

Evaluation of Serum Uric Acid and Magnesium Levels in Cases of Myocardial Infarction

M. Indira¹, Ch. Sudhakar Babu², V. Bhagya Laxmi³

¹Associate Professor, Department of Biochemistry, Rangaraya Medical College, Kakinada.

² Professor & HOD, Department of Anatomy, Government Medical College, Ongole.

³Professor & HOD, Department of Biochemistry, Rangaraya Medical College, Kakinada, Andhra Pradesh, Dr. YSR UHS Vijayawada, India.

Received: 04-02-2023 / Revised: 28-02-2023 / Accepted: 29-03-2023

Corresponding author: Dr M. Indira

Conflict of interest: Nil

Abstract

Background: Coronary artery disease is currently the leading cause of mortality and morbidity. The current study was designed to assess the causes of myocardial infarction by measuring serum uric acid and magnesium levels.

Materials and Methods: This research was carried out at the Institute of Rangaraya Medical College, GGH, Kakinada. A total of 80 people were included and divided into two groups. Group I (n=40) served as the control group. Group II (n=40) had a myocardial infarction. All of the patients' demographic information was gathered. Blood was drawn from all patients and used to calculate serum uric acid and magnesium levels. The data was presented in mean standard deviation. The unpaired "t" test was used to determine the statistical significance between groups.

Results: There was significant difference was absorbed in serum uric acid and magnesium levels when compared to group I with group II.

Conclusion: There were significant differences in myocardial infarction cases when compared to the control group. Knowledge of these changes can help in the prevention and treatment of myocardial infarction patients with cardiovascular disorders.

Keywords: Myocardial Infarction, Serum Uric Acid Levels, Serum Magnesium Levels.

This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

Introduction

Myocardial infarction (coronary artery disease) is one of the leading causes of death [1]. Recent research has shown that measuring serum uric acid and magnesium levels can be useful in determining the risk of mortality in acute myocardial infarction. [2]

In healthy people, the rate of uric acid production and excretion is relatively constant. Changes in the uric acid content of body fluids can indicate the state of metabolism, immunity, and other human

body functions. [3] If the body produces excessive uric acid or if the excretion mechanism is compromised, the body will retain excessive uric acid. [4]

Patients with hyperuricemia who have had an acute myocardial infarction have a higher rate of left ventricular systolic and diastolic dysfunction [5]. Reduction of concentration of uric acid may decrease the incidence of heart failure and death. (Magnesium is required for enzymatic reactions and

responsible for regulating blood pressure, glycemic control and lipid peroxidation) [6].

Low magnesium intake frequently predisposes to deficiency, increasing the risk of cardiovascular disease and death. With this context in mind, the current study was designed to assess serum uric acid and magnesium levels in patients suffering from a myocardial infarction.

Materials and Methods

A total of 40 healthy subjects were selected for group I. They were considered as control group. Group II had (n= 40) patients with myocardial infarction considered as cases group.

Study groups

Group I(control): healthy subjects (n= 40)

Group II(cases):patients with myocardial infarction(n=40)

Procedure: Individuals' demographic data (age & gender) were collected after the study

protocol was explained to them.

A small amount of blood was drawn from each subject and used to calculate serum uric acid levels using the uricase method and magnesium levels using the xylidyl blue method.

Results

In group 1, there were 17 males and 23 females, while in group II, there were 27 males and 13 females.

A significant increase in serum uric acid levels was observed in myocardial infarction patients compared to the control group and a decrease in serum Magnesium levels were found to be statistically higher in Group II than in Group 1. ($p < 0.001$).

Statistical Analysis

P value < 0.5 considered statistically significant 95% confidence interval and calculated according to "t" test. The data was expressed in mean and standard deviation.

Table: Comparison of serum uric acid levels and magnesium levels between the groups

Parameters	Mean \pm SD Group I	Mean \pm SD Group II	value
1. serum uric acid	4.455 \pm 1.18	9.585 \pm 2.63	<0.001
2.serum magnesium	2.202 \pm 0.37	1.055 \pm 0.27	<0.001

Discussion

Increased serum uric acid levels and decreased magnesium levels have an effect on heart function and increase the risk of cardiovascular disease [7-10]. A total of 80 subjects were included in this study, with 40 numbers in group 1 and the rest in group II. MY NADKAR and VI JAIN observed these changes in cardiovascular diseases, and similar results were observed in the current study. In the current study, patients with myocardial infarction had higher levels of serum uric acid and lower levels of magnesium than the control group. [11] Increased uric acid levels are known to contribute to endothelial dysfunction by

impairing nitric oxide production, which damages heart function. Magnesium supplementation improves myocardial function by preventing calcium buildup and cell death. [12] Serum uric acid and magnesium levels can be measured to reduce the risk of a myocardial infarction.

Conclusion

Based on the findings of this study, it can be concluded that patients with elevated levels of serum uric acid and low levels of serum magnesium can impair cardiac function and require medical attention to reduce the risk of myocardial infarction. Because there are significant differences in the cases of

myocardial infarction compared to the healthy population.

References

1. Kanbay M, Segal M, Afsar B, et al. The role of uric acid in the pathogenesis of human cardiovascular disease. *Heart.* 2013; 99:9759-66.
2. Shankar A, Klein R, Klein BE, et al. The association between serum Uric acid level and long-term incidence of hypertension: Population Based cohort study. *J Hum Hyper tens.* 2006; 20:937-45.
3. Dehghan A, van Hoek M, Misra J, et al. High serum uric acid as a novel risk factor for type 2 diabetes. *Diabetes Care.* 2008; 31:361-2.
4. Borghi C, Rosei EA, Bardin T, Dawson J, Dominiczak A, Kielstein JT, Manolis AJ, Perez-Ruiz F, Mancia G. Serum uric acid and the risk of cardiovascular and renal disease. *Journal of hypertension.* 2015 Sep 1;33(9):1729-41.
5. Masuo K, Kawaguchi H, Mikami H, et al. Serum uric acid and plasma norepinephrine concentrations predict subsequent weight gain and blood pressure elevation. *Hypertension.* 2003;42:474-80.
6. Culleton BF, Larson MG, Kannel WB, et al. Serum uric acid and risk for cardiovascular disease and death: the Framingham Heart Study. *Ann Intern Med.* 1999; 131:7-13.
7. Tscharre M, Herman R, Rohla M, et al. Uric acid is associated with Long-term adverse cardiovascular outcomes in patients with acute Coronary syndrome undergoing percutaneous coronary Intervention. *Atherosclerosis.* 2018; 270:173-9.
8. Guo W, Liu Y, Chen JY, et al. Hyperuricemia Is an Independent Predictor of Contrast-Induced Acute Kidney Injury and Mortality in Patients Undergoing Percutaneous Coronary Intervention. *Angiology.* 2015;66:721-6.
9. Liu Y, Tan N, Chen J, et al. The relationship between hyperuricemia and the risk of contrast-induced acute kidney injury after percutaneous coronary intervention in patients with relatively normal serum creatinine. *Clinics (Sao Paulo).* 2013;68:19-25.
10. MY Nadkar and VI Jain Serum Uric acid in Acute Myocardial Infarction in JAPI., October 2008;56:759-762.
11. Magnoni M, Bertotti M, Ceriotti F, et al. Serum uric acids in hospital Mortality in patients with acute coronary syndrome. *Int J Cardiol.* 2017; 240:25-9.
12. Lazzeri C, Valente S, Chiostri M, et al. Uric acid in the acute phase ST elevation myocardial infarction submitted to primary PCI: its prognostic role and relation with inflammatory markers: a single center experience. *Int J Cardiology.* 2010; 138:206-9.