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Relation of Red Cell Distribution Width And Severity Of Stemi

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Abstract

Background: Higher values of RDW may show association with adverse outcomes in patients with acute coronary syndrome. The objective of study was to assess the correlation between red cell distribution width with short term outcome and left ventricular ejection fraction in patients presenting with acute STEMI.

Methods: Study was conducted on 100 patients admitted at tertiary care centre with acute myocardial infarction satisfying inclusion criteria. Detailed history and clinical examination was done .RDW was noted from CBC calculated by an automatic blood counter and measurement of LVEF was done by Echocardiographer on Echocardiography machine by standardized method. Patients were followed for 1 month6 for various cardiac complications including death and the data was recorded .Patients were divided into two groups on the basis of RDW into group 1 (RDW < 14.5) and group 2 (RDW > 14.5)

Results: Out of total 100 patients: In 53 patients of group 1 complications were present in 11 patients where as 21 out of 43 patients in group 2 experienced various cardiac complications and there was statistically significant difference in death rate between 2 groups (p value = 0.03). There was statistically significant correlation between high RDW and low LVEF (P <0.05).

Conclusions: increase RDW can be a predictor of adverse outcome in acute STEMI patients as there is statistically significant difference for complications rate and LVEF in relation to RDW in acute STEMI patients.

Keywords-: Red cell distribution width, Left ventricular ejection fraction ,acute coronary syndrome.

Introduction

Red cell distribution width (RDW) is a measure of the diversity of the size of red blood cells. It is one of the parameters included in routine blood counts and is thus widely available. Along with mean corpuscular volume, RDW is useful in differential diagnosis of various hematological disorders[1]. However, it was shown by Felker et al that elevated RDW is a very strong predictor of morbidity and mortality in patients with chronic heart disease.[2] This association remained after a wide variety of adjustments, and for the first time, RDW was recognized as a marker of adverse outcomes in a disease other than the one for which it was intended. The same finding was shown in the acute setting of heart failure,[3] coronary disease, acute myocardial infarction (AMI), and various other diseases.[4-5] Multiple studies demonstrated an association of RDW with the ultrasound parameters of

both systolic and diastolic heart dysfunction in different cardiovascular (CV) settings.[6-7]

The aims of our study is to describe the prognostic utility of RDW in patients with acute coronary syndrome (STEMI) and to elucidate the mechanism underlying the relationship between elevated RDW values and poor patient prognosis in this particular group of patients.

Material And Method

In our prospective study we enrolled 100 consecutive patients, admitted in the department of medicine.

Inclusion Criteria

Following inclusion criteria were made for recruitment in this study-_Subjects who gave informed consent, All patients who were fulfilling following criteria that satisfy diagnosis of an acute, evolving or recent STEMI and Patients with haemoglobin > 12 gm% .

Exclusion Criteria

Following patients were excluded from the study : those with comorbidities like renal insufficiency, hepatic insufficiency, trauma, major surgery, Patients already having cardiovascular morbidities such as CHF, aortic aneurysm, pericardial effusion, pericarditis, myocarditis, valvular heart diseases, Patients who refused to be part of study and patients with past history of blood transfusion or clinically reported anemia.

Clinical and biochemical data of each patient were collected. All patients were evaluated with a full medical history (with information regarding lifestyle, clinical history, cardiovascular risk factors, presence of other pathologies like renal failure and diabetes mellitus), a physical examination, an echocardiogram, a 12-lead electrocardiogram,; routine blood tests, including a complete blood count, myocardial necrosis markers, lipid profile, renal function profile were carried out by our biochemistry department.

We divided the population in two groups, depending on RDW values: Group 1, including patients with normal values of RDW; Group 2, including patients with RDW values above the range

In our laboratory, normal reference range of RDW in human blood is 11.5 - 14.5%.

Statistic Analysis

Data analysis was performed using the GraphPad Prism 5. Continuous variables are presented as mean ± standard deviation and were compared using Student's unpaired test. Categorical variables are presented as frequency counts and percentages and were calculated with the "Chi-square" test when appropriate; otherwise, Fisher's exact test was used.

P value equal or less than 0.05 was considered statistically significant

Observations And Results

Table 1. General Characteristics of patients (group 1 vs group 2).

Characterstics	GROUP 1	GROUP 2	P value
Total number	57	43	
age	60.59 ± 14.57	59.45 ±15.49	0.7070
Sex (male/female)	41/18	34/9	0.2789
Hypertension (%)	56%	62%	0.6613
H/o smoking (%)	54%	58%	0.7622
DM (%)	29%	36%	0.4505
Mean total cholesterol	219.21 ± 36.87	228.92 ± 43.81	0.4007
Mean triglycerides	177.43 ± 56.87	179.51 ± 63.81	0.9037
Mean hdl	32.56 ± 5.471	34.24 ± 4.437	0.2389
Mean LVEF	50.42 +_ 10.88	41.29 +_ 14.57	0.0005

Both the groups were matched for various risk factors age , sex , HTN , H/o smoking, DM , lipid profile as p value is statistically insignificant . Mean LVEF was significantly lower in group 2 (RDW > 14.5) as compared to group 1 (RDW < 14.5) { p value = 0.0005 }.

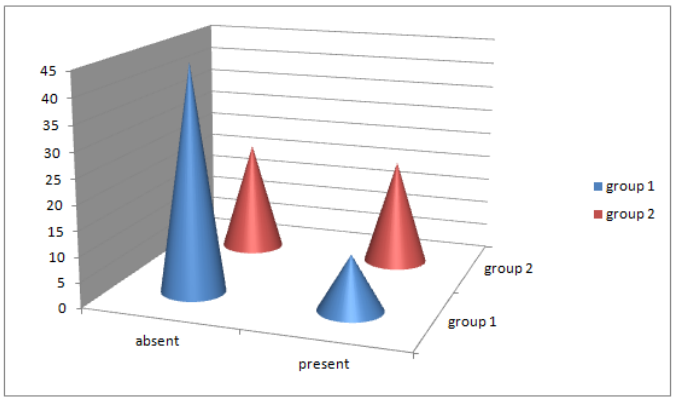
Table no .2 : Relation between RDW and complication rate in acute STEMI patients

Various cardiac complications were assessed in both the groups including post infarct angina, heart failure , cardiogenic shock and persistent ST elevation.

COMPLICATIONS	Group 1(n =57)		Group 2(n =43)	
	N	%	N	%
Absent	45	78	22	33
Present	11	22	21	67

Chi-square = 9.477 with 1 degree of freedom; P = 0.0021 (highly Significant)

Complication rate is significantly higher in group 2 as compared to group 1 showing high rdw has a worse prognostic impact in acute MI.

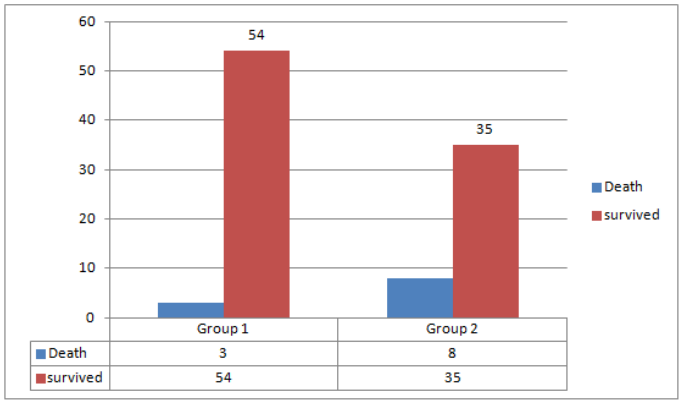


Graph No 1 : Complication Rate In Both The Groups

Table no. 3 : Relation of RDW with mortality rate (on admission plus 1 month follow up)

Outcome	Group 1		Group 2	
	N	%	N	%
Death	3	5	8	18
Survived	54	95	35	82

Mortality rate was significantly higher in group 2 as compared to group 1 with p value = 0.0348



Graph No. 2 : Mortality Rate In Both The Groups

Discussion

Cardiovascular disease will be the most common cause of morbidity and mortality in INDIA by 2020.There is growing demographic and epidemiological transition in low and middle income countries like India. Various studies suggested that RDW can be a useful marker for predicting mortality and outcome in patients with acute and chronic heart failure, peripheral artery disease, stroke, acute pulmonary embolism and pulmonary arterial hypertension[7-11].

Red cells are the primary oxygen delivery organelles to the tissue, their well being determine the well being of tissue. Increase RDW is associated with increase variations in size of RBC, these RBC are more vulnerable to haemolysis and their oxygen carrying capacity is reduced therefore, reduced perfusion or reduced oxygen supply of cardiac muscles. Also inflammatory states are strongly related to ineffective erythropoiesis and it has been demonstrated that inflammatory cytokine such as tumor necrosis factor (TNF-α), interleukin 1 and IL-6 desensitize bonemarrow erythroid progenitors to erythropoiesis, inhibit RBC meturation and thereby promote anisocytosis or increased RDW[8]

In our study out of 100 patients 57 patients were in group 1 and 43 in group 2 comparative analysis was done for

various cardiac complication and LV function in both the groups .cardiac complications were present in 11/57 patients in group 1 and 21/43 in group 2 patients The difference was statistically significant with p value 0.0021.Death rate was also significantly higher in group 2 as 8 out of 43 patients reported death in group 2 and 3 out of 57 in group 1 with p value = 0.0348. Study have been conducted suggesting role of RDW in acute MI. According to A1 Najjar et al[12] RDW has an independent prognostic power in heart failure patients following acute MI. Study done by yang cavsoglu E et al[4] showed higher 1 month admission rate post MI for reinfarction and heart failure in patients with higher RDW.

LV function was also compared between two groups. Mean LVEF in group 1 was 50.42 and 41.29 in group 2 difference was found to be statistically significant (p value = 0.0029 m9t ·Our study showed that high RDW was negatively correlated with LVEF in acute MI patients. There are limited number of studies that shows correlation between RDW and LVEF in acute MI by indirect way. Uyarel H et al [13] showed a significant association between elevated admission RDW level and adjusted risk of cardiovascular mortality and LVEF (hazard ratio : 1.831, 95% confidence interval: 1.034-3.24, P=0.03). In contrast to our study Covusoglu E et al[4] showed that there was no significant correlation between high RDW and LVEF, in patients of acute MI.(P = 0.0827).

Our results suggest that RDW can provide information concerning the severity of clinical condition in the acute phase of acute MI and a relation with poor prognostic factors as a reduced systolic function and higher complication rate.

Conclusions

RDW has been associated in prognosis of acute MI ; therefore rdw which is routinely carried out in every hospitalized patient can be used as tool in assessment of outcome in acute MI.

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