



## Platelet Indices in Sudanese Patients with Rheumatoid Arthritis

Abdel Rahim Mahmoud Muddathir<sup>1\*</sup>, Fadel El-Jabbar Haj<sup>2</sup>

<sup>1</sup>Dr. Abdel Rahim Mahmoud Muddathir, Department of Haematology, Faculty of Medical Laboratory Sciences, Alzaeim Alazhari University, Khartoum, Sudan

<sup>2</sup>Fadel El-Jabbar Haj Division of Haematology, Department of Laboratory, Fedail Hospital, Khartoum, Sudan

Received:  
29<sup>th</sup> July 2013  
Received in revised form:  
15<sup>th</sup> Aug 2013  
Accepted:  
25<sup>th</sup> Aug 2013  
Available online:  
10<sup>th</sup> Sept 2013



Online ISSN 2249-622X  
<http://www.jbiopharm.com>

### ABSTRACT

#### Background:

Mean platelet volume (MPV) and platelet distribution width (PDW) are indicators of platelet function and activation. MPV has been reported to be influenced inversely by their production and removal from circulation. C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR) are inflammatory markers affected in RA. The present study aimed to investigate the changes in platelets count, MPV and PDW in patients with RA, compared to healthy control individuals and to find out if there is any correlation with the inflammatory markers (CRP, WBC and ESR) and the duration of the disease.

#### Material and methods:

This was case control study conducted in Khartoum Rheumatic Diseases and Rehabilitation Clinic and Fedail Hospital in Khartoum state on 103 patients with RA according to the (American College of Rheumatology guide line); white blood cells count, ESR and CRP in addition to platelet count, mean platelet volume (MPV) and platelet distribution width (PDW) were performed on those patients. The obtained values of MPV and PDW were also analyzed and compared with matched 56 control group without RA.

#### Results:

The platelet indices showed higher values for MPV ( $p=0.00$ ) and PDW ( $p=0.00$ ) in patients with RA compared to control, reflecting greater platelet activation in those patients. The Platelet count was positively correlated with inflammatory markers in RA patients ( $p<0.05$ ), while the MPV and PDW were not.

#### Conclusions:

Platelet indices which are routinely measured by automated hematology analyzers are significantly elevated in RA patients. Their clinical utility and association with disease activity in patients with RA should be further investigated.

**Keywords:** Rheumatoid arthritis, inflammatory markers, mean platelet volume, platelet distribution width.

### 1. INTRODUCTION:

Rheumatoid arthritis (RA) is a chronic systemic inflammatory disease of unknown cause, which primarily affects the peripheral joints in a symmetric pattern. Patients with RA may present constitutional symptoms such as fatigue, malaise, and morning stiffness [1-3] Extra-articular involvements of the skin, heart, lungs, and eyes can be significant. RA can result in joint destruction and thus often leads to considerable morbidity and mortality.

It is believed that RA patient may present an increasing count of platelets during active stages and that will decline in number with the remission of the inflammation [4-6]. But the activation status of the platelets is unknown.

Several studies reported that platelet histogram indices mean platelet volume (MPV) and platelet distribution width (PDW) might be considered as platelet activation markers [9], as during the activation process the platelets became larger. PDW, also routinely reported by modern analyzers together with MPV, might be regarded as a marker of platelets activation, in fact reflecting a more important heterogeneity of the platelets dimensions. Thus, the aim of this study was to evaluate these platelet indices in patients with RA as early markers of platelet activation.

**2. MATERIALS AND METHODS**

This was case control study conducted in Khartoum Rheumatic Diseases and Rehabilitation Clinic and Fedail Hospital in Khartoum state done in 103 patients diagnosed with RA according to American College of Rheumatology criteria and 56 normal control group, the study was conducted from (December 2011 to June 2012) ,standard biochemical workup including the erythrocyte sedimentation rate (ESR), TWBCs count, C-reactive protein (CRP) as inflammatory markers were performed, furthermore Rheumatoid Factor and also the platelet histogram from which we analyzed mean platelet volume (MPV) and platelet distribution width (PDW) as markers of platelet activation also done.

A volume of 7.8 ml of venous blood were collected from antecubital vein, 3ml poured in K<sub>3</sub> EDTA and gently mixed for platelets histogram by Sysmex KX-21 haematology analyzer, while 3 ml were placed in a plain container for serological test for CRP and RF and 1.8 ml is collected directly in evacuated sodium citrated ESR tube.

The values of MPV and PDW were also analyzed in an age- and sex-matched control group of 56 healthy individual without RA.

Patients with active cancers (solid cancers or hematological cancers); acute (at the moment of inclusion or in the past three months) or having chronic infections; granulomatous chronic diseases (sarcoidosis); pregnancy or post-partum period (six months); or patients with severe chronic renal failure were excluded.

The statistical analysis for the obtained data was performed using SPSS version 16.0. Frequencies, independent Sample T Test, Correlations and One-Way ANOVA were calculated. All reported P values were considered significant at a level of P<0.05.

**3. RESULTS**

This was case control study conducted in Khartoum Rheumatic Diseases and Rehabilitation Clinic and Fedail

Hospital in Khartoum state done in 103 patients diagnosed with RA according to American College of Rheumatology criteria and 56 normal control group, the study was conducted from (December 2011 to June 2012) ,standard biochemical workup including the erythrocyte sedimentation rate (ESR), TWBCs count, C-reactive protein (CRP) as inflammatory markers were performed, furthermore Rheumatoid Factor and also the platelet histogram from which we analyzed mean platelet volume (MPV) and platelet distribution width (PDW) as markers of platelet activation also done.

A volume of 7.8 ml of venous blood were collected from antecubital vein, 3ml poured in K<sub>3</sub> EDTA and gently mixed for platelets histogram by Sysmex KX-21 haematology analyzer, while 3 ml were placed in a plain container for serological test for CRP and RF and 1.8 ml is collected directly in evacuated sodium citrated ESR tube.

The values of MPV and PDW were also analyzed in an age- and sex-matched control group of 56 healthy individual without RA.

Patients with active cancers (solid cancers or hematological cancers); acute (at the moment of inclusion or in the past three months) or having chronic infections; granulomatous chronic diseases (sarcoidosis); pregnancy or post-partum period (six months); or patients with severe chronic renal failure were excluded.

The statistical analysis for the obtained data was performed using SPSS version 16.0. Frequencies, independent Sample T Test, Correlations and One-Way ANOVA were calculated. All reported P values were considered significant at a level of P<0.05.

Laboratory parameters	Normal control 56	RA patients 103	P.value
Platelet Count (x10 <sup>9</sup> /L)	281.9±58.8	291.8±86.8	0.113
MPV (fl)	9.0±0.5	9.6±0.9	0.00
PDW(fl)	10.5±1	11.9±2.9	0.00

**Table 1: Platelet parameters in RA patients and normal controls.**

**4. DISCUSSION**

In present study the current results revealed that the patients with RA have higher values of MPV and higher values of PDW than controls (P=0.00, P =0.00) respectively. The Platelet count correlate significantly with WBC, ESR and CRP values (p value <0.05), while the MPV and PDW values were not correlated with the inflammatory markers. Our result was in agreement with Yazici, *et al.* who reported higher values of MPV in patients with RA [7]., also Kanonidou, C, *et al* have found that platelet count and Platelet indices which are significantly elevated in RA and platelet count was positively correlated with ESR in RA patients [8]. Furthermore it was agreed with Jurcuț.c, *et al* that showed

higher values for PDW in RA patients compared to control showing increased platelet activation only linked to the presence of RA[9].

In contrast our finding didn't agreed with Kisacik *et al* who reported lower values of MPV in patients with active RA than controls[10] and it was also near to the results obtained by Redaitene E , *et al* who showed that the numbers of platelets increased while MPV was significantly lowers [11]. Another work done by Baynes RD , *et al* has shown that Active rheumatoid arthritis present with low levels of MPV[12].

Jurcut C *et al* who The PDW and MPV values were not correlated with the inflammatory markers[13]. These differences from our finding might be explained by the fact that our ethnic background is different from other population in previous studies, or due to the difference in methodology used to measure these parameters in these studies.

## 5. CONCLUSION

Platelet indices which are routinely measured by automated hematology analyzers are significantly elevated in RA. Their clinical utility and association with disease activity in patients with RA should be further investigated.

## 6. ACKNOWLEDGEMENTS

We thank all the study participants, all members of staff in Khartoum Rheumatic Diseases and Rehabilitation Clinic and Fedail Hospital for their excellent technical assistance in conducting the laboratory work.

## 7. REFERENCES

1. Altman RD, Bloch DA, Bole GG, Jr., Brandt KD, Cooke DV, Greenwald RA, Hochberg MC, Howell DS, Kaplan D, Koopman WJ, .: Development of clinical criteria for osteoarthritis. *J Rheumatol* 1987, 14 Spec No:3-6.
2. American College of Rheumatology Ad Hoc Committee on Clinical Guidelines. Guidelines for the management of rheumatoid arthritis. *Arthritis Rheum* 1996, 39:713-722.
3. American College of Rheumatology Ad Hoc Committee on Clinical Guidelines Guidelines for the management of rheumatoid arthritis. *Arthritis Rheum* 2002, 46:328-346.
4. Bathon JM, Martin RW, Fleischmann RM, Tesser JR, Schiff MH, Keystone EC, Genovese MC, Wasko MC, Moreland LW, Weaver AL, Markenson J, Finck BK: A comparison of etanercept and methotrexate in patients with early rheumatoid arthritis. *N Engl J Med* 2000, 343:1586-1593.
5. Boers M, Verhoeven AC, Markusse HM, van de Laar MA, Westhovens R, van Denderen JC, van ZD, Dijkmans BA, Peeters AJ, Jacobs P, van den Brink HR, Schouten HJ, van der Heijde DM, Boonen A, van der Linden S: Randomised comparison of combined step-down prednisolone, methotrexate and sulphasalazine with sulphasalazine alone in early rheumatoid arthritis. *Lancet* 1997, 350:309-318.
6. Breedveld FC, Dayer JM: Leflunomide: mode of action in the treatment of rheumatoid arthritis. *Ann Rheum Dis* 2000, 59:841-849.
7. Yazici S, Yazici M, Erer B, Erer B, Calik Y, Ozhan H, Ataoglu S: The platelet indices in patients with rheumatoid arthritis: mean platelet volume reflects disease activity. *Platelets* 2010, 21:122-125.
8. Nagata-Sakurai M, Inaba M, Goto H, Kumeda Y, Furumitsu Y, Inui K, Koyama H, Emoto M, Ishimura E, Shoji T, Nishizawa Y: Inflammation and bone resorption as independent factors of accelerated arterial wall

thickening in patients with rheumatoid arthritis. *Arthritis Rheum* 2003, 48:3061-3067.

9. Jurcut R, Arsenescu I, Puscariu T, Uscatescu V, Jurcut C, Apetrei E, Ginghina C: Is interleukin-18 correlated with endothelial dysfunction and platelet activation in patients with unstable angina? *Rom J Intern Med* 2005, 43:199-209.

10. Kisacik B, Tufan A, Kalyoncu U, Karadag O, Akdogan A, Ozturk MA, Kiraz S, Ertenli I, Calguneri M: Mean platelet volume (MPV) as an inflammatory marker in ankylosing spondylitis and rheumatoid arthritis. *Joint Bone Spine* 2008, 75:291-294.

11. Redaitene E, Dadonene I, Kirdaite G, Martsiushkene E, Shapoka V: [Hemostasis in patients with rheumatoid arthritis]. *Ter Arkh* 2005, 77:74-77.

12. Baynes RD, Lamparelli RD, Bezwoda WR, Gear AJ, Chetty N, Atkinson P: Platelet parameters. Part II. Platelet volume-number relationships in various normal and disease states. *S Afr Med J* 1988, 73:39-43.

13. Jurcut C, Jurcut R, Caraiola S, Nitescu D, Mihai C, Baicus A, Copaci I, Predeteanu D, Ginghina C, Tanasescu C: Platelet histogram indices and cardiovascular disease in patients with rheumatoid arthritis. *Rom J Intern Med* 2010, 48:51-55.

**Conflict of Interest: None Declared**

### Cite this article as:

Abdel Rahim Mahmoud Muddathir· Fadel El-Jabbar Haj, Platelet Indices in Sudanese Patients with Rheumatoid Arthritis. Asian Journal of Biomedical and Pharmaceutical Sciences, 2013, 3: (23), 1-3.