

Analysis of Red Cell Profile: Red Cell Distribution Width, Hemoglobin, Mean Corpuscular Volume in Elderly Patients

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Abstract

Introduction: Red cell distribution width (RDW), a numeric measure of variability in the size of circulating erythrocytes is a routinely reported haematological parameter commonly part of complete blood cell count. RDW was found to be a strong independent predictor of poor outcome in a variety of cardiovascular disease states even after adjustment for potential confounders, including anaemia and renal dysfunction. The present study was undertaken to analyze the variation in RDW, Hb% and MCV in elderly patients with various illnesses. *Aim and Objective:* 1. To study the pattern of Red cell Distribution width (RDW) in elderly patients in different diseases. 2. To correlate increased RDW values with other RBC parameters like Hb% and MCV. *Materials and Methods:* Material for the study consisted of RBC parameters like Hb%, MCV of consecutive patients aged more than 65 years, who had increased RDW, irrespective of their sex and illness which were retrieved from laboratory records. These patients (both in patients and out patients) were referred to haematology laboratory whose Ethylene Diamine Tetra Acetic acid (EDTA) blood samples were analyzed by automated hematology analyser (Horiba Abxpentra xl 80.303pxl 5748 analyzer). Relevant clinical data of these patients like age, sex and clinical diagnoses were also obtained from the clinical records. Data analyzed was expressed in numerals and percentage. *Results:* Out of 196 patients, blood samples of 60(30.16%) patients had increased RDW, out of which 39(65%) were males and 21(35%) were females. IHD formed the major portion of patients with increased RDW comprising of 31(51.66%) patients. 36 patients had Hb<10gm% (59.9%) and 40 (66.6%) patients had MCV <70fL. *Conclusion:* Most of the patients with increased RDW were those with IHD. Majority of them were males. The biologic mechanisms underlying the association of RDW with various diseases merit investigation. RDW is an inexpensive test routinely reported to physicians, further research is needed to determine whether RDW is a useful risk assessment tool in different clinical settings apart from the ones which are proved.

Keywords: RDW; Elderly Patients; IHD.

Introduction

Red cell distribution width (RDW), a numeric measure of variability in the size of circulating erythrocytes is a routinely reported haematological parameter commonly part of complete blood cell count [1,2,3,4]. RDW was found to be a strong independent predictor of poor outcome in a variety of cardiovascular

disease states even after adjustment for potential confounders, including anaemia and renal dysfunction [5]. RDW has attracted increased attention recently as a marker of poor outcomes in coronary artery diseases in the absence of heart failure, stroke and pulmonary hypertension and unselected patients presenting for coronary angiography [6,7,8,9,10]. The recent prospective evidence of a strong association between elevated RDW and the occurrence of chronic heart failure, as well as fatal and non fatal cardiovascular disease events, has revealed a new and unpredictable scenario in the clinical usefulness of RDW [11]. Some studies indicate, RDW is independently related to endothelial dysfunction in

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patients with chronic kidney disease as well as kidney transplant recipients [12,13]. Yet another study suggests that RDW might be used as a biomarker in the evaluation of the severity of Chronic Obstructive Pulmonary Disease (COPD). At the same time, there seems to be correlation between the survival of COPD patients and RDW [14]. As, RDW is a measure of variability of the size of RBCs, the other associated RBC parameters like Hemoglobin % (Hb%) and Mean Corpuscular Volume (MCV) may also be altered in patients with increased RDW. Hence the present study was undertaken to analyze the variation in RDW, Hb% and MCV in elderly patients with various illnesses.

Aim and Objective

- To study the pattern of Red cell Distribution width (RDW) in elderly patients in different diseases.
- To study RBC parameters like Hb% and MCV with respect to increased RDW.

Materials and Methods

The present study is a cross sectional descriptive study undertaken in the haematology laboratory SSIMS & RC over a period of two months.

Ethical permission for the study was obtained from Institutional Ethical Review Board (IERB).

Material for the study consisted of red cell parameters obtained from lab records of consecutive patients above 65 years of age. They were chosen irrespective of the sex and illness which included both inpatients and outpatients who were referred to

haematology laboratory. RBC parameters of these patients with increased RDW like range of RDW, Hb%, MCV were retrieved from the reports of Ethylene Diamine Tetra Acetic acid (EDTA) analyzed blood samples by automated hematology analyzer (Horiba Abxpentraxl 80.303pxl 5748 analyzer). Relevant clinical data of these patients like age, sex and clinical diagnoses were also obtained from request forms. Data analyzed was expressed in numerals and percentage.

Results

A total of 196 blood samples were analyzed.

Out of 196 patients, 60 (30.61%) had increased RDW (>14.6%) of which 39 (65%) were males and 21 (45%) were females and were included for study.

33(55%) patients were in the age group of 65-70 years, 9 (15%) in the age group of 71-75 years, 11(18.33%) in the age group of 76-80 years, 6(10%) in the group of 81-85 years and 1 (1.6%) in the age group of 91-95 years.

31 (51.66%) patients were suffering from Ischaemic Heart Disease (IHD), 9 (15%) from Acute Febrile Illness (AFI), 8 (13.33%) from COPD, 6(10%) from Alcoholic Liver Disease (ALD), 3 (5%) patients each from Chronic Kidney Disease (CKD) and cellulitis.

Hb% of these patients ranged from 3gm% to 14gm%. Mean Hb% being 8.5gm%.

MCV was less than 70fl in most of the patients. (n=40, 66.6%). Mean MCV being 65.8fL.

RDW was in the range of 15-16% in 36 (60%) patients, 16.1-17% in 12(20%) patients, 17.1-18% in 8 (13.33%) patients and 18.1-19% in 6 (10%) patients. Mean RDW being 16.5%.

Table 1: RBC parameters in various illnesses.

Clinical Diagnoses	Number of Cases (N=60)	Male	Female	Range of RDW (%)	HB (GM %)	MCV (FL)
Ischaemic Heart Disease	31 (51.66%)	23 (74.1%)	8 (25.8%)	15.1-19	3-14	61-90
Acute Febrile Illness	9 (15%)	6 (66.6%)	3 (33.3%)	16-18.5	7-11	75-87
Chronic Obstructive Pulmonary Disease	8 (13.3%)	5 (62.5%)	3 (37.5%)	16.6-17.8	6-13	66-86
Alcoholic Liver Disease	6 (10%)	2 (33.3%)	4 (66.6%)	15.5-16.8	5-13	71-90
Chronic Kidney Disease	3 (5%)	2 (66.6%)	1 (33.3%)	16.1-17.5	6.8-14	65-91
Cellulitis	3 (5%)	1 (33.3%)	2 (66.6%)	17.7-19	7.3-13	67-85
Total	60 (100%)	39 (65%)	21 (35%)	-	-	-

Discussion

The prognostic significance of RDW is a very valuable tool for risk stratification and clinical decision making.

Lippi G et al conducted a study on relation between

red cell distribution width and inflammatory biomarkers in a large cohort of unselected outpatients and inferred that increased RDW in these patients was because of impaired iron metabolism, inhibition of response to erythropoietin, reduction in life span of RBCs. In our study we encountered 9 patients suffering from AFI and 3 patients with cellulitis, the

pathogenesis of which could be attributable to the above mentioned causes [16].

The mean age varied from 57.8 years to 65.7 years in different studies [1,16,17]. In our study the mean age was 70.7 years. Higher mean age in our study was probably because of inclusion of patients. >65 years of age.

The percentage of females with increased RDW varied from 26.8% to 55.8% in different studies [1,16]. In our study 30.10% were females indicating more number of males showed increased RDW.

The mean Hb% in different studies varied from 10gm% to 13.2gm [11,16,17]. In our study it was 8.5gm% which was much lower than other studies.

The mean MCV was 77.8fL in a study conducted by Patel KV et al whereas in our study mean MCV was 65.8fL [16].

The upper limit of RDW in various studies was 19% which was similar to our study and RDW ranged from 10-19% [1,11,17]. In our study the RDW ranged from 13-19%.

Xin LU et al conducted a study on relationship between red blood cell distribution width and intermediate term mortality in elderly patients after per cutaneous coronary intervention in patients with IHD and concluded that mortality rate was 2.2 times greater in patients with elevated RDW. Each 1% increase in baseline RDW was associated with a 10% enhanced risk of mortality [18,19].

Elevated RDW in IHD patients can be either because of inflammation, oxidative stress or impaired ventricular remodeling indicating poor prognosis in these patients [6,7,8,9]. In the present study 31 patients with IHD had increased RDW ranging from 15.1 % to 19% and 40% were not anemic. Hence, this increase in RDW observed may be attributable to the above mentioned causes.

Conclusion

Most of the patients with increased RDW were those with IHD. Majority of them were males. The biologic mechanisms underlying the association of RDW with various diseases merit investigation. RDW is an inexpensive test routinely reported to physicians, further research is needed to determine whether RDW is an useful risk assessment tool in different clinical settings apart from the ones which are proved. RDW is easy, cost effective, less time consuming investigation. RDW may be an epiphenomenon rather than an effective player in the pathogenesis of

cardiovascular diseases. Regardless of its putative role, however, the considerable evidence available so far suggests that the clinical role of RDW may be broadened beyond the conventional boundaries of erythrocyte disorders, especially for supporting the diagnosis and prognostication of patients with cardiovascular diseases.

Limitations

Increased RDW could be because of pre analytical errors and associated co-morbid conditions like anaemia than the disease per se.

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