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**CORRELATION BETWEEN SERUM URIC ACID LEVELS AND NON HDL CHOLESTEROL IN TYPE II DIABETES MELLITUS – AN OBSERVATIONAL STUDY**

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**ABSTRACT**

Diabetes mellitus is a systemic metabolic disorder characterized by hyperglycaemia resulting from defects in insulin secretion, insulin action, or both. There is insulin resistance and dyslipidemia which results in micro and macrovascular complications of diabetes. Uric acid, the end product of purine catabolism has been identified as one of the risk factors in the development of metabolic syndrome, coronary artery disease and diabetes mellitus. Non HDL levels are shown to be high in diabetics when compared to healthy individuals. The aim of this study is to evaluate the association between non HDL levels and serum uric acid in type 2 diabetic individuals.

**KEY WORDS:** Uric acid, Non-HDL, Diabetes, dyslipidemia



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## INTRODUCTION

Diabetes mellitus type 2 is a common condition among middle age and older individuals. The Prevalence of diabetes mellitus type 2 is increasing globally. India has the maximum increase during the last few years. The serum uric acid level is associated with the individual components of metabolic syndrome such as obesity, dyslipidemia and hypertension (1). Hyperuricemia has been identified as having major clinical significance in the development of various co morbidities including gout, metabolic syndrome, coronary artery disease and type 2 diabetes mellitus<sup>(2,3,4)</sup>. Hyperuricemia can be an accompaniment disorder with syndrome X (characterized by abdominal obesity, impaired glucose tolerance, increased LDL Cholesterol & decreased HDL Cholesterol). Several studies show that hyperuricemia is one of the risk factors of metabolic syndrome and it clearly has a strong correlation between various components of diabetic dyslipidemia including raised LDL, reduced HDL, raised triglycerides. Though LDL cholesterol plays a major role in atherogenesis and so contributing to its pathogenic role in various complications of type II diabetes mellitus, non HDL cholesterol which includes all the atherogenic lipoproteins needs to be given more importance as it is associated with various complications of type II diabetes mellitus. The aim of this study was to investigate the association between serum uric acid levels and non HDL cholesterol levels in type II diabetes mellitus which might pave the way for intervention at modifying serum uric acid levels and thereby have an impact on the outcome of complications from type II diabetes mellitus.

## RESULTS OF THE STUDY

## MATERIALS & METHODS

Blood sample ( 5 ml ) , serum separated is obtained from 100 individuals aged 40-60 years, cases including 50 diabetic individuals ,and controls 50 healthy individuals attending medicine / diabetology OPD of our institute ..

### INCLUSION CRITERION

Patients with type II diabetes mellitus and normal healthy controls aged 40 to 60 years.

### EXCLUSION CRITERION

Those individuals with liver dysfunction and renal insufficiency were excluded from the study.

### INVESTIGATIONS

1. FBS , PPBS by GOD – POD method
2. Fasting serum lipid profile Total cholesterol by CHOD-POD method  
HDL cholesterol by CHOD-POD method after precipitation  
Non HDL cholesterol, calculated value [ total cholesterol-HDL cholesterol ]
3. serum uric acid by uricase method
4. Serum Creatinine By Jaffes Kinetic Method
5. 12 lead ECG

The association of serum uric acid levels with non HDL was evaluated by using pearsons correlation co efficient. Statistical analysis was performed using SPSS data editor version20 with the help of a statistician. The study was approved by the institutional ethical committee . An informed consent was obtained from all the study participants, both in English and in vernacular language.

**Table 1**

N Non HDL(CASES)	
Mean	std. Deviation
176.36	27.969

**Table 2**

U URIC ACID(CASES)	
Mean	Std. Deviation
8.0212	1.82578

**Table 3**

NONHDL(CONTROL GROUP)	
Mean	Std. Deviation
124.80	21.304

**Table 4**

C URIC ACID(CONTROL GROUP)	
Mean	Std. Deviation
4.4708	1.50439

Table 1 to 4 shows the mean and standard deviation of all the parameters for both study and control group.

**Table 5**  
**STUDENT T TEST FOR NON HDL CHOLESTEROL**

**Independent Samples Test**

	L Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	T	df	sig. (2-tailed)	Mean Difference	std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Non HDL	60.735	.000	43.394	98	.000	171.889	3.961	164.028	179.750
			43.394	49.284	.000	171.889	3.961	163.930	179.848

The comparison of mean Non HDL levels between case and control group shows that the difference is significant(p =.000)

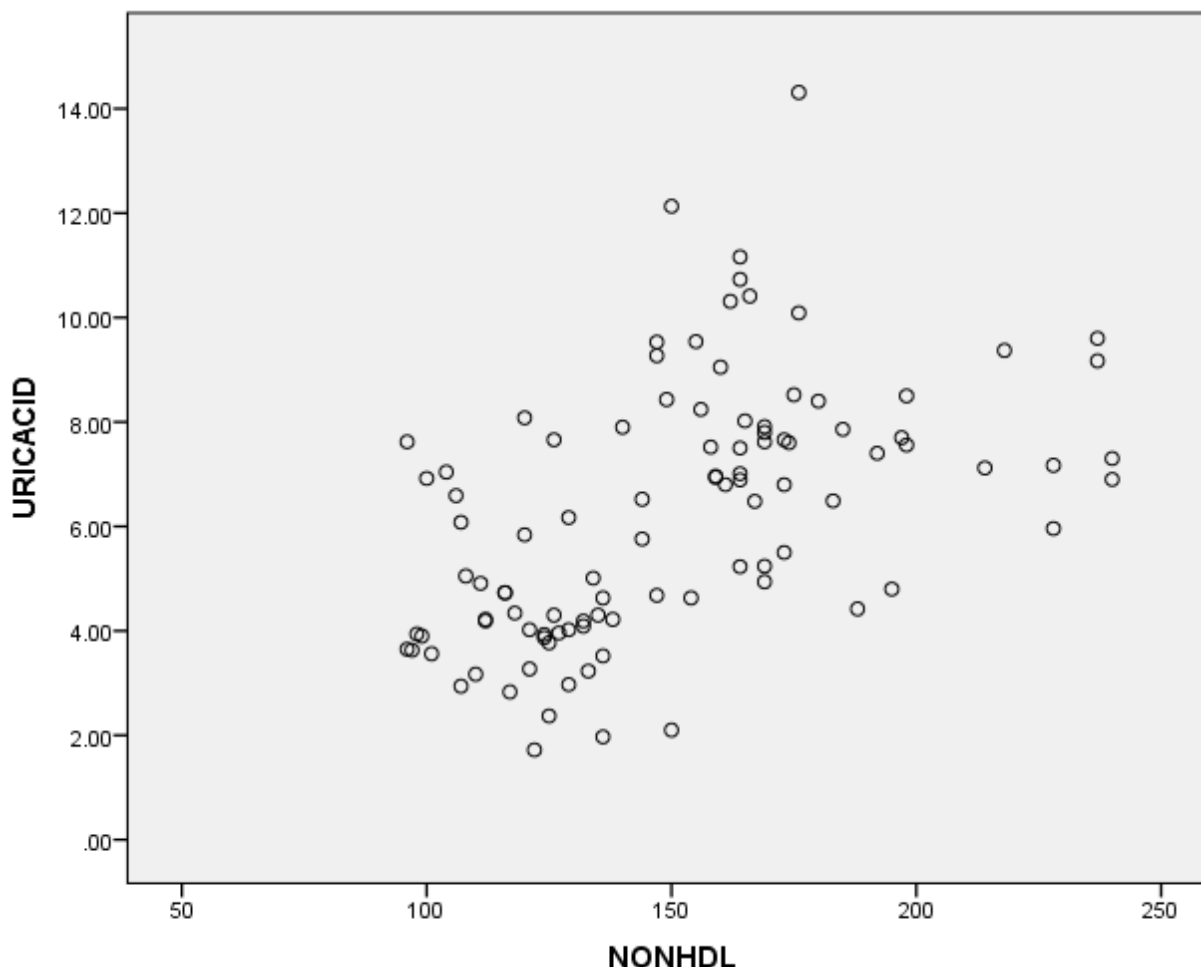
**Table 6**  
**STUDENT T TEST FOR URIC ACID**

**Independent Samples Test**

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Confidence Interval of the Difference	
								Lower	Upper
UR URICACID	44.444	.000	-38.618	98	.000	-116.779	3.024	-122.780	-110.778
			-38.618	49.720	.000	-116.779	3.024	-122.853	-110.704

The comparison of mean uric acid levels between case and control group shows that the difference is significant(p =.000)

**Graph 1**  
**PEARSONS CORRELATION – SCATTER PLOT**



*Pearsons correlation shows a positive correlation between Non HDL levels and uric acid ( $r = .513^{**}$ )*

## DISCUSSION

Type 2 diabetes is a state of insulin resistance with dyslipidemia and other associated features of atherosclerosis. Some recent studies have shown that elevated level of uric acid is involved in the pathogenesis of type 2 diabetes, regardless of other characteristics of subjects. Study done by Baynes shows that there is a growing evidence of hyperuricemia in type 2 dm individuals and is closely related to oxidative stress<sup>(5)</sup>. Also, some studies have shown that there is a positive association between uric acid and type 2 diabetes regardless of various other characters<sup>(6,7,8)</sup>. This study also shows higher uric acid levels in diabetic patients when

compared to healthy controls. Some studies show that uric acid level is an indicator of endogenous antioxidant activity<sup>(9)</sup>. However, hyperuricemia as a risk factor for hyperglycemic complication secondary to Diabetes mellitus has been established, though the mechanism remains unclear. This study was done to show the relationship of uric acid level with Non HDL levels in diabetics. Patients with type 2 diabetes have higher levels of atherogenic lipoproteins. A study done by S. H. Ley *et al* showed that non-HDL cholesterol was higher in type 2 diabetics and was shown to be superior to LDL cholesterol as a risk predictor in Aboriginal Canadians<sup>(10)</sup>. Similarly,

this study also showed higher levels of non-HDL in type 2 diabetics as compared to healthy individuals. Study done by Ram has shown the importance of non-HDL level in type 2 diabetics<sup>(11)</sup> Lipid Research Clinics Program Follow-Up Study done with a total of 4,462 men and women and who were followed for 19 years, showed that non-HDL cholesterol is a better predictor of CVD mortality than LDL<sup>(12)</sup>. An analysis done by Howard BV *et al* supports the evidence that non-HDL cholesterol may be useful in treating patients with diabetes and this was restricted to American Indians, who have the highest rate of diabetes of any ethnic group in the U.S.<sup>(13)</sup>. Study done by A.A.Akande correlated the serum uric acid level with components of metabolic syndrome in type 2 diabetic blacks. The present study was done with the intention of correlating non-HDL levels with serum uric acid. Statistical analysis showed that non-HDL levels are positively associated with serum uric acid levels. This might suggest that uric acid level is

an indirect indicator of oxidative stress in the body. In conclusion, the results of the present study suggest that when compared to non-diabetic subjects, diabetic subjects have significantly higher level of uric acid and it is positively associated with non-HDL levels in a group of South Indian population

### LIMITATIONS

The sample size is small which did not allow a multivariate approach for incorporating additional potentially meaningful factors for modifying the levels of serum uric acid and non HDL cholesterol levels. Nevertheless, it seems reasonable that routine screening for serum uric acid levels and non HDL cholesterol levels among diabetics provide additional information and so make way for aggressive intervention to decrease the morbidity and mortality of patients with type II diabetes mellitus.

### CONFLICT OF INTEREST

The authors declare no conflict of interest.

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