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ORGINAL REASEARCH

STUDY ON ASSOCIATION OF SERUM URIC ACID LEVEL WITH URINE ALBUMIN LEVEL IN TYPE 2 DIABETES MELLITUS IN A TERTIARY CARE HOSPITAL-A CROSS SECTIONAL STUDY

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ABSTRACT

Background: Study on association of serum uric acid level with urine albumin level in type 2 diabetes mellitus in a tertiary care hospital-a cross sectional study**.**

Methods: Data was collected from diabetic patients attending Department of General medicine of Sree Mookambika Institute of Medical Sciences,Kanyakumari, TamilNadu from march 2022 to September 2023.Data collected from 100 patients those who are diagnosed T2DM.

Result: There is a strong positive correlation between increase in serum uric acid levels and corresponding increase in urine albumin creatinine ratio. This is indicated by the Pearson's R Correlation value of 0.890043. This means as serum uric acid levels increases the urine albumin creatinine ratio increases.

Conclusion: In this study we can safely conclude that the mean serum uric acid level was significantly and consistently higher in microalbuminuria patients in type 2 diabetes mellitus patients.

Keywords: Type 2 Diabetes Mellitus

INTRODUCTION:

Nephropathy related to type 2 diabetes is one of the leading causes of end-stage renal disease (ESRD), and is also associated with an increased risk of cardiovascular morbidity and mortality. Over the past 15 years, it has emergedas the primary reason for initiating dialysis[1] . Modifiable factors, such as arterial blood pressure, albuminuria, glycemic control and lipid control, play a role in the progression of diabetic nephropathy[2].

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Studies have documented that elevated serum uric acid (SUA) levels are positively associated with the development of type 2 diabetes itself[3]. SUA is also associated with known risk factors for kidney disease progression[4], including hypertension[5], cardiovascular disease[6-8] andatherosclerosis[7]. SUA has not been investigated as a risk factor for declining renal function in patients with type 2 diabetes who are at the onset of overt nephropathy, although SUA was previously reported in the early stage of diabetic nephropathy[9].An elevated SUA level within the normal range (>380 μmol/L [6.4 mg/dL] in men, >303 μmol/L [5.1 mg/dL] in women) emerged as a strong and independent risk factor for renal function decline.

The recommended multifactorial management of type 2 diabetic nephropathy is to stop smoking and to maintain the following: blood pressure<130/85 mmHg, HbA1c <7.0% and LDL-C < 100 mg/d. Of these, poor glycemic control, elevated LDL-C and smoking were significant risk factorsfor renal dysfunction . In addition to these known factors, SUA also probably increased the risk of declining renal function. Further evidence for the use of UA-lowering treatment for renoprotection is required.

OBJECTIVE:

To evaluate association between serum uric acid level and urinealbumin in type 2 diabetes mellitus patients.

METERIALS AND METHEDOLOGY:

Data was collected from diabetic patients attending Department of General medicine of Sree Mookambika Institute of Medical Sciences,Kanyakumari, TamilNadu from march 2022 to September 2023 . All 100 patients were explained in detail about the procedure and informed consent was obtaine

The inclusion criteria were 100 type 2 diabetic patients. Patients with arthritis, hypertension, hypothyroidism, myeloproliferative disorders, renal failure, heart failure, acute febrile illness, recent exercise, urinary tract infection, patients taking alcohol, diuretics were excluded.Data collected using a pre-tested profoma meeting the objectives of the Study History,Physical examination,Investigations,Purpose of the study explained to the patient,Informed consent obtained.Using clinical methods and investigation diabetic patients who fulfill theinclusion criteria assessed.All patients underwent serum uric acid and urine spot albumincreatinine ratio.Blood samples for complete blood count, RBS,urea, creatinine,electrolytes , FLP , urine for urine routine obtained.

Statistical analysis was done using the statistical package for social sciences (SPSS).Different statistical methods were used as appropriate. Mean ± SD was determined for quantitative data and frequency for categorical variables. The independent t- test was performed on all continuous variables. The normal distribution data was checked before any t-test. The Chi-Square test was used to analyze group difference for categorical variables. In logistic regression models, age was adjusted for estimation of each or all the independent

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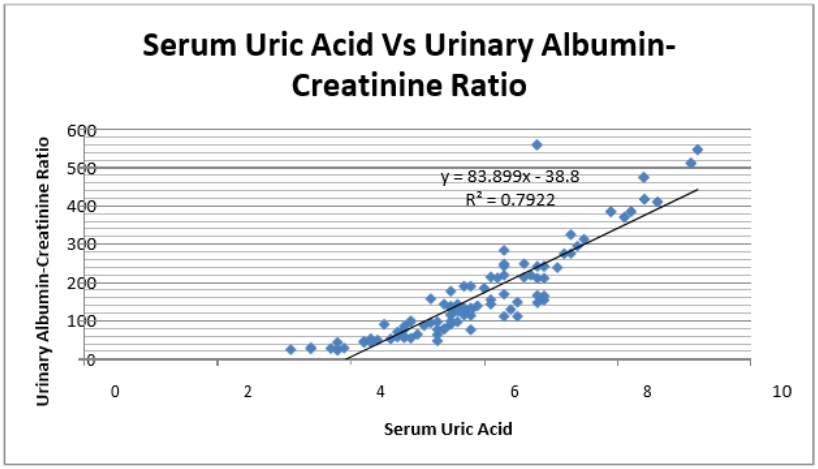
effects of hypertension, ischemic heart disease and diabetes mellitus . A p- value < 0.05 was considered significant.

Results:

Descriptive statistics was done for all data and were reported in terms of mean values and percentages. Suitable statistical tests of comparison were done. Continuous variables were analysed with the unpaired t test.. Categorical variables were analysed with the Chi-Square Test and Fisher Exact Test. Statistical significance was taken as P < 0.05.The data was analysed using SPSS version 16 and Microsoft Excel 2007.



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Regression Statistics	
Multiple R	0.890043
R Square	0.792176
Adjusted R Square	0.790055
Standard Error	0.581066
Observations	100

ANOVA	***df***	***SS***	***MS***	***F***	***Significance F***
Regression	1	126.1254	126.1254	373.5523	<0.0001
Residual	98	33.08851	0.337638		
Total	99	159.2139			

	Coefficients	***StandardError***	***t Stat***	***P-value***	***Lower 95%***	***Upper 95%***	***Lower 95.0%***	***Upper 95.0%***
Intercept	4.313841	0.097166	44.39683	0.0000	4.121019	4.506662	4.121019	4.506662
Urine Albumin CreatinineRatio	0.009442	0.000489	19.3275	0.0000	0.008473	0.010412	0.008473	0.010412

There is a strong positive correlation between increase in serum uric acid levels and corresponding increase in urine albumin creatinine ratio. This is indicated by the Pearson's R Correlation value of 0.890043. This means as serum uric acid levels increases the urine albumin creatinine ratio increases. As per Pearson's R Correlation this increase in urine albumin creatinine ratio dueto corresponding increase in serum uric acid levels happens 89% of times.

This direct positive and high correlation is significant with a p value of <0.0001 as per analysis of variance test. The percentage change is also explained in the scatter plot. This linear model explains all the variability of the response data around its mean. Since $R^2$is 0.792176, “the fitted regression equation explains 79% of the variation in Y"(Y= 83.899

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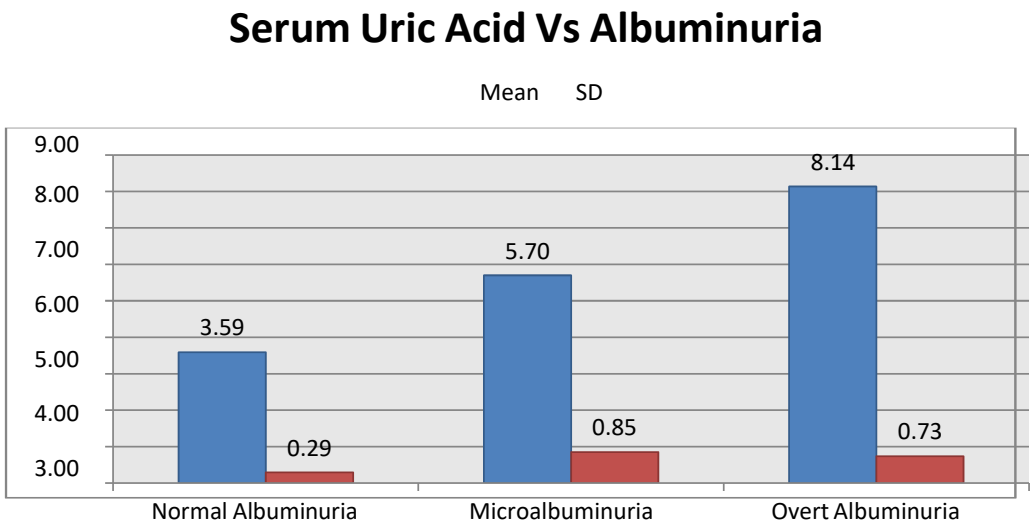
(uric acid measurement) – 38.8).

Thus 1 mg/dl increase in serum uric acid causes 45.10 points increase in urine albumin creatinine ratio. This variation in serum uric acid in relation to urine albumin creatinine ratio correlates 89% of times and this variation is truly accounted 79% of times.



Serum Uric Acid Vs Albuminuria	Normal Albuminuria	Microalbuminuria	Overt Albuminuria
N	7	82	11
Mean	3.59	5.70	8.14
SD	0.29	0.85	0.73
P value Single Factor ANOVA			<0.0001

By conventional criteria the association between the serum uric acidlevels and albuminuria status among study subjects is considered to be statistically significant since $p < 0.05$.

In patients belonging to normal, albuminuria,microalbuminuria and overt albuminuria groups, the mean serum uric acid level is 3.59, 5,70 and 8.14 mg/dl repectively. The increased mean serum uric acid level as perincreasing albuminuria status is statistically significant as the p value is <0.0001 as per single factor ANOVA test indicating a true difference amongstudy groups.

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Discussion:

The mean serum uric acid level was meaningfully more in overt albuminuria, group compared to the microalbuminuria group by 37% with amean difference of 2.44 mg/dl.The mean serum uric acid level was meaningfully more in microalbuminuria group compared to the normal albuminuria group by 30%with a mean difference of 2.11 mg/dl.

Conclusion:

In this study we can safely conclude that the mean serum uric acid level was significantly and consistently higher in microalbuminuria patients compared to normal albuminuria and consistently higher in overt albuminuria patients compared to microalbuminuria in type 2 diabetes mellitus patients.

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