Section: Paediatrics

Original Research Article

# THROMBOCYTOSIS AND ITS EFFECT ON MORBIDITY AND MORTALITY IN CHILDREN OF 2 MONTHS TO 5 YEARS WITH PNEUMONIA

**Mayank Priyadarshi[1], Navin Kumar[1], Dhiraj Kumar[1], Ashit Kumar*[2], Ashish Kumar Bharti[2], Kumar Shambhu Nath[3], Ghazi Sharique Ahmad[4]**

[1]Junior Resident, Department of Pediatrics, Katihar Medical College, Katihar, India
[2]Assistant Professor, Department of Pediatrics, Katihar Medical College, Katihar, India
[3]Professor, Department of Pediatrics, Katihar Medical College, Katihar, India
[4]Professor and Head, Department of Pediatrics, Katihar Medical College, Katihar, India

*Received* :04/04/2023
*Received in revised form* : 24/04/2023
*Accepted* : 05/05/2023

*Keywords:*
*Pneumonia, Severe Pneumonia, Thrombocytosis.*

Corresponding Author:
**Dr. Ashit Kumar,**
Email: kuwarashit@gmail.com

DOI: 10.47009/jamp.2023.5.3.168

Source of Support: Nil,
Conflict of Interest: None declared

*Int J Acad Med Pharm*
2023; 5 (3); 814-817

## Abstract

**Background:** Pneumonia is one of the commonest causes of morbidity and mortality in children of under 5 years of age. Rise of platelet count is component of inflammation and immune response. This study aims to evaluate the association of thrombocytosis with severity of pneumonia. **Materials and Methods:** This study is observational prospective study conducted over period of 20 months which included children between 2 months to 5 years of age with pneumonia. Patients were put into 2 groups according to severity of disease after doing detailed clinical examination. X ray was done to confirm the diagnosis and 2 groups were analysed on the basis of platelet count, duration of hospital stay and clinical outcome. **Result:** Out of 1043 cases, 63.1% (658) were pneumonia, 36.9% (385) were severe pneumonia. Among 768 cases of infants, 462 (70.2%) had pneumonia, and 306 (79.5%) had severe pneumonia. Among 275 cases of 13-60 months age group children, 196 (29.8%) had pneumonia, and 79(20.5%) had severe pneumonia. In cases of pneumonia out of total 658 patients, 98 (14.9%) had thrombocytosis while 511 (77.7%) had normal platelet count which is statistically significant. In patients of severe pneumonia 236(61.3 %) had thrombocytosis as opposed to 121 (31.4%) patients with normal platelet count which is also statistically significant. Long duration of hospital stay was associated with thrombocytosis and severity of pneumonia but not significant. **Conclusion:** Infants were more effected with severe pneumonia and thrombocytosis is associated with severity of pneumonia.

## INTRODUCTION

Pneumonia is defined as inflammation of lung parenchyma. It is the leading cause of death in children under 5 years of age. Virus, bacteria and fungi are causing agent of pneumonia. Streptococcus pneumoniae is the commonest cause of bacterial pneumonia in children 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 present with respiratory distress and even seizures and loss of consciousness.[1]

Increased platelet count more than normal is often sign of severe pneumonia according to various studies.[2] In hospitalized children 6-15% has reactive thrombocytosis. Bacterial or viral infections (acute or chronic) are the most common cause for reactive thrombocytosis (37– 78%) at any age during childhood.60-80% of reactive thrombocytosis is associated with infections of the respiratory tract, followed by infections of the gastrointestinal and urinary tract.[3,4] Induction of inflammation, antimicrobial host defence, and tissue healing all are important functions of platelets..[5] Agonist that activates platelets also increases platelet interactions with complement proteins and humoral immune components, as well as leukocytes and endothelial cells. Activated platelets are capable of binding, aggregating and internalizing microorganisms, which facilitates removal of pathogens from bloodstream and also actively take part in antibody dependent cell cytotoxicity functions to destroy protozoal pathogens by releasing array of potent antimicrobial peptides. Elevated levels of various cytokines such as thrombopoietin, interleukin-6, interleukin-1alpha, interleukin-8 and tumour necrosis factor alpha are associated with Inflammatory thrombocytosis.[6]

**Objective**

To determine the association of thrombocytosis with

- Severity of pneumonia.
- Morbidity and mortality in pneumonia.


ISSN (O): 2687-5365; ISSN (P): 2753-6556

## MATERIALS AND METHODS

**Study Design:** Observational Prospective Study.
**Study Setting:** The study was conducted in the Department of Paediatrics at Katihar Medical College, Katihar.
**Study Population**: Children between 2 months to 5 years coming to Katihar Medical College with pneumonia.
**Duration of Study**
January 2021 to August 2022.
**Sample size:** All children of study population in defined study period.
**Data Collection**
At the time of enrollment an informed written consent was obtained from either of the parents/guardian.

1. Detailed history was elicited from the mother and child regarding various clinical manifestations.
2. Detailed clinical examination done and child was categorised into pneumonia and severe pneumonia according to WHO classification.[7]
3. Chest x-ray was done to confirm the diagnosis.
4. Blood sample sent for estimating complete blood count.
5. According to platelet count, children were categorised into 2 groups, having thrombocytosis and normal platelet count.
6. Normal platelet counts range between 150000/mm3 and 450000/mm3.[8]
7. Thrombocytosis is defined as platelet count >4.5 lakhs/ mm3.[1]

**Statistical Analysis**
Data were analysed using Statistical Package for the Social Sciences (SPSS) Version 27.0. Categorical variables were expressed as number and percentages. Fisher's exact test, Chi-square test was used for categorical data as appropriate. A P-value < 0.05 was considered significant.
**Inclusion Criteria**

1. Children between 2 months to 5 years with pneumonia.

**Exclusion Criteria**

1. Children of age less than 2 months and more than 5 years.
2. Children with renal disorder, neurological infection, gastroenteritis and on drugs causing electrolytes disturbance.

## RESULTS

Total 1043 cases were taken according to inclusion and exclusion criteria. Among 1043 cases, 63.1% (658) were pneumonia, 36.9% (385) were severe pneumonia. [Figure: 1]

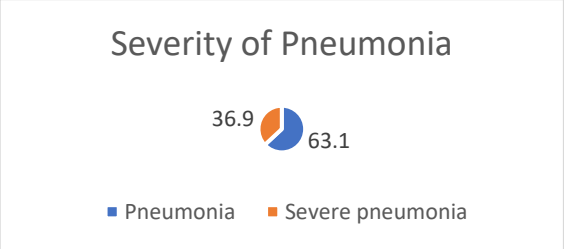


**Figure 1: Distribution according to severity of pneumonia**

Among 768 cases of 2-12 months, 462 (70.2%) had pneumonia, and 306 (79.5%) had severe pneumonia. Among 275 cases of 13-60 months, 196 (29.8%) had pneumonia, and 79 (20.5%) had severe pneumonia. The chi-square value was 10.7454, and the P-value was 0.001, which is significant. (Table 1).

**Table 1: Shows association of age distribution in severity of pneumonia (n=1043)**

| Age in months | Pneumonia(n=658) | Severe pneumonia (n=385) |
|---|---|---|
| 2 – 12 months (n=768) | 462(70.2%) | 306(79.5%) |
| 13- 60 months (n=275) | 196(29.8%) | 79(20.5%) |
| Statistical Inferences | Chi-square value- 10.7454<br>P-Value- 0.001 | |

Out of total 1043 cases 334 of them had thrombocytosis whereas 632 patients had normal platelet count. The incidence of thrombocytosis was 32 % among the study population with a P- value of < .00001 which is significant. [Table 2]

**Table 2: Association of Incidence of thrombocytosis in study population (n=1043) to Incidence of normal platelet count in study population (n=1043)**

| Platelet | Frequency | Percent |
|---|---|---|
| **Normal Platelet Count** | 632 | 60.6% |
| **Thrombocytosis** | 334 | 32.0% |
| | P-value is < .00001. | |

Out of total 658 patients of pneumonia, 98 (14.9 %) had thrombocytosis while 511 (77.7%) had normal platelet count. The P- value was calculated to be < .00001which is significant. In 358 patients of severe pneumonia 236(61.3 %) had thrombocytosis as opposed to 121 (31.4%) patients with normal platelet count. Again the P- value was found to be < .00001 which is significant. [Table 3, Figure 2].


ISSN (O): 2687-5365; ISSN (P): 2753-6556

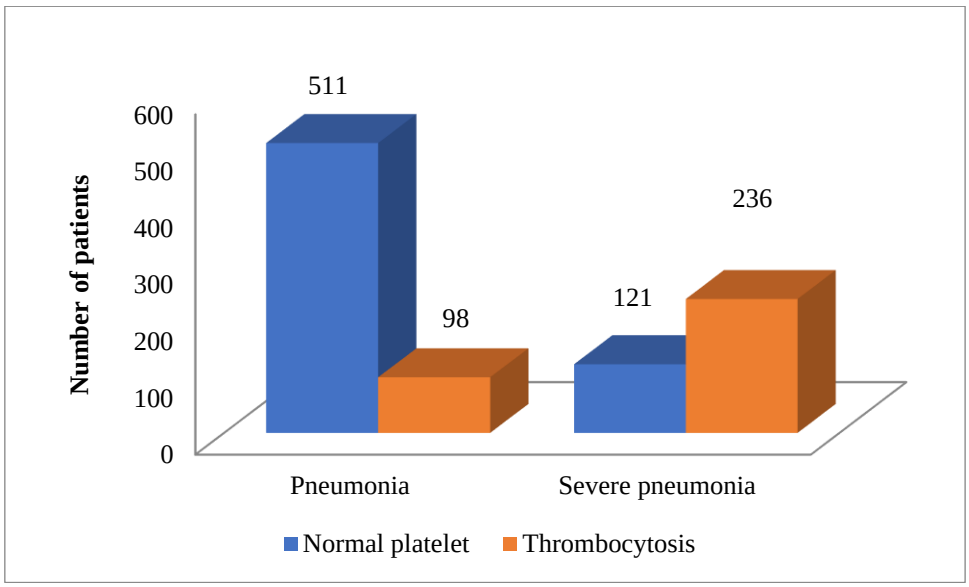


**Figure 2: Relation between Incidence of thrombocytosis in Pneumonia (n=658) and Severe pneumonia (n=385) cases to incidence of Normal platelet count in Pneumonia (n=658) and Severe pneumonia (n=385).**

**Table 3: Relation between Incidence of thrombocytosis in Pneumonia (n=658) and Severe pneumonia (n=385) cases to incidence of Normal platelet count in Pneumonia (n=658) and Severe pneumonia (n=385)**

| **Platelet** | **Pneumonia** | **Severe pneumonia** |
|---|---|---|
| Normal Platelet Count<br>Row %<br>Col % | 511<br>80.9<br>77.7 | 121<br>19.1<br>31.4 |
| Thrombocytosis<br>Row %<br>Col % | 98<br>29.3<br>14.9 | 236<br>70.7<br>61.3 |
| **P-value** | < .00001 | < .00001 |

The average duration of stay for patients with thrombocytosis is 6.17 days for pneumonia and 6.52 days for severe pneumonia. The P-value for this comparison is 0.258, which is statistically insignificant. Similarly, the average duration of stay for patients with a normal platelet count is 6.12 days for pneumonia and 6.36 days for severe pneumonia. The P-value for this comparison is 0.436 which is also statistically insignificant. (Table 4)

**Table 4: Average duration of stay in relation to platelet in severity of pneumonia**

| **Platelet** | **Average duration of stay in days** | | **P-Value** |
|---|---|---|---|
| | Pneumonia | Severe pneumonia | |
| Thrombocytosis | 6.17 | 6.52 | 0.258 |
| Normal platelet count | 6.12 | 6.36 | 0.436 |

In the thrombocytosis group, there were 5 deaths reported (0.4%). In normal platelet count group death reported was that of 9 patients (0.8%). The statistical analysis gave a P-value of 0.2850 which was not significant. [Table 5].

**Table 5: Incidence of death in relation to thrombocytosis and normal platelet count in pneumonia (n=1043)**

| | **Thrombocytosis** | **Normal Platelet** | **P-value** |
|---|---|---|---|
| **Death** | 5 (0.4%) | 9 (0.8%) | 0.2850 |

## DISCUSSION

In this study among 1043 cases, 63.1% (658) were pneumonia, 36.9% (385) were severe pneumonia. Out of total 1043 cases 334 of them had thrombocytosis whereas 632 patients had normal platelet count. The incidence of thrombocytosis was 32 % among the study population with a P- value of < .00001 which is significant, which was comparable to study done by J Choudhury et al (2017).[2] In out of 658 cases of pneumonia, thrombocytosis was found in 14.9% of cases and out of 385 cases of severe pneumonia, thrombocytosis was found 61.3% of cases. P Value < 0.00001 which is significant. Our study shows severity increases with thrombocytosis, similar result was found in P Chandrakala et al (2021)[1] study, which shows 42% cases of pneumonia and 58% cases of severe pneumonia have thrombocytosis. A similar consistent result is also shown in by J Choudhury et al (2017).[2] Our study


ISSN (O): 2687-5365; ISSN (P): 2753-6556

shows average duration of stay in cases of pneumonia with thrombocytosis was 6.17 days while the average duration in cases of severe pneumonia with thrombocytosis was 6.52 days. Both of which came out to be statistically insignificant. Study conducted by P kiyawat et al (2021),[9] also shows increased duration of hospital stay in patient of severe pneumonia with thrombocytosis in comparison to patient of pneumonia with thrombocytosis. Similar result was also found in study conducted by J Choudhury (2017),[2] Usha D et al (2014).[10] In the thrombocytosis group, there were 5 deaths reported (0.4%). In normal platelet count group death reported was that of 9 patients (0.8%). The statistical analysis gave a P-value of 0.2850 which was not significant.

## CONCLUSION

In our study most cases of severe pneumonia were found in 2-12 months of age group with no any significant association with sex. Thrombocytosis came out to be an important predictor of severity of pneumonia and a significant association was found between thrombocytosis and severity of pneumonia. It can be emphasized that in a case of clinically diagnosed pneumonia, thrombocytosis could be used as early predictor for severity of the disease.

Conflict of interest: None

## REFERENCES


1. Chandrakala P, Patil V, Kavya VN, Sushmitha. Thrombocytosis: a predictor of severity in children with lower respiratory tract infection. Int J Contemp Pediatr 2021;8:1658-61.
2. Chaudhary J. Thrombocytosis in under five children with lower respiratory tract infection. Arch Pediatric Infect Dis. 2017;6(1);e61605.
3. Dame C, Sutor AH. Primary and secondary thrombocytosis in childhood. Br J Haematol 2005; 129:165-77.
4. Heng JT, Tan AM. Thrombocytosis in childhood. Singapore Med J 1998; 39:485,487.
5. Klinger MH, Jelkmann W. Role of blood platelets in infection and inflammation. J Interferon Cytokine Res 2002; 22(9):913-22.
6. Yeaman MR. The Role of Platelets in Antimicrobial Host Defense. Clinical Infectious Diseases 1997; 25:951-70.
7. https://iapindia.org/pdf/Ch-011-Community-Acquired-Pneumonia.pdf/ downloaded at 11:37am on 11.4.2023.
8. Dua Vikas, Sachdev A, Yadav SP. Practical Pediatric Hematology (IAP). 2nd ed. 2012; 90-97.
9. P. Kiyawat et al International Journal of Health and Clinical Research, 2021;4(4):275-277.
10. Usha D, Sudha Rudrappa. Significance of thrombocytosis in lower respiratory tract infections.MedPulse international Medical JournalSeptember 2014; 1(9): 470-475.




ISSN (O): 2687-5365; ISSN (P): 2753-6556