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Low hemoglobin as a risk factor in influencing severity of bronchiolitis

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Abstract

Bronchiolitis is the major cause of hospitalisation in children under 2 years of age. It has peak incidence between 2 months to 6 months. There is an increase in severity of bronchiolitis in children with anemia. Our study is undertaken to prove that low hemoglobin is an independent risk factor for bronchiolitis

Methods: This study is a prospective study conducted in a tertiary care hospital. Children admitted with bronchiolitis in the age group of 2 months to 2 years were included in study group. Total of 91 children were enrolled in the study. Duration of study was one year. Hemoglobin levels of the children were correlated with the severity by BROSJOD scoring of bronchiolitis.

Results: The study showed that hemoglobin levels were low in children of severe group by BROSJOD scoring. Mean hemoglobin level of 9.7 ± 1.4 is found in children of severe group, mean hemoglobin of 10.2 ± 1.2 is found in moderate group and mean hemoglobin of 11.0 ± 0.8 is found in mild group.

Conclusion: The study concluded that hemoglobin would influence the severity of bronchiolitis and could be an independent risk factor in influencing the severity.

Keywords: Bronchiolitis, hemoglobin, severe group.

Introduction

Bronchiolitis is the most common lower respiratory tract infection in children under 2 years. Infants between 2 to 6 months are commonly affected [1]. Around 3% of all infants younger than one year are admitted with bronchiolitis [2]. Hemoglobin is the reliable indicator of anemia. WHO estimates the worldwide prevalence of anemia to be 1.62 billion of which highest prevalence of anemia (47.4%) is common among preschool aged children [3]. As recommended by WHO antenatal iron supplementation delays the neonatal presentation of anemia and thus it is commonly presented after 6 months of age [4]. Iron is important for the development and growth of children and is also responsible for etiopathogenic mechanisms of various pathologies. The lower respiratory tract infections appear to be directly related to insufficient or inefficient use of iron and there is an altered immune response. This is supported by mechanisms in which mediators of inflammation such as TNF alpha, IFN gamma, IL-1 beta and IL6 which play a role in activation of monocytes and neutrophils which induce the synthesis of proteins blocking the duodenal iron absorption [5].

Respiratory syncytial virus is a risk factor for severe bronchiolitis. Risk factors are categorised as environmental, maternal and host factors. Environmental factors include exposure of mothers to allergens, cigarette smoke, overcrowding and particulate matter. Host related factors are male sex, prematurity and low birth weight. Other risk factor include lack of breast feeding, maternal age, incomplete vaccination and family history of asthma [6].

In a study conducted by Sheikh *et al.*, [7] proved that anemia was significantly found in patients with lower respiratory tract infection and these patients were 4.5 times susceptible to anemia.

Methods

The current prospective study was carried out in a tertiary care hospital from April 2019 to March 2020. Ninety one children were included in the study group. Children with acute onset of respiratory illness between 2 months to 2 years were included in the study. Children with chronic lung and cardiac disease, Congenital heart disease, Pneumonia, children who had recurrent/previous episode of wheezing and children who received any inhaled drug therapy were excluded in the study. BROSJOD scoring for bronchiolitis was done at

admission and children were classified as mild, moderate and severe according to the score. Hemoglobin levels was analysed for all children. According to WHO classification iron deficiency anemia is defined as 10 to 10.9 as mild anemia, 9.9 to 7 as moderate anemia and <7 grams as severe anemia. Values are obtained and statistically analysed.

Results

Ninety one children with acute respiratory illness were enrolled in the study. The mean age group was 8.9 ± 5.9 months. The study included males 67% and females 33% BROSJOD scoring of bronchiolitis is done at admission classified into mild group of 34 children, moderate group of 42 children and severe group of 15 children. Mean hemoglobin levels among study participants was 10.2 ± 1.2g/dl. In mild group of 34 children mean hemoglobin levels was 11.0 ± 0.8, moderate group of 42 children with mean hemoglobin of 10.2 ± 1.2 g/dl and in severe group of 15 children mean hemoglobin levels was 9.7 ± 1.4. As the severity of bronchiolitis increases mean hemoglobin values is lower.

Table 1: Hemoglobin levels in relation with severity of respiratory illness by BROSJOD scoring

Severity of respiratory illness	Number of patients	Percentage	Hemoglobin levels Mean ± SD	P Value
Mild	34	37.4	11.0 ± 0.8	0.001
Moderate	42	46.1	10.2 ± 1.2	
Severe	15	16.5	9.7 ± 1.4	
Total	91	100	10.4 ± 1.2	

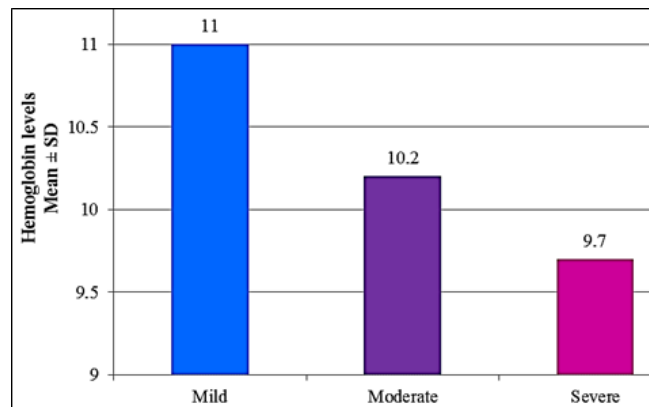


Fig 1: Hemoglobin levels in relation with severity of respiratory illness by BROSJOD scoring

Discussion

This study was conducted to assess the severity of bronchiolitis and its outcome. In that hemoglobin is found to be a risk factor in influencing the severity of bronchiolitis. Our study was conducted and found that the severe group according to scoring done by BROSJOD scoring of bronchiolitis was found to have a low mean hemoglobin than the moderate and mild group. The p value was <0.0001 which was statistically highly significant. Many studies conducted proved that anemia may increase the lower respiratory tract infection. In a study conducted by tournaire *et al.*, [8] classified the study group into mild and moderate based on wood downscore and found that decremental decrease of hemoglobin every 1g/dl may increase the severity of bronchiolitis. They concluded that anemia is a new risk factor in young infants with

bronchiolitis. A cross sectional study conducted by Shakil *et al.*, [9] found that iron deficiency anemia is a risk factor in lower respiratory tract infection. But this study was conducted in infants under 5 years and has infants with pneumonia and bronchiolitis. Mourad *et al.*, [10] study conducted that anemic children were two times more susceptible to lower respiratory tract infection and mean hemoglobin levels was 9.99 + -0.62g/dl. Ramakrishnan *et al.*, [11] study conducted proved that anemic children were 5.75 times more susceptible to lower respiratory tract infections than control group. In a study conducted by Gupta *et al.*, [12] concluded that anemic children is 4.99 times more susceptible to acute lower respiratory tract infection. Mean hemoglobin levels was 9.2 g and 11.4 g in cases and controls and early diagnosis and management could prevent the recurrence. A study conducted by Shakya *et al.*, [13] also proved that mean hemoglobin level was 9.24g/dl and found that anemic children were 2.68 times susceptible to lower respiratory tract infection.

On contrary Broor study *et al.*, [14] conducted on a hospital based case control study proved that anemia is not a risk factor for lower respiratory tract infection. Iron deficiency has a better host defence than during iron depletion proved by Murray study *et al.*, [15].

Limitation

Limitation of this study is it is conducted on small population. Other parameters like red blood cell indices and peripheral smear study were not taken.

Conclusion

We concluded that hemoglobin is an independent risk factor in influencing the severity of bronchiolitis as the hemoglobin decreases the severity of bronchiolitis increases. As the hemoglobin values decreases by 1g the severity of bronchiolitis increases as done by brosjod scoring.

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