

Uric Acid Level in Advanced Age of Patients with Rheumatoid Arthritis

V. Senthilkumar¹, E. Prabhakar Reddy²

¹*Dept. of Physiology, Sri Lakshmi Narayana Institute of Medical Sciences, Affiliated to Bharath Institute of Higher Education and Research, Pondicherry- 605502, India*

²*Dept. of Biochemistry, Sri Lakshmi Narayana Institute of Medical Sciences, Affiliated to Bharath Institute of Higher Education and Research, Pondicherry- 605502, India.*

*E-Mail: drpebyreddy@yahoo.com

Received December 14, 2019

Rheumatoid arthritis is a long-term autoimmune disorder causes chronic inflammation of the joints. The pathogenesis of this disease is linked predominantly with the formation of free radicals at the site of inflammation. Uric Acid is an endogenous aqueous antioxidant and considerably higher than the ascorbate level, making it one of the major antioxidants to scavenges the singlet oxygen and radicals in the blood stream. The present study was aimed to estimate the Uric acid levels along with C-reactive protein, Erythrocyte sedimentation rate, Malondialdehyde level and calcium in patients with rheumatoid arthritis and compared with healthy individual. Results showed that with the age matched control between 30-40 and 40-50 changes in the Uric acid level was not signification but showed significant elevation in C-reactive protein, Erythrocyte sedimentation rate and Malondialdehyde level rate observed in the studied age group. The present study evidently concludes that advancing age decrease in the Uric acid level was observed both genders may insult in oxidative stress induced damage.

Key words: Rheumatoid arthritis, Uric Acid, Antioxidant

Rheumatoid Arthritis is a systemic autoimmune disorder that primarily targets the synovium of diarthrodial joints resulting in inflammation, erosion of periarticular surfaces. Though the etiology and pathogenesis of Rheumatoid arthritis remain unresolved, the reactive oxygen species (ROS) have been implicated to play an important role in this process (Quinonez-Flores *et al.*, 2016) Free radicals are the molecules containing one or more unpaired electrons in the outermost atomic or molecular orbital's and capable of exciting independently. Generation of free radicals attack the nearest stable molecule by stealing it's outermost electrons by which molecule then loses its electron and becomes a free radical itself, beginning a chain reaction cascade resulting in damage to the cells results in tissue damage (Sailaja Rao *et al.*, 2011) This will further acceleration the incidence in the patient with Rheumatoid Arthritis. As Rheumatoid arthritis is associated with an increase in oxidative stress, which is defined as an increased load of free radicals generated during cellular metabolism. Considerable evidence implicates oxidative stress in the pathophysiology of many complications. As uric acid, is a powerful exogenous scavenger of free radicals when compared to vitamin C in the blood plasma (Sautin & Johnson, 2008) Though high uric acid level may leads to various complication including Gout, the present study was aimed to explore the uric acid level and incident of oxidative stress in the patient with Rheumatoid arthritis.

MATERIALS AND METHODS

Study was carried out at Sri Lakshmi Narayana Institute of Medical Sciences, Hospital Pondicherry, India, Affiliated to Bharath Institute of Higher Education and research, Chennai. An informed verbal consent was taken from the patients before conducting the study. The institutional ethical clearance was also obtained.

Inclusion Criteria

Patients with rheumatoid arthritis who are all suffering from active disease at the time of investigation, complaining of morning stiffness, synovial swellings and increased sedimentation rate are included in this study

Exclusion Criteria

The individuals having clinical history of Diabetes

Mellitus, Cardio Vascular Disease, various Inflammatory diseases and those who are not willing to participate were excluded in this study.

The 162 sero-positive patients of rheumatoid arthritis who undergone treatment at Sri Lakshmi Narayana Institute of Medical Sciences Hospital & College at Pondicherry, India were selected. Equal number of age and sex matched normal individuals with asymptomatic of the Rheumatoid arthritis who volunteered participated in this study was included as controls.

Parameters

The healthy individuals (Control) and rheumatoid arthritis patients were subjected to the following investigations, rheumatoid Factor, Erythrocyte Sedimentation Rate and Uric Acid levels.

Statistical analysis

Statistical analysis was carried using Students't' test.

RESULTS

Results showed changes observed in Uric acid level in the age group of 30-40 & 40-50 was not significant when compared with the respective matched control age groups but showed significant depletion in the patient with a Rheumatoid Arthritis complication in the age group between 50-60 (Table. 1). The Calcium level was significantly decreased with concomitant increase in C-reactive protein, Erythrocyte sedimentation rate and Malondialdehyde was observed in all the studied aged group with Rheumatoid Arthritis complication when compared with the respective control groups.

DISCUSSION

Free radicals have been implicated in the pathogenesis of numerous diseases like diabetes mellitus, cancer, rheumatoid arthritis, and also in aging. Uric acid plays an important protective role in humans by providing protection against oxidative stress provoked ageing and cancer. Uric Acid is an oxidizable substrate for haemprotein and hydrogen peroxide which able to able to protect the oxidative damage by acting as an electron donor and further chelate metal ions to converting them into poorly reactive forms to enable them to catalyse the free radical reactions.

Table 1 Rheumatoid Arthritis complication

Sl.NO	Parameter	Age Group 30 - 40				Age Group 40 - 50				Age Group 50 - 60			
		Male Cont.	Male Test	Female Cont.	Female Test	Male Cont.	Male Test	Female Cont.	Female Test	Male Cont.	Male Test	Female Cont.	Female Test
1	Uric Acid	5.19 ± 0.02	5.13 ± 0.08	5.17 ± 0.13	5.12 ± 0.18	5.15 ± 0.04	5.12 ± 0.03	5.16 ± 0.09	5.13 ± 0.05	5.15 ± 0.02	3.78 ± 0.09***	5.15 ± 0.01	3.80 ± 0.09***
2	C-Reactive protein	0.05 ± 0.001	0.07 ± 0.005***	0.06 ± 0.004	0.06 ± 0.009***	0.06 ± 0.001	0.09 ± 0.01***	0.05 ± 0.001	0.06 ± 0.001***	0.06 ± 0.001	0.72 ± 0.01***	0.06 ± 0.001	0.75 ± 0.01***
3	Erythrocyte Sedimentation Rate	6.45 ± 0.40	11.02 ± 1.80	7.01 ± 0.56	11.06 ± 1.2	11.04 ± 0.81	22.12 ± 1.94	11.08 ± 0.80	28.02 ± 1.98	11.38 ± 0.90	34.02 ± 1.78	12.42 ± 0.96	42.28 ± 1.98
4	Malondialdehyde level	0.08 ± 0.001	0.28 ± 0.00***	0.07 ± 0.001	0.49 ± 0.01***	0.09 ± 0.001	0.98 ± 0.01***	0.08 ± 0.001	2.15 ± 0.01***	0.09 ± 0.001	2.16 ± 0.02***	0.08 ± 0.001	3.56 ± 0.05***
5	Calcium	9.20 ± 0.10	8.27 ± 0.10***	9.00 ± 0.06	8.32 ± 0.04***	9.33 ± 0.05	8.48 ± 0.09***	9.18 ± 0.09	8.25 ± 0.05***	9.45 ± 0.08	7.95 ± 0.05***	9.07 ± 0.10	7.85 ± 0.05***

* compared with control, † The symbols *** represent statistical significance at p<0.001.

Uric acid is a strong exogenous antioxidant protects the Red blood cells for the oxidative damage, in the present study significant elevation in the Erythrocyte Sedimentation Rate was observed with concomitant decrease in the Uric acid levels in artherities patients (Simavlı et al., 2010). Further correlation that was observed in this study between the serum MDA level

and blood ESR and between the serum MDA and CRP levels in patients with Rheumatoid Arthritis (Silva et al., 2010) This may be due the depletion in the uric acid levels as it react with reactive oxygen species result in oxidation products like allantoin, hence uric acid is an important tool in the assessment of oxidative stress in humans. Further Uric Acid is ionized to urate, which has limited solubility in water and excess production leads to crystallization and accumulated in joints results in arthritis. Further in the present study rheumatoid arthritis was found more common in females than males and most patients fall in the age group of 50-60 years. The prevalence of Rheumatoid Arthritis increases with age and the sex difference was explored in this study.

CONFLICTS OF INTEREST

All authors have declared that they do not have any conflict of interest for publishing this research.

REFERENCES

Quinonez-Flores C.M., Gonzalez-Chavez S.A., Del Río Nájera D., and Pacheco-Tena C. (2016) Oxidative Stress Relevance in the Pathogenesis of the Rheumatoid Arthritis: A Systematic Review. Biomed Res Int.; 2016: 6097417.

Sailaja Rao, P., Kalva, S., Yerramilli, A., & Mamidi, S. (2011). Free Radicals and Tissue Damage: Role of Antioxidants. Free Radicals and Antioxidants, 1(4), 2–7.

Sautin, Y. Y., & Johnson, R. J. (2008). Uric Acid: The Oxidant-Antioxidant Paradox. Nucleosides, Nucleotides and Nucleic Acids, 27(6-7), 608–619..

Silva I, Mateus M, Branco JC. (2010) Assessment of erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP) on rheumatoid arthritis activity prediction. Acta Reumatol Port., 35(5), 456-462.

Simavlı, H., Bucak, Y. Y., Tosun, M., & Erdurmuş, M. (2015). Serum Uric Acid, Alanine Aminotransferase, Hemoglobin and Red Blood Cell Count Levels in Pseudoexfoliation Syndrome. Journal of Ophthalmology, 2015, 1–4.