during the study period were included in the study. Children with weight for height/length less than -3SD and/or visible severe wasting and/or presence of edema of both feet and/or mid arm circumference less than 11.5 cm were included.

Whereas children less than 6 months and more than 59 months of age. Having other causes of edema (ex. Nephrotic syndrome) and associated systemic diseases (congenital heart disease, malabsorption, cerebral palsy, etc.) and those refused to give consent were excluded.

The patients fulfilling the inclusion/ exclusion criteria will be included in the study after obtaining informed consent. Weight will be measured by Digital weighing machine, Height and mid arm circumference are measured by infantometer / stadiometer and a measuring tape. A predesigned questionnaire will be used to record the details.

The data collected will be analyzed statistically using descriptive statistics namely Mean, Standard Deviation, Percentage wherever applicable. To determine the predictors of Severe Acute Malnutrition, we perform univariate analysis using the chi-square test or Fisher's exact test; then, we perform a multivariate analysis. Variables with a p value less than 0.05 in the univariate analysis were included in the logistic regression model using the stepwise method. In the final model, we use variables whose significance level is less than 0.05.

RESULTS

In this study it was found that most of the children with SAM was in the age group of 6 months to 2 years of age -64%[n=64].21% [n=21] was 2 to 3 years old,10%v[n=10] was 3 to 4 years ,5%[n=5]. In this study most of the children affected by SAM was found be male 56%.female were 44%.

In this study, 42 % of the children belongs to nuclear family, 41% in three generation. In this study most of the children is underweight 78%. Also 15 % of the children had normal weight for age and only 6% were severely underweight. In this study, stunting was found in 69%. Height for age was normal in 24% and severe stunting was seen in 7%. MUAC was less than 15 cms in almost 93% of the cases. In this study, edema was present in only 5% of the cases.

In this study, 46% of the fathers were illiterate, 21 % had middle school certificate and 21% had middle school certificate. SAM was found in only 4% of the children is whose father had either high school or diploma/degree certificate. Similarly 53% of the mothers were illiterate 36% had primary school certificate, 7% had middle school certificate and 4% had high school certificate. Hence, considering literacy of the parents SAM was most common in illiterate parents. In this study, SAM was common in children belonging to upper lower SE class 38% and lower class 35%. It was very less in children belonging to upper middle class 2%

In this study, most of the children were found to be born at term 79% and only 21% were preterm In this study most of the children were less than 2.5 kgs at birth-56 %. Also 56 % of the children had first order

at birth followed by second [33%], third [8%] and fourth [3%]. Birth interval was 2 to 3 years in 16 %,< 2 years in 15% and > 3 years in 13%. . In this study, only 9% of the children had > 2 children under the age of 5 years in the family. In our study 60% of the children had, family history of malnutrition 40% did not have any family history of malnutrition.

In this study 60% of the children were born to mothers in the age group of 25 to 30 years In 34% of the children mothers age at birth was <25 years and 6% had maternal age of >30 years at birth. Colostrum was given to 37% of the children in the study group the remaining 63% of the children did not receive colostrum at birth. Prelacteal feed were given to 69% of the children. Formula feeding was given to 34% of the children. While 27 % of the children were exclusively breast fed, most of the children received complementary feed at the age of 7 to 12 months and 30 % received complementary feeds from <6 months of age. Those children received complementary feed at >1 year of age was only 2%. In this study, only 87% of the children were completely immunized the remaining 13% were partially immunized. In this study, 74% of the children were breast fed till 1 year of age 24% of the children received less than 6 months of breast feeding 2% were breast fed even after 1 year of age.

Table 1: Past history of illness.

Past History	Frequency	Percentage
ARI	12	12.00
Diarrhea	43	43.00
Worm infestation	11	11.00
Skin infections	5	5.00
Nil	41	41.00

In children with undernutrition diarrhea was found to be more frequent - 43%followed by acute respiratory tract infection -12%, worm infestation 11%, skin infection 11%. In this study group most of the children had mixed diet only 17% had vegetarian diet.

Table 2: Relation exclusive breast feeding and past history of illness

Past History	EBF				Grand Total
	Given		Not given		
	Frequency	Percentage	Frequency	Percentage	
ARI	0	0	12	12	12
Diarrhea	5	5.00	38	38.00	48
Worm Infestation	0	0.00	11	11.00	11
Skin infections	2	2.00	3	3.00	7
Nil	20	20.00	21	21.00	61
Grand Total	27		85		112
Chi-Square = 25.29					
p = 0.001					

In this table the causes leading to malnutrition were compared most of the children had past history of diarrhea, p value is found to be statistically significant [<0.05]. In addition, there was significant relation between duration of breast-feeding and history of illness leading to malnutrition.

Table 3: Relation of duration of breast-feeding with past history of illness

Past History	Duration of Breast feeding						Grand Total
	< 6 months		6 months - 1 year		> 1 year		
	Frequency	Percent age	Frequency	Percentage	Frequency	Percentage	
ARI	1	1	11	11	0	0	24
Diarrhoea	21	21.00	22	22.00	0	0.00	86
Worm Infestation	1	1.00	10	10.00	0	0.00	22
Skin Infections	2	2.00	3	3.00	0	0.00	10
Nil	1	1.00	38	38.00	2	2.00	80
Chi-Square = 31.87							
p = 0.009							

DISCUSSION

Severe acute malnutrition is both a medical and social disorder. The social problem in most of the times leads to medical problems.

It was found that most of the children with SAM was in the age group of 6months to 2 years of age -64%. 21% was 2 to 3 years old,10% was 3 to 4 years ,5% were belonging to > 4 years of age, which was consistent with the study done by Mishra et al8 with mean age of SAM to be 19.1±15.4 months whereas the study done by Kumar NP et al9 showed majority of children 48 % were in the 3 to 4 years age group.

In our study, most of the children affected by SAM was found be male 56%. Females contributed to 44%. This finding was consistent with the previous studies

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done. Some studies have shown female preponderance in SAM, but in present study, males are more affected than females, which may be attributed to health seeking behaviour of parents where there will be a male preference as against female children.

In our study 42 % of the children belongs to nuclear family, 41% in three-generation family and 17 % belong to joint family. This is in contrary to the previous studies which stated that it was large family size rather than small family, which could be associated with SAM. This difference could be explained by maternal and paternal illiteracy and lack of knowledge about complementary feeding practices.

In present study, it was found that most of the children are underweight 78%. 15 % of the children had normal weight for age, only 6% were severely underweight, and stunting was found in 69%. Height for age was normal in 24% and severe stunting was seen in 7%. Oedema was present in only 5% (n = 5) of the cases, which was in accordance with the previous studies. Oedematous malnutrition has been reported commonly from Africa.

Parental education status is also one of the main contributory risk factors for SAM. On studying the parental education status, it was found that both maternal as well as paternal illiteracy is an independent risk factor for SAM as done by Anusya et al and Pravana et al.[10,11] On the contrary, the level of father's education has not been found to be associated with the nutritional status of the child in some studies.

In our study population, 46% of the fathers were illiterate in the present study, which was statistically significant (p < 0.001). 21% of the children with SAM had fathers with education up to middle school certificate. SAM was found in only 4% of the children whose father had either high school or diploma/degree certificate. A father's education is important in family such that being the bread winner and the head of the family most times, his decisions are to influence the health status of the family members including children. The higher the education of the father, the better the nutritional status of the child and the awareness of the sickness and well-being of his children. A low level of maternal education has been associated with poor feeding practices, leading to malnutrition. Educated mothers are more likely to ensure that their child gets adequate nutrition and treatment. Some studies have found a strong association between maternal education and higher socioeconomic status.

Low literacy of parents can result in poor understanding of their children's health-related problems and has been found to be associated with malnutrition of children under the age of five years. Uneducated parents are less likely to clearly explain their child's symptoms to the physician, and this can act as a barrier in their child receiving the best possible care. Parents' education status is one of the most important determinants of malnutrition.

Educated parents are more likely to employ better child-care practices as compared to uneducated parents. Hence considering literacy of the parents SAM was most common in illiterate parents.

Most of the children were found to be born at term 79% and only 21%were preterm. This frequencies were similar to previous studies done by Anusya et al.[10] Also most of the children were born less than 2.5 kgs at birth-56%. This was in agreement to the previous studies done by Anusya et al, Pravana et al and Kumar et al.[9-11] A study done at Dhaka, Bangladesh by Arifeen et al,[12] found that birth weight was the most important determinant of subsequent growth status during infancy in under 5 population.

Greater morbidity among children with LBW results in poor physical growth and development that is perceived as malnutrition. A similar study done by Ramakrishnan et al,[13] on LBW in developing countries found that children with LBW experienced growth failure during early childhood and into the adolescence period and the ensuing malnutrition ultimately led to increased risk of maternal complications in later life. This suggests that once a baby is born underweight, the risk of becoming malnourished during the first five years of life is higher compared to a baby of normal birth weight even if the mother is educated, household socio-economic conditions are good, and the preceding birth interval is long.

Based on the results of the current investigation, it is our opinion that a reasonable prescription for addressing the child malnutrition problem would be to reduce the prevalence of LBW in addition to spacing births and improving mother's education and socio- economic well-being.

Since child malnutrition has its origins in the foetal period, favourable socio-demographic conditions during the postnatal period cannot fully compensate for the initial setback. As discussed in the medical literature, the main reason for LBW in developing countries is intra-uterine growth retardation (IUGR). A baby who suffers from IUGR as a foetus is effectively born malnourished. About half of all IUGR cases in developing countries are attributable to mother's malnutrition, low maternal weight and stature at conception and low weight gain during pregnancy.

Birth interval was 2 to 3 years in 16 %,<2 years in 15% and > 3 years in 13%. This was in contrary to other studies were inadequate child spacing was associated with SAM. This finding is explained by the fact that most of the children were of first birth order in this study.

The higher prevalence of SAM in first born child can be explained by that the new mothers (especially young mothers) after delivery experience great difficulty in managing the household, a child, the health of the child, and providing adequate care for their children (often the first child) especially when stopping breastfeeding. Breastfeeding cessation and introduction of complementary diets are often poorly

conducted, leading to deterioration in the nutritional status of children during this period.

60% of the children had family history of malnutrition. This was in accordance with the study done by Oliver Mukuku et al,[14] where family history of malnutrition was significantly associated with SAM.

60% of the children were born to mothers in the age group of 25 to 30 years and in 34% of the children mothers age at birth was <25 years and 6% had maternal age of >30 years at birth. The mothers age at birth was compared and it was not found to be significant [p=0.44]. The risk of developing SAM will be more if mother age is < 24 years or > 35 years and is a risk factor as quoted by many studies.

Colostrum was given to 37% of the children in the study group the remaining 63% of the children did not receive colostrum at birth. Children with SAM were deprived of colostrum; rather they received prelacteals at birth. Such practices have been found to be associated with malnutrition in other studies as well.

Only 27 % of the children were exclusively breast fed, prelacteal feed were given to 69% of the children and Formula feeding was given to 34% of the children. This was in similarity to the study done by Jamro B et al,[15] but varies from Mishra et al8 and Amsalu et al.[16] Formula feeding was given to 34% of the children. Feeding diluted milk to children, which is a norm in this region, was found to have significant association with undernourishment.

This study showed that exclusive breastfeeding of children and deferring colostrum were not found to be significantly associated with SAM. These findings are in agreement with studies from India and Vietnam but not from studies in Ethiopia and Chad.

In this study most of the children received complementary feed at the age of 7 to 12 months, and a good number (30%) received complementary feeds from <6 months of age and those children who had started receiving complementary feed at >1 year of age was only 2%. Amsalu et al,[16] found that late initiation of complementary diet beyond 12 months was an independent risk factor for SAM.

Immunization is an essential intervention to prevent childhood infections and consequent under-nutrition. Unimmunized and partially immunized children suffer from infections causing primarily diarrhoea and pneumonia. In present study, only 87% of the children were completely immunized and the remaining 13% were partially immunized. Lack of complete immunization is associated with SAM according to previous studies. High coverage of immunization was noticed in present study. Since present study was conducted in Medical College where routine immunization will be taken care by the immunization staff in contrast to other studies.

Children whose mothers feed breast milk less than one year were more likely to develop acute malnutrition as compared to those feed breast milk above 24 months. Mothers who stop breast-feeding early expose their child for acute malnutrition due lack sufficient nutrients as well as more likely to risk for infection. This is also agreed with a study done in Karnataka, India: a case control study revealed that breast-feeding for more than one year is a protective effect on child under nutrition.

Our study showed a protective effect of breast feeding for more than one year to infections like both diarrhoea and pneumonia which was statistically significant up to 8 degrees of freedom. However a study in Uganda showed that children who were breastfed for prolonged periods (>18 months and up to 24 months) had a greater incidence of stunting.

In children with undernutrition, diarrhoea was found to be more frequent - 43%, followed by acute respiratory tract infection -12%, worm infestation 11% and skin infections 11%. The causes leading to malnutrition were compared most of the children had past history of diarrhoea, p value is found to be statistically significant [<0.05]. This could be explained by multiple factors such as lack of protective effects from inadequate breastfeeding and immunization, inappropriate dilution of formula feeds or the poor hygiene practices associated with bottle-feeding.

CONCLUSION

This study identified some of the new risk factors in relation to previous studies. Most of the malnourished were <2 years of age, male gender, belonging to nuclear family. Most of the children in this study were underweight and stunted. Education of parents play a major role in the child's nutritional status. In this study, both maternal as well as paternal illiteracy were found to be associated with SAM. Most of the children with SAM belong to upper lower and lower SE class. Low birth weight was present and is a significant risk factor in causing SAM. In this study group, 80% of children were born at term and 56% had first birth order. Family history of malnutrition was present in most of the cases.

Colostrum was not given and prelacteal feeds were given to most children in this study group. Most of the children were not exclusively breast-fed. High rate of immunization was observed in the study. Duration of breastfeeding and early cessation of breastfeeding is significantly associated with diarrhoea and other infections.

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