

Anemia is a risk factor for Bronchiolitis

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ABSTRACT:

Introduction: The bronchiolitis outbreak is common in Bangladesh. The infantile period is the transitional period for weaning, when inadequate & inappropriate supplementary food has eaten, then a child starts to decline hemoglobin level. In this period incidence and prevalence of bronchiolitis become high. There are very few studies on anemia with bronchiolitis in this country, whereas this is very important to disclose any relation between them in the aspect of our society. Possibly it is one of the few studies between anemia with bronchiolitis which conducted in Bangladesh and only on infants. **Methods:** This descriptive type of cross-sectional study was conducted in the Pediatric department of Institute of Child & Mother Health (ICMH), Dhaka, Bangladesh, on 165 infants selected by simple random sampling. Face to face interview with parents, physical examination on infants, chest X-ray and complete blood count was done and noted in a semi-structured questionnaire. **Results:** Most samples were up to 3 months, whereas data collected up to 12 months, most were male (75%), 71% came from the rural area and more the half (58%) were middle class. One fifth (20%) were anemic according to Hemoglobin level (less than 11 gm/dl). Prevalence of bronchiolitis was more in anemic children ($P<0.03$). **Conclusion & Recommendation:** Anemic children were suffered by bronchiolitis more, which indicates anemia is a risk factor for bronchiolitis. There need multi-centric study, control group to understand the real picture of the disease prevalence of bronchiolitis and relation with anemia. This study has provided a baseline for future intervention studies which could inform policy formulation and review in Bangladesh towards bronchiolitis prevention and control.

Key words: Anemia, Bronchiolitis', Infants.

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INTRODUCTION:

Bronchiolitis is a disease of infants and young children. Runny nose followed by respiratory distress is known as broncheolitis¹. There has been epidemic of bronchiolitis in recent years in Bangladesh. Bronchiolitis is mostly (95%) a viral disease of the lower respiratory tract. The incidence of bronchiolitis has been shown to be as high as 11 cases per 100 children per year of the first 18 months of life. In the first 24 months of life, 5 children per 1000 are hospitalized with bronchiolitis per year in USA².

In Bangladesh, seventy percent mothers and children are suffering from anemia. Hb concentration is highest 23 gm/dl (WHO) and 13.3 gm/dl (Bangladeshi child) at birth and lowest at 2-3 months at respectively. The concentration then gradually rises to 12 gm/dl and 8.7 gm/dl at one year respectively. Ultimate economic loss due to anemia is huge³.

National Family Health Survey (NFHS) of India, shows that 7 out of every 10 children age 6 to 50 months are anemic. Three percent of children age 6 to 59 months are severely anemic (Hb<7.0g/dl), 40 percent are moderately anemic (Hb-7.0-9.9g/dl), and 26 percent are mildly anemic(10.0-10.9g/dl).⁴ A prevalence rate of over 65% in preschool children has been reported in various studies undertaken in rural and urban India. Iron deficiency is the most frequent and widespread nutritional deficiency in the world. In fact, iron deficiency is the only micronutrient deficiency that is also prevalent in virtually all developed countries.⁵ Iron deficiency

affects nearly 2170 million persons worldwide, and 1200 million of them are anemic, of which 90% are in the developing countries. The development of iron deficiency is a result of the interaction between iron intake, physiologic iron requirements and the potential for blood loss. Much of the 7world's population eat little or no meat, with their nutrition derived from cultivated, grasses such as rice, which are poor sources of iron,^{6,7,8} which contributes to the fact that iron deficiency is the most common nutritional anemia worldwide.

Bronchiolitis associated with anemia occur more commonly in children than in adults, with anemia affecting approximately 30% of children all over the world^{7,8}. whereas there was very few study in Bangladesh on Anemia with Bronchiolitis. It was to determine any association between anemia with bronchiolitis. Aim of this study was to identify anemia is a risk factor for bronchiolitis in infants.

METHODS AND MATERIAL:

This descriptive type of cross-sectional study was a single-center study, conducted over a period of 06 months from October 2015 to March 2016 at ICMH in Dhaka, Bangladesh (tertiary care) in all wards attending to patients of acute bronchiolitis with or without anemia. Bronchiolitis was defined on the basis of runny nose followed by respiratory distress¹.

Sample size was (n-165). After fulfilling, the inclusion criteria, face-to-face interview was taken. Each patient was evaluated by history

taken for present illness, socio-demography, thorough physical examination and laboratory investigation of Hemoglobin with Complete Blood Count (CBC). Hemoglobin level consider normal ≥ 11 mg/dl for infant. Anemia was defined as hemoglobin level < 11 gm/dl.^{4,9} Parents were also informed about the purpose of this study and tried to perform relevant investigations of our patients after proper counseling. Data were analyzed by descriptive statistics and inferential statistics on non-parametric calculation by SPSS 25 version. χ^2 test were used for quantitative variables. P values < 0.05 were considered statistically significant. The study was approved by the ethical board of the Bangladesh Society of Epidemiology (BSE).

RESULTS:

From October 2015 to March 2016, a total of 165 children were randomly selected, among them 124 (75%) male and 41(25%) female. Age distribution of these patients were from 1 to 12 months, and 90% was up to 6 months. Neonate were 07 (04%) of the respondents. The mean age of those children were 3.75 ± 2.51 months. The mean age at presentation of broncheolitis was 45 days.

Table-I: Anthropometry and Socio-demography

Variables	Category	Frequency and percent
Age	1-3 months	108 (65.5%)
	4-6 months	41 (25%)
	7-12 months	16 (9.5%)
Sex	Male	124 (75%)
	Female	41 (25%)

Residence	7-12 months	48 (29%)
	11-12 months	117 (71%)
Socio-economical condition	Male	69 (42%)
	Female	96 (58%)
	Urban	00
	Rural	
	Poor	
class	Middle	
	Rich	

Most sample were up to 3 months, whereas data collected up to 12 months, most were male (75%), 71% came from rural area and more the half (58%) were middle class.

Table-II: Anemic status of respondents according to Hb gm/dl#

Anemic status according to Hb gm/dl	Frequency and percent of cases
Anemia present (< 11 gm/dl)	132 (80%)
Anemia absent (> 11 gm/dl)	33 (20%)
Total	165 (100%)

Definition of Anemia by Hemoglobin level.^{4,9}

Four fifth (80%) were anemic according to Hemoglobin level.

Table-III: Non parametric statistics

Anemia (Hb gm/dl)	Broncheolitis		
	Present	Absent	Total
Anemia present	98	34	132

Anemia absent	04	29	33
Total	102	63	165

$X^2 (1) 18.34, P 0.03$

Prevalence of broncheolitis was more in anemic children.

DISCUSSION:

The present study was a hospital based descriptive type of cross sectional study conducted over a period of 6 months from October 2015 to March 2016, in the department of Pediatrics, ICMH, Dhaka, Bangladesh. Broncheolitis is a leading cause of morbidity in children below 2 years of age,^{1,2,5} Hence it is important to control the risk factors to decline morbidity from broncheolitis. Along with many risk actors like low birth weight, lack of breastfeeding, severe malnutrition, smoke, low haemoglobin be a risk factor.^{8,10,11,12}

Present study was carried out to find any correlation between anemia and broncheolitis in infants. There were 165 cases (Male-124 & Female-41) in the study population. In our study, 100% were up to 12 months and most (65.5%) children were between 1-3 months. In Malla et. Al,¹³ 49.2% children were in the age group of 2 months to 1year. Infantile period is the transitional period for weaning. When children eat inadequate & inappropriate supplementation of food, then a child starts to decline haemoglobin level. The patients in the study group had usual presentation of bronchiolitis. In this study haemoglobin level <11.0 gm/dl was considered Anemia.

Anemia was found in 132 (80%) cases in study infants. In de Silva et al¹⁴ an overall prevalence of anemia was found in 52.6% cases which was dissimilar from our study. In our study, 124 (75%) males and 41(25%) females were suffered from bronchiolitis and among them 132 (80%) were anemic. Whereas dissimilar result was found, with no significant gender difference in anemic children were found by Mourad et al¹⁵ in children less than 5 years of age with lower respiratory tract infections.

Anemic patients were found to be 18.34 times more susceptible to bronchiolitis in our study. Ramkrishnan et al¹⁶ found that anemic children were 5.75 times more susceptible to bronchiolitis while as Malla et al¹³ found that they were 3.2 times more susceptible to ALRTI. Mourad et al¹⁵ found that anemic children are twice more susceptible to lower respiratory tract infections as compared to non- anemic children. The role of low Hb level per se, as a risk factor for developing broncheolitis is reported only in few articles. They had found that reduced Hb level due to whatever etiology is a significant risk factor for developing bronchiolitis as well as ALRTI. Here in this study low hemoglobin due to iron deficiency was found the main cause of bronchiolitis. Malla et al¹³ has also found low Hb due to iron deficiency was the main cause of developing ALRTI.

Hb facilitates oxygen (O₂) and carbon-dioxide (CO₂) transport. It carries and inactivates nitric oxide (NO) and also plays the role of a buffer.¹⁷ Hemoglobin in the blood is mainly responsible for stabilizing

the oxygen pressures in the tissues. Therefore, quantitative and/or qualitative reduction in Hb, may adversely affect the normal physiological functions.¹⁷ Iron is primarily required for hemoglobin synthesis and intestinal iron absorption is related to erythropoietic requirements, although the regulatory mechanisms remain unknown. The usual source of iron in the lungs is serum iron which is derived from catabolized erythrocytes and absorbed iron. Probably it may be the reason for low hemoglobin level found to be as a serious risk factor for developing bronchiolitis as well as ALRTI.¹⁷ Further studies including other risk factors like low birth weight, lack of breast feeding, severe malnutrition etc. along with low Hb should be considered in future prospective.

CONCLUSION:

Anemic children were suffered more with bronchiolitis. Sample were only infants and most were up to 6 months' age. Most were from middle class and from rural area. This study indicate anemia is a risk factor for broncheolitis.

There need multi-centric study with control group to understand the real picture of the disease prevalence of bronchiolitis and its relation with anemia. This study has provided a baseline for future intervention studies which could help in policy formulation and review in Bangladesh towards bronchiolitis prevention and control.

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