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Original Article

Socio-Demographic Risk Factors for Severe Acute Malnutrition

Naznin Akther[1], Md. Tarek Azad[2], Tahmina Jahan Chowdhury[3], Md. Muazzem Hussain[4], Forida Akter[5], Aloka Nanda Talukder[6]

[1]Assistant Professor, Department of Paediatrics, Jalalabad Ragib-Rabeya Medical College, Sylhet.

[2]Professor, Department of Paediatrics, Jalalabad Ragib-Rabeya Medical College, Sylhet.

[3,4]Associate Professor, Department of Paediatrics, Jalalabad Ragib-Rabeya Medical College, Sylhet.

[5,6]Indoor Medical Officer, Department of Paediatrics, Jalalabad Ragib-Rabeya Medical College, Sylhet.

ABSTRACT

Malnutrition is one of the leading causes of morbidity and mortality in under-five children in developing countries. Bangladesh being one of the developing countries, malnutrition is an important public health problem. This was a hospital-based case-control study conducted in the department of Paediatrics, Jalalabad Ragib-Rabeya Medical College Hospital, Sylhet during the period from July 2013 to June 2014 to see the socio-demographic risk factors for severe acute malnutrition among children under five. Forty five severe acute malnourished children, aged 6 months to 5 years, with a weight-for-height Z score below -3 were enrolled in the case group. Controls were age and sex matched, well nourished children with a weight-for-height Z score of -1 to <+2 who were admitted at the same time following the admission of the case due to other problems. Rural participants (p<0.001), undernourished mother (p=0.006), less-educated parents (p<0.001), lower monthly income (p=0.005), birth order 3 or more (p=0.017), family member 5 or higher (p=0.015), lack of exclusive breast feeding (p<0.001), and inappropriate weaning (p<0.001) significantly increased the risk of development of severe acute malnutrition. To reduce childhood malnutrition, due emphasis should be given to improve the socioeconomic status, parental education, knowledge and practice of parents on appropriate infant and child feeding practices.

Keywords: *Severe acute malnutrition, Socio-demographic risk factors, Under-five children.*

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INTRODUCTION

Severe malnutrition among children, and particularly acute malnutrition, is a life-threatening condition that requires urgent intervention. The condition can also be chronic. The World Health Organization (WHO) defines severe acute malnutrition (SAM) as 'a very low weight for height, by visible severe wasting, or by the presence of nutritional oedema'[1]. Wasting is defined in children aged 6-59 months as a weight for height Z score below -3 standard deviations (SD) of the WHO growth standards and/or a mid-upper arm circumference (MUAC) <115 mm[2].

Severe acute malnutrition affects an estimated 20 million children under the age of five worldwide and needs treatment urgently. If it is untreated, the median under-five case-fatality rate for SAM ranges from 30% to 50%. SAM kills one million children each year worldwide, an average of one child every thirty seconds[1,3,4,5]. Malnutrition alone is one of the leading causes of about 10% (140 million disability adjusted life-years) of the global burden of disease[6]. To reduce

Address of Correspondence:

Dr. Naznin Akther, Assstant Professor, Department of Paediatrics, Jalalabad Ragib-Rabeya Medical College, Sylhet. Mobile: 01717414470, Email: drnazninakter27@gmail.com.

the mortality rate, community and facility-based health services are thus principally focused on identifying and treating children with SAM[7]. Improving SAM survival is a global public health priority and key to the achievement of international health targets such as Millennium Development Goal 4, reducing child mortality[8].

Bangladesh has the world's fourth highest number of children suffering from SAM[9]. In Bangladesh, the proportion of children with severe wasting is 2.9%, thus the total number being 500,000[10]. Different studies have shown that several factors closely related to infant and child malnutrition, including mother's nutritional status, child's sex, family size, low dietary intake, breast feeding status, poverty, socio-economic status, place of residence, child care behaviour, previous birth interval, early and delayed weaning, cultural beliefs, access to health care, and environmental ecosystems[11,12,13].

Although factors predisposing children to protein energy malnutrition have been studied at home[14] and abroad[15,16,17], there is a lack of study on socio-demographic risk factors amongst under five children with malnutrition in Sylhet. So, this study was designed to find out socio-demographic risk factors for severe acute malnutrition amongst children attending Jalalabad Ragib-Rabeya Medical College Hospital, Sylhet.

MATERIALS AND METHODS

This was a hospital-based case-control study conducted in the Department of Paediatrics, Jalalabad Ragib-Rabeya Medical College Hospital, Sylhet during the period from July 2013 to June 2014. Children with SAM aged between 6 months and 5 years with a weight for height Z score of <-3, admitted to the Department of Paediatrics, Jalalabad Ragib-Rabeya Medical College Hospital, Sylhet were evaluated. Those who fulfilled the inclusion and exclusion criteria were enrolled in the case group. In this way, forty-five severe acute malnourished children aged 6 months to 5 years with a weight for height Z score of <-3 were consecutively enrolled in this study. Children with chronic malnutrition, the presence of any congenital anomaly or chronic disease, and those who refused to be enrolled in this study were excluded. Forty five cases were matched with ninety well-nourished controls of similar age and sex with weight for height Z score -1 to <+2, who were admitted at the same time following the admission of the case due to other problems (Case-control ratio 1:2). The aims and objectives of the study were explained to the mother or the attendant of the children in an easily understandable local language, and then written informed consent was taken from the mother or the attendant. Mothers of the selected children were interviewed to obtain information on their socioeconomic and demographic issues through pretested structured questionnaires. This included maternal age, parental education, monthly family income, occupation, and birth order. The children's information included their age, gender, breast feeding status, weaning practice, place of residence, and number of family members. The weight of the child was measured to the nearest 0.1 kg and their height was measured to the nearest 0.1 centimetre. For children aged less than two years, weight was recorded using a conventional beam balance scale. Recumbent length and standing height of under five children were measured with an infantometer and stadio-meter accordingly. The age of the children was recorded either from the mother's statement or from the discharge paper of the mother after delivery. The severe acute malnutrition was diagnosed according to the child growth standard of the World Health Organization (WHO). The Anthro 2005 software of the WHO was used for calculating the Z-score. The same questionnaire was applied to the control group, which consisted of children without malnutrition admitted for other medical problems. Data was processed and analyzed with the help of the computer program Statistical Package for Social Sciences (SPSS) version 16. Quantitative data was expressed as mean and standard deviation, and qualitative data as frequency and percentage. Comparison was done by the Chi-square (χ^2) test and the Z-test where applicable. Socio-demographic risk factors were calculated using an Odd ratio with a confidence interval. A probability (p) value of <0.05 was considered statistically significant.

RESULT

In our study, 135 children were studied, of whom 45 were severely malnourished from age 6 months to 5 years, and 90 were age and sex matched well-nourished controls. The mean age was 17.33±8.2 months in the case group and 16.48±7.28 months in the control group. In the case group, 25 (55.6%) were male and 20 (44.4%) were female, whereas in the control group, 55 (61.1%) were male and 35 (38.9%) were female. Age and sex didn't differ significantly between the case and control groups. (Table-I, Figure-1).

Table-I: *Distribution of the case and control by age at admission, N=135*

Age (Months)	Case group, n (%)	Control group, n (%)	p-value
6-12	15 (33.3)	31 (34.4)	*0.720
13-24	25 (55.6)	53 (58.9)	
25-36	5 (11.1)	6 (6.7)	
Mean age (Months±SD)	17.33±8.2	16.48±7.28	†0.322

*Chi-square (χ^2) test and †Z test were employed to analyze the data.

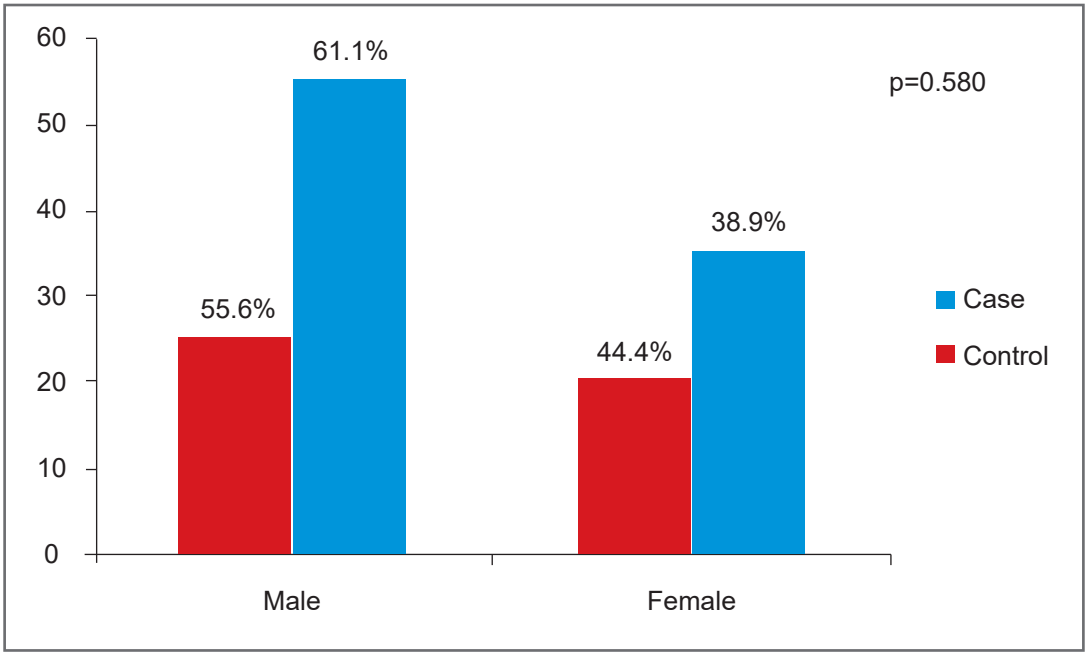

Figure-1: *Distribution of case and control by gender, N=135*

Table-II: *Socio-demographic risk factors of case and control, N=135*

Risk Factors		Case n (%)	Control n (%)	p-value	Odds ratio (95% of CI)
Place of residence	Urban	12 (26.7)	58 (64.4)	<0.001	4.984
	Rural	33 (73.3)	32 (35.6)		(2.264-10.974)
Breast feeding status	Exclusive	12 (26.7)	61 (67.8)	<0.001	0.173
	Non-exclusive	33 (73.3)	29 (32.2)		(0.078-0.383)
Weaning	Appropriate	8 (17.8)	53 (58.9)	<0.001	0.151
	Inappropriate	37 (82.2)	37 (41.1)		(0.063-0.361)
Number of family member	> 5	40 (88.9)	63 (70)	0.015	3.429
	< 5	5 (11.1)	27 (30)		(1.220-9.635)

The case group had more children living in rural areas (73.3%) than the control group (35.6%), which was statistically significant (OR=4.984, 95% CI=2.264-10.974, p=0.001). Exclusive breast feeding was significantly lower in the case group (26.7%) than in the control group (67.8%) (OR=0.173; 95% of CI=0.078-0.383; p<0.001). Appropriate weaning practice was lower in the case group (17.8%) than in the control group (58.9%), which was statistically significant (OR=0.151; 95% of CI=0.063-0.361; p<0.001). The numbers of family members were greater in the case group than in the control group. (OR=3.429; 95% of CI=1.220-9.635; p=0.015) (Table-II).

The mean age of the mother of both cases and controls showed no significant difference (OR=2.00; 95% of CI=0.749–5.343; p=0.162). But the mothers' BMI were lower in the case group than in the control group (OR=3.727; 95% of CI=1.397-9.947; p=0.006).

Only 8.9% of mothers had more than 5 years of schooling in the case group, which was 72% in the control group. (OR=28.188; 95% of CI=9.124-87.082; p<0.001). Working mothers made up 4.4% of the case group and 8.9% of the control group among the mothers, however there was no statistically significant difference between the two (OR=2.098; 95% CI=0.427-10.314; p=0.353). In the case group, 42.2% of fathers had more than 5 years of schooling, which was 75.6% in the control group. The difference was statistically significant (OR=4.230; 95% of CI=1.974-9.065; p<0.001). Approximately thirty percent (28.9%) of the children in the case group came from low-income families, whereas only 10% of the children in the control group came from low-income families (OR=3.656; 95% of CI=1.424-9.392; p=0.005). The number of birth order >3 was higher (26.7%) in the case group than in the control group (7.8%), which was statistically significant (OR=3.388; 95% of CI=1.193–9.619; p=0.017) (Table-III).

Table -III: *Socio-demographic risk factors of parents of case and control, N=135*

Risk Factors		Case n (%)	Control n (%)	p-value	Odds ratio (95% of CI)
Mean age of the mother (Years±SD)		25.13±4.97	25.78±3.25	†0.162	2.00 (0.749-5.343)
Mother's BMI (kg/m^2)	<18.5	12 (26.7)	8 (8.9)	*0.006	3.727
	> 18.5	33 (73.3)	82 (91.1)		(1.397-9.947)
Mother's education	<5 yrs of schooling	41 (91.1)	24 (26.7)	*<0.00	28.188
	>5 yrs of schooling	4 (8.9)	66 (73.3)	1	(9.124-87.082)
Mother's occupation	Housewife	43 (95.6)	82 (91.1)	*0.353	2.098
	Service	2 (4.4)	8 (8.9)		(0.427-10.314)
Father's education	<5 yrs of schooling	26 (57.8)	11 (24.4)	*<0.00	4.230
	>5 yrs of schooling	19 (42.2)	34 (75.6)	1	(1.974-9.065)
Monthly income	<5000 taka	13 (28.9)	9 (10)	*0.005	3.656
	>5000 taka	32 (71.1)	81 (90)		(1.424-9.392)
Birth order	> 3	12 (26.7)	7 (7.8)	*0.017	3.388
	<3	33 (73.3)	83 (92.2)		(1.193-9.619)

*Chi-square (χ^2) test and †Z test were employed to analyze the data.

DISCUSSION

The aim of the study was to determine the socio-demographic risk factors for SAM in a tertiary level hospital, so that we might be able to take appropriate action to reduce the burden of childhood malnutrition.

Among 45 cases and 90 controls the mean age of the cases was 17.33±8.2 months and the mean age of the controls was 16.48±7.28 months. In the present study 25 (55.6%) patients were male and 20 (44.4%) patients were female in case group; whereas 55 (61.1%) subjects were male and 35 (38.9%) subjects were female in the control group. Age and sex didn't differ significantly between case and control groups. This result was consistent with the study of Nahar et al[19]. They found that the mean age of the patients with severely-underweight children was 12.6±4 months in case group; whereas it was 16.48±7.28 in the control group. In the case group, 56.6% of patients with severely-underweight were male and 43.6% were female; whereas in control group 56% of subjects were male and 44% were female. There was no significant difference in age and sex between the cases and controls.

In the current study the mean age of mother was 25.13±4.97 years in case group; whereas 25.78±3.25 years in control group. There was no statistically significant difference of the age group of the mothers between case and control group.

Underweight mothers have a greater risk of their children being malnourished. A healthy mother can have healthy children. Children of well nourished mother had a lower risk of being underweight compared to undernourished mother[11]. In our study maternal BMI less than <18.5 kg/m^2 (Under nourished mother) significantly increased the risk of development of severe acute malnutrition. This result correlated with the study of Nahar et al[19].

This study showed that the risk of development of severe acute malnutrition was significantly higher in rural participants. Siddiqi et al.[11] and Yimer G[20] found the similar result in their study. Availability of water and sanitary facilities, better socioeconomic status and child health care facilities in urban areas results into less risk of being malnourished among children living in urban areas than their rural counterparts[11].

In a study done by Rayhan and Khan[21] reported that the risk of malnutrition decreased as paternal education increased. In our study, <5 years of schooling of the parents significantly increased the risk of development of severe acute malnutrition in children. This result was consistent with the study of Nahar et al[19]. Maternal education is known to have profound beneficial effects on child feeding, health seeking and care giving practices which is especially important for child nutritional status[11].

Maternal occupation did not differ significantly between cases and controls in this study. This result was in agreement with the study of Dereje N[22] who found that there was no significant difference in the child's severe wasting in cases and controls in relation to the maternal occupation ($p>0.05$). However, the opposite result was found by Nahar et al.[19], where mothers working outside the home were significantly associated with the development of severe acute malnutrition in children.

In this study, lower monthly income (<5000 Taka) and birth order of 3 or more significantly increased the risk of development of severe acute malnutrition. This result was in agreement with the study of Nahar et al[19].
In the current study, the number of family members 5 or higher significantly increased the risk of development of severe acute malnutrition. In a study, Dereje N[22] found that 86.1% of the households in the cases had more than 5 family members as compared to 76.9% of the controls.

In the present study, exclusive breastfeeding for the first 6 months of life and appropriate weaning practices significantly reduced the risk of the development of severe acute malnutrition. Nahar et al.[19] in their study showed that predominant breastfeeding for <4 months and early weaning significantly increased the risk of the development of severe acute malnutrition, which supports our result.

CONCLUSION

This present study concluded that rural residence, undernourished mother, less-educational qualification of the parents, lower monthly income, higher birth order, large family member, lack of exclusive breast-feeding and inappropriate weaning practice are some socio-demographic risk factors for development of severe acute malnutrition. To reduce the burden of childhood malnutrition, due emphasis should be given to improving the socioeconomic status, parental education, maternal health, and parents' knowledge about appropriate feeding practice for children.

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