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Original Article

Platelet Count: A Possible Marker for Severity of Community Acquired Pneumonia

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Abstract

Background: Platelets play an essential role in both coagulation system and the host immune defenses against infection including community-acquired pneumonia (CAP). Its response in antimicrobial host defense is similar, in many ways, to the leukocyte response as both cell types contain antimicrobial peptides that act against a broad range of pathogens.
Objective: The aim of this study was to detect whether platelet count could be used as a marker for severity of community acquired pneumonia (CAP) or not.
Materials and Methods: This observational cross-sectional study was carried out at Medicine ward in Mymensingh Medical College Hospital (MMCH) from July 2018 to December 2018. In total 100 cases were selected as per a pre-defined exclusion and inclusion criteria. All cases were subjected to the following: full history taking, thorough clinical examination and necessary investigations including compete blood picture. CURB-65 score was considered as a marker for severity of CAP. Data were processed, analyzed and disseminated by MS Office and SPSS programs as per need.
Results: According to platelet count at admission, 29% patients showed thrombocytopenia and 59% normal platelet count, while 12% patients showed thrombocytosis. Significant correlation between both thrombocytopenia and thrombocytosis and the CURB-65 score was found in this study. There was also found a significant relation between both thrombocytopenia and thrombocytosis with confusion and hypotension among the patients with CAP.
Conclusion: A better understanding of the role of platelets in the severity of patients with CAP may generate new prognostic and therapeutic modalities for patients with severe disease.

Keywords: Community acquired pneumonia, Thrombocytopenia and Thrombocytosis, CURB-65.

Introduction

Community-acquired pneumonia (CAP) is a common and potentially serious illness.[1] It is defined as an acute infection of the pulmonary parenchyma, occurring outside the hospital, with clinical symptoms accompanied by the presence of pulmonary infiltrates on chest radiograph. With a prevalence estimated at nearly five million cases annually in United States, emergency physicians and general practitioners diagnose and treat CAP on a regular basis.[2] Nearly one third of CAP patients arrived by emergency medical services, and half eventually were admitted.[3] Despite the availability of potent antibiotics, community-acquired pneumonia (CAP) remains common and serious illness with significant morbidity and mortality, both in developing and developed countries. In the United State, pneumonia is the sixth leading cause of death.[4] Many clinicians are concerned about the severity of CAP and its associated mortality. The Pneumonia Patients Outcome Research Team score was introduced in 1997 to assess the severity of CAP after a study including more than 50,000 patients.[5] Established by the American Thoracic Society/ Infectious Diseases Society of America, this scoring system is called the Pneumonia Severity Index (PSI) and is the recom mended severity scoring system for CAP. More simple severity scores for CAP, such as CURB-65, have also been documented.[6] CURB-65 is a five-point scoring system for CAP, recommended by the British Thoracic Society, and includes confusion, urea >7 mmol/L (19 mg/dL), respiratory rate >30 breaths per minute, low blood pressure (systolic blood pressure < 90 mmHg and/or diastolic blood pressure ≤ 60 mmHg) and age >65 years. But these scoring systems may be affected by subjec tivity on the part of

the individual clinician. For example, it is often difficult for clinicians to evaluate the mental status of patients with CAP who have dementia or those of advanced age, so the severity score may vary from clinician to clinician.[7] In contrast, certain serum biomarkers have been reported to predict mortality and to indicate the severity of CAP. These include inflammatory biomarkers, such as platelet count,[8] C-reactive, procalcitonin, higher blood urea nitrogen levels and lower serum albumin levels. Platelets have been increasingly recognized as an important component of innate and adaptive immunity.[9] Platelet response in antimicrobial host defense is similar, in many ways, to the leukocyte response: both cell types contain antimicrobial peptides that act against a broad range of pathogens. After platelets and neutrophils are activated, they accumulate at the site of infection to produce direct contact between their antimicrobial peptides and invading bacteria. Leukocytes need to phagocytize bacteria to achieve interaction with intracellular peptides; platelets can also internalize microorganisms into phagosome-like vacuoles, enhancing pathogen clearance. Antimicrobial peptides from both cells exert a rapid, potent, and direct antimicrobial effect that contributes to limiting the infection.[10] Clinicians have always evaluated the degree of leukocytosis in patients with pneumonia as an indication of systemic inflammatory response and severity of disease. Thrombocytopenia is also a recognized marker of poor outcomes in patients with pneumonia due to the association of low platelet counts with disseminated intravascular coagulation and severe sepsis.[11] In perspective of our country laboratory diagnosis of Platelet count is easily available, and affordable test.

Therefore, the proposed study is intended to determine the levels of Platelet count in patients with CAP and relation with severity of CAP. The data generated from the study might be useful for routine use in the diagnosis and prognosis of CAP.

Materials and Methods

This is a cross sectional prospective study conducted in the Department of Medicine, Mymensingh Medical College Hospital, from July 2018 to December 2018. A total 100 cases with community acquired pneumonia admitted in hospital were confirmed as the study population as per predefined inclusion and exclusion criteria. Ethical clearance was taken from the IRB Mymensingh Medical College. Informed written consent was taken from the patient/attendant (in case of altered consciousness). Data were collected by face face interview with necessary clinical examination and investigations. Data was analyzed using Microsoft Excel and SPSS software.

Inclusion criteria

- **i.** Are aged ≥14 years
- **ii.** Admitted from the community,
- **iii.** Presented with a radiographic infiltrate and showed at least two compatible clinical findings (e.g., body temperature >38°C, productive cough, chest pain, shortness of breath, crackles on auscultation).

Exclusion criteria

Patients were excluded if they

- **i.** Had acute illness within last 3 months. or
- **ii.** are chronically immunosuppressed (i.e., chemotherapy, HIV infection, therapy with ≥20 mg prednisolone or equivalent)
- **iii.** Any Diseases like ITP, CLD, SLE, etc. which causes thrombocytopenia.
- **iv.** Severely ill patients like uncontrolled DM, tuberculosis, bronchiectasis, or lung cancer etc.

Results

This descriptive study conducted in Medicine department of Mymensingh Medical College and Hospital from July 2018 to December 2018 was included total 100 cases of CAP.

Table- I: Distribution of population by general data (n=100)

Variables		Frequency	Percentage (%)
Age	1-19	1	1.0
	20-39	24	24.0
	40-59	19	19.0
	60-80	56	56.0
	Mean ± SD (years)	60.5±19.6	
Sex	Male	68	68.0
	Female	32	32.0
Smoking	Non smoker	49	49.0
	Smoker	51	51.0

Table-I shows the age of the patients ranged from 18 to 95 years with a mean of 60.5±19.6 years. Out of 100 patients 68% were male and 32% female, 51% patient was smoker.

Table-II: Distribution of the population by clinical & biochemical profile

Variables		Frequency	Percentage (%)
Confusion	No	29	29.0
	Yes	71	71.0
Respiratory rate	<30	21	21.0
	>30	79	79.0
Hypotension	No	70	70.0
	Yes	30	30.0
WBC	<4000	5	5.0
	4000-11000	53	53.0
	>11000	42	42.0
Platelet	<150000	29	29.0
	150000-400000	59	59.0
	>400000	12	12.0
S. Urea	<20	37	37.0
	≥20	63	63.0
Hyponatremia	No	60	60.0
	Yes	40	40.0

In Table- II it shows on admission 71% patients was found in confusional state and 29% patients well alert, 79 % patients had respiratory rate more than 30 breaths/min while 21% less than 30, 70% patient was found in hypotension (BP ‹90/60 mmHg) and 30% patient had blood pressure more than 90/60 mm (Hg). Regarding biochemical parameter, 53% patients were found having WBC count normal (4000-11,000 cells/mm3), while 42% patient leukocytosis (>11000 cells/mm3) and 5% patients had leukopenia (<4000 cells/mm3). Maximum patients 59% had platelet count between 150000-400000 cells/mm3, 29% patients had Thrombocytopenia (<150000 cells/mm3) and 12% patient had Thrombocytosis (>400000 cells/mm3). 63% patient had serum urea level more than or equal to 20 mg/dl while 37% patient had less than 20 mg/dl, 60% patients had serum Sodium level more than 130 meq/L and 40% patients had Hyponatremia that is less than 130 meq/L.

Variables		Platelet						P value	Level of Significance
		<150000		150000-400000		>400000			
		Count	%	Count	%	Count	%		
Confusion	No	4	13.8	25	42.4	0	0.0	0.001	**
	Yes	25	86.2	34	57.6	12	100.0		
Respiratory rate	<30	3	10.3	17	28.8	1	8.3	0.070	NS
	>30	26	89.7	42	71.2	11	91.7		
Hypotension	No	12	41.4	53	89.8	5	41.7	0.001	**
	Yes	17	58.6	6	10.2	7	58.3		
WBC	<4000	2	6.9	3	5.1	0	0.0	0.900	NS
	4000-11000	15	51.7	32	54.2	6	50.0		
	>11000	12	41.4	24	40.7	6	50.0		
S. Urea	<20	6	20.7	27	45.8	4	33.3	0.070	NS
	>20	23	79.3	32	54.2	8	66.7		

Significant statistical correlation between Thrombocytopenia and Thrombocytosis with confusion state and Hypotension was found as the P value here is 0.001 but there was no significant statistical correlation between Platelet count with respiratory rate, WBC count and S. Urea. (Table- III).

Table -IV: Relation of platelet count with CURB-65.

CURB-65 Score	Platelet						P value	Level of Significance
	<150000		150000-400000		>400000			
	Count	%	Count	%	Count	%		
2.00	4	13.8	35	59.3	1	8.3	0.001	**
3.00	8	27.6	18	30.5	4	33.3		
4.00	12	41.4	6	10.2	7	58.3		
5.00	5	17.2	0	0.0	0	0.0		

* Chi-Square Test (χ^2- test).

In Table - IV we found there was significant correlation between both Thrombocytopenia and Thrombocytosis with CURB-65 score, as the P value is here 0.001.

Discussion

Clinicians have always evaluated the degree of leukocytosis in patients with pneumonia as an indication of systemic inflammatory response and severity of disease. Thrombocytopenia is also a recognized marker of poor outcomes in patients with pneumonia, due to the association of low platelet counts with disseminated intravascular coagulation and severe sepsis.[9] Platelets are important inflammatory cells that can undergo chemotaxis and are able to release numerous pro inflammatory molecules. In patients with CAP, there is an association between levels of inflammatory cytokines and severity of disease. It can be theorized that thrombocytosis may favor an exaggerated systemic inflammatory response that, in turn, produces poor outcomes in patients with CAP.[12]

This study was a prospective one about the relation between platelet count abnormality and the severity of community-acquired pneumonia cases. The study included 100 cases of CAP admitted in the Medicine Department of Mymensingh Medical College and

Hospital. The results showed that 68% of the enrolled patients were males and 32% were females, the age ranged from 18 to 80 years with a mean of 60.5 ± 19.6 years. Among the respondents 51% smoker and 49% were nonsmoker, 71% patients were confused and 29% well alert, 79% patients had respiratory rate more than 30 breaths/min and 21% less than 30. Hypotension was found among 30% patents. 53% patients had normal WBC count whereas 42% Leukocytosis and 5% patients had Leukopenia. 40% patient had hyponatremia and 63% patient had S. Urea level more than 20 mg/dl. Platelet count was distributed as 59% had normal count, 29% Thrombocytopenia and 12% patients had Thrombocytosis. For evaluation of pneumonia severity, CURB-65 criteria were used, which in this study, the frequencies of ranking were 40 % patients had CURB-65 score 2, 30% had 3, 25% had 4 and 5% patients had score 5.

There was no significant correlation between the Age, smoking status and respiratory rate versus the platelet count. Also, there was no significant correlation between the platelet count versus WBC count and S. Urea level. Importantly, there was a significant relation of confusion state and hypotension with both thrombocytopenia and thrombocytosis.

Moreover, there was a significant relation between both thrombocytopenia and thrombocytosis and the CURB65 score as a score for severity of CAP. These results are similar to those of Martinez et al. who conducted a 12-month prospective multicenter and longitudinal study in 10 hospitals of a Spanish Mediterranean area. They included hospitalized adult patients with CAP. They analyzed 1314 patients. Forty-three patients (3%) presented with thrombocytopenia, 107 (8%) thrombocytosis and 1164 (89%) had normal platelet count. They concluded their study with that, here is a significant relation between the occurrence of respiratory complications and both thrombocytopenia and thrombocytosis. Also, there was a significant relation between both thrombocytopenia and thrombocytosis and the CURB-65 score as a score for severity of CAP.[13]

Georges et al. conducted a multicenter retrospective study showing, in 822 patients admitted to an ICU for severe CAP, that severe thrombocytopenia (< 50,000 cells/lL) was an independent predictor of mortality. They looked at the impact of thrombocytosis in their patients. The overall ICU mortality rate was 35.4%. Thrombocytosis was present in 70 (5.7%) patients. They did not find any difference in outcome compared with patients with thrombocytosis. When considering the cause of death according to platelet numbers, they found it was essentially related to sepsis complications in patients with thrombocytopenia (septic refractory shock, n=18; multi organ failure, n=17; ARDS, n=11; nosocomial pneumonia, n=8), while in patients with thrombocytosis, the cause of death was mostly related to complications of ICU stay or associated co morbidity. Thus, they believed that thrombocytopenia remains an important predictor of outcome in patients with severe CAP. In these patients, thrombocytosis is not associated with worse outcome.[14] The difference between the results of our study and those of Georges et al. might be due to the obvious discrepancy in the number of enrolled patients with thrombocytosis in both studies.

On the contrary, Prina et al. prospectively analyzed 2423 consecutive, hospitalized patients with CAP. They found that patients with thrombocytosis presented more frequently with respiratory complications, such as complicated pleural effusion and empyema, whereas those with thrombocytopenia presented more often with severe sepsis, septic shock, need for invasive mechanical ventilation and ICU admission. They concluded that thrombocytosis in patients with CAP is associated with poor outcome, complicated pleural effusion, and empyema.[15]

The results of our study are supported with those of Mirsaeidi et al. who conducted a retrospective cohort study of 500 consecutive patients admitted with CAP to the Veterans Administration Medical Center of Louisville, Kentucky, between June 2001 and March 2006.[16] This study indicated that thrombocytopenia and thrombocytosis were significantly associated with mortality in patients with CAP. At the time of hospitalization, abnormalities in platelet count were

better predictors of clinical outcomes in patients with CAP when compared with abnormalities in leukocyte count.

Conclusion

On the basis of this study, we can conclude that abnormal platelet count is associated with higher CURB-65 score. There is association between abnormal platelet count and severity of pneumonia, abnormal platelet counts and confusion, abnormal Platelet count and Hypotension. Using this test can be effective in rapid evaluation and early assessment of CAP for making clinical decisions regarding the management of the patients. As the present results are confirmed in other studies, Platelet count could be a highly useful tool for measuring severity of patients with CAP.

References

1. Gotfried MH. Epidemiology of clinically diagnosed community-acquired pneumonia in the primary care setting: results from the 1999-2000 respiratory surveillance program. Am J Med 2001;111(9):25-29.
2. Schappert SM, Burt CW. Ambulatory care visits to physician offices, hospital outpatient departments, and emergency departments. United States 2006; 159:1-66.
3. Niska R, Bhuiya F, Xu J. National Hospital Ambulatory Medical Care Survey: 2007 emergency department summary. Natl Health Stat Report 2010; 26:1-32.
4. Garibaldi RA. Epidemiology of community-acquired respiratory tract infections in adults. Incidence, etiology, and impact. Am J Med 1985; 78:32-7.
5. Fine MJ, Smith MA, Carson CA, Mutha SS, Sankey SS, Weissfeld LA, Kapoor WN. Prognosis and outcomes of patients with community-acquired pneumonia: a metaanalysis. JAMA 1996; 275:134-41.
6. Lim WS, van der Eerden MM, Laing R, Boersma WG, Karalus N, Town GI, Lewis SA, Macfarlance JT. Defining commu nity acquired pneumonia severity on presentation to hospital: an international derivation and validation study. Thorax 2003; 58:377–82.
7. Rudolph JL, Zanin NM, Jones RN, Marcantonio ER, Fong TG, Yang FM, Yap L, Inouye SK. Hospitalization in community-dwelling persons with Alzheimer's disease: frequency and causes. J Am Geriatr Soc 2010; 58:1542–48.
8. Ashraf A. E Maraghy, Eman B. AbdelFattah, Mostafa S. Ahmed. Is it a possible marker for severity and outcome of community acquired pneumonia?. Egypt. J. Chest. Dis. 2016;65(2):499-504.
9. B.D. Elzey, D.L. Sprague, T.L. Ratliff. The emerging role of platelets in adaptive immunity. Cell. Immunol. 2005; 238(1):1–9.
10. J.R. Fitzgerald, T.J. Foster, D. Cox. The interaction of bacterial pathogens with platelets. Nat. Rev. Microbiol 2006;4(6): 445–457.
11. M.R. Yeaman, A.S. Bayer. Antimicrobial peptides versus invasive infections. Curr. Top. Microbiol. Immunol 2006; 306:111 –152.
12. G. Antunes, S.A. Evans, J.L. Lordan, A.J. Frew. Systemic cytokine levels in community -acquired pneumonia and their association with disease severity. Eur. Respir. J. 2002; 20 (4):990–995.
13. I. Martinez, F. Sanz, E. Fernandez, A. Cervera, M.L. Briones. Platelet count is a marker of outcome in community-acquired pneumonia. European Respiratory Society Annual Congress 2013 Abstract Number: 3914.
14. H. Georges, N. Brogly, D. Olive, O. Leroy. Thrombocytosis in Patients with Severe Community-Acquired Pneumonia. Chest 2010;138(5):1279.