

ORIGINAL ARTICLE

FREQUENCY OF ABNORMAL URIC ACID LEVEL IN HAEMODIALYSIS PATIENTS.

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ABSTRACT

Background: Hyperuricemia and hypouricemia have been implicated as a cause of high mortality in haemodialysis patients. Our study is designed to determine the frequency of abnormal Uric Acid levels in haemodialysis patients and to identify those at risk of increasing mortality.

Methods: 140 End Stage Renal Disease (ESRD) patients undergoing haemodialysis were enrolled in a retrospective cross sectional study. Uric Acid levels done as routine sampling was noted and data analyzed using SPSS for windows, version 23. All data are presented as mean \pm SD. A relationship was considered statistically significant at p-values less than 0.05. Patient's age and comorbidities like Diabetes and Hypertension were noted. Patients with mean UA levels between 2.4-6 mg/dl were specified as normouricemic, above this range as hyperuricemic and below this range as hypouricemic.

Results: Out of 140 patients, 71 (50.7%) were males and 69 (49.3%) were females. Mean age of our patient population was 56.64 ± 12.207 . 56 (40%) patients were hyperuricemic and 8 (5.7%) hypouricemic. 87 (62.1%) were diabetic, 122 (87.1%) were hypertensive whereas 83 (59.3%) were both hypertensive and diabetic but no notable ($p > 0.05$) link was found to exist between hyperuricemia and these co-morbidities.

Conclusion: We report a very high frequency of abnormal Uric Acid levels in haemodialysis patients. Nearly half of our haemodialysis population is at high risk of all-cause mortality based on Uric Acid levels alone.

KEYWORDS: Hyperuricemia, Uric Acid, Hemodialysis, End Stage Renal Disease (ESRD)

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INTRODUCTION

Hyperuricemia is defined as Uric Acid (UA) more than 6.0mg/dL and is commonly seen in patients with kidney diseases. There has been a long-standing debate whether increased Uric Acid causes progression of chronic kidney disease and influences mortality or not. Multiple studies have favored that treating asymptomatic hyperuricemia in patients with initial stages of CKD have a beneficial effect on preserving and even improving Glomerular Filtration Rate (GFR).^[1]

Hyperuricemia exerts its effect by stimulating afferent vascular smooth muscle cell proliferation with resultant decrease in renal perfusion.^[2] Since a

major fraction of Uric Acid is excreted via kidney, it gets accumulated in patients with renal diseases.^[3,4] However, in majority of these patients it remains asymptomatic.^[5]

Recent studies have shown that asymptomatic hyperuricemia is not benign and has been implicated as a risk factor for cardiovascular diseases including Myocardial Infarction and stroke^[6], as well as long term study in haemodialysis patients have shown decreased survival in hyperuricemic group.^[7] Uric acid is also one of the nutritional marker in patients undergoing haemodialysis. Studies have demonstrated that a low uric acid increases mortality if other nutritional parameters like PO_4 , albumin and BMI are not well.

Hence both hyperuricemia and hypouricemia may be a contributing factor for high mortality in haemodialysis patients. Previous studies in peritoneal dialysis patients [8], demonstrated high cardiovascular mortality in patients with increased Uric Acid. A study by Bae et al [9] showed increased all-cause mortality in patients with hypouricemia.

We conducted this study in haemodialysis patients to identify patients with low or high uric acid level and to identify those that are at a higher risk of increased all-cause mortality.

METHODS

A cross sectional retrospective study, after informed consent, was conducted on all end stage renal disease patients undergoing haemodialysis from 1st April 2017 to 15th January 2018 in Department of Nephrology, Liaquat National Hospital. Haemodialysis charts were reviewed for Uric Acid level, measured on venous blood sample as part of the monthly labs done routinely on hemodialysis patients.

Patients with mean Uric acid level between 2.4 to 6mg/dL were defined as normouricemic, patients with uric acid level above 6.0 mg/dL were defined as hyperuricemic and patients with uric acid level below 2.4 mg/ dL were defined as hypouricemic.

In addition, patient's age, comorbidities like Hypertension and Diabetes Mellitus were also recorded. Statistical analysis was performed using SPSS for windows, version 20. All data are presented as mean \pm SD. A relationship was considered statistically significant at p-values less than 0.05.

Patients were included if their ages were between 18 to 70 years and have been undergoing haemodialysis for more than 3 months. Exclusion criteria included patients on peritoneal dialysis, patients with failed renal transplant and patients with infection or malignancy and on immunosuppressive agents.

RESULTS

Total number of patients in the study were 140, out of which male were 71 (50.7%) and females were 69 (49.3%). Mean age of the patient was 56.64 ± 12.207 . Mean Uric Acid level was 5.68 ± 2.01 . Among males, mean uric acid level was 5.81 ± 2.15 and in females it was 5.56 ± 1.87 (showing no significant gender difference $p = 0.457$). Out of 140, 56(40%) patients were hyperurecemic having Uric Acid level greater than 6.0 mg/dL, 76 (54.3%) were

normouricemic having Uric Acid level between 2.4 to 6.0 mg/dL and 8(5.7%) hypouricemic having uric acid level less than 2.5 mg/ dL.

Among our study population, 87 (62.1) were diabetic, 122 (87.1%) were hypertensive and 83 (59.3%) were both diabetic and hypertensive. The important results are shown in Table 1.

Table 1: Demographics of Study

Number of Patients	140
Males/ Female	71/69
Age (mean \pm SD; years)	56.64 ± 12.207
Uric acid (mean \pm SD; mg/dL)	5.68 ± 2.01
Hyperuricemia, UA more than 6mg/ dL (proportion; percentage)	56/140, 40%
Normouricemia, UA between 2 mg/dl to 6 mg/dL (proportion; percentage)	76/140, 54.3%
Hypouricemia, UA less than 2 mg/dL (proportion; percentage)	8/140, 5.7%
Diabetes Mellitus (proportion; percentage)	87/140, 62.1%
Hypertension (proportion; percentage)	122/140, 87.1%

Chi square test was conducted to compare the frequency of hyperuricemia with incidence of Diabetes Mellitus and hypertension. Statistically, no significant relationship (p values less than 0.05) was found to exist between hyperuricemia and these comorbidities as shown in Table 2.

Table 2: Relationship Of Comorbid Conditions With High Ua Levels

COMORBIDS	P value (by Chi square test)
Diabetes Mellitus and Hyperuricemia	0.388
Hypertension and Hyperuricemia	0.247
Diabetes Mellitus + Hypertension and Hyperuricemia	0.553

DISCUSSION

We report a very high number of abnormal Uric Acid level in haemodialysis patients. About 1/2 of our dialysis population is at high risk of increased mortality (including both hypouricemic and hyperurecemic patients). 40% of the haemodialysis patients were hyperurecemic, an incidence almost alike the study reported by Petreski et al [7] in which 28% of the patients were hyperuricemic.

Several studies have shown a J shaped relationship between Uric Acid and mortality [3] in haemodialysis patients in which both high and low UA levels were associated with high cardiovascular risk and mortality in this patient population. A study by Chung W et al analyzed hyperuricemic patients with chronic kidney disease and concluded it to be an indepen-

dent risk factor for all cause mortality in this population.^[10] while another study failed to show high UA to be associated with increased cardiovascular mortality.^[11]

Since lower UA levels may indicate poor nutritional status however other factors also need to be taken in account that can lower UA level but do not have an impact on mortality, as low UA level have been reported in diabetics^[3] and use of phosphate binders^[12], both of which are very common scenarios in haemodialysis patients.

Our study failed to establish a correlation between Diabetes Mellitus, hypertension, hypouricemia and hyperuricemia as p value was more than 0.05. In both cases we did not took into account as to how many of our patients were taking phosphate binders and whether there were other parameters of nutritional deficiency in the hypouricemic group.

Our study has limitations. Firstly, we did not obtain complete information about the medication history of the patients although we have tried to exclude those patients who were on uricosuric drugs and had lower UA levels consequently. Secondly, it was a cross sectional study with only one reading of UA level.

CONCLUSION

We conclude that our dialysis population are at high risk of mortality based on their UA levels alone. As both high and low UA level are quite prevalent in our population; further prospective and well controlled trails need to be conducted at larger scale to establish a relationship.

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