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Are Red Cell Distribution Width and Mean Platelet Volume associated with Rheumatoid Arthritis?

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Abstract

Aim: The aim of this retrospective study was to investigate the correlation between Rheumatoid Arthritis (RA) and Mean Platelet Volume (MPV) and Red Cell Distribution Width (RDW), which are parameters of routine hemogram tests that are suggested to be related with inflammation.
Methods: We included 81 patients with RA in this retrospective study. Control group was consisted of 80 healthy subjects admitted to our institution for a routine check-up. White Bood Cell count (WBC), haemoglobin (Hb), RDW, platelet count (PLT) and MPV values of the participants obtained and analyzed.
Results: We found that, RDW and MPW values were significantly different in patients with RA compared to control subjects.
Conclusion: We think that, MPV reduction and RDW elevation is associated with RA. However, prospective studies with larger population are needed to reveal the relationship between the disease activity and MPV and RDW.

Keywords Rheumatoid arthritis, mean platelet volume, red cell distribution width.

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Introduction:

Rheumatoid Arthritis (RA) is a chronic inflammatory disease of unknown cause which characterized by tenderness, swelling and stiffness of the joints, with progressive destruction of cartilage and bone structure [1, 2]. About 40% of the pain present with extra articular involvement [3]. Pathogenesis of RA has been associated with a variety of inflammatory molecules [4]. Detection of platelet associated micro particles in the synovial fluid of RA patients has been attracted authors' interest whether platelets have involved in the inflammation [4, 5]. It is well known that peripheric thrombocytosis accompanies with inflammation in RA [6]. MPV and RDW are hemogram parameters that authors speculate that both two were associated with inflammation and inflammatory conditions [7-9]. Previously, MPV has been introduced as an inflammatory marker in RA and ankylosing spondylitis [10]. Mean platelet volume (MPV) is an indicator of platelet function. It reflects activation of the platelets [11] and it has been found to be related with inflammatory conditions [12-15]. Variability in size of the erythrocytes have been referred to as red cell distribution width (RDW) and similarly, it has been found to be associated with inflammatory processes [9, 16, 17]. We aimed in this retrospective study to assess RDW and MPV values of the patients with RA and to compare those to normal population.

Methods

A total of 81 patients with RA and 80 healthy controls included in present retrospective study. Exclusion criteria were as follows: iron deficiency anemia, hypo-hyperthyroidism, active infection, cardiovascular and metabolic diseases that may affect MPV and RDW values. Laboratory data of the participants obtained from computerized database of our institution.

We recorded age, gender, white blood cell count (WBC) , hemoglobin (Hb) , red cell distribution width (RDW), platelet count (PLT) and mean platelet volume (MPV) values. All statistics were brought out with SPSS programme (SPSS 15.0, SPSS Inc., Chicago, IL, USA). Variables were expressed as

median (min-max) and compared with Mann Whitney U test. A p value <0.05 was considered as statistically significant. The study was approved by Ministry of Health, Ordu Health Directorate.

Results

Age of the patients in RA group was 53 (16-95) years and age of the control group was 57.5 (28-81) years. The difference was not statistically significant (p=0.71). There were 17 men and 64 women in RA group and 27 men and 53 women in control group. The difference was not significant (p=0.07). Similarly, WBC (p=0.07), Hb (p=0.13) and PLT (p=0.83) values were not statistically different between study and control groups.

Table 1. *Characteristics and data of study population.*

		RA group	Control group	P
Gender	Men (n)	17	27	0.07
	Women (n)	64	53	
		Median (Min.- max.)		
Age (years)		53 (16-95)	57.5 (28-81)	0.71
WBC (k/mm^3)		7.9 (2.3-9.6)	6.8 (4.4-14)	0.07
Hb (g/dl)		12.7 (11-16.5)	13.2 (10.8-14.7)	0.13
RDW (%)		13.8 (12-18)	13.7 (10.2-15.2)	0.04
PLT (k/ mm^3)		258 (131-689)	260 (109-509)	0.83
MPV (fL)		8 (5.2-14.2)	8.9 (6.9-16.4)	<0.001

Table 1 shows general characteristics and laboratory data of the RA and control groups.
Median RDW of the RA group was 13.8 (12-18) and median RDW of the control group was 13.7 (10.2-15.2). The difference was statistically significant (p=0.04). Median MPV of the RA group was 8 (5.2-14.2) and median MPV of the control group was 8.9 (6.9-16.4). The difference was statistically significant (p<0.001).

Discussion

In present retrospective study, we showed that the patients with RA have significantly lower MPV and higher RDW values compared to age-sex matched healthy subjects.

We shall discuss the reasons of elevated MPV in RA patients here. MPV is the marker of platelet activation. Activated platelets become enlarge in size. Kısacık et al reported that MPV was significantly decreased in RA patients compared to controls [10]. Similarly, Aktas et al reported significantly decreased MPV values in patients with nasal polyps, another inflammatory condition, compared to healthy population [18]. Boilard et al reported the important role of platelets in the course of inflammatory arthritis [19]. Literature is full of data about the relation between MPV and inflammatory conditions [4, 5, 20, 21]. Therefore, the decrease of MPV in RA is not surprising.

What are the possible mechanisms of MPV reduction in RA? First of all, activated platelets in response to the inflammatory processes are tend to be in larger size. After their utilization and involvement in inflammatory processes, remaining smaller, inactive platelets may cause a reduction in MPV. Secondly, inflammatory cytokines in blood flow may interact with the megakariopoesis in bone marrow and cause production of smaller platelets which results a decrease in MPV. Red cell distribution width is a marker of erythrocyte indices in routine hemogram test and indicates anisocytosis of the red cells. Elevation in RDW has been reported in various inflammatory conditions in literature [8, 22]. The data about the association between RDW and inflammation in literature is conflicting. Authors reported an association between inflammation and RDW increase [23-25] while others not [26].

One of these conflicting reports in literature, the study by Vaya et al, which showed elevated RDW levels in patients with systemic lupus erythematosus compared to control subjects [27]. Unfortunately, Hb levels of patients with SLE were significantly lower than that of the controls in their study. Iron deficiency, the most common cause of anaemia may induce RDW elevation.

On the other hand, Hb levels were not different between study and control groups in our report and similar to literature, we found increased RDW in RA patients compared to healthy subjects. Inflammatory burden of RA may interfere with erythropoiesis and cause production of erythrocytes in different sizes. Two major limitations of present study are retrospective design and relatively small study cohort.

Conclusion

In conclusion, we think that, MPV reduction and RDW elevation is associated with RA. However, prospective studies with larger population are needed to reveal the relationship between the disease activity and MPV and RDW.

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