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Evaluation of Red Cell Distribution Width as a Prognostic Marker in Coronary Artery Disease Patients

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Abstract

Background: Acute coronary syndrome (ACS) is a cardiovascular disease causing serious mortality and morbidity throughout the entire world.

Methods: The study was a Cross-sectional study. A sample size of 100 subjects aged over 18 years with acute coronary syndrome were selected for the assessment of RDW. Acute coronary syndrome patients admitted in the medical wards of the hospital as well as those who came to medical OPD for follow up were selected.

Results: The RDW was significantly higher in the ACS group than the control (14.8 ± 1.7 vs 13.4 ± 1.5, respectively, $P < .01$).

Conclusion: In conclusion, this study demonstrates that the RDW were higher in the ACS group compared with the control group. These results showed that RDW is a reliable, simple, and inexpensive marker for patients with ACS, but further studies with a greater sample size are needed to confirm our results.

Keywords: Acute coronary syndrome (ACS), RDW, Prognosis.

Introduction

Acute coronary syndrome (ACS) is a cardiovascular disease causing serious mortality and morbidity throughout the entire world [1]. Although ACS related mortality rates were low in the last quarter, conditions such as re-ACS and stroke, which develop during the follow-up of these patients, still pose a major problem.[2]. Many clinical and laboratory parameters associated with mortality in patients with CAD were studied. However, affordable and easily accessible biomarker-based studies that are related to re-ACS are still scarce [3]

The red cell distribution width (RDW), a routinely reported parameter in the complete blood count of most laboratories, is a numerical measure of the variability in size of circulating erythrocytes. A higher RDW value indicates greater variation in size, and is the objective equivalent of anisocytosis noted in peripheral blood smears. It has found utility in the work-up for the differential diagnoses of microcytic anemia.[4]

Materials and Methods

The study was a Cross-sectional study. A sample size of 100 subjects aged over 18 years with acute coronary syndrome were selected for the assessment of RDW. Acute coronary syndrome patients admitted in the medical wards of the hospital as well as those who came to medical OPD for follow up were selected.

Inclusion criteria's were 1) Age group 18 and above 2) Follow up cases of heart failure coming in decompensation state of heart failure

Exclusion criteria's were 1) Refusal of consent 2) Congenital heart diseases 3) Chronic obstructive pulmonary disease 4) Severe anaemia 5) Neoplastic metastasis to bone marrow 6) Pregnancy 7) Severe arthritis 8) Inflammatory bowel disease 9) hypothyroidism 10) Liver diseases. Anemia was defined as hemoglobin levels lower than 13 g/dL in men and 12 g/dL in women, in accordance with the World Health Organization criteria.

Hypertension was defined as blood pressure >140/90 mmHg on >2 occasions during office measurements or being on antihypertensive treatment.

Diabetes mellitus was defined as fasting blood glucose ≥126 mg/dL or being on antidiabetic treatment.

Results

Table 1 : Demographic variable

Variable	ACS patients	Control group	p-value
Age (Yrs)	52.3±6.4	54.6±7.1	>0.05
Male : Female	72:28	71:29	>0.05
BMI	28.2±2.1	27.9±2.13	>0.05

The study group was divided into two, according to angiographic results (CAD negative and CAD positive). There were no significant differences between the two groups with regard to age, gender, hypertension, hyperlipidaemia, smoking, BMI, systolic and diastolic blood pressure, and medications, including aspirin, renin–angiotensin system (RAS) blockers and statins.

Table 2 : Comparison of RDW parameter

Variable	ACS patients	Control group	p-value
HB (Gm/dl)	12.6±1.3	13.1±1.4	>0.05
MCV (fl)	82±4	84±4	>0.05
WBC(mm^3)	7.48±2.12	7.12±2.08	>0.05
PLT(10^3 * mm3)	232±52	248±48	>0.05
RDW %	14.8±1.7	13.4±1.5	<0.01

The RDW was significantly higher in the ACS group than the control (14.8 ± 1.7 vs 13.4 ± 1.5, respectively, $P <$ .01).

Discussion

The RDW reflects variability in the size of circulating red cells (anisocytosis) and is routinely reported by analyzers as part of the routine CBCs[5] The formula for calculating RDW is (standard deviation of red cell volume/mean cell volume) × 100. Thus, elevated RDW means that there is heterogeneity of cell sizes in the peripheral blood smear.[6,7] Increased RDW can be seen in hemolysis, nutritional deficiencies such as iron, vitamin B12, and folate, or after blood transfusion.[8] Additionally, an elevated RDW levels can result from conditions that modify the shape of red blood cells due to the premature release of immature cells into the bloodstream (severe blood loss), abnormal Hbs (eg, sickle cell anemia), hemolysis, or hemolytic anemias.[9]

Previous studies have reported a strong association between increased RDW and cardiovascular mortality and morbidity in different populations. In 2 large heart failure populations (CHARM and DUKE Databank), RDW was demonstrated to be a very strong independent predictor of morbidity and mortality.[10] In another study, Cavusoglu et al[11] demonstrated that increased RDW was a strong independent predictor of all-cause mortality in an unselected population of male patients referred for coronary angiography. Also, Patel et al[12] measured RDW in a healthy sample of 8175 adults aged >45 and found that for every 1% increment in RDW, the all-cause mortality risk increased by 22%. The physiological mechanisms that underlie the association of RDW with

CAE are entirely unknown, systemic factors that alter erythrocyte homeostasis, such as inflammation and oxidative stress, likely play a role.

Conclusion

In conclusion, this study demonstrates that the RDW were higher in the ACS group compared with the control group. These results showed that RDW is a reliable, simple, and inexpensive marker for patients with ACS, but further studies with a greater sample size are needed to confirm our results.

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