International Journal of Environmental Sciences
ISSN: 2229-7359
Vol. 11 No. 19s, 2025
https://theaspd.com/index.php

Study Of Serum Uric Acid In Type-2 Diabetes Mellitus (T2DM)

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ABSTRACT

Introduction:

Diabetes mellitus type-2 (T2DM) also known as non-insulin dependent diabetes mellitus is a metabolic disease characterized by hyperglycemia. Obesity and oxidative stress are the major contributing factor for diabetes mellitus, which are associated with high uric acid level.

Aim: - *The aim of our study is to assess the serum uric acid level in type-2 diabetes mellitus to reduce the risk of renal failure, cardiovascular disease and other complication.*

Materials and Methods: - *This retrospective study, done at Department of Biochemistry and Shri Mehant Indresh Hospital, Shri Guru Ram Rai Institute of Medical and Health Sciences, Patel Nagar, Dehradun, from 2024-2025. The study included 100 Diabetic and 100 healthy control subjects.*

Result: - *In this present study serum uric acid level significantly elevated in diabetic group as compared to healthy control group. The mean Fasting blood sugar level was higher in diabetic group (201.09 ± 60.25mg/dl) than in healthy control (100.11± 9.51 mg/dl). The mean postprandial blood sugar level was higher in diabetic group (270.66±56.37 mg/dl) than in healthy control (132.06±24.51mg/dl). The mean uric acid level was also higher in diabetic group (8.40± 2.80mg/dl) than in healthy controls (5.04 ± 1.81mg/dl) (P value <0.0001)*

Conclusion: - *The study revealed that serum uric acid concentrations were significantly elevated in diabetic patients compared to healthy controls. We also found a Significant positive correlation between fasting, postprandial blood sugar and uric acid in type-2 diabetes mellitus.*

Keywords: - *Type-2 diabetes mellitus, hyperuricemia,*

INTRODUCTION

Type 2 diabetes mellitus (T2DM), is a slow progressive disease that steadily impacts numerous body systems, leading to a continuous decline in their normal functions **[1].** Many individuals with diabetes are often obese and exhibit increased insulin resistance. Obesity is a condition marked by excessive fat accumulation, reaching levels that compromise health and overall well-being. It has long been identified as a key contributor to various adverse health outcomes, including diabetes, hypertension, dyslipidemia, cardiovascular risk, and elevated serum uric acid levels **[2-5].** The link between hyperuricemia and obesity can be attributed to several mechanisms. Excessive body fat may contribute to increased uric acid production and reduced excretion, primarily due to insulin resistance (IR). This disruption in uric acid metabolism can ultimately lead to hyperuricemia **[6].** In type 2 diabetes mellitus, the oxidative stress is also caused by prolonged hyperglycemia, which contributes to endothelial dysfunction and a reduction in nitric oxide synthesis. This is

accompanied by vascular resistance and facilitates the progression of atherogenesis, obesity and hyperuricemia [7].

Hyperuricemia has been linked to the extent of renal damage in patients with type 2 diabetes mellitus (T2DM) [8]. Diabetes is known as silent killer because uncontrolled glucose level for long time leads to atherosclerosis, hypertension, diabetic nephropathy, microangiopathy and retinopathy. All these conditions are followed by increased prevalence of mortality among diabetic patients.it is necessary to reduce the mortality. Thus, management of hyperuricemia in early stage of diabetes is must to reduce the rate of related complication and mortality in diabetic patients. Thus the aim of our study is to assess the serum uric acid level in type-2 diabetes mellitus to reduce the risk of renal failure, cardiovascular disease and other complication.

MATERIAL AND METHOD

The aim of our study is to assess the serum uric acid level in type-2 diabetes mellitus to reduce the risk of renal failure, cardiovascular disease and other complication. The objectives of our study is to assess the serum uric acid level in patients of type-2 diabetes mellitus and its correlation with Fasting and Postprandial blood sugar. The present retrospective study was done at Department of Biochemistry and Shri Mehant Indresh Hospital, Shri Guru Ram Rai Institute of Medical and Health Sciences, Patel Nagar, Dehradun, Uttarakhand, India. The study population included total 200 participants (100 diabetic and 100 healthy control subjects). Blood samples was collected from each participant for the measurement of FBS, PPBS, and uric acid level. All samples were analyzed by VITROS 7600 fully automated biochemistry analyzer.

RESULTS

Table-1: Comparison of diabetic group with healthy control group.

Parameter	Group	Mean	SD	P-Value
Fasting blood sugar (FBS) (mg/dl)	Diabetic	201.09	60.25	<0.0001
	Control	100.11	9.51	
Postprandial blood sugar (PPBS) (mg/dl)	Diabetic	270.66	56.37	<0.0001
	Control	132.06	24.51	
Uric acid (mg/dl)	Diabetic	8.40	2.80	<0.0001
	Control	5.04	1.81	

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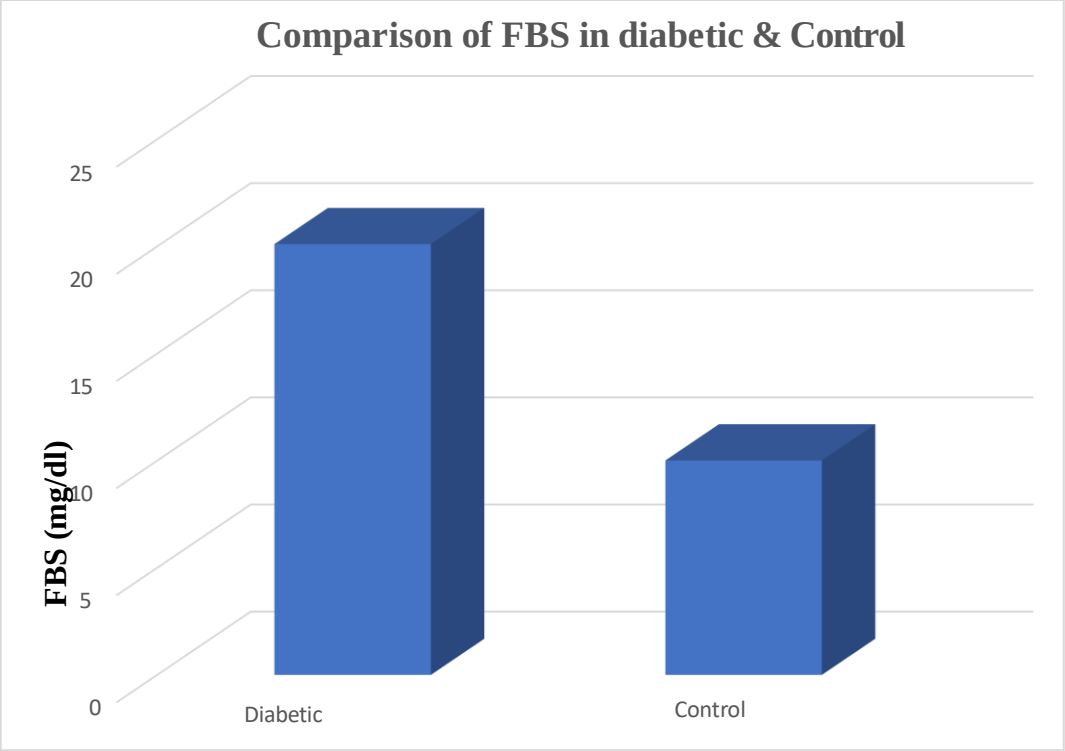
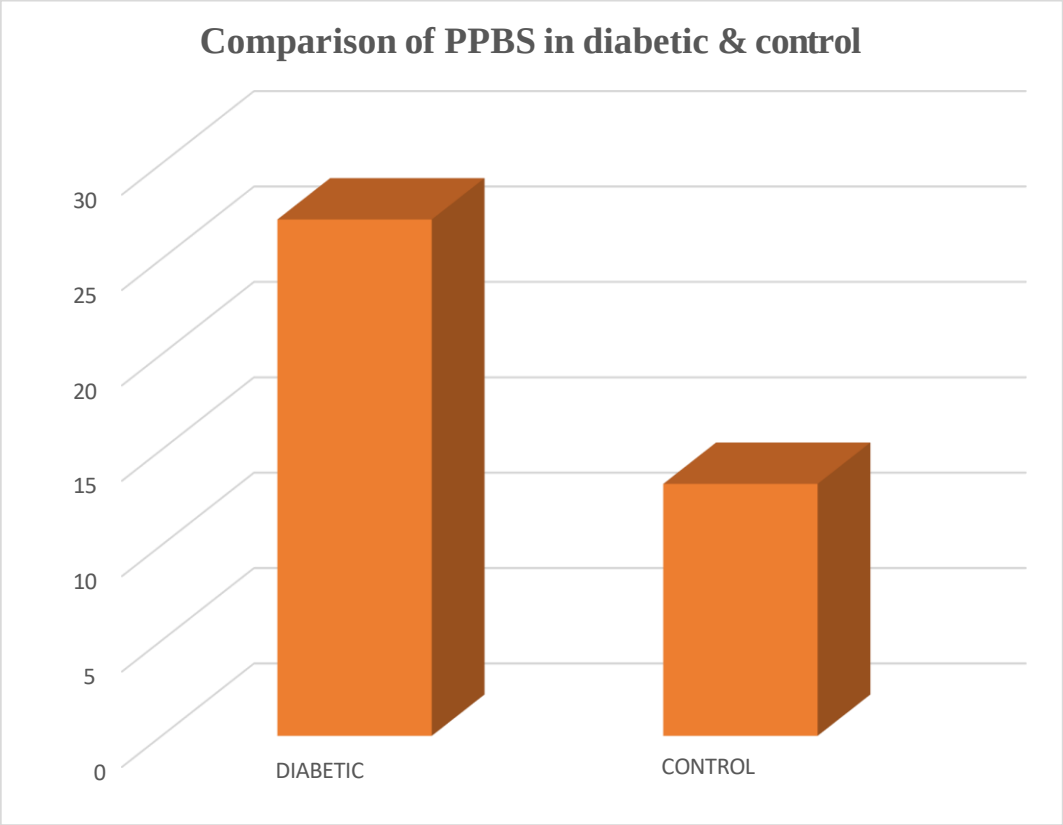


Graph:1 comparison of fasting blood sugar in diabetic and control group.



Graph:2 comparison of postprandial blood sugar in diabetic and control group.

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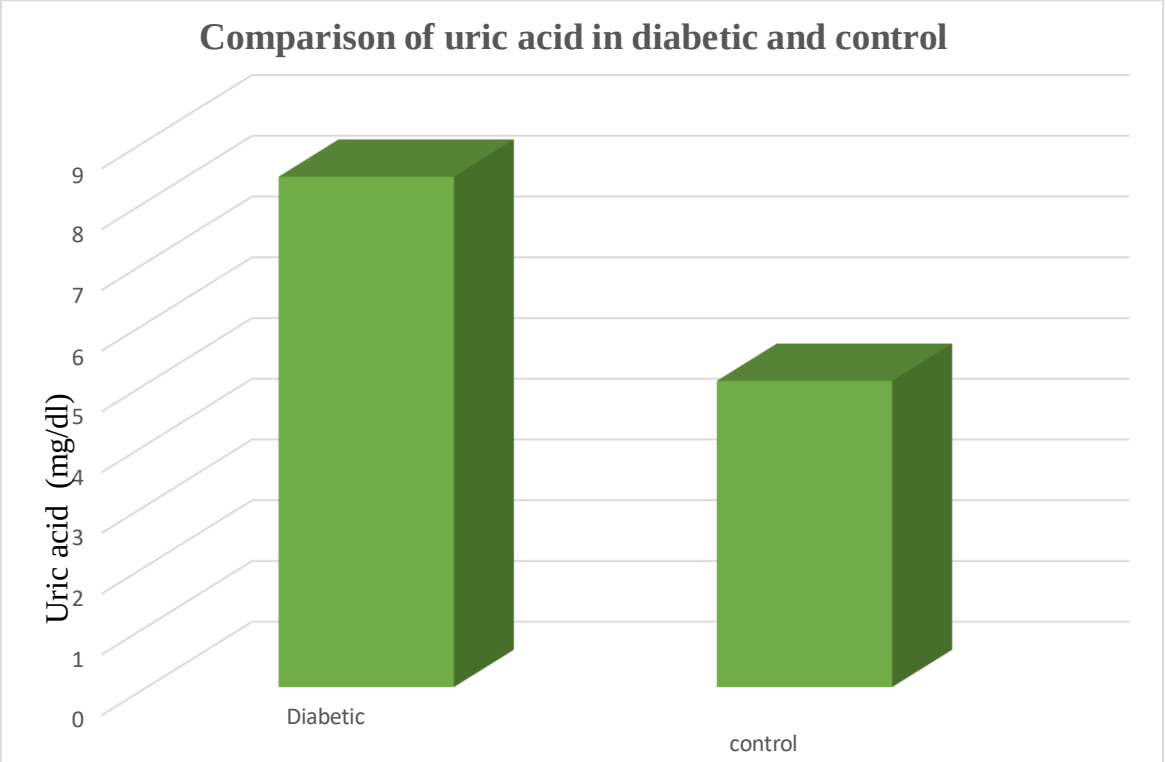
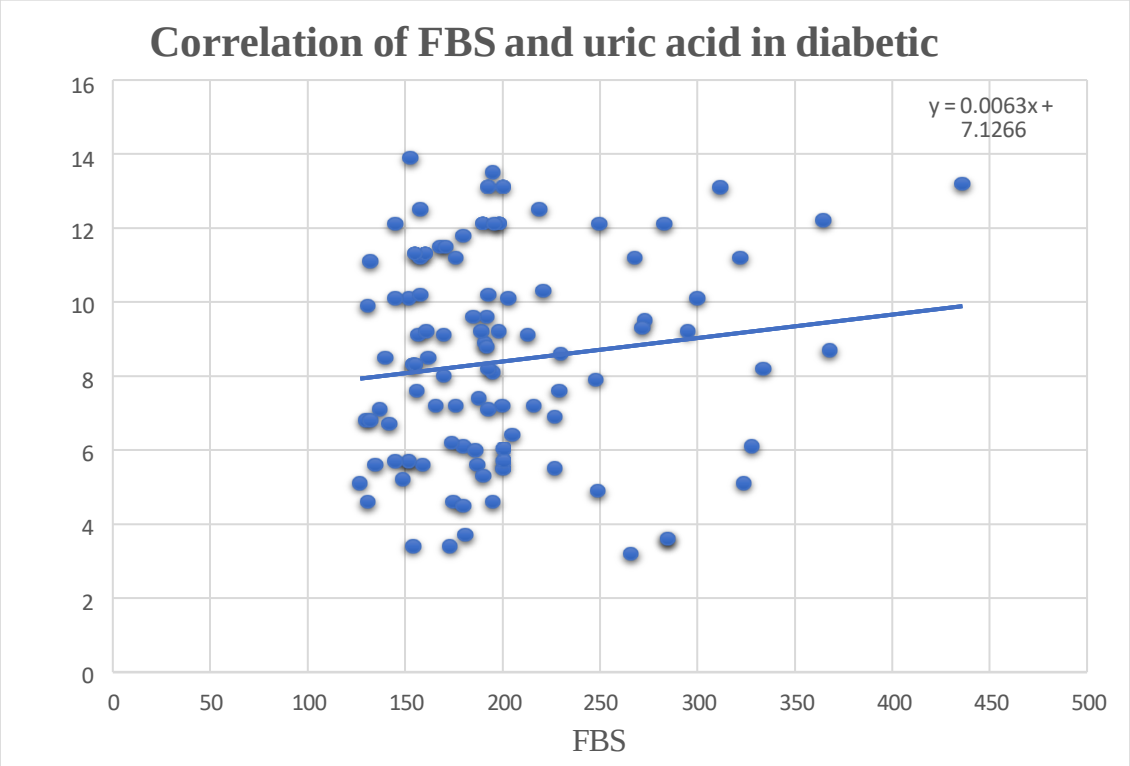


Graph:3 comparison of uric acid in diabetic and control group.



Graph: 4 correlation of fasting blood sugar (FBS) and uric acid in diabetic group.

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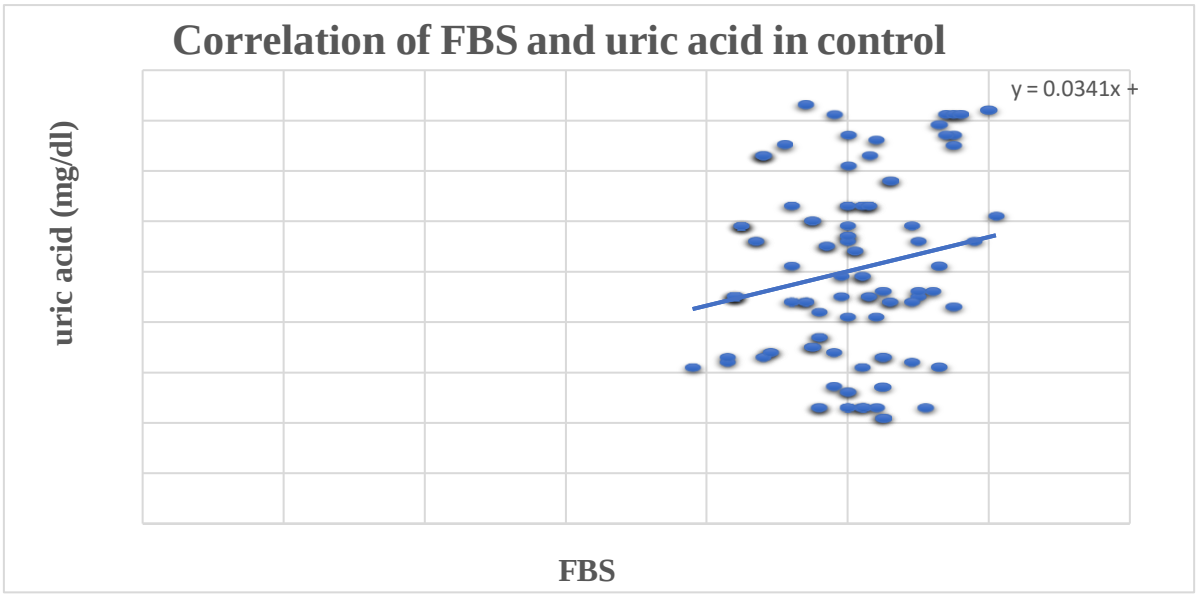
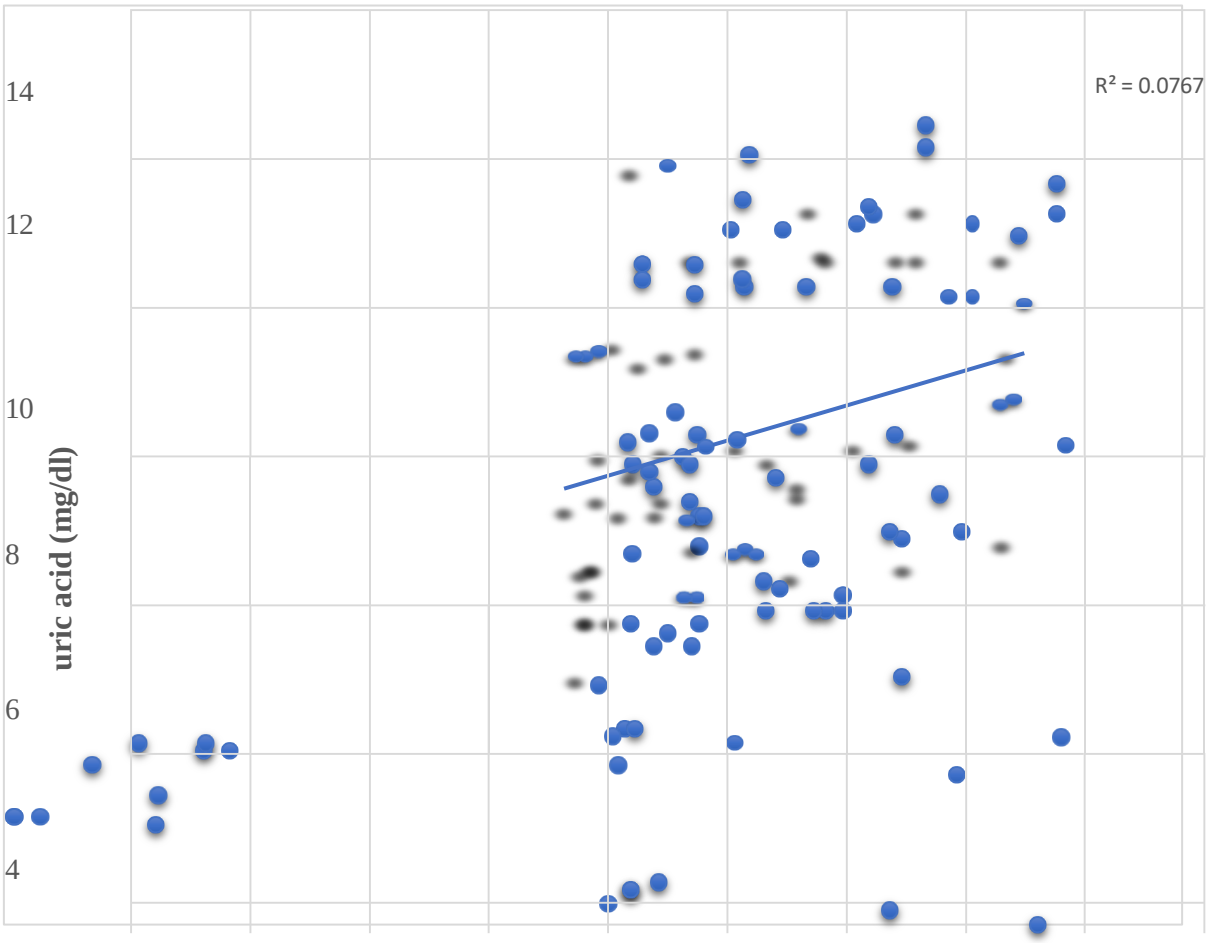
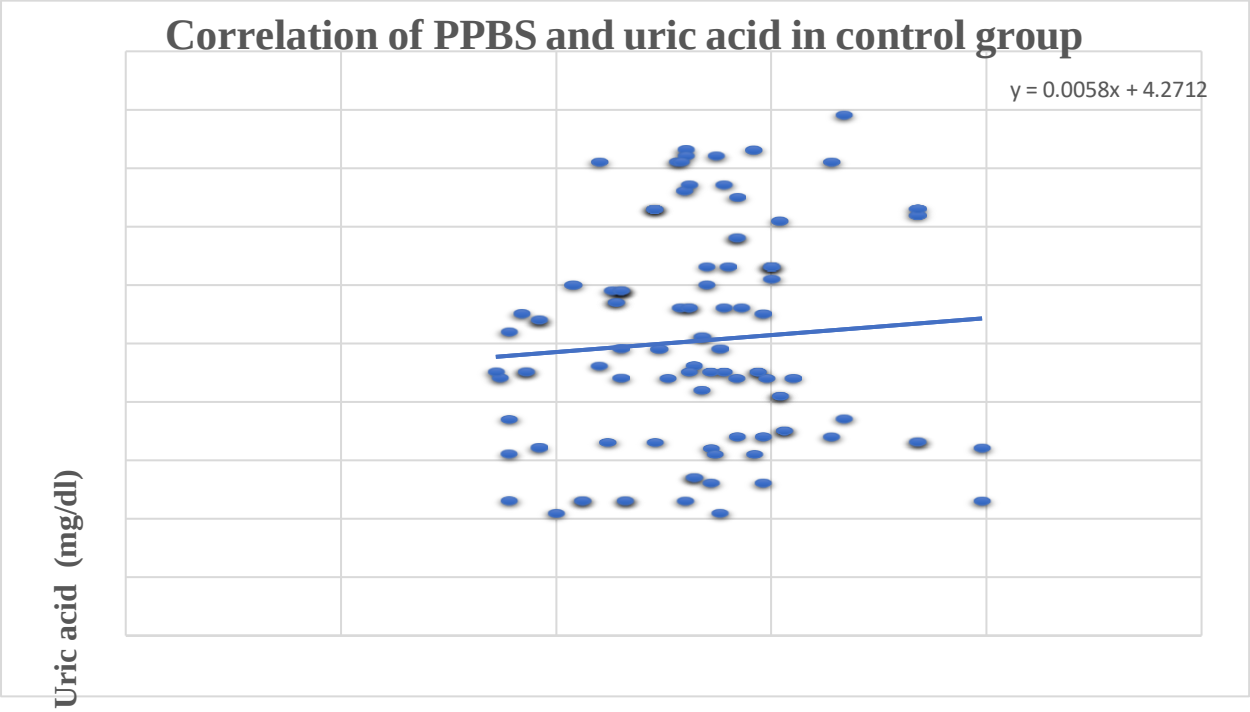


Graph: 5 Correlation of fasting blood sugar (FBS) and uric acid in control group.

Correlation of PPBS and uric acid in diabetic group



Graph: 6 Correlation of postprandial blood sugar (PPBS) and uric acid in diabetic group.



Graph: 7 Correlation of Postprandial blood sugar (PPBS) and uric acid in control group.

DISCUSSION

The result documented in our study showed relatively high uric acid level of diabetic subjects as compared to healthy controls. The mean value of FBS in diabetic patients was 201.09 ± 60.25 mg/dl and in healthy control was 100.11 ± 9.51 mg/dl. The mean value of PPBS in diabetic patients was 270.66 ± 56.37 mg/dl and in healthy control was 132.06 ± 24.51 mg/dl. The uric acid levels in our study were found to be increased in diabetic patients as compared to healthy control. The mean value of uric acid in diabetic patients was 8.40 ± 2.80 mg/dl and in healthy controls was 5.04 ± 1.81. and the difference was statistically significant ($p<0.0001$) as shown in table-1. Similar results were reported by Jha et al. [9], Samin (2021) et al.[10] and Kalyani (2019) et al.[11] who found that the serum uric acid levels in Type 2 diabetic cases were significantly higher as compared to healthy control. In a study performed by Sidhu (2017) et al.[12] the mean uric acid level in diabetic group was found to be 8.02 ± 1.86 mg/dl, whereas in controls, it was found to be 3.73 ± 1.06 mg/dl. The difference was statistically significant ($P < 0.05$). Vanukuri (2016) [13], Himanshu (2024) [14] and Periyandavar (2020) [15] also found significantly elevated in the diabetic patients. We also conducted correlation analysis using Pearson's correlation coefficient according to the distribution of variables. We plotted a scattered correlation graph for FBS, PPBS and uric acid in diabetic patients as well as in healthy control which shows a positive correlation in both groups. Meena (2024) et al. [16], Vijaya samundeeswari (2019) et al. [17], and Solanki (2021) et al.[18] also found a positive correlation of fasting, postprandial blood sugar and serum uric acid level in type 2 diabetes mellitus, which is similar to our findings.

CONCLUSION

The study revealed that serum uric acid concentrations was significantly elevated in diabetic patients compared to healthy controls. We also found a Significant positive correlation between fasting, postprandial blood sugar and uric acid in type-2 diabetes mellitus. Diabetes mellitus is associated with chronic complication such as nephropathy and cardiovascular disorder. These complications are major contributing factor for mortality in diabetic patients. High uric acid is closely linked with higher risk of

these complication. Thus, in order to reduce the diabetic complication and further mortality, the uric acid can be used routinely as a potential biomarker in diabetic patients.

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