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ORIGINAL ARTICLE

Assessment of red cell distribution width with acute exacerbation of chronic obstructive pulmonary disease

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ABSTRACT:

Background: To assess red cell distribution width with acute exacerbation of chronic obstructive pulmonary disease (AECOPD). **Material and Methods:** Group I comprised of AECOPD patients and group II stable COPD patients. Blood sample was collected from the anticubital vein and parameters such as RDW, RBC Count and CBC were calculated. **Results:** Group I comprised of 36 males and 20 females and group II had 31 males and 25 females. RDW% 10-20% was seen in 40 in group I and 42 in group II and 21-30% in 16 in group IU and 14 in group II. The mean RDW was 17.6% in group I and 13.2% in group II. The difference was significant (P< 0.05). There were 52 survived in group I and 56 in group II. The difference was significant (P< 0.05). **Conclusion:** The mean red cell distribution width on the day of presenting the illness was significantly higher in AECOPD as compare to stable COPD. **Keywords:** Red cell distribution width, COPD, Survivor.

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INTRODUCTION

Chronic Obstructive Pulmonary Disease (COPD) is the fourth-largest cause of death worldwide.¹ However, more patients with COPD die from cardiovascular causes than from respiratory failure. Therefore, cardiovascular disease (CVD)-related morbidity and mortality is also high in COPD patients.² Th e most obvious explanation for the high cardiovascular morbidity and mortality rates seen in COPD patients is the high prevalence among this group of smoking and other known risk factors for CVD, such as a poor diet, sedentary lifestyle and low socioeconomic class.³

A red cell distribution width (RDW) test is a measurement of the range in the volume and size of red blood cells (erythrocytes).⁴ Red blood cells move oxygen from your lungs to every cell in body. Cells need oxygen to grow, reproduce, and stay healthy. If red blood cells are larger than normal, it could indicate a medical problem.⁵ The red RDW test measures variation in red blood cell size or red blood cell volume as a part of a complete blood count (CBC), and it is used along with other RBC indices, especially mean corpuscular volume (MCV), to help determine the causes of anemia. COPD-related

inflammation may also impair erythropoiesis, as do other chronic inflammatory processes, and increase RDW.⁶ Although the relationship between RDW and survival is well recognized in CVD.⁷ We performed this study to assess red cell distribution width with acute exacerbation of chronic obstructive pulmonary disease (AECOPD).

MATERIAL & METHODS

A sum total of fifty- six adult patients of acute exacerbation of chronic obstructive pulmonary disease (AECOPD) and fifty- six adult patients of stable COPD of both genders were selected after considering the utility of the study and obtaining approval from ethical review committee. Patients' consent was obtained before starting the study.

Data such as name, age, gender etc. was recorded. Group I comprised of AECOPD patients and group II stable COPD patients. Blood sample was collected from the anticubital vein. The blood samples were analyzed on the same day within 3 hours of collection. Parameters such as RDW, RBC Count and CBC were calculated. The results were compiled and subjected for statistical analysis using Mann Whitney U test. P value less than 0.05 was set significant.

RESULTS

Groups	Group I	Group II
M:F	36:20	31:25

Group I comprised of 36 males and 20 females and group II had 31 males and 25 females (Table I).

Table II RDW wise distribution

RDW%	Group I	Group II	P value				
10-20	40	42	0.17				
21-30	16	14					
Mean	17.6	13.2					

RDW% 10-20% was seen in 40 in group I and 42 in group II and 21-30% in 16 in group IU and 14 in group II. The mean RDW was 17.6% in group I and

13.2% in group II. The difference was significant (P< 0.05) (Table II).

Table III: Assessment of outcome

cht of outcome								
	Outcome	Group I	Group II	P value				
	Survived	52	56	0.02				
	Death	4	0					

There were 52 survived in group I and 56 in group II. The difference was significant (P< 0.05) (Table III).

DISCUSSION

COPD is associated in some patients with a "low grade systemic inflammation" that may also initiate or worsen co-morbid diseases, such as CVD.⁸ Therefore, co-morbid diseases potentiate the morbidity of COPD, leading to increased mortality.9 Red blood cell distribution width (RDW) is a numerical measure of the size variability of circulating erythrocytes and is routinely reported as a component of complete blood count in the differential diagnosis of anemia.^{10,11} RDW is in a standard size, but disorders related to systemic inflammation, ineffective erythropoiesis, nutritional deficiencies, bone marrow dysfunction or increased destruction cause a higher RDW. Very recently, researchers have reported higher mortality risk associated with higher RDW in patient populations with CVD.^{12,13} We performed this study to assess red cell distribution width with acute exacerbation of chronic obstructive pulmonary disease (AECOPD).

Our results showed that group I comprised of 36 males and 20 females and group II had 31 males and 25 females. RDW% 10-20% was seen in 40 in group I and 42 in group II and 21-30% in 16 in group IU and 14 in group II. Gaur et al¹⁵ enrolled 100 AECOPD and 50 patient of stable period of COPD. Sociovariable in both groups demographic were comparable. BMI was significantly lower in AECOPD patients. The mean PACK/YR in AECOPD group was 24.44±6.23 and in Stable COPD was 20.66±8.21. Mean admission per year were significantly higher in AECOPD patients (1.88±0.80 per year) as compare to stable COPD patients (0.80±0.67 per year). Mean FEV1 % was significantly lower in AECOPD patients (43.87±14.26) as compare to stable COPD patients (48.12±20.18). Mean RDW significantly higher in AECOPD (17.60±5.70%) as compare to stable COPD patients (13.80±3.33%). The difference in both groups was found statistically significant. MCV was significantly lower in AECOPD (82.04 ± 1.49) as compare to stable COPD patients (86.50 ± 1.87) . The difference in both groups was found statistically significant. RDW was significantly higher in those patient who were died $(19.50\pm0.70\%)$ as compare to survived patients (17.52±5.61%). The

difference in both groups was found statistically significant. 4.00% hospital mortality in AECOPD group

Our results showed that the mean RDW was 17.6% in group I and 13.2% in group II. There were 52 survived in group I and 56 in group II. Seyhan et al¹⁶ studied the prognostic value of RDW in patients with COPD and compared the value of this measurement with cardiac, respiratory, and hemotological status. In the overall patients, the RDW level had a mean value of 15.1 ± 2.4 . RDW was positively correlated with Creactive protein (CRP) (p = 0.008, r = 0.21), right ventricular dysfunction (RVD) (p < 0.001, r = 0.25), and pulmonary arterial hypertension (PAH) (p = 0.03, r = 0.14). Variables (p < 0.1) included in the univariate survival analysis were forced expiratory volume in 1 second (FEV1% predicted), RDW levels, age, PaCO2, albumin and CRP levels, presence of CVD, presence of anemia, presence of RVD, and presence of PAH. Subsequent multivariate analysis suggested that RDW levels (1.12; 95% CI, 1.01 to 1.24; p = 0.01), and presence of RVD (2.6; 95% CI, 1.19 to 5.8; p = 0.01) were independently related to mortality.

CONCLUSION

The mean red cell distribution width on the day of presenting the illness was significantly higher in AECOPD as compare to stable COPD.

REFERENCES

- Lopez AD, Shibuya K, Rao C, Mathers CD, Hansell AL. Chronic obstructive pulmonary disease: current burden and future projections. Eur Respir J. 2006;27(2):397–412.
- 2. Roberts CM, Lowe D, Bucknall CE, Ryland I, Kelly Y, Pearson MG, et al. Clinical audit indicators of outcome following admission to hospital with acute exacerbation of chronic obstructive pulmonary disease. Thorax. 2002;57(2):137–41.
- 3. Chung LP, Winship P, Phung S, Lake F, Waterer G. Five-year outcome in COPD patients after their first episode of acute exacerbation treated with non-invasive ventilation. Respirology. 2010;15(7):1084–91.
- 4. Patil SP, Krishnan JA, Lechtzin N, Diette GB. Inhospital mortality following acute exacerbations of

chronic obstructive pulmonary disease. Arch Intern Med. 2003;163(10):1180-6.

- Fruchter O, Yigla M. Predictors of long-term survival in elderly patients hospitalized for acute exacerbations of chronic obstructive pulmonary disease. Respirology. 2008;13(6):851–5.
- Roche N, Zureik M, Soussan D, Neukirch F, Perrotin D. Predictors of outcomes in COPD exacerbation cases presenting to the emergency department. Eur Respir J. 2008;32(4):953–61.
- Gaude GS, Rajesh BP, Chaudhury A, Hattiholi J. Outcomes associated with acute exacerbations of chronic obstructive pulmonary disorder requiring hospitalization. Lung India. 2015;32(5):465–72.
- Cavusoglu E, Chopra V, Gupta A. Relation between red blood cell distribution width (RDW) and all-cause mortality at two years in an unselected population referred for coronary angiography. Int J Cardiol. 2010;141(6):141–6.
- Patel KV, Ferrucci L, Ershler WB, Longo DL, Guralnik JM. Red blood cell distribution width and the risk of death in middleaged and older adults. Arch Internal Med. 2009;169(5):515–23.
- Allen LA, Felker GM, Mehra MR, Chiong JR, Dunlap SH, Ghali JK, Lenihan DJ, Oren RM, Wagoner LE, Schwartz TA, Adams KF Jr. Validation and potential mechanisms of red cell distribution width as a prognostic marker in heart failure. J Card Fail 2010;16: 230–238.
- 11. Romero AJ, Carbia CD, Ceballo MF, Diaz NB. Red cell distribution width (RDW): its use in the characterization of microcytic and hypochromic anemias. Medicina (B Aires) 1999; 59:17–22.
- Williams WJ. Examination of the blood. In: Williams WJ, Beutler E, Erslev AJ, Lichtman MA, eds. Hematology, 3rd ed. New York: McGraw-Hill, 1983: 9–14.
- Van Kimmenade RR, Mohammed AA, Uthamalingam S, van der Meer P, Felker GM, Januzzi Jr JL. Red blood cell distribution width and 1-year mortality in acute heart failure. Eur J Heart Fail 2010; 12:129–136.
- 14. Lappe JM, Horne BD, Shah SH, May HT, Muhlestein JB, Lappé DL, Kfoury AG, Carlquist JF, Budge D, Alharethi R, Bair TL, Kraus WE, Anderson JL. Red cell distribution width, C-reactive protein, the complete blood count, and mortality in patients with coronary disease and a normal comparison population. Clin Chim Acta 2011; 412:2094–2099.
- Gaur R, Tundwal VK, Gaur R, Gaur M, Khatri JK. Study of correlation of red cell distribution width with acute exacerbation of chronic obstructive pulmonary disease. IP Indian J Immunol Respir Med 2022;7(3):108-115.
- Seyhan EC, Özgül MA, Tutar N, Ömür IM, Uysal A, Altın S. Red blood cell distribution and survival in patients with chronic obstructive pulmonary disease. COPD: Journal of Chronic Obstructive Pulmonary Disease. 2013 Aug 1;10(4):416-24.