

A prospective study of serum adenosine deaminase and alkaline phosphatase in rheumatoid arthritis

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Abstract

Introduction: Rheumatoid arthritis (RA) is a systemic autoimmune disorder causing chronic inflammation and proliferation of the synovial tissues, destruction of articular cartilage and also affects many other sites that include the heart, blood vessels and skin. In general population the prevalence of RA is believed to range from 0.5-1.0 %. RA is reported to affect almost 1% of adult population worldwide and approximately 0.75% of adult Indian population. In India alone there are some 10 million people with RA. **Materials and methods:** The study was conducted at Department of Biochemistry, RIMS, Ranchi and test performed in Medall scans and lab, RIMS, Ranchi, Jharkhand. The study comprised of 30 patients of rheumatoid arthritis in the age group of 30-60 years who were diagnosed by clinical analysis, rheumatoid factor and E.S.R tests (Group 1). 60 healthy individual with no known history of any disease matched by age and sex with group 1 were taken as controls (Group 2). After taking informed consent and noting the name, age and sex, venous samples were drawn from both the groups. **Results:** In rheumatoid arthritis patients, serum Adenosine deaminase levels were high, the mean serum Adenosine deaminase levels were 60 ± 9.55 and in controls the mean Adenosine deaminase levels were 21 ± 3.04 . The p value was significant at $p < 0.001$. We conclude that serum Adenosine deaminase can be used as a marker for cell mediated immunity to monitor disease activity in rheumatoid arthritis. Serum Alkaline phosphatase was found to be raised in rheumatoid arthritis, the mean serum Alkaline phosphatase levels were 291.63 ± 35.84 in patients of rheumatoid arthritis when compared to healthy controls (196.73 ± 32.71). The p value was significant at $p < 0.001$. **Conclusion:** The present study has focused on investigating the serum total Alkaline phosphatase levels in Rheumatoid Arthritis Patients and The findings have indicated a raised serum Alkaline phosphatase in patients of rheumatoid arthritis when compared to healthy controls thereby suggesting the role of serum Alkaline phosphatase as a marker of disease activity in rheumatoid arthritis.

Key Words: Rheumatoid arthritis, serum Adenosine deaminase, Alkaline phosphatase.

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Introduction

Rheumatoid arthritis (RA) is a systemic autoimmune disorder causing chronic inflammation and proliferation of the synovial tissues, destruction of articular cartilage and also affects many other sites that include the heart, blood vessels and skin[1].

In general population the prevalence of RA is believed to range from 0.5-1.0 %. RA is reported to affect almost 1% of adult population worldwide and approximately 0.75% of adult Indian population[3]. In India alone there are some 10 million people with RA[2]. Diagnosis of RA is done on the basis of clinical and radiological findings and presence of rheumatoid factor in serum. The characteristic feature of RA is non-specific inflammation of the peripheral joints with joint swelling, morning stiffness, destruction of articular tissues and joint deformities[5]. The classification of RA is done by a score based algorithm system according to the 2010 ACR-EULAR classification criteria for rheumatoid arthritis[4].

Purine metabolism may be related to rheumatoid arthritis since several disturbances of purine metabolism have been found to be associated with immune disorders. Immune deregulation forms one of the pathogenic mechanisms of rheumatoid arthritis and hence, it is not surprising to find altered levels of purine enzymes in RA. Adenosine deaminase (ADA, adenosine amino hydrolase E.C. 3.5.4.4) is an

important enzyme of purine metabolism catalysing the irreversible deamination of adenosine to form inosine and is considered as a marker of cell mediated immunity. Serum ADA was found to reflect monocyte / macrophage activity in inflammatory conditions such as RA and has also been suggested as a marker of inflammatory processes in RA. It is well-known that continued disease activity results in joint damage, decreased physical activity or even irreversible disability. Hence, early diagnosis and intervention help in reducing the morbidity associated with RA[5].

In rheumatoid arthritis the promotion of disease activity induces more active bone resorption. Activated bone resorption is accompanied by concomitant bone formation and a rise in serum ALP[5].

There is also a possibility that rise in serum ALP is due to the hepatobiliary involvement observed in rheumatoid arthritis.

Serum ALP, may also be induced by inflammatory markers such as Interleukin-1 because it correlates with acute phase response.

Aim

To determine the levels of serum Adenosine deaminase and Alkaline phosphatase in rheumatoid arthritis patients.

Materials and methods

The study was conducted at Department of Biochemistry, RIMS, Ranchi and test performed in Medall scans and lab, RIMS, Ranchi, Jharkhand. The study comprised of 30 patients of rheumatoid arthritis in the age group of 30-60 years who were diagnosed by clinical analysis, rheumatoid factor and E.S.R tests (Group 1). 60 healthy individual with no known history of any disease matched by age and sex with group 1 were taken as controls (Group 2). After taking informed consent and noting the name, age and sex, venous samples were drawn from both the groups. Serum ADA was estimated by Gusti and Galanti method of enzymatic analysis with the tulip

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diagnostics reagent kit. Serum ALP was estimated by photometric determination of ALP according to the recommendation Of German Society of Clinical Chemistry. The concentration of ADA and ALP was measured using Erba Chem 7 semi auto analyzer.

Results

The results obtained were subjected to descriptive statistical analysis to find the mean, standard deviation, standard error of mean and P value. The statistical analysis was done by SSPS software.

The difference between the two groups was done by means of 'T' test for independent mean value.

The statistical analysis is tabulated below:

Table 1: Serum Adenosine deaminase: Units of measurement of ADA: U/L

	Serum Adenosine deaminase	
	Controls	Rheumatoid Arthritis
Mean	21.590	60.520
Standard Deviation	3.0478	9.5547
Standard Error Of Mean	.5565	1.7444
Students T Value	21.261	
Df	58	
P Value	< 0.001	

Table 2: Serum Alkaline phosphatase: Units of measurement: IU/L

	Serum Alkaline Phosphatase	
	Controls	Rheumatoid Arthritis
Mean	196.733	291.633
Standard Deviation	32.7161	35.8440
Standard Error Of Mean	5.9731	6.5442
Students T Value	10.711	
Df	58	
P Value	< 0.001	

The results of this study indicated significant mean levels of ADA and ALP in rheumatoid arthritis patients when compared to controls.

Discussion

Rheumatoid arthritis is the most common form of chronic inflammatory joint disease. The disease activity of rheumatoid arthritis is an expression of a cascade of immunological and inflammatory reactions, probably initiated by an unknown stimulus. The prominence of T cells and monocytes and macrophages in rheumatoid arthritis synovial suggest that T cells may localize and amplify the effector functions of monocytes and macrophages in rheumatoid disease[7].

ADA activity has been higher In T cells and varies during different ion of T lymphocytes with increased activity found to be elevated in diseases in which there is a cell mediated immune response. Therefore ADA has been considered as a marker of cell mediated immunity[8]. It has been strongly suggested that serum ADA activity reflects monocyte and macrophage activity or turnover in different diseases.

Conflict of Interest: Nil

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The findings in this study also showed an elevated ADA levels in rheumatoid arthritis patients as compared to healthy controls[9].

These findings also correlate with those in previous studies. Sari Et al investigated the correlation between the activity of ADA and clinical activity in patients with rheumatoid arthritis and concluded that serum ADA activity is associated with rheumatoid arthritis. Hence this study supports the importance of measuring serum ADA in patients of rheumatoid arthritis and emphasizes the importance of using Serum ADA as a non-invasive marker of inflammation which may provide additional information regarding disease activity[10].

Conclusion

The present study was done to investigate the significance of Adenosine deaminase and alkaline phosphatase in rheumatoid arthritis patients. In this study increased ADA levels were observed in patients of rheumatoid arthritis as compared to controls indicating that ADA can be used as a marker of cell mediated immunity to monitor disease activity in these patients. Raised serum ALP levels were observed in rheumatoid arthritis patients in comparison with the control group. A high ALP is therefore suggestive of increased disease activity in rheumatoid arthritis.

Hence the present study suggests the importance of measuring serum Adenosine deaminase and alkaline phosphatase in providing an insight into the pathology of rheumatoid arthritis. This helps to evolve targeted treatment strategies for better management of the disease.

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