Prevalence and Risk Factors for Severe Acute Malnutrition among Less Than Five Children from an Urban Locality of Surat City, Western India

Varsha Gupta[1], Aseem Garg[2], Harsimranjit kaur Natt[3], Rikita Munshi[4]

[1]Maharishi Markandeshwar Institute of Medical Sciences and Research, Ambala, Haryana, India
[2]Kalpana Chawla Government Medical College, Karnal, Haryana, India
[3]Maharishi Markandeshwar Institute of Medical Sciences and Research, Ambala, Haryana, India
[4]Surat Municipal Corporation, Surat, Gujarat, India

ABSTRACT

Introduction Under nutrition puts children at greater risk of dying from common infections, increases the frequency and severity of such infections, and delays recovery. The aetiology of malnutrition is complex and multi-factorial usually a consequence of inadequate dietary intake and various diseases.

Methodology: A community based case-control study was conducted among children aged 6 to 59 months, registered at the Anganwadi centers in an urban locality of Surat city, Gujrat. Study population was divided into cases and controls using WHO classification based on anthropometric measurements.

Result: The prevalence of under nutrition and severe acute malnutrition among the under-five children were 26.2 and 8.7% respectively. Significant association (p<0.05) was found between nutritional status of the children and type of the family (OR 3.84), low birth weight (OR 4.85), poor appetite (OR = 2.89), bottle feeding (OR = 5.41) and children with habits of eating wafers/candies (OR = 21.99).

Conclusion: Severe acute malnutrition continues to be an important health concern among under five children in the urban area and is affected by many risk factors which can be mitigated through structured and timely interventions using IEC materials.

Key Words: Under nutrition, Low birth weight, Aanganwadi Center, under 5 Children, feeding, appetite

INTRODUCTION

Malnutrition refers to deficiencies, excesses or imbalances in a person's intake of energy and/or nutrients. The term malnutrition covers two broad groups of conditions. One is 'under nutrition'—which includes stunting (low height for age), wasting (low weight for height), underweight (low weight for age) and micronutrient deficiencies or insufficiencies (a lack of important vitamins and minerals). The other is overweight, obesity and diet-related non-communicable diseases (such as heart disease, stroke, diabetes and cancer).[1]

The first five years of life play a critical role in defining a child's physical and cognitive development that has an impact on the potential attainments in adult life. Under nutrition puts children at greater risk of dying from common infections, increases the frequency and severity of such infections, and delays recovery.[2] Around 45% of the deaths among children under 5 years of age are linked to under nutrition. These mostly occur in low- and middle-income countries.[1]

Although poverty and illiteracy of the parents are the important determinants of under nutrition, factors such as too early or delayed introduction of complementary foods, low birth weight (LBW), intrauterine

growth retardation, inadequate birth spacing and increased morbidities such as diarrhoeal diseases, acute respiratory infections (ARIs) and food insecurity are other determinants for high prevalence of under nutrition in India.[3] United Nations Children's Fund (UNICEF), in the year 2006, reported the causes of childhood malnutrition as insufficient diet, frequent infections, poor breastfeeding practices, delayed introduction of complementary foods and inadequate protein in the diet.[4]

Malnutrition is largely a treatable condition. Therefore, prompt identification, prevention and treatment is vital. Malnutrition in children is a substantial problem in India, in spite of global efforts on maternal child health improvement, and specific programmes such as Integrated Child Development Services (ICDS).[5]

The prevalence of underweight, stunting and wasting in the children less than 5 years of the age in India are 35.7%, 38.4% and 21.0% respectively.[6] There are wide variations in the prevalence of under nutrition in fewer than 5 children across states of India. The data from Gujarat shows that the prevalence of underweight, stunting and wasting in this age-group was 39.3%, 38.5% and 26.4% respectively.[7]

Anthropometric assessment is widely used and often regarded as the best single measure for health and nutritional status of children.[8] The World Health Organization (WHO) published the Child Growth Standard for infants and children up to the age of 5 year based on a multi-country study on growth of healthy breast-fed children under optimal conditions in April, 2006.[9] The Government of India has also accepted the use of WHO (2006) standards for assessment of nutritional status in preschool children.[10]

The etiology of malnutrition is complex and multifactorial. It is usually a consequence of inadequate diet and infectious diseases. However, this occurs in combination with multiple social, economic, cultural and political elements.[11]

Despite government of India's guidelines on the management of malnutrition, state of Gujarat experienced persistently high levels of malnutrition among children in last few decades.[7] Thus; it is of interest to identify the local risk factors, which would help in developing preventive strategies, early identification and timely management. With this background, the current study was planned to identify the risk factors of severe acute malnutrition among the under five children from an urban locality of Surat City in Gujrat.

MATERIAL AND METHODS

Study settings and design: This was a case-control study conducted in an urban locality which is field practice area of Department of Community Medicine, Government Medical College, Surat, Gujrat. It is located in South West zone of Surat city.

Selection of participants: A community based case-control study was conducted from August to September, 2019. All the children aged between 6 months to 5 years, registered at the Aanganwadi centres (AWCs) of the locality, were included in the study after obtaining informed consent from their mothers. Anthropometric measurements of the children were performed according to Rashtriya Bal Swasthya Karyakram (RBSK) guidelines.[12] Under nutrition in the children was identified as per WHO weight for height indicator Z-score as mentioned in WHO 2006 growth standards. The Z-scores of weight for height were calculated using the WHO Anthro software. The children, with weight for height ratios less than – 2 SD (– 2Z Scores) were identified as suffering from under nutrition and those with less -3SD (-3Z scores) were identified as having severe acute malnutrition (SAM) and were taken as cases. Controls were children in the same age-group with weight for height ratios above −2 SD (>−2Z scores).[12] The ratio for cases to controls was set as 1:2. Mothers of the selected children were contacted at their residence to collect the information. Data were collected using a pre-tested semi-structured questionnaire, which included of socio-demographic questionnaire, and the risk factor questionnaire.[13]

Data analysis: Data were analyzed using SPSS (Statistical Product and Service Solutions) version 21.0. The findings were reported in terms of frequency and percentage. The risk factors were estimated using odds ratios with 95% CI (Confidence interval).

Ethical considerations: The study was approved by Institute Ethical committee (IEC), Government Medical College, Surat, Gujrat. Written informed consent was taken from mothers of all the participants before administering the study questionnaire.

RESULTS

The study was carried out among 584 children aged between 6-59 months registered at four Aanganwadi (AWCs. The prevalence of under nutrition was 26.2% and that of severe acute malnutrition was 8.7%. Out of total 51 severely undernourished children, 34 (66.7%) were in the age group 6 months to 3 years. A total of 51 cases and 102 controls were included in the study. The descriptive findings are presented in table 1.

Mean ages of cases and controls were 30.2±14.2 and 32.2 ± 12.8 months respectively without any significant difference (P>0.05). Majority (68.2%) of the cases were girls whereas controls had almost equal ratio of male to female. Except for four mothers, rest all the mothers (92.4%) were homemakers (Table 1).

Socio-demographic risk factors for severe acute malnutrition (SAM)

Significant number of cases belonged to joint family as compared to nuclear family (OR = 3.84, p-value <0.000).

Table 1: Socio-demographic characteristics of study population (n= 153)

Demographic characteristics	Cases (n=51)(%)	Controls (n=102)(%)
Age, Mean± SD (months)	30.2 ±14.2	32.2 ± 12.8
Age group (in months)		
Jun-36	34 (66.7)	68 (66.7)
37-59	17 (33.3)	34 (33.3)
Gender		
Male	19 (37.2)	52 (50.9)
Female	32 (62.8)	50 (49.1)
Type of Family		
Nuclear	16 (31.4)	65 (63.7)
Joint	35 (68.6)	37 (36.3)
Mother's education		
Up to primary standard	32 (62.7)	68 (66.7)
More than primary std	19 (37.3)	34 (33.3)
Mother' s work status		
Working	4 (7.8)	6 (5.8)
Non-working	47 (92.2)	96 (94.2)
Socio-economic status*		
Upper middle class	2 (3.9)	4 (3.9)
Middle class	11 (21.6)	37 (36.2)
Lower Middle Class	33 (64.7)	43 (42.2)
Lower Class	5 (9.8)	18 (17.6)

*As per Modified BG Prasad classification

However, there was no significant association found between severe malnutrition and other risk factors like education of mother and father, working mother, socio-economic status, and caretaker other relatives instead of mother. (Table 2)

Risk factors related to birth details and feeding practices

The children who had low weight at birth, had significant high risk (4.85 times) of having severe malnutrition compared to children with normal weight at birth (OR 4.85, 95% CI =2.29 – 10.26, p <0.000). However, no significant association was found between pre- term delivery, birth order of the child and interval in years from previous birth and severe malnutrition. The children with history of poor appetite since last 6 months had significantly higher risk of having severe under nutrition compared to chil-dren with normal appetite (OR = 2.89, 95% CI = 1.38-6.01, p = 0.004). Practices of bottle feeding also had a significant association with severe malnutrition (OR = 5.41, 95% CI = 1.91-15.29, p= 0.001). The children with practices of eating wafers/ packets/ candies frequently had high risk of having severe malnutri-tion than children who do not eat them at all or eat less frequently. (OR=13.25, p=0.001). The children with the habits of eating pen/soil/stone (pica) had 21.99 times higher risk of having severe malnutrition than children who did not have such habits. (OR = 21.99, 95% CI = 9.02-53.60, p <0.000).

DISCUSSION

Malnutrition among under-five children is a major public health problem in India. It's prevalence in In-dia is highest in the world and is almost double that of Sub-Saharan Africa.[14] In our study, prevalence of under-nutrition among under-five children was found out to be 26.2% and majority of the under-nourished children were in the age-group of 6 month to 3 years (66.7%). The 2011 Census report, Gujarat reported that more than 40% children are suffering from malnutrtion[15]. This might be due to poor child feeding and caring practices as a result of over-crowding and poor living conditions of the urban slum along with prominent migration. This preva-lence rate was higher than our study. In our study prevalence of SAM (severe acute malnutrition) was higher (8.7%) as compared to other study and lower than (9.7%) national data (National family health survey-5 Report).[16,17,18]

In our study 64.7% children belonged to lower mid-dle-class family. Similarly, David et al reported ma-jority of the cases 64.8% and 50% of the controls be-longed to lower socio-economic class and no signifi-cantly associated with severe acute malnutrtion.[19]

Malnutrition is a multi-dimensional entity. The nutri-tional status of children under the age of five is af-fected by different factors. The present study identi-fied certain risk factors which were found to be sig-nificantly higher in children with malnutrition compared to normal children.

Table 2: Risk factors for severe acute malnutrition (Socio-demographic profile, n= 153)

Variables	Cases(n=51) (%)	Controls (n=102) (%)	X^2, p-value	OR (95% CI)
Type of family				
Joint	35 (48.6)	37 (51.4)	14.28, <0.000	3.84 (1.87-7.86)
Nuclear	16 (19.8)	65 (80.2)		Reference
Mother's occupation				
Working	4 (7.8)	6 (5.9)	0.214, 0.31	1.36 (0.36- 5.05)
Non- working	47 (92.2)	96 (94.1)		Reference
Socio-economic status				
Middle Class	46 (90.2)	84 (82.4)	7.2, 0.07	1.56 (0.92-8.67)
Lower Class	5 (9.8)	18 (17.6)		Reference
Primary Care taker				
Mother	48 (94.1)	87 (85.3)	2.55, 0.11	2.75 (0.76-10.01)
Relatives other than mother	3 (5.9)	15 (14.3)		Reference

Table 3: Risk factors for severe acute malnutrition (Birth details and medical history, and feeding practices, n= 153)

Variables	Cases(n=51) (%)	Controls (n=102) (%)	X², p- value	OR (95% CI)
Child birth				
Pre-term	5 (9.8)	5 (4.9)	1.33, 0.24	2.09 (0.53-8.16)
At term/post-term	46 (90.2)	97 (95.1)		Reference
Birth weight				
Low birth weight	26 (51.05)	18 (7.6)	18.43, <0.000	4.85 (2.29 – 10.26)
Normal birth weight	25 (49.0)	84 (82.4)		Reference
Birth order				
First	15 (29.4)	32 (31.4)	0.14, 0.93	Reference
Second or more	36 (70.6)	70 (68.6)		1.09 (0.53-2.28)
Birth interval from previous birth				
First born or <2 years	29 (56.9)	50 (49.1)	0.87, 0.64	1.37 (0.69- 2.69)
>2 years	22(43.1)	52 (50.9)		Reference
Colostrum's feeding				
Present	46 (90.2)	97 (95.1)	1.33, 0.24	0.47 (0.12-1.85)
Absent	5 (9.8)	5 (4.9\)		Reference
Pre-lacteals				
Yes, given	20 (39.2)	21 (20.6)	6.01, 0.01	2.48 (1.18- 5.21)
No, not given	31 (60.8)	81 (79.4)		Reference
Medical illness at present				
Yes	9 (17.6)	14 (13.7)	0.40, 0.52	1.344 (0.51-3.36)
No	42 (82.4)	88 (86.3)		Reference
History of recurrent cough and cold				
Yes	10 (19.6)	17 (16.7)	0.20, 0.65	1.21(0.49-2.89)
No	41 (80.4)	85 (83.3)		Reference
History of poor appetite				
Yes	22 (43.1)	21 (20.8)	8.34, 0.004	2.89 (1.38-6.01)
No	29 (56.9)	80 (79.2)		Reference
History of Bottle feeding				
Yes	13 (25.5%)	6 (5.9%)	11.84, 0.001	5.41 (1.91-15.29)
No	38 (74.5%)	95 (94.1%)		Reference
Frequency of candies/wafer/packets				
Never or rarely	1 (2.0)	22 (2.0)	10.23, 0.001	Reference
Frequently	50 (98.0)	80 (98.0)		13.75(1.75-105.21)
History of pica (eating pen/soil/chowk)				
Yes	37 (74%)	11 (11.5%)	58.27, <0.000	21.99(9.02-53.60)
No	13 (26%)	85 (88.5%)		Reference

In our study, significant association was found between nutritional status of the children and type of family (OR 3.84, 95% CI =1.87 – 7.86, p = 0.000). However, no significant association was seen between under nutrition and other socio-demographic factors and these findings consistent with the findings of study done by Murakar S et al study and in contrast to the studies done by Shukla et al study and Ansyua et al study. [20,21,5]

The literacy status of the parents did not emerge as a significant risk factor for malnutrition in this study. Gupta et al study showed a strong association between maternal education and poor nutrition among children.[22]

The present study reported that birth weight had a statistically significant influence on the weight of the children. Similar findings were reported under NFHS-5 nutrition report 2019-20.[18] Also, this study finding was supported by the study conducted by Rahman et al, Which found statistically significant association between LBW and underweight children (RR value=1.47; p<0.05).[23]

The present study depicted that birth order, birth interval and preterm delivery had no significant influence on the severe acute malnutrition which was in contrast to the findings of studies conducted in India and Bangladesh.[24, 25]

In the present study, 39.2% of undernourished children had history of prelacteal feed which was significantly associated with under nutrition. This finding was corroborated by the finding of Ansyua et al study.[5] Also, Gujarat NFHS-5 2019-20 reports, supported the fact that 17% children were given prelacteal feeding.[18] Thus, it can be stated that prelacteal feeding habits can be a major risk factor for under nutrition.

In the present study, children with history of poor appetite since last 6 months had 2.89 times high risk of having under nutrition compared to children with normal appetite. Similar observation was found in UNICEF 2019 report on "Children, Food and Nutrition", which stated that Poor diets drive malnutrition in early childhood.[26]This highlights the fact that any decrease in appetite among children must be dealt meticulously and appropriate measures need to be undertaken to improve appetite.

In these study children with habits of eating wafers/ packets/ candies frequently had high chances of getting under nutrition as compared to children who do not eat them at all or eat less frequently. Similarly, Ansuya et al in their study found the higher risk of malnutrition among children who ate more sweets or candies.[5] These finding might be due to the lack of intake of nutritious food which is required for growth of the child.

LIMITATIONS

Finding appropriate controls in the community was a major limitation of the study. Apart from that, there may be interviewer bias in the data collection as the interviewer was aware of the nutritional status of the cases and controls before the interview. Some of the mothers, both cases and controls, had difficulty in recollecting the duration of breastfeeding and the time of initiation of complementary feeds. This could have raised a recall bias in the study. Despite these, the study methodology and design were the major strengths identifying the risk factors for SAM.

CONCLUSION & RECOMMENDATIONS

In our study, prevalence of SAM in an urban locality of western India was found to be 8.4%, slightly higher than the national figure (7.4%). SAM is still an important public health challenge among under five children of urban localities and is affected by many factors like type of family, low birth weight, poor appetite, bottle feeding and improper dietary habits. These problems can be mitigated through gap analysis at each level of facilities and organizations, provide physical and financial support for bridging the gaps. Other solutions are diagnosis of individual cases and providing its management both at facility and community levels. Public health interventions using IEC (Information, education and Communication) materials aiming at changing or reinforcing health related behaviors in parents of the children is an important strategy to mitigate the problem of SAM. Only with active involvement of all the stakeholders and health care delivery system in various promotive and preventive programs related to children, the dream of malnutrition free India can be achieved.

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