Potential role of hematological parameters in patients with chronic obstructive pulmonary disease: current point of view

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The article by Kalemci et al[1] published in the current issue of *Polish Archives of Internal Medicine* (*Pol Arch Intern Med*) deals with a topic of recent scientific interest. Chronic obstructive pulmonary disease (COPD) is recognized as one of the most important lung diseases leading to disability and death. For many years, COPD has been considered an exclusive pulmonary disease, characterized by a well-defined respiratory pattern; only recently, it has been reevaluated as a systemic chronic inflammatory condition. In particular, according to the first scientific evidence, increased airway inflammation in COPD exacerbations seems to represent an optimal prothrombotic stimulus.[2,3]

In the above article, the authors aimed to analyze the relationship between platelet indices, including the platelet-to-lymphocyte ratio (PLR), white blood cell count to mean platelet volume ratio (WMR), and red cell distribution width (RDW) and the severity degree of COPD. A retrospective cohort, with a total of 153 patients admitted between March 2014 and March 2015, was studied. The diagnosis of COPD was established according to the Global Initiative for Chronic Obstructive Lung Disease criteria, and patients were divided into 4 groups depending on disease severity: group A (mild), group B (mild to moderate), group C (moderate to severe), and group D (severe).[4] The authors found a significant increase in platelet distribution width (PDW), mean platelet volume (MPV), plateletcrit (PCT), and RDW values and a decrease in WMR and PLR values as the severity of COPD increased from groups A to D. Patients with severe COPD, belonging to groups C and D, were older, mainly male, presented higher RDW, PDW, MPV, PCT, PLR, and NLR values but had lower hemoglobin levels, lymphocyte count, and WMR compared with the mild COPD groups (A and B). In particular, the PDW was shown to be significantly higher in each COPD group in an increasing manner from group A to

group D. The RDW value also significantly increased with disease severity, except for the difference between groups A and B. Moreover, the RDW (adjusted odds ratio [OR], 3.668; 95% confidence interval [CI], 1.234–11.75) and the PDW (adjusted OR, 2.454; 95% CI, 1.036–5.811) were found to be independently associated with the presence of severe COPD (groups C and D). To determine the cut-off values for the RDW and PDW for severe COPD, a receiver operating characteristic (ROC) curve analysis was performed. Using the cut-off level of 14.85, the PDW was correlated with the presence of severe COPD with a sensitivity of 85% and specificity of 86% (area under the ROC curve [AUC], 0.946; 95% CI, 0.911–0.980; *P* <0.001); in addition, an RDW value above 14.45 was associated with severe COPD with a sensitivity of 90% and a specificity of 87% (AUC, 0.948; 95% CI, 0.916–0.981; *P* <0.001). Platelet indices such as the MPV, PDW, PCT, PLR, RDW, and neutrophil-to-lymphocyte ratio showed an increasing trend, while the lymphocyte count and WMR tended to decrease with the increasing severity of COPD. Furthermore, the authors found that the RDW and PDW parameters were independently associated with severe COPD besides the effects related to age.

Platelets play an important role in several systemic inflammatory conditions by secreting different cytokines and mediators that regulate activation of immune cells and their adhesion to the endothelial barrier, thus presenting an active role in the modulation of inflammatory immune responses. In our previous study, we hypothesized that an increase in PDW with increasing severity of COPD could be correlated with elevated atherothrombotic risk and/or major systemic inflammation.[5] Increased MPV is a marker of platelet activation and an acute-phase reactant in inflammatory conditions depending on the severity of systemic inflammation; patients with more

severe COPD tend to present higher MPV values. PCT depends on the number of platelets in blood, which is associated with the risk of cardiovascular events, including thrombosis and worse outcomes in acute coronary syndrome. The low lymphocyte count is correlated with systemic inflammation; if considered together with the platelet count, the PLR reflects the inflammatory status in a more sensitive manner.

The RDW parameter represents a quantitative indicator of both complete blood count and anisocytosis. It is usually increased in conditions associated with ineffective red cell production and increased red cell destruction. Seyhan et al[6] and Ozgul et al[7] found a significant relationship between the RDW and increased mortality of patients with stable COPD. An increased RDW reflects an impaired regulation of erythrocyte homeostasis, including abnormal erythropoiesis and red blood cell survival, which are due to a variety of underlying metabolic abnormalities, such as shortening of telomere length, oxidative stress, chronic inflammation, poor nutritional status, dyslipidemia, hypertension, erythrocyte fragmentation, and deregulation of erythropoietin function. The RDW was also found to be a useful diagnostic tool in patients with suspected acute pulmonary embolism.[8] In conclusion, PDW and RDW values could be used as indicators of hypoxemia, underlying inflammation, and oxidative stress in patients with COPD.

Among the limitations of the study, we must note that the authors did not include healthy controls to compare with the study group. It would be also interesting to study a possible correlation between platelets and blood cell parameters with other markers of inflammation[9,10] and endothelial involvement, such as interleukin 6, von Willebrand factor, D-dimer, prothrombin, and plasminogen activator inhibitor 1, as well as with functional measurement of endothelial dysfunction such as noninvasive peripheral arterial tonometry.[11] Also the correlation with spirometry and other functional data, both in active smokers and nonsmokers with COPD, would be of great interest. Moreover, it would be important to confirm the data in larger population-scale studies to obtain more statistically powerful results.

Despite the above limitations, the study by Kalemci et al[1] has significantly contributed to confirming the role of platelets in the systemic inflammatory process in patients with COPD and the correlation between the severity of COPD and PDW, since so far there have been paucity of literature data on this topic. Hopefully, these preliminary data will soon be useful for monitoring systemic inflammation levels and for finding prevention measures and biologic treatments for atherothrombotic complications of COPD in selected patients.

NOTE   The opinions expressed by the author are not necessarily those of the journal editors, Polish Society of Internal Medicine, or publisher.

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