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Risk factors of Stunting among Children Aged Six to Sixty Months

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ABSTRACT

Introduction: *Malnutrition in under five children is a major health problem in Bangladesh. Among child malnutrition, stunting is a prominent public health issue in many low and middle-income countries. Knowledge about the risk factors of stunting is an important precondition for developing and strengthening nutritional intervention strategies. So, this study was aimed to identify the risk factors of stunting among children aged six to sixty months attending a tertiary care hospital of Bangladesh.* ***Methods:*** *This case-control study was conducted among 200 children aged six to sixty months, who attended pediatric outdoor in Bangladesh Medical College Hospital from January, 2022 to December, 2022. Among them, purposively 100 stunted children were selected as case and 100 children without stunting were taken as control. A conditional logistic regression model and odds ratio was calculated to assess the risk factors in different aspects of stunting. Data were analyzed using SPSS Statistics for Windows, Version 27.0.* ***Results:*** *The proportion of illiterate mothers were significantly higher in the cases group (stunted) compared to the control group with adjusted odds ratio (AOR) = 2.74. The number of households members with ≥ five were 3.45 times (AOR = 3.45, 95% CI; 2.42-6.41) more likely to be stunted than household members less than five. The subjects who had birth weight of less than 2.5 kg was found to be a risk factor for stunting (AOR =4.47; 95%CI: 1.80-4.30). Children who had exclusively breastfed for less than six months had 2.58 times more possibilities of stunting (AOR=2.58, 95%CI; 2.09-12.67).* ***Conclusion:*** *The current study revealed that illiterate mother, household members five or more, low birth weight (LBW), and breastfeeding less than six months were the risk factors associated with stunting children aged from six to sixty months.*

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INTRODUCTION

The nutritional status of children is an important indicator of the socioeconomic development of a country.[1] Stunting is a prominent parameter to investigate a child's nutritional status.[2] According to the World Health Organization (WHO), a child is regarded as stunted when his/her height <−2 standard deviations from the child growth standard median for the same age and sex.[3] Stunting is the outcome of chronic under nutrition which ultimately leads to increased morbidity and mortality. Stunting is associated with a greater risk of developing overweight and non-communicable diseases in adult life.[4] It can suppress the immunity and increase the risk of infection. Stunting children might have an average IQ 11 points lower than children without stunting.[5] It can also affect a child's social and personal development.[6]

Globally, about 150.8 million children aged under five years were stunted in 2017[7], and nearly 40% of stunted children lived in South Asia.[8] The rate of stunting among children under five decreased dramatically worldwide, from 47% in 1985 to 21.9% in 2018.[9,10] In Bangladesh, however, 31% of children under the age of five were stunted in 2017[9] and 28% in 2019.[8]

The risk factors of stunting are multidimensional in different geographical regions.[11] To reduce the prevalence of stunted children, an effective intervention package must be implemented, focusing on the most vulnerable groups. Previous studies have been conducted to identify significant risk factors for stunting in low and middle-income countries to develop prevention and control strategies.[9,12,13] Studies revealed family size, number of under-five children in the household, low income, low birth weight, birth length, incomplete immunization, duration of exclusive breastfeeding, inappropriate feeding practices, nutrition during pregnancy, maternal education and occupation are the risk factors of stunting in under five children.[5,14,15]

The stunted rate among children under the age of five in Bangladesh is still greater than the global rate.[1] So, adverse outcome related to stunting is expected more in our country. If we want to prevent adverse outcome following stunting, we have to know the risk factors of stunting in our country perspective.

So, this study was done to explore the risk factors of stunting among children aged six to sixty months old, so that steps can be taken to eradicate these risk factors.

METHODS

This case-control study was conducted in the department of paediatrics of Bangladesh Medical College Hospital, Dhaka from January, 2022 to December, 2022. A total of 200 children aged 6 to 60 months old attending the outpatient department was enrolled for this study. Among those children, 100 stunted children were selected as cases and 100 children without stunting were taken as control. Purposive sampling was done. Children's length, height and weight were measured. Length was measured using an Infantometer for the children below 24 months of age. Height was measured in children aged 24–60 months by a Stadiometer. Trained personals measured their length and height in centimeters. Height for age (HAZ) z-scores was calculated using the 2006 WHO Child Growth Standards. Children with height-for-age-z-score <-2 were considered to be stunted. The inclusion criteria were children who were allowed a complete physical examination, and their mothers provided informed consent and volunteered to participate in the study. Children who had tuberculosis, chronic nephritis, chronic liver disease, chronic bronchitis, asthma, heart disease, nervous system diseases, endocrine diseases, rickets, or other deformities were excluded from the study. A preformed written questionnaire was introduced to mothers. A conditional logistic regression model and odds ratio was calculated to assess the risk factors in different aspects of stunting. Data were analyzed using IBM SPSS Statistics for Windows, Version 27.0.

RESULTS

Concerning the educational status, most of the mothers of children were illiterate in cases group and literate in the control group. The occupational status of mothers showed the majority of mothers were housewives in both cases (74%) and the control (77%) group (Table I).

Table I: Education and occupational status of children's mother

Variables	Cases (n-100)	Controls (n-100)	Total
Educational status of mothers			
Illiterate	56(56%)	39(39%)	95(47.5%)
literate	44(44%)	61(61%)	105(52.5%)
Total	**100**	**100**	**200 (100%)**
Occupational status of mothers			
Housewife	74(74%)	77(77%)	151(75.5%)
Daily laborer	14(14%)	05(05%)	19(9.5%)
Private job	09(09%)	13(13%)	22(11%)
Government employee	03(03%)	05(05%)	08(04%)
Total	**100**	**100**	**200 (100%)**

Majority of the fathers were literate in both case and control group and most of them were businessmen (Table II).

Table II: Education and occupational status of children's father

Variables	Cases (n-100)	Controls (n-100)	Total (N-200)
Educational status of Fathers			
Illiterate	30(30%)	25(25%)	55 (27.5%)
literate	70(70%)	75 (75%)	145(72.5%)
Total	**100**	**100**	**200 (100%)**
Occupational status of Fathers			
Business	64(64%)	55(55%)	119 (59.5%)
Private job	15(15%)	22(22%)	37 (18.5%)
Farmer	12(12%)	10(10%)	22 (11%)
Government employee	09(09%)	13(13%)	22 (11%)
Total	**100**	**100**	**200 (100%)**

Maximum children were male in both groups (Figure 1).

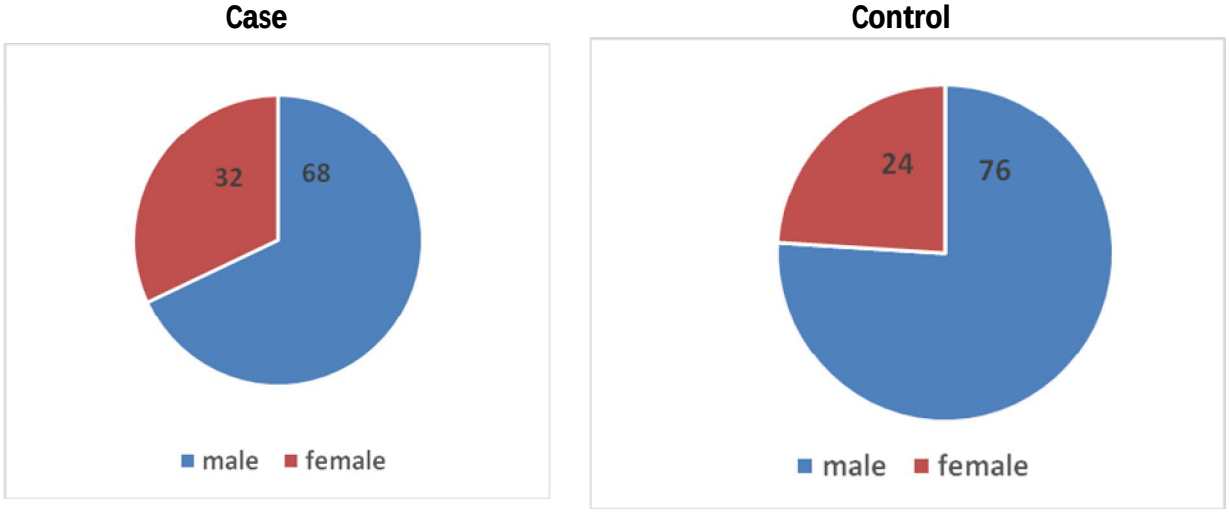

Figure 1: Sex distribution of the children

Stunting is common (40%) in the age group of 25–48 months (Figure 2).

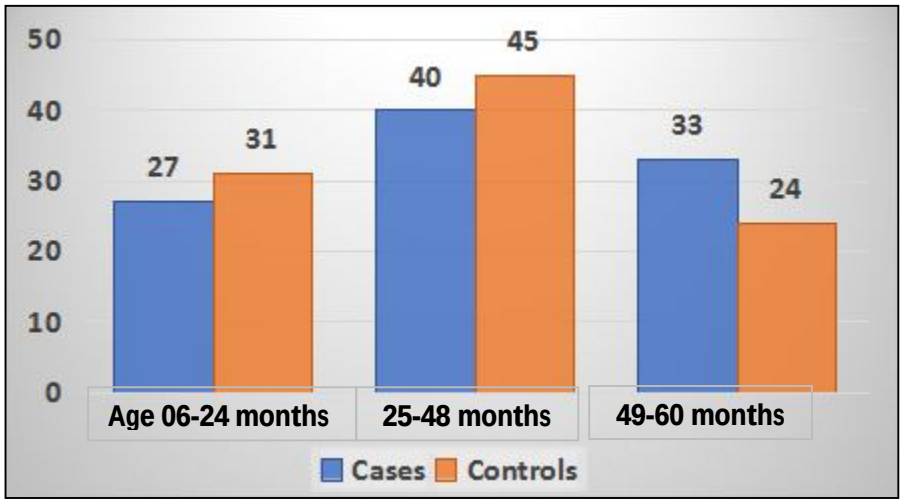

Figure 2: Age distribution of the children

Table III: Logistic regression analysis to identify the risk factors associated with stunting of children (n-200)

Variables	Case group	Control group	Adjusted Odds Ratio AOR, (95% CI)	*p* value
Maternal education				
Illiterate	56 (56%)	39 (39%)	2.74 (1.62- 4.45)	0.034*
literate	44 (44%)	61 (61%)		
Family members				
≥ 5	57 (57%)	30 (30%)	3.45 (2.42-6.41)	0.048*
<5	43 (43%)	70 (70%)		
Mother's height				
<150 cm	55 (55%)	40 (40%)	1.24 (0.90 - 2.43)	0.115
≥ 150 cm	45 (45%)	60 (60%)		
Birth weight				
< 2500 gm	78 (78%)	34 (34%)	4.47 (1.80-4.30)	0.001*
≥ 2500 gm	22 (22%)	66 (66%)		
Exclusive breastfeeding (EBF)				
<6 months	71 (71%)	41 (41%)	2.58 (2.09-12.67)	0.026*
At 6 months	29 (29%)	59 (59%)		

*Statistically significant

In multivariate logistic regression analysis, only four factors are significantly associated with stunting (*p*-value <0.05). To avoid the risk of over fitting the multivariate model, we selected the most significant variables in bivariate logistic regression analysis and based on the available literature. The proportion of illiterate mothers were significantly higher in the cases group (stunted) compared to the control group (AOR= 2.74). The study subjects exposed to ≥5 household members were 3.45 times more likely to be stunted. The proportion of children with birth weight <2.5 kg (low birth weight) was found to be a risk factor for stunting. Children who had exclusively breastfed for less than six months had 2.58 times more prone to stunting (Table III).

DISCUSSION

This study revealed risk factors of stunting were multiple, including maternal factors, household

factors, birth weight, and breastfeeding. From the multivariable logistic regression analysis model, the findings of this study revealed that, mothers' educational status had an independent association with childhood stunting. This study's finding was similar with the other studies.[16,17,18] This could be explained as educated mothers would have better idea and method of feeding their children with different foods as compared to illiterate mothers. Maternal education enabling them to choose balance diet for their children that are rich in carbohydrate, protein, fat and micro-nutrients. Malnutrition leads to infectious diseases. So, maternal knowledge improves their sanitation and hygiene, which reduces the odds of getting infectious diseases. Moreover, educated mother nicely manage their child's health care services like immunization and home remedy for common diseases, which in turn affects height.

In this study, participants living in households with more than or equal to five members are more likely to develop stunting as compared to those living in households with less than five members. This finding is similar to the studies conducted in North Ethiopia, South Ethiopia, and Mozambique.[15,19,20] This might be the fact that as the number of family members increases in the household; the care given to the children decreases, and mothers are unable to optimally breastfeed children, causing competition for family resources, and increasing the risk of infectious diseases.[21]

The mothers who had a height less than 150 cm was higher in the cases group than the control group but that was not statistically significant (*p*-0.115). This finding was not consistent with some other studies where short mothers were significantly higher in the cases group.[5,22]This might be due to the small sample size in our study.Birth weight of less than 2.5 kg was found in higher number in case group in this study. Similar observations were found in studies done by Berhe et al.[19], Habibzadeh et al.[23] and Gezae et al.[24] Birth weight is a strong predictive factorfor height in later life because most low birth weighted babies do not get normal height during childhood. Having low weight at birth has a profound detrimental effect on development of the neonate. Infants with LBW had growth retardation since the intrauterine period. Lack of nutrition for infants in early pregnancy could affect their birth weight and length, which makes them short and thin.[15] In malnourished child, there is a decrease level of insulin-like growth factor-1(IGF-1) and thyroid hormones which leads to lower linear growth. In addition, there is a reduction in anabolic events in insulin-dependent tissue synthesis, causing lower lean body mass and impaired bone growth.[25,26]

Children who had exclusively breastfed for less than 6 months had 2.58 times more chances of stunting. Similar findings revealed in different studies.[15,27,28] It might be due to the short period of breastfeeding is not sufficient to provide adequate protein and micronutrients for optimal physical growth. The other possible explanation is that inappropriate timing for introducing some kinds of complementary food to a child may affect his/her nutritional status because his/her digestive and immune systems are not yet mature.[29] Early initiation of complementary feeding might introduce gastrointestinal infections and intestine ulcers, which decrease micronutrient absorption and result in stunting.[30]

This study was conducted in single centre covering small sample. Some information relied completely on mothers' statements. So, large scale multicenter study should be done in future.

CONCLUSION

Mother's education, household members, low birth weight and exclusive breastfeeding were common risk factors associated with stunting of children aged between 6 and 60 months. Public health intervention program should emphasize on maternal education

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Conflict of interest: The authors declare no conflict of interest

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