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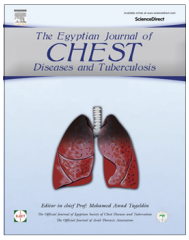

ORIGINAL ARTICLE

Hemogram values in community acquired pneumonia

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KEYWORDS

Community acquired pneumonia;
Thrombocytosis;
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Abstract *Background:* Hemogram or complete blood count (CBC) is one of essential laboratory tests either in the diagnosis or assessment of community acquired pneumonia (CAP) patients.

Objective: To assess the role of leukocyte and platelet count in determination of the severity and outcome of CAP.

Patients and methods: This is a prospective descriptive study which was done on 95 patients aged ⩾18 years, who were diagnosed to have CAP. Clinical, laboratory and chest radiographic finding data were collected for each patient. Assessment of CAP severity using Pneumonia Severity Index (PSI) and CRB-65 score (the confusion, respiratory rate, blood pressure plus age ⩾65) was done for all enrolled patients. Thrombocytopenia and thrombocytosis were defined as platelet count $<100{,}000/\mu L$ and $400{,}000/\mu L$, respectively. Leukopenia and leukocytosis were defined as WBC count of $<4000/\mu L$ and $>11{,}000/\mu L$, respectively. The outcome variable was in-hospital mortality.

Results: In this study 75 (78.9%) of patients improved (survivors) and the outcome of 20 (21.1%) patients was in-hospital mortality (non-survivors). PS-index score III, IV and V and CRB-65 score II, III and IV were significantly higher in patients with thrombocytosis ($P < 0.006$, $P < 0.04$ respectively) while there was no significant difference as regards leukocyte count in both scores. Also both thrombocytopenia and thrombocytosis were significantly higher in non survivors ($P < 0.006$) while there was no significant difference as regards leukocytosis. Platelet count has a significant positive correlation with CRB-65 and PS index with *P*-value 0.001 for each and *r*-value 0.236, 0.259 respectively.

Conclusion: On assessment of CAP patients at admission; platelet count could be considered to be a valuable indicator of severity and outcome on evaluating hemogram (CBC) values than the more commonly used leukocyte count.

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Introduction

Up till now community acquired pneumonia (CAP) still has significant morbidity and mortality especially with the emergent pathogens that presented with aggressive pictures of

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CAP. It is considered as the eighth cause of death in the United States. In the world of community acquired pneumonia early and adequate severity assessment and treatment are recommended to improve morbidity and mortality of CAP. Usually patients were treated according to international guidelines, and scores of severity were used to classify patients that help to decide the site of care in CAP patients [1].

Hemogram or complete blood count (CBC) is one of essential laboratory tests either in the diagnosis or assessment of CAP patients where leukocyte values are considered as an indication of systemic inflammatory response and severity of disease. Recently, being part of the hemostatic process, platelets have been increasingly recognized as an important component of the immune response to infection similar to the leukocyte response [2–4]. It has been evidenced that platelets play a major role in antimicrobial host defense in different ways similar to the leukocyte response as both cell types contain antimicrobial peptides to kill a broad range of pathogens [2]. Activation of platelets by agonists enhances platelet interactions with complement proteins and humoral immune components, as well as leukocytes and endothelial cells. Leukocytes need to phagocytize bacteria to achieve interaction with intracellular peptides; also platelets are capable of binding, aggregating and internalizing microorganisms into phagosome-like vacuoles, which enhances the clearance of pathogens from bloodstream and release potent antimicrobial peptides that participate in antibody dependent cell cytotoxicity functions to kill pathogens [5]. Inflammatory thrombocytosis is related to increased levels of several cytokines such as thrombopoietin, interleukin-6, interleukin-1alpha, interleukin-8 and tumor necrosis factor alpha [6]. Studies revealed that severe CAP is associated with significant increment of plasma levels of the inflammatory cytokines TNF-α, IL-1b, IL-6, IL-8 [7,8].

Although many scores have been established to evaluate the severity and outcome of CAP, we are in real need to a clinically rapid and reliable method for assessment.

The aim of this study is to assess the role of two components of hemogram; one of them is leukocyte count and the other is platelet count, in determination of severity and outcome of CAP.

Patients and methods

This is a prospective descriptive study which was done on 95 patients aged $\geqslant 18$ years, who were diagnosed to have CAP. All of them were admitted to Chest Department, Assiut University Hospitals between September 2013 and December 2014. CAP was defined [9] as the presence of a new pulmonary infiltrate on chest radiograph at the time of hospital admission associated with at least one of the following: (1) new or increased symptoms and signs of lower respiratory tract infection, (2) an abnormal temperature (35.6 °C or 37.8 °C), (3) an abnormal serum leukocyte count (leukocytosis, left shift, or leukopenia defined by local laboratory values). We excluded patients with previous use of oral corticosteroids ($\geqslant 10$ mg prednisone equivalent per day for at least 2 weeks); other immunosuppressive therapy; tuberculosis; HIV infection; active solid or hematologic neoplasm; hematologic disease involving platelets and/or leukocytes, such as essential thrombocytosis or myelodysplastic syndrome, patients on antiplatelet or anticoagulant drugs; and hospitalization within the preceding 21 days. Clinical and laboratory data were collected for each patient. These include patient's demographic, clinical presentation, comorbidity, physical examination, laboratory (CBC, liver function, arterial blood gas, serum urea and creatinine, serum electrolyte) and chest radiographic findings. Thrombocytopenia and thrombocytosis were defined as platelet counts $<100{,}000/\mu L$ or $>400{,}000/\mu L$, respectively [10]. Leukopenia and leukocytosis were defined as WBC counts of $<4000/\mu L$ and $>11{,}000/\mu L$, respectively [11]. Assessment of CAP severity at time of hospital admission using Pneumonia Severity Index (PSI) [12] and CRB-65 score (the confusion, respiratory rate, blood pressure plus age $\geqslant 65$) [13] was done for all enrolled patients. The outcome variable was in hospital mortality.

Statistical analysis

Analysis was performed using the statistical software (SPSS version 17; SPSS, Inc., Chicago, IL, USA). Data are presented as mean ± SD for continuous variables or frequency (percentage) for categorical variables, using χ^2-test to compare qualitative data while two-sampled unpaired *t*-test for quantitative data. *P* value of <0.05 was considered significant. The correlation of parameters with each other was investigated by the Pearson correlation test. Discriminative diagnostic values including sensitivity, specificity, and receiver operating characteristic (ROC) curve were assessed by medical tests.

Results

This study done upon 95 CAP patients where 75 (78.9%) of them improved (survivors) and the outcome of 20 (21.1%) patients was in hospital mortality (non-survivors). Patient characteristics are described in Table 1 where age is significantly older in non-survivors patients. Also length of hospital stay, patients on empirical antibiotics before hospital admission and comorbidity (Fig. 1) were significantly higher in those patients. Table 2 shows that PS-index score IV and V and CRB-65 score II, III and IV are significantly higher in non-survivors patients with $P < 0.000$. Normal platelet count was detected in 64 (67.4%) patients, thrombocytosis in 26 (27.4%) patients and thrombocytopenia in 5 (5.2%) patients, while normal leukocyte count was revealed in 26 (27.4%), leukopenia in two (2.1%) patients and leukocytosis in 67 (70.5%). Table 3 reveals that both thrombocytopenia and thrombocytosis were significantly higher in non survivors ($P < 0.006$) while there was no significant difference as regards leukocyte count.

As regards severity assessment of CAP patients; Table 4 reveals that PS-index score III, IV and V and CRB-65 score II, III and IV were significantly higher in patients with thrombocytosis ($P < 0.006$, $P < 0.048$ respectively) while there was no significant difference as regards leukocyte counts in both scores (Table 5).

There is a significant positive correlation between platelet counts with both CRB-65 and PSI scores (*r*-value 0.335, 0.259, respectively) with $P < 0.022$, <0.011 respectively, also there is a significant positive correlation between leukocyte counts with both CRB-65 and PSI scores (*r*-value 0.319, 0.253, respectively) with $P < 0.002$, <0.013 respectively (Figs. 2–5).

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