

Thrombocytosis associated with lower respiratory tract infection in pediatric population - two year study

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Abstract

Background: Thrombocytosis showing as inflammatory marker with various clinical conditions. The current study aimed at evaluating the incidence and significance of thrombocytosis associated with lower respiratory tract infection in paediatric population. **Materials and Methods:** The current retrospective study was conducted over a period of 24 months on 200 children aged 6 year, hospitalized for lower respiratory tract infection. Patients were classified into 2 groups of patients with or without thrombocytosis. **Results:** Out of 200 children, 110 (55%) had thrombocytosis and 90 (45%) not had thrombocytosis. Among children with thrombocytosis, 10 (9%) had pneumonia, 40 (36.3%) had severe pneumonia, and 60 (54.5%) had very severe pneumonia. Out of 90 children without thrombocytosis, 50 (55.5%) had pneumonia, 10 (11%) had severe pneumonia, and 30 (33%) had very severe pneumonia. **Conclusions:** This study indicated that children with lower respiratory tract infection had continuously associated with thrombocytosis. In the group with high thrombocyte count, the duration of hospital stay and severity of pneumonia were higher.

Keywords: Pneumonia, Lower Respiratory Tract Infection, Children, Thrombocytosis.

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Introduction

Primary or essential thrombocythemia is rare in the pediatric population, besides acute infection and chronic inflammation and chronic hemolytic phase are the other causes of pediatric thrombocytosis [1]. Platelets play a major role in antimicrobial host defense, the induction of inflammation and tissue repair [2]. Activation of platelets stimulates platelet interactions with complement proteins and humoral immune components also leukocytes and endothelial cells. Platelets are capable of binding, aggregating and internalizing microorganisms, which enhances the clearance of pathogens from bloodstream and also participate in antibody dependent cell cytotoxicity functions to kill protozoal pathogens by releasing array of potent antimicrobial peptides. Inflammatory thrombocytosis is related to increased levels of several cytokines such as thrombopoietin, interleukin-6, interleukin-1 α , interleukin-8 and tumour necrosis factor alpha [3]. In Severe community acquired pneumonia there is increase plasma levels of the inflammatory cytokines TNF- α , IL-1b, IL-6, IL-8. The TNF- α , IL-1b and IL-6 were also increases in the bronchoalveolar lavage fluid [4,5]. Normal platelet counts range between 1.5 lakh to 4.5 lakh [6]. Platelet count more than 5 lakh, is observed in 3% to 13% of pediatric population. As pneumonia goes to be the leading cause of

mortality in children less than 5 years in the developing countries such as India, the current study primarily aimed at finding out the association between severity of pneumonia and degree of thrombocytosis.

Material and Methods

The current study was conducted in the department of pathology over a period of 2 years from November 2018 to November 2020. All patients within the age range of 2 to 72 months with a clinical diagnosis of lower respiratory tract infection were studied. Patients were classified as per world health organization (WHO) criteria in acute respiratory infection (ARI) control programme guidelines [7]. After signing the written consent by the parents, the demographic profile, clinical data, and laboratory testing results of each participant were collected. Complete blood count (CBC) was performed with automated Sysmex, a 6 part analyzer (XN Series), and differential count was performed. Clinical severity of the disease was classified as pneumonia, severe pneumonia, or very severe pneumonia. Thrombocytosis was considered when peripheral blood platelet count was >5 lakh. Thrombocytosis is further divided as mild if platelet count ranges 5 to 7 lakh, moderate if ranges 7 to 9 lakh, and severe if ranges 9 to 10 lakh. Extreme thrombocytosis was defined as platelet count > 10 lakh. All the patients were classified into 2 groups on the basis of platelet count; ie, patients with or without thrombocytosis.

Statistics - All the variables were compared and analyzed with SPSS version 16. Results of data analysis were expressed as numbers and percentage. Comparisons of the frequency of variables were made

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using chi-square test. P value_0.05 was considered as statistically significant.

Observation and Results

A total of 200 children, admitted with lower respiratory tract infection in the under study hospital, were included in the study out of

which 130 (65%) were within the age range of 2 to 12 months and 70 (35%) within the age range of 12 to 72 months. A total of 90 (45%) children were admitted with very severe pneumonia, 50 (25%) with severe pneumonia, and 60 (30%) with pneumonia

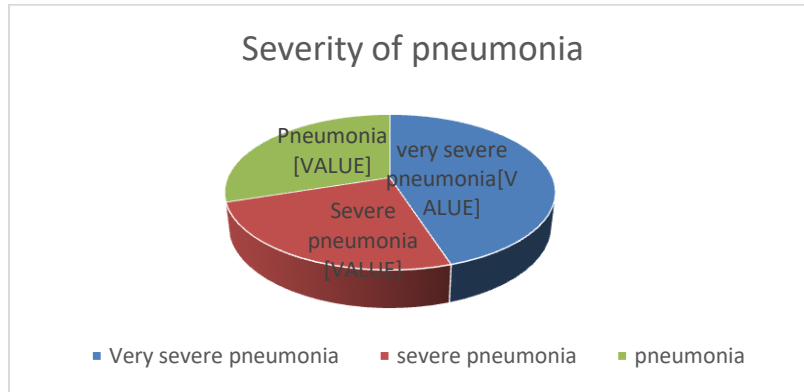


Fig. 1: Severity of pneumonia

Out of 130 infants, 60 had very severe pneumonia, 40 had severe pneumonia, and 30 developed pneumonia. Out of 70 children in the age group of 12 to 72 months, 30 had pneumonia, 10 had severe pneumonia, and 30 had very severe pneumonia. pneumonia was more marked in infants than older children.

Table 1: Severity of pneumonia

Age group	Pneumonia	Severe pneumonia	Very severe pneumonia	Total
Infant (1 – 12months)	30	40	60	130
Children (12 – 72 months)	30	10	30	70

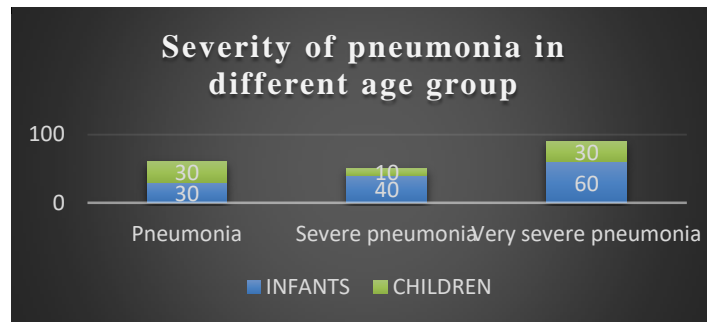


Fig. 2: Severity of Pneumonia in different age group

In our study we found that, out of 200 children, 110 (55%) had thrombocytosis and 90 (45%) not had thrombocytosis. Among children with thrombocytosis, 10 (9%) had pneumonia, 40 (36.3%) had severe pneumonia, and 60 (54.5%) had very severe pneumonia. Out of 90 children without thrombocytosis, 50 (55.5%) had pneumonia, 10 (11%) had severe pneumonia, and 30 (33%) had very severe pneumonia.

Table 2: Severity of Pneumonia in different age group

Severity	With Thrombocytosis (110 patients)	Without Thrombocytosis (90 patients)
Pneumonia	10	50
Severe Pneumonia	40	10
Very Pneumonia	60	30

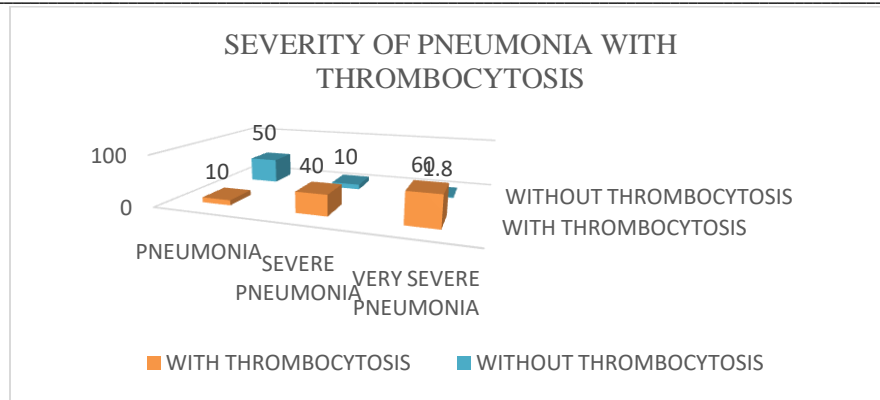


Fig. 3: Severity of pneumonia with thrombocytosis

Table 3: Relationship between platelet count and severity of pneumonia

	Platelet count	pneumonia	Severe pneumonia	Very severe pneumonia	Total patients
Without thrombocytosis	<1.5 lakh	10	5	10	25
	1.5 – 4.5 lakh	40	5	20	65
With thrombocytosis	5 – 7 lakh	8	30	38	76
	7 – 9 lakh	1	10	12	23
	9 – 10 lakh	1	0	5	6
	>10 lakh	0	0	5	5

Table 4: Relationship between platelet count and duration of hospital stay

	>2 days	>4 days	>8 days	>10 days	Total patients
With thrombocytosis	20	32	48	10	110
Without thrombocytosis	22	42	18	8	90

Discussion

Platelets has an important role in antimicrobial host. During respiratory tract infection, the level of inflammatory cytokines increases. Lower respiratory tract is an important cause of mortality in children. Mortality rate and the severity of disease are usually high in young infants and young children. In the current study, out of 200, 130 (65 %) were less than 12 months. Severity of illness was high in infancy, which was supported by other studies [8,9]. Platelet count increases with increasing the severity of pneumonia. It showed that children admitted with lower respiratory tract infection had thrombocyte count > 5 lakh. The critically ill children had more severe thrombocytosis. Unsal et al., concluded that the symptoms were more severe in patients with thrombocytosis. [10]. Out of 110 children with thrombocytosis, 69 % had mild thrombocytosis, and moderate thrombocytosis was found in 21 % of the patients. Severe and very severe thrombocytosis were found in 4.5% and 5.0% of the children, respectively. Other studies showed findings similar to those of the current study [11,12]. In the current study, the duration of hospital stay showed a significant association with thrombocytosis (P= 0.008), our study is similar to the results of the study by Srineevasa et al. [13]. The current study explains that thrombocytosis was a useful indicator for the severity of the disease and complications in children with lower respiratory tract infection.

Conclusion

Thrombocytosis was commonly associated with pneumonia in children. Children with thrombocytosis usually develop severe illness and complications resulting in prolonged hospital stay. Degree of thrombocytosis directly correlated with severity of illness.

References

1. Marwaha N. Thrombocytosis as a predictor of serious bacterial infection. *Indian Pediatr.* 2010;47(11):923-4. [PubMed: 21149900].
2. Klinger MH, Jelkmann W. Role of blood platelets in infection and inflammation. *J Interferon Cytokine Res.* 2002;22(9):913-22.

3. Yeaman MR. The role of platelets in antimicrobial host defence. *Clin Infect Dis.* 1997;25:951-70..
4. Greene C, Lowe G, Taggart C, Gallagher P, McElvaney N, O’Neill S. Tumor necrosis factor alpha converting enzyme: its role in community acquired pneumonia. *J Infect Dis.* 2002;186(12):1790-6.
5. Ishiguro A, Ishikita T, Shimbo T, Matsubara K, Baba K, Hayashi, et al. Elevation of serum thrombopoietin precedes thrombocytosis in Kawasaki disease. *Thromb Hemost.* 1998;79:1096-100.
6. Dua Vikas, Sachdev A, Yadav SP. Platelet counts in healthy neonates, infants, children and adolescents. In: Dua Vikas, Sachdev A, Yadav SP, eds. *Practical Pediatric Hematology (IAP)*. 2nd ed. Delhi, India: Jaypee; 2012: 90-97.
7. Park K. *Parks textbook of preventive and social medicine*. 22nd ed. Jabalpur (India): Banarsidas Bhanot; 2013.
8. Tiewsoh K, Lodha R, Pandey RM, Broor S, Kalaivani M, Kabra SK. Factors determining the outcome of children hospitalized with severe pneumonia. *BMC Pediatr.* 2009;9:15.
9. Usha D, Sudha R. Significance of thrombocytosis in lower respiratory tract infections. *Medpulse -Inter Med J.* 2014;1(9):470-5.
10. Unsal E, Aksaray S, Koksall D, Sipit T. Potential role of interleukin 6 in reactive thrombocytosis and acute phase response in pulmonary tuberculosis. *Postgrad Med J.* 2005;81(959):604-7.
11. Yohannan MD, Higgy KE, al-Mashhadani SA, Santhosh-Kumar CR. Thrombocytosis. Etiologic analysis of 663 patients. *Clin Pediatr (Phila).* 1994;33(6):340-3. doi: 10.1177/00092289403300605.
12. Vlach A, Feketea G. Thrombocytosis in pediatric patients is associated with severe lower respiratory tract inflammation. *Arch Med Res.* 2006;37(6):755-9.
13. Sreenivasa B, Kumar GV, Manjunath B. Study of significant of thrombocytosis in lower respiratory tract infection in children. *Int J Contemp Pediatr.* 2015;2(2):103-7.

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