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Original Research

Platelet Count and Eosinophilia in Peripheral Blood and Rheumatoid Arthritis

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Abstract

Aim: Rheumatoid arthritis is a chronic autoimmune inflammatory disorder of flexible joints with unknown etiology, which afflicts 1% of the world's population. The aim of this study was to investigate the association between platelet count and eosinophilia in peripheral blood and history of blood transfusion with RA in Hamadan city, west of Iran.

Methods: As a case-control study, data of Complete Blood Count tests and filled questionnaire with written consents from 128 patients and 129 age and sex matched controls, were collected and analyzed by Pearson Chi-Square test using SPSS.

Results: In the case and the control groups, there were 116 and 117 females, respectively. Statistical analysis showed that there was no significant association between platelet count and eosinophilia in peripheral blood and history of blood transfusion with the RA ($p > .05$).

Conclusion: Considering previous global investigations on this topic with controversial results and the result of our study, it seems more studies are needed to determine the definitive association between platelet count and eosinophilia in peripheral blood and history of blood transfusion with RA

BACKGROUND

Rheumatoid arthritis (RA) is a most common chronic inflammatory joint disease. The mechanisms underlying RA are complex and depend on several internal and external factors. RA is a form of chronic recurrent arthritis that usually involves several joints symmetrically leading to restriction of activities of daily living and deterioration of the quality of life. Similar to other multifactorial diseases, RA is believed to be affected by both genetic and environmental factors [1-4]. Based on previous reports, the genetic factors are responsible for more than half of the risk of developing RA [2]. However, as in most other complex diseases, few such interactions have been described and it is assumed that more studies will be needed to determine significant and definite gene–environment interactions in these diseases. The incidence rate of RA in the world is more than 1% (range 0.3% to 2.1%) and female gender are more susceptible than male one [1-4]. Familial studies have also showed that genetic susceptibility is important in this connection and the role of shared epitope of HLA has been proved, but in the context of environmental triggers, several risk factors have been suggested [1-4]. One of the most important of such factors should be the history of particular infections such as Epstein-Barr virus (EBV) [2, 5-10]. Infection of B lymphocyte followed by their polyclonal activation causes production of a kind of IgM auto antibody which reacts with auto-IgG. This abnormal IgM is called Rheumatoid Factor (RF). Precipitation of RF in joints followed by immunopathological events (e.g. activation of complement system) has an essential role in RA formation. Appearance of RA following a history of infection has also been attributed to other

microorganisms (Cytomegalovirus, Rubella and Micoplasma) [2]. In this case, cross-reaction between microbial antigens and joint proteins or super antigen presentation should be noted. Several other areas of research about other risk factors have identified coffee consumption [11-13], sex hormones [2,14, 15], diet [2, 16-18], weather [2, 19, 20], smoking [2-4, 21-34], obesity [35], diabetes [36] and family history [36]. To investigate the influence of other factors on RA in our region, we decided to perform a case control study. As mentioned in other reports, 80% of RA cases begin in the fourth and fifth decades of life, and information about relative risk factors and useful instruction should assist in preventive methods and decrease the incidence of RA. Other scientists have studied the association of Platelet count and Eosinophilia in peripheral blood and history of blood transfusion with RA previously [37-43], but different results related to different areas of the world demonstrate these geographically limited studies cannot be generalized to other parts of world because some known and unknown area-dependant factors should have an effect. Thus in 2010 we start to investigate any possible association between Platelet count and Eosinophilia in peripheral blood and history of blood transfusion with RA in Hamadan, a city located in the west of the Iran.

METHODS

Patients:

This study was designed based on a case-control study involving incident cases of RA that were from the population ages between 20 to55 years of Hamadan in west of Iran. The recruitment period for the controls and cases was 2010 and written consents were obtained from both patients and controls.

All referring potential cases were physically examined and diagnosed by a rheumatologist in "Mobasher" hospital, a center of rheumatology care affiliated to Hamadan University of Medical sciences. Definite RA diagnosis was done on 128 individuals after RA latex examination on blood samples, physical exam, clinical symptoms and study of personal history. Primary statistical analysis was then conducted in order to calculate the average of sex and age in the case group. A total of 130 control population were selected by physicians among apparently healthy persons matched for age and sex with the case group after examination.

Data Collection:

Required data about history of blood transfusion and cell (Platelet and Eosinophil) count in peripheral blood were collected by standard questionnaire in the presence of physician and Complete Blood Count (CBC) exam were determined by using standard laboratory procedures respectively.

Statistical Analysis:

Pearson's chi-square tests were used to compare the means of the examined groups. All comparisons were two-sided with P values lower than 0.05 indicate statistical significance. The statistical software used for this analysis was SPSS version 16. Results were analyzed and studied using cross-tabulation.

RESULTS

All results based on completed questionnaires were cross-tabulated including sex distribution in two groups, case and control and are shown in Table 1. In case and control groups, females were 116 and 117 persons respectively and the rest were males. The mean age among the cases was 37.51 years and 37.54 among the controls. The association between Platelet count in peripheral blood and RA was analyzed using Pearson's chi square test and p value was 0.8, meaning that there is not significant relation between them (Table 2). Similar results were obtained in two other parts of our study. Based on these results, It has been showed that the Eosinophilia in peripheral blood and history of blood transfusion have not significant associations with RA (p=0.45 & 0.38 respectively) (Tables 3, 4).

Table 1. Cross-Tabulation for sex distribution in case and control groups

Studied groups	Male		Female		Total	
	Number	Percent	Number	Percent	Number	Percent
Case	12	9.38	116	90.62	128	100
Control	12	9.31	117	90.69	129	100
Total	24	9.35	233	90.65	257	100

Table 2: Cross-Tabulation between Platelet count in peripheral blood and RA.

Platelet count / Studied groups	<150000/µL	150-400000/µL	>400000/µL	Total	p.value
	Number Percent	Number Percent	Number Percent	Number Percent	
Case	1 0.8	122 95.3	5 3.9	128 100	
Control	2 1.5	124 95.4	4 3.1	130 100	0.8 Not significant
Total	3 1.2	246 95.3	9 3.5	258 100	

Table 3. Cross-Tabulation between Eosinophilia in peripheral blood and RA.

Eosinophil Percent / Studied groups	3-5% (Normal)		>5% (Eosinophilia)		Total		p.value
	Number	Percent	Number	Percent	Number	Percent	
Case	123	96.1	5	3.9	128	100	
Control	119	98.3	2	1.7	121	100	0.45 Non.Significant
Total	242	97.2	7	2.8	249	100	

Table 4. Cross-Tabulation between History of Blood transfusion and RA.

History of Blood transfusion / Studied groups	Without Blood transfusion		With Blood transfusion		Total		p.value
	Number	Percent	Number	Percent	Number	Percent	
Case	120	93.8	8	6.3	128	100	0.38 Non.Significant
Control	124	96.5	5	3.9	129	100	
Total	244	94.9	13	5.1	257	100	

DISCUSSION

The first part of results of the present study showed that there is not significant (p= 0.8

) association between platelet count in peripheral blood and RA in Hamadan, although there was a trend toward higher platelet counts in the patients. In this context some studies have also been performed by other scientists. It is likely the platelets are also involved in inflammation and the major cause of increasing the platelet count in blood should be the result of fluctuation in cytokine levels which enrolled in hematopoiesis and throbocytopoiesis in inflammation. Consistent with this idea, In 2004 Milovanovic M. et al. [40] after a small study on 16 patients compared with controls, found that platelet count, CRP and IL-6 in

serum were elevated in active RA. Also, based on a study by Ertenli I. et al. in 1998 [41], which enrolled 19 patients with RA with marked thrombocytosis, 20 with normal platelet counts and 24 controls, it has been reported that patients with RA and thrombocytosis compared to patients with normal platelet counts showed RA with more severity. The platelet count in patients with RA with significant thrombocytosis revealed a positive correlation with CRP level in serum. In addition, Plasma soluble P-selectin levels were found to be significantly higher in patients with RA compared to controls and soluble P-selectin levels were significantly higher in patients with RA with thrombocytosis compared to those with normal platelet counts. It seems that increased plasma soluble P-selectin level in RA can be attributed to the presence of a continuous inflammatory condition. In 2002, Knijff-Dutmer EA et al. [42], after a descriptive cross-sectional study, found that platelet counts in the case and control groups were similar (in consistent with our results), but Platelet-derived microparticles (PMPs) levels in RA patients were significantly higher than those in healthy controls. Moreover, the number of PMPs correlates with disease activity. In a study by Redaitene E in 2005 [43], increased number of platelets in 54.4% in cases compared to controls has been reported. In another part of our study, we found that the Eosinophilia in peripheral blood has not significant association with RA, but patients showed a trend toward the Eosinophilia. Eosinophils as a member of innate immune system originate from bone marrow and have several enzymes in their granules. They comprise 3 to 5 percent of white blood cells and this amount can significantly be increased in allergic diseases, inflammatory conditions and parasitic infections. Consistent with our results, Kargili A et al. in 2004 [39] after a prospective study on 1000 patients who applied to their rheumatology outpatient clinic in Turkey between 2001 and 2002, found that eosinophilia can have a significant relation with various rheumatologic conditions such RA, but because corticosteroids are one of the most common medications used in collagen tissue diseases, the eosinophil numbers found may be lower than expected in this inflammatory disease. This can cause eosinophilia to be ignored. Eosinophils have a crucial role in developing the inflammation and tissue destruction due to secretion the various chemokines, vasoactive mediators such as prostaglandins and enzymes such as MBP (Major Basic Protein). On the other hand, These cells as a double-edged sword excrete some regulatory and anti-inflammatory substances results in calming this painful process. So the slight to moderate eosinophilia followed by RA seems to be expectable and reasonable. We also found that there is not significant relation between history of blood transfusion and RA in our study. Based on the results of a primary care-based incident case-control study in Norfolk, England by Symmons DP. et al. in 1997 [38], history of blood transfusion has a significant association with RA in both sexes, male and female. Contrarily (and consistent to our results), Cerhan JR. et al. 5 years later in the USA [37] found that these items have reverse association to each other in females. Because it is likely that blood transfusion may have occurred during childhood, so the prospective studies with more cases and controls, seems to be better and more reasonable.

As conclusion, despite the multiplicity of studies and due to the frequent contradictions in their results which may be attributed to the methodological and/or geographical differences, it seems that more studies are needed to determine the definitive association between Platelet count and Eosinophilia in peripheral blood and history of blood transfusion with RA.

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