

# Comparative Study of Serum Magnesium and Uric Acid in Patients of Rheumatoid Arthritis and Healthy Controls at SMS Medical College & Hospital, Jaipur<sup>1</sup>

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DOI:10.37648/ijrmst.v15i01.005

Received: 25 November 2022; Accepted: 30 December 2022; Published:27 January 2023

## ABSTRACT

### Introduction-

Rheumatoid arthritis (RA) is a chronic inflammatory disease that is associated with a higher risk of CVD than the general population. Chronic inflammatory conditions are likely to alter magnesium levels and various biochemical parameters. Magnesium has been shown to help in fighting with inflammation by reducing inflammatory markers such as CRP and interleukin-6 and decreased level of Mg has been suggested to be reasonable marker of RA. There is growing evidence that serum uric acid might play a crucial role in inflammatory responses. The association between serum uric acid concentrations and inflammation in patients with rheumatoid arthritis (RA) has been still controversial.

### Aims –

To assess and compare the serum magnesium and uric acid levels between RA cases and controls.

### Methodology-

A comparative study was conducted in the department of Biochemistry and Rheumatology at SMS Medical College, Jaipur. Serum Magnesium and uric acid were measured in 30 patients with a known history of rheumatoid arthritis, and the results were compared with those of 30 age- and sex-matched controls.

### Results-

The mean serum magnesium in RA patients was  $1.68 \pm 0.42$  mg/dl and uric acid was  $3.7 \pm 0.9$  mg/dl and in controls was  $2.56 \pm 0.28$  mg/dl and  $3.03 \pm 0.6$  mg/dl respectively, which were highly significant ( $P < 0.001$ ). Serum magnesium was significantly lower while serum uric acid was significantly higher in RA cases as compared to the control group.

### Conclusion-

A significant decrease in serum magnesium and an increase in serum uric acid were found in RA subjects compared to the controls. Hence, serum magnesium and uric acid can be used as screening parameters.

<sup>1</sup> How to cite the article:

Chaudhary N., Comparative Study of Serum Magnesium and Uric Acid in Patients of Rheumatoid Arthritis and Healthy Controls at SMS Medical College & Hospital, Jaipur, IJRMST, Jan-Jun 2023, Vol 15, 30-33, DOI: <http://doi.org/10.37648/ijrmst.v15i01.005>

## INTRODUCTION

Rheumatoid arthritis (RA) is a chronic autoimmune disease that causes inflammation and deformity of the joints. It can begin gradually, the first symptoms of RA are pain, swelling and stiffness in the joints. The most normally involved joints include hands, feet, wrists, elbows and ankles, although other joints may also be involved. The joints may be difficult to straighten and affected fingers and toes may be permanently bent, the hands and feet may curve outward in an abnormal way. With an annual incidence of 0.5 to 1% in both developed and developing nations, it affects 0.8% of the global population. Chronic inflammations alter magnesium levels, and a lower level of magnesium has been proposed as a reliable indicator of rheumatoid arthritis (RA). There is significant evidence that suggests serum uric acid may be a key player in inflammatory responses. In patients with rheumatoid arthritis (RA), the relationship between serum uric acid levels and inflammation is still debatable. In our study, we aim to study the probable changes in serum magnesium and uric acid in newly diagnosed Rheumatoid arthritis patients compared to healthy controls.

## MATERIALS & METHODS

After taking necessary permission from The Ethical Committee, Research Review Board and Department of Rheumatology (Division of Medicine), the study was conducted as below:

A Comparative Study was conducted in 30 rheumatoid arthritis patients and 30 age and sex matched healthy controls in the Department of Biochemistry in association with Department of Rheumatology at S.M.S Medical College and Hospital, Jaipur.

### Inclusion Criteria:

Clinically diagnosed cases of rheumatoid arthritis and healthy controls of 20-60 age groups of both gender, who have given written informed consent were included.

### Exclusion Criteria:

Patients with diabetes mellitus, hypertension, endocrine disorders, cardiovascular, liver, kidney diseases, obesity, smoking, alcoholism, any neoplastic disease, recent fever, taking drugs affecting uric acid level, trauma cases, Pregnant and lactating women, any other therapy including vitamins and minerals were excluded.

## SAMPLING TECHNIQUE

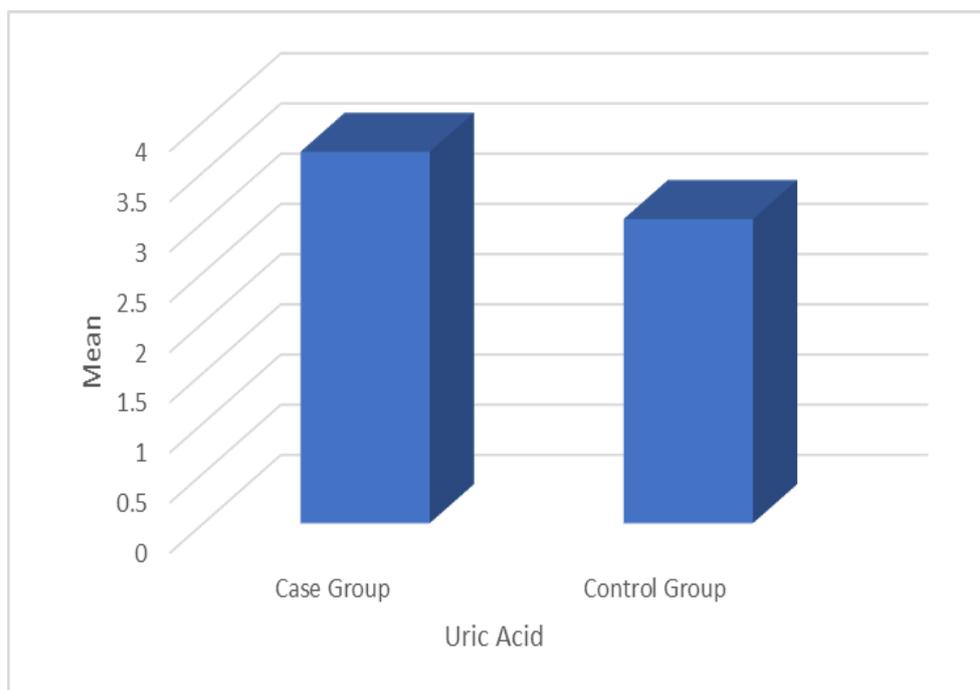
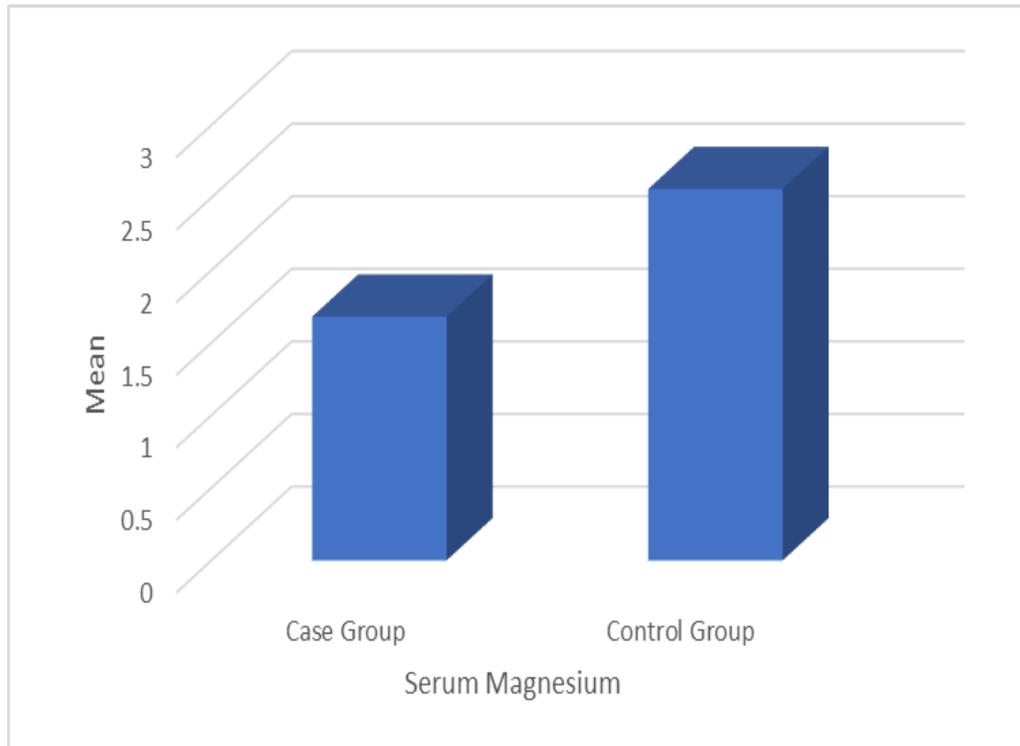
After diagnosing patients, 5ml fasting venous blood sample was collected under aseptic conditions in the plain vials. The sample was then left standing for approximately 30 minutes so that proper coagulation would have been achieved. After that, serum was separated at 2500 rpm centrifugation for 10 minutes and analyzed on fully automated analyzer Beckman Coulter AU-680 for serum magnesium and uric acid. Serum magnesium by CALMAGITE METHOD. Serum uric Acid level by TRINDER METHOD.

Statistical analysis was done using SPSS latest version and student-t test was applied to compare the data between the two groups. P value <0.05 was considered Significant.

## RESULTS

A significant decrease in serum magnesium was observed in cases as compared to controls ( $p < 0.0001$ ). A significant increase in serum uric acid levels was observed in cases compared to controls ( $p < 0.001$ ).

PARAMETER	CASE GROUP		CONTROL GROUP		P-VALUE
	MEAN	SD	MEAN	SD	
SERUM MAGNESIUM	1.68	0.42	2.56	0.28	<0.0001
URIC ACID	3.7	0.9	3.03	0.6	<0.001



**DISCUSSION**

Rheumatoid arthritis (RA) is a multifactorial disease which affects the immune system and ultimately various tissues in the body.

In the present study, serum magnesium and uric acid is compared between rheumatoid arthritis patients and controls. We found that mean serum uric acid for case group was 3.7 and for control group it was 3.03. There was significant difference found between these group as p value was <0.05. It was assumed that the prevalence of hyperuricemia in RA patients was significantly lower than the expected age and sex-specific prevalence rate from the general population **Nada D et al** found that Sixty percent of the study population had hyperuricemia.

**Chavan V U et al** observed increased level of serum uric acid in RA patients, similar like **Magnus et al** and **Panoulas et al** study. **Panoulas et al** suggested that increased serum uric acid may be independently associated with CVD in RA subjects. Hence, all these findings support the idea that elevated serum UA may negatively affect the joints, perhaps by activating a more complex vicious cycle involving inflammatory and oxidative related mechanisms. Chronic inflammatory conditions are likely to alter magnesium level and possible mechanism of decrease magnesium in RA is due to chronic inflammation and autoimmune injury.

We found that mean serum magnesium for case group was 1.68 and for control group it was 2.56. There was significant difference found between these group as p value was <0.05.

**Chavan V U et al** found that decreased level of serum magnesium in RA subjects as compared to controls. The results of our study are correlating with the study by **Manole et al** and **Amin et al**. **Cortes et al** suggested that the RA, an autoimmune disease is associated with serum magnesium disturbances. We are in concordance with **Cortes et al**.

## CONCLUSION

Our study concludes that newly diagnosed RA patients had significantly lower serum magnesium compared to controls. Low level of magnesium and increased uric acid observed in our study together may be more potent risk factors for CVD in newly diagnosed RA subjects. We recommend that serum magnesium should be investigated as a part of cardiovascular risk management in RA. We suggest that magnesium supplementation, may prove to be beneficial to reduce the risk of CVD in RA patients. Further prospective, long-term studies are needed to determine the role of inflammation and its impact on various biochemical markers and cardiovascular outcomes in patients with RA.

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