



Study on Uric Acid Levels in Various Stages of Chronic Kidney Disease

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ABSTRACT

Introduction: Chronic Kidney Disease (CKD) is defined as presence of markers of kidney damage for 3 months as defined by structural or functional abnormalities of the kidney with or without decreased GFR. Uric acid levels increases with progression of kidney dysfunction since uric acid is primarily excreted by the kidney. Uric acid is also considered to be a risk factor in the progression of atherosclerosis and coronary heart disease which is the most common cause of death in CKD population.

Aim: To study the level of uric acid level in various stages of chronic kidney diseases and to study the relationship of hyperuricemia with progression of stages of CKD and hypertension.

Methods: Prospective study was conducted in patients with chronic kidney disease. Serum samples were collected and analyzed for the uric acid and creatinine level. Patients were categorized into various stages of CKD on the basis of GFR. GFR is calculated using Cockcroft-Gault formula with the available data.

Results: Presence of uric acid level above 7.0 mg/dL in males and above 5.6 mg/dL in females was taken as criteria for detecting hyperuricemia. Incidence of hyperuricemia in CKD patients (including all stages) was 71.5%.

Conclusion: The uric acid level increased significantly with progression of stages of CKD. Stage V CKD has significant correlation with hyperuricemia. Hyperuricemia has also been strongly associated with hypertension.

KEYWORDS : Uric acid, chronic kidney disease (CKD), Glomerular filtration rate (GFR), Hyperuricemia

INTRODUCTION:

Chronic kidney disease (CKD) has become a public health challenge and is a common disorder. Chronic kidney disease occurs when one suffers from gradual and usually permanent loss of kidney function over time with glomerular filtration rate (GFR) <60 ml/min/1.73 m² for at least three months regardless of cause. Elevation of serum uric acid level is often associated with CKD and hyperuricemia is considered as an independent risk factor for aggravation of CKD. Normal serum uric acid level in male is 3.1-7.0 mg/dL and in females, it is 2.5-5.6 mg/dL. Uric acid is an active player in the processes related to cardiovascular events and kidney disease progression by the activation of rennin-angiotensin system, cyclooxygenase system and promotion of oxidative stress. Also, uric acid is correlated with endothelial dysfunction, hypertension and it lays an important cause of morbidity and mortality in CKD patients. Furthermore, lowering uric acid in patients with established renal disease has been reported to stabilize renal function independent of other confounders, suggesting a causative role of elevated uric acid in progression of CKD, rather than as an incidental finding related to CKD severity. Hence, it is necessary to detect uric acid level in various stages of CKD.

AIM

To study the level of uric acid level in various stages of chronic kidney diseases and to study the relationship of hyperuricemia with progression of stages of CKD and hypertension

MATERIALS AND METHODS:

Prospective observational study was done in Department of Medicine, Tirunelveli Medical College Hospital. Institutional ethics committee approval and informed consent from patients were obtained. Patients diagnosed with CKD are included in the study. The study was carried out in the Outpatient Department of Nephrology, Tirunelveli Medical College Hospital (TVMCH). The duration of the study was

seven weeks (July 16, 2012 to August 31, 2012). The study was conducted on 200 patients diagnosed with CKD. Patients on drugs causing hyperuricemia, more than 60 years of age were excluded from the study. The included patients were subjected to detailed history and clinical examination. Serum samples were collected, detection of uric acid using uricase test and estimation of serum creatinine using Jaffe's method. The blood pressure of all the patients was recorded.

RESULTS:

Of the 200 patients studied, 137 were males and 63 were females. The incidence of hyperuricemia in CKD patients was 71.5%. It was 69.34% in males and 76.19% in females. (Figure-1). The distribution of patients in various stages of chronic kidney diseases are – Stage III (26%), Stage IV (43%), Stage V (31%), (Figure-2). Incidence of hyperuricemia increased with progression of stages of chronic kidney disease. It was 55.76% in Stage III, 73.5% in Stage IV and 83.6% in Stage V (Figure-3). Incidence of hyperuricemia was significantly associated with increased blood pressure. Of hyperuricemic patients, hypertension prevalence was 62.06% in Stage III, 71.87% in Stage IV, 78.43% in Stage V.

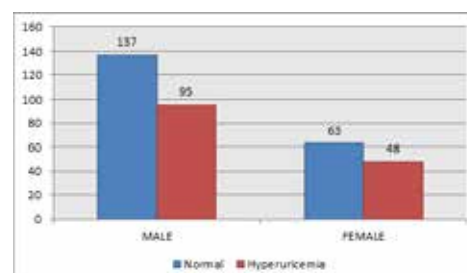


Figure - 1: Distribution of Hyperuricemia in Gender

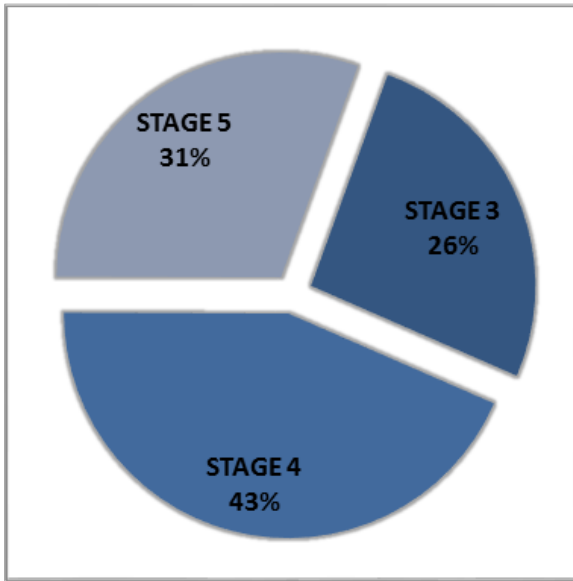


Figure – 2: Distribution of Patients in Various Stages Of CKD

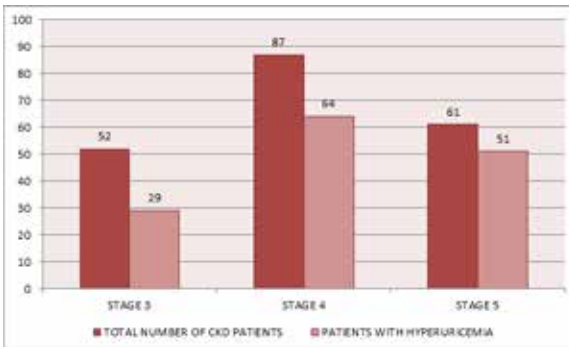


Figure – 3: Distribution of Various Stages of CKD with Hyperuricemia

DISCUSSION:

Increasing serum uric acid levels are positively associated with chronic kidney disease. Hyperuricemia deteriorates the autoregulation of renin-angiotensin system which leads to hypertension, microalbuminuria and overt proteinuria and progressive renal failure and cardiovascular events due to endothelial dysfunction. Stress is being laid on its early detection. In Earlier studies, it has been shown that hyperuricemia is present in about 73% of CKD patients. This study shows that 71.5% of CKD patients have hyperuricemia. This is in accordance with the previous reports. It was also seen that hyperuricemia has a strong co relation with hypertension (72% of hyperuricemic patients have hypertension). Also, hyperuricemia was highly prevalent in Stage V CKD (83.6%), compared to other stages. On the other hand, in intervention studies on hyperuricemia, the treatment of hyperuricemia with allopurinol in CKD has resulted in a fall in blood pressure and inhibition of the progression of renal damage. Conversely, the cessation of allopurinol treatment in CKD was followed by a rise in blood pressure and the development of renal damage.

CONCLUSION:

High levels of serum uric acid are strongly associated with the progression of CKD. Thus it is an independent risk factor. Hence the adequate monitoring and management of abnormal levels of serum uric acid, seems primordial in preventing or arresting of CKD in hypertensive individuals. In whole, the incidence of hyperuricemia in CKD patients is 71.5% and it is significant in Stage V CKD. The incidence of hyperuricemia has significant correlation with elevated blood pressure. Indeed, an elevated uric acid was more predictive for the development of renal insufficiency than proteinuria.

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