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Original Research Article

Thrombocytosis: a predictor of severity in children with lower respiratory tract infection

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ABSTRACT

Background: Community acquired pneumonia remains a significant cause of morbidity and mortality due to infection all over the world. Thrombocytes are known to be an essential part of immune response to various infectious agents. Platelet count elevated more than normal is often sign of severe pneumonia according to various studies.
Methods: This is a retrospective study conducted in Kempegowda Institute of Medical Science, a tertiary care hospital in Bangalore with a study duration of 1 year. All children were classified into two groups based on platelet count that is with thrombocytosis and without thrombocytosis. Respiratory distress was defined as presence of tachypnoea, chest retractions, oxygen saturation <94% in room air. Children with respiratory distress were classified as severe pneumonia and those with no respiratory distress as non-severe pneumonia.
Results: A total of 213 children were admitted with lower respiratory tract infection of which 35 children were excluded based on exclusion criteria. Of these 178 children 142 (80%) belonged to non-severe pneumonia group and 36 (20%) belonged to severe pneumonia group. Thrombocytosis is found in 31 (17%) children, 147 (82%) children had platelet count less than 4.5 lakhs/cu mm. Of these children with thrombocytosis 13 (42%) had non severe pneumonia and 18 (58%) had severe pneumonia. The $p<0.0000001$ which showed statistical significance, that is thrombocytosis was significantly associated with severity of pneumonia.
Conclusions: Thrombocytosis can be considered as a marker of severity of pneumonia in day-to-day practice.

Keywords: Severe pneumonia, Non-severe pneumonia, Thrombocytosis, Respiratory distress

INTRODUCTION

Community acquired pneumonia remains a significant cause of morbidity and mortality due to infection all over the world. It is the leading cause of death in children under 5 years of age according to World Health Organization (WHO).[1] Thrombocytes are the components of blood involved in blood clotting process. Thrombocytes are known to be an essential part of immune response to various infectious agents.[2] Platelets are recruited by action of various proinflammatory cytokines like thrombopoietin, interleukin -6 interleukin -8, interleukin 1 alpha and tumour necrosis factor. They are recruited at the site of inflammation and they have the ability to release multiple proinflammatory cytokines which further recruit platelets.[3-5]

Pneumonia is defined as inflammation of lung parenchyma. It is the leading cause of death in children less than 5 years of age. Pneumonia can be caused by virus, bacteria and fungi. The most common cause of bacterial pneumonia in children is Streptococcus pneumonia followed by Haemophilus influenzae type b and most common viral cause of pneumonia is respiratory syncytial virus. Pneumonia presents as cough, fever, tachypnoea, increased use of accessory respiratory muscles. Pneumonia ranges from mild with only symptoms and subtle signs to severe pneumonia associated with

respiratory distress and even convulsions and unconsciousness.

There are various studies showing abnormal platelet count as marker of severe sepsis.[6] Platelet count elevated more than normal is often sign of severe pneumonia according to various studies.[7]

METHODS

This is a retrospective study conducted in Kempegowda Institute of Medical Sciences, V V puram, Bangalore a tertiary hospital with a study duration of 1 year that is June 2019 to June 2020. All children admitted with lower respiratory tract infection were included in the study. Children with connective tissue disorders, anaemia (Hb <10), congenital heart diseases and other haematological diseases were excluded. complete blood count was done by automated analysers and differential counts confirmed by the pathologists. The chest radiographs were reviewed by radiologists. As per ARI control programme tachypnoea was defined as respiratory rate >50/minute for infants; >40/minute in children from 1 year to 5 years of age; >20/min in children more than 5 years of age.8 Respiratory distress was defined as presence of tachypnoea, chest retractions, oxygen saturation <94% in room air. All subjects after exclusion were classified into non severe pneumonia and severe pneumonia based on presence or absence of respiratory distress. Children with respiratory distress were classified as severe pneumonia and those with no respiratory distress as non-severe pneumonia. Duration of hospitalization, outcome as death or discharge were noted. Thrombocytosis is defined as platelet count >4.5 lakhs/cumm. All children were classified into two groups based on platelet count that is with thrombocytosis and without thrombocytosis. All the variables were compared and statistical analysis was done by chi square.

Results were provided as numbers, percentage or as mean whenever applicable. Comparisons of the frequency of variables between patients with thrombocytosis and without thrombocytosis was done using chi-square test and students T test. P≤0.05 was considered statistically significant.

RESULTS

A total of 213 children were admitted with lower respiratory tract infection of which 35 children were excluded based on exclusion criteria.

Table 1: Age distribution of pneumonia cases.

Age	Number	Percentage
<1	50	28
1-5	98	55
>5	30	17
Total	178	100

Table 2: Gender distribution of pneumonia cases.

Male	**99**	**55.6**
Female	70	44.4
Total	178	100

Table 3: Platelet counts in severe and non-severe pneumonia.

Platelet count	Non severe Pneumonia	Severe pneumonia	Total
<4.5 lakhs	128	19	147
>4.5 lakhs	13	18	31
Total	145	37	178

Table 4: Leucocyte counts in severe and non-severe pneumonia.

Leukocyte count	Pneumonia	Severe pneumonia	Total	P value
<11000	85	9	94	<0.00009
>11000	57	27	84	
Total	142	36	178	

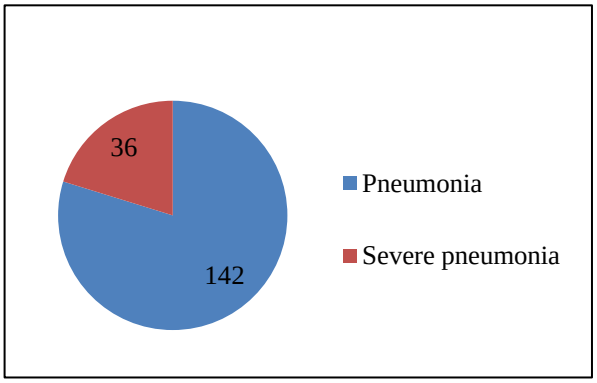

Figure 1: Incidence of severe pneumonia in our study.

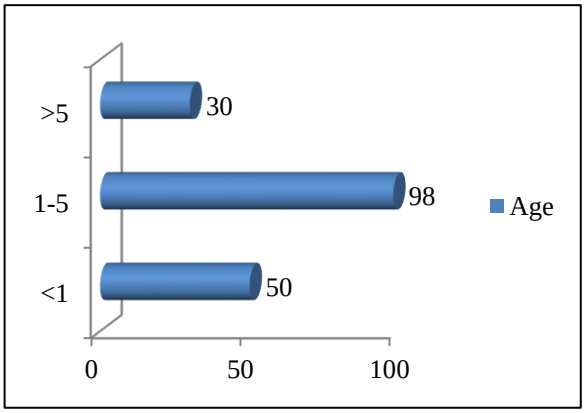

Figure 2: Age distribution on pneumonia cases.

Total of 178 children were included in the study of which 50 (28%) children were in the age group of <1 year; 98 (55%) children were in the age between 1 to 5 years; 30

(17%) children were of age above 5 years. 99 (55.6%) children were boys and 70 (44.4%) were girls. Of these 178 children 142 (80%) belonged to non-severe pneumonia group and 36 (20%) belonged to severe pneumonia group. (Table 1, 2, Figure 1, 2, 3).

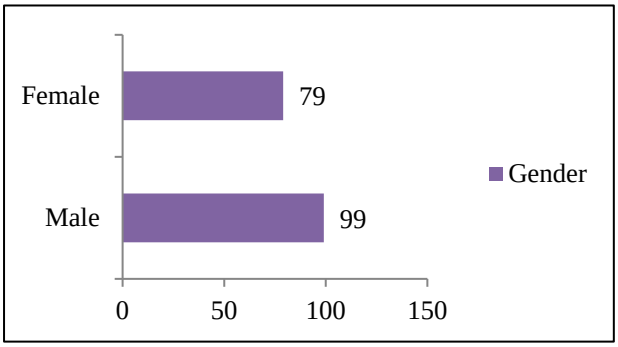

Figure 3: Gender distribution of pneumonia cases.

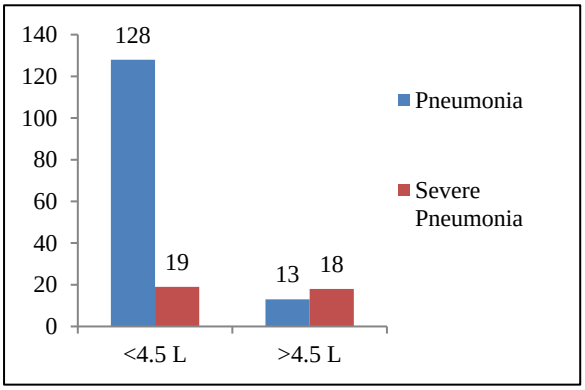

Figure 4: Platelets count in severe and non-severe pneumonia.

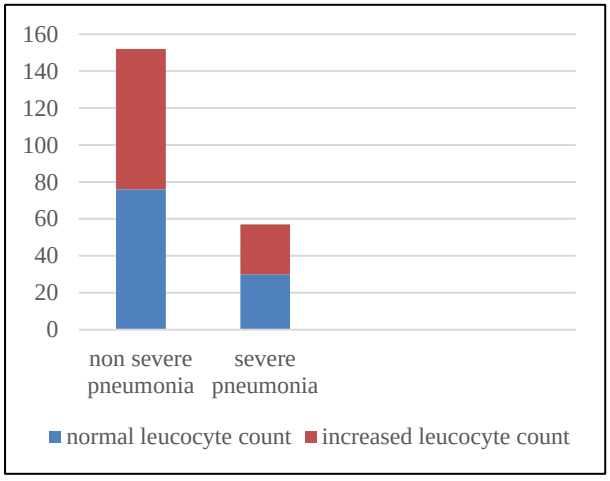

Figure 5: Association of leucocyte count with severe pneumonia.

Thrombocytosis is found in 31 (17%) children, 147 (82%) children had platelet count less than 4.5 lakhs/cumm. Of these children with thrombocytosis 13 (42%) had non severe pneumonia and 18 (58%) had severe pneumonia. The $p<0.0000001$ which showed statistical significance, that is thrombocytosis was significantly associated with severity of pneumonia (Table 3, Figure 4).

Above analysis shows leucocyte count and severity of pneumonia are significantly associated. Hence high leucocyte count and high platelet count both are significantly associated with severity of pneumonia. (Table 4, Figure 5).

DISCUSSION

Platelets play major role in anti-microbial host defence, induction of inflammation and tissue repair. During respiratory infections there is elevated levels inflammatory cytokines which increases the production of thrombocytes. Severe pneumonia is associated with elevated levels of inflammatory cytokines like TNF alpha, IL-1B, IL-6, IL-8. These were seen elevated in bronchoalveolar lavage of children with severe pneumonia.[9]

Pneumonia is the leading cause of death in children under 5 years of age and associated with great morbidity. Early detection of severe pneumonia by monitoring of platelet counts makes it possible to combat the disease at an early stage. In this study 178 children had pneumonia of which 31 children had thrombocytosis. Among these children with thrombocytosis 18 had severe pneumonia. This study infers that, platelets are elevated in severe pneumonia and there is a strong correlation between thrombocytosis and severity of pneumonia. This is comparable with various other studies which shows results consistent with this.[10-12]

Limitations of the study

This study does not explain the exact reason behind thrombocytosis association with severe pneumonia and does not explain thrombocytosis present in non-severe pneumonia cases

CONCLUSION

Platelets are important proinflammatory mediators. Thrombocytosis can be considered as a marker of severity of pneumonia in day-to-day practice. Children having pneumonia with thrombocytosis should be aggressively treated as they are more prone to develop severe pneumonia and its complications.13

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