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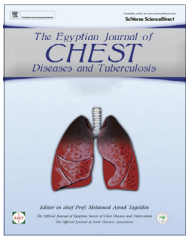

ORIGINAL ARTICLE

Thrombocytosis at time of hospitalization is a reliable indicator for severity of CAP patients in ICU

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KEYWORDS

Community-acquired pneumonia;
PSI;
CURB-65 score;
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Leucocytosis

Abstract *Background:* Clinicians have always evaluated the degree of leukocytosis in patients with pneumonia as an indication of systemic inflammatory response and severity of disease. But platelets have been increasingly recognized as inflammatory cells with an important role in host defenses.

Objective: To evaluate if abnormal platelet count in hospitalized patients with CAP was associated with severity of CAP comparing it with abnormal leucocytes' count.

Methods: The study enrolled 66 patients with community acquired pneumonia admitted to respiratory ICU of Ain Shams University and Ain Shams University specialized hospitals. Data were collected from each patient including demographic data, clinical findings, comorbidities, laboratory data, arterial blood gas results, chest radiographic findings; pneumonia severity index (PSI) and CURB-65 were calculated. Simple correlations between variables were examined by calculating Pearson's product correlation coefficient. Four models of multiple linear regression analysis was performed to study the simultaneous effects of the different data variables on PSI, CURB-65 score, need for mechanical ventilation and length of stay in ICU as dependent variables respectively indicating pneumonia severity.

Results: There were significant correlations between the following: personal data, clinical findings, arterial blood gas findings, laboratory results, radiological findings and data of severity which are (PSI, PSI class, CURB-65 score, length of stay in ICU, mechanical ventilation) ($p < 0.001$). Thrombocytosis was strongly associated with CAP severity parameters and was more significant than abnormal leucocytic count in predicting the severity of CAP as studied on their effect

Abbreviations: CAP, community-acquired pneumonia; PSI, pneumonia severity index; CURB-65, confusion, urea $\geqslant$7 mmol/L, respiratory rate $\geqslant$30 breaths/min, blood pressure $\leqslant$90 mm Hg systolic or $\leqslant$60 mm Hg diastolic, age $\geqslant$65 years.

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on PSI, CURB-65 score and need for mechanical ventilation; while leucocytosis was more significant in predicting the length of stay in ICU than thrombocytosis.

Conclusion: Thrombocytosis can be used as a marker of severity in patients with community-acquired pneumonia better than leucocytes' count.

Introduction

Community-acquired pneumonia (CAP) continues to be associated with significant morbidity and mortality, is ranked together with influenza as the eighth leading cause of death in the United States [1]. Physicians continue to be either conservative or overestimating the risk of death in patients with pneumonia, and therefore affecting the decision to hospitalize many patients. Severity scores provide pivotal direction for the management of community-acquired pneumonia helping guide decisions such as the appropriate venue for care, diagnostic strategies, and antibiotic therapies. Fine and his colleagues [2] have provided us with a validated evidence-based tool and a most popular severity scores, the pneumonia severity index (PSI) which is specific for predicting mortality, besides the British Thoracic Society's CURB-65 [3] (Confusion, urea $\geqslant$ 7 mmol/L, respiratory rate $\geqslant$ 30 breaths/min, blood pressure $\leqslant$ 90 mm Hg systolic or $\leqslant$60 mm Hg diastolic, age $\geqslant$ 65 years) are accurate for predicting pneumonia-related mortality These tools are simple to apply and highly useful in practice, and have been widely adopted [4,5].

No matter how simple or validated a tool may be, many physicians find any scoring system cumbersome and would prefer a single surrogate blood test that would allow them to predict outcomes and to stratify risk in patients [6].

Previously, Clinicians have always evaluated the degree of leukocytosis in patients with pneumonia as an indication of systemic inflammatory response and severity of disease. But Platelets have been increasingly recognized as an important component of innate and adaptive immunity. 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 that contributes to limiting the infection [7]. Therefore, 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 [8]. However, to our knowledge scanty studies investigated the association between thrombocytosis and clinical outcomes in adult patients with CAP [9]. Therefore, considering that platelets play a crucial role in antimicrobial host defenses and the coagulation system, the primary objective of this study was to investigate the association of an abnormal platelet count as an important marker to assess severity of disease in patients with CAP versus the usual counting on the total leukocyte count.

Subjects and methods

Patients and study design

The study was conducted on 66 patients, all had community acquired pneumonia and all were admitted to respiratory ICU of Ain Shams University and Ain Shams University specialized hospitals. Data were collected from each patient including demographic data, clinical findings, comorbidities, laboratory data, arterial blood gas results, chest radiographic findings, the collected data were used to calculate the patient's pneumonia severity using the pneumonia severity index (PSI) and CURB-65 (confusion, urea, respiratory rate, blood pressure, age $\geqslant$ 65 years). There were no exclusion criteria.

Definitions

CAP was defined as the presence of a new pulmonary infiltrate on chest radiograph at the time of hospitalization associated with at least one of the following: (1) new or increased cough, (2) an abnormal temperature ($<$35.6 °C or $>$37.8 °C) and (3) an abnormal serum leukocyte count (leukocytosis, left shift, or leucopenia defined by local laboratory values). Hypotension as defined as a systolic blood pressure $\leqslant$ 90 mm Hg or diastolic blood pressure $\leqslant$ 60 mm Hg. Alteration of gas exchange was defined as PaO_2 $<$ 60 mm Hg or PaO_2/FIO_2 $<$ 300 or O_2 saturation $<$ 90%. Thrombocytopenia and thrombocytosis were defined as platelet counts $<$ 150,000/L or $>$400,000/L, respectively. Significant leucopenia and leukocytosis were defined as WBC counts of $<$4,000 and $>$11,000, respectively [9].

Data analysis

Simple correlations between variables were examined by calculating Pearson's product correlation coefficient. Multiple linear regression analysis was performed to study the simultaneous effects of the different data variables on each parameter indicating pneumonia severity as a dependent variable. Data are presented as mean ± SD for continuous variables or frequency (percentage %) for categorical variables, $P < 0.05$ was considered significant. Analysis was performed using the statistical software (SPSS version 17; SPSS, Inc., Chicago, IL, USA).

Results

Sixty-six patients with community acquired pneumonia were recruited from the respiratory ICU of Ain Shams University hospital and Ain Shams University Specialized hospital. The patient characteristic data are described in Table 1.

Data presented as mean ± SD or frequency (percentage); SBP, systolic blood pressure; DBP, diastolic blood pressure; ABG, arterial blood gases; ALB, albumin; HCT, hematocrit value; TLC, total leukocytic count; PSI, pneumonia severity index; MV, mechanical ventilation; CURB-65: confusion, urea, respiratory rate, blood pressure, age $>$ 65 years.

Correlations of different data with the parameters indicating severity on admission (PSI, PSI class, CURB-65 score, length of stay in ICU, mechanical ventilation) were done using Pearson's product correlation. There were significant correlations between the following: personal data (age, sex, smoking