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STUDY OF SERUM ADENOSINE DEAMINASE AND ALKALINE PHOSPHATASE IN RHEUMATOID ARTHRITIS

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ABSTRACT: Rheumatoid arthritis is a chronic systemic autoimmune disorder causing inflammation of the synovial joints leading to joint destruction as well as a variety of extra articular features. In this present study, serum Adenosine deaminase and Alkaline phosphatase levels were studied in patients of rheumatoid arthritis. Thirty patients in the age group of 30-60 years of both sexes and equal number of age and sex matched healthy controls were included in this study. 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 $p < 0.001$. 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.

KEYWORDS: Rheumatoid arthritis, cell mediated immunity, Adenosine deaminase (ADA), Alkaline phosphatase (ALP).

INTRODUCTION: Rheumatoid arthritis is the most common form of inflammatory arthritis affecting approximately 1- 2 % of the world's population.⁽¹⁾

There is continuing interest in the metabolic changes occurring in rheumatoid arthritis.

The etiology of rheumatoid arthritis is not known but it is classified as an autoimmune disease.⁽²⁾ Immunological and inflammatory reactions play an important role in the initiation and perpetuation of rheumatoid arthritis.

The autoimmune reaction in rheumatoid arthritis consists of activated Cd 4+ T cells. These T cells apparently function mainly by stimulating the joint to produce cytokines that are central mediators of synovial reaction which leads to joint destruction. These T cells have been shown to contain 5-20 times more activity of enzyme Adenosine deaminase than other lymphocytes.

The physiological activity of ADA is related to lymphocytic proliferation and differentiation. The levels of ADA are elevated in diseases in which there is a cell mediated immune response as is seen in rheumatoid arthritis⁽³⁾ therefore determination of serum ADA activity can be a useful indicator of increased lymphoreticular activities and can be used as a marker of cell mediated immunity in rheumatoid arthritis.

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In rheumatoid arthritis the promotion of disease activity induces more active bone resorption.⁽⁴⁾ 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.⁽⁶⁾

Serum ALP, may also be induced by inflammatory markers such as Interleukin-1 because it correlates with acute phase response.⁽⁷⁾

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

MATERIALS AND METHODS:

- The study was conducted at Dr V.R.K Women's teaching hospital and research center.
- 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).
- 30 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⁽⁸⁾ of enzymatic analysis with the tulip diagnostics reagent kit.
- Serum ALP was estimated by photometric determination of ALP according to the recommendation Of German Society Of Clinical Chemistry.⁽⁹⁾
- 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:

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

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	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	
Serum Alkaline phosphatase: Units of measurement: IU/L

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

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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.

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.^(10,11) Therefore ADA has been considered as a marker of cell mediated immunity.⁽¹²⁾

It has been strongly suggested that serum ADA activity reflects monocyte and macrophage activity or turnover in different diseases.⁽¹³⁾

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

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.

In this study serum ALP was found to be raised in patients of rheumatoid arthritis when compared with healthy controls.

The findings of raised Alp in rheumatoid arthritis in his study can be supported by the work of several authors.^(6,14,15)

These studies suggest an increase in baseline serum ALP. These studies have described that the raised serum ADA originates in liver or bone or both implying that these organs are affected by the disease process in rheumatoid arthritis.

The increase in ALP in rheumatoid arthritis has been attributed to osteoblastic activity indicating an increased bone turnover.

It is known that promotion of disease activity induces more active bone resorption. Activated bone resorption is accompanied by concomitant bone formation and rise in serum ALP.⁽⁵⁾

Therefore it is considered that the disease activity in rheumatoid arthritis is related to the serum Levels of ALP. The higher ALP levels in patients with rheumatoid arthritis is considered to be produced by the active bone formation that is to say a rise in bone type ALP is not a cause but a result of disease activation.⁽¹⁴⁾

Hepatic involvement in rheumatoid arthritis has been reported and liver is one of the organs affected by rheumatoid arthritis. Another source of rise in ALP is hepatic origin as reported by previous studies.⁽¹⁴⁾

A rise in liver type ALP in these studies have implicated that hepatic dysfunction is not uncommon and the activation of rheumatoid process correlates with rise in ALP in cases of active rheumatoid disease. The hepatic changes may be a response to chronic inflammatory disease.

Therefore we conclude that serum ALP can be used as a marker of disease activity in rheumatoid Arthritis.

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These biochemical alterations in rheumatoid arthritis observed in this study reflect on the pathogenesis of rheumatoid arthritis. The understanding of pathophysiology of rheumatoid arthritis may help open new therapeutic approaches in the management of rheumatoid arthritis.

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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