ASSESSMENT OF HYPERURICEMIA AMONG TYPE 2 DIABETES MELLITUS PATIENTS

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ABSTRACT

Background- It is well known that insulin resistance at peripheral tissues (muscular tissue and adipose) plays a key role in the glucose metabolism disturbance in diabetes. Diabetes is a chronic disease in etiology and occurs when the pancreas does not produce enough amount of insulin or when there is resistance towards its action on the body. Various studies have been reported that elevated serum uric acid is found to be associated with diabetes mellitus. It is well known that Serum uric acid is formed in the body by the breakdown of purines. **Material & Methods:** The present observational prospective study was conducted at the department of Department general medicine of our tertiary care hospital. The study duration was of one year from January 2020 to December 2020. A sample size of 200 was calculated at a 90% confidence interval at a 10% acceptable margin of error by epi info software version 7.2. All newly diagnosed patients (diagnosed within 3 months) of diabetes mellitus were enrolled in the present study. Patients were enrolled from outdoor and from the ward by simple random sampling. **Results**. In the present study, the incidence of hyperuricemia among study participants was seen in 38 % of patients. Based on HbA1c levels and hyperuricemia, out of the total majority of study participants 34% patients had HbA1C levels 6.5-8 out of these 11% patients had hyperuricemia which was followed by 26% patients had HbA1C levels >11 out of these 12% patients had hyperuricemia which was followed by 25% patients had HbA1C levels 8.1-9.5 out of these 10% patients had hyperuricemia which was followed by 15% patients had HbA1C levels 9.6-11 out of these 5% patients had hyperuricemia. This difference was statistically non-significant.**Conclusion:** We concluded from the present study that hyperuricemia (serum uric acid levels) can be used as a sole and supplementary diagnostic marker for the progression and development of diabetes from prediabetes and its severity and complications. Patients who have high HbA1C levels (more than 6.5) should be tested for hyperuricemia (serum uric acid levels).

Keywords: Diabetics Mellitus, hyperuricemia, uric acid levels.

INTRODUCTION

The It is well known that insulin resistance at peripheral tissues (muscular tissue and adipose) plays a key role in the glucose metabolism disturbance in diabetes. Diabetes is a chronic disease in etiology and occurs when the pancreas does not produce enough amount of insulin or when there is resistance towards its action on the body (1). The prevalence of non-communicable diseases is increasing compared to communicable diseases. Among the non-communicable diseases, diabetes mellitus is rapidly increasing globally and affecting all age groups (2). Previous studies reported that chronic inflammation also leads to the occurrence of insulin resistance (3).

In India, the prevalence of diabetes is increasing and imposing challenges on the health care infrastructure of the country (4). In 2016, WHO reports that diabetes was directly responsible for 1.6 million mortality occurred worldwide (5). The etio-pathology of hematogenous diabetes is complex and it is not precisely reported in previous studies but portosystemic shunting of insulin reported in

systemic hyperinsulinemia which leads to subsequent downregulation of insulin receptors which results in insulin resistance **(6).** In 2014, WHO reports that 8.5% of adults aged 18 years or above had been diagnosed with diabetes. It was estimated that by the year 2030 diabetes will become the seventh leading cause of mortality worldwide **(5).**

Physiologically majority of children have serum urate levels concentrations of 180 to 240 mmol (3 to 4 mg/dl) levels started to increase among males during puberty but levels have remained low among females until menopause. Various studies have been reported that the association of serum uric acid levels with diabetes as a risk factor among prediabetes individuals to type 2 diabetes mellitus. It is well known that Serum uric acid is formed in the body by the breakdown of purines **(7).** Various studies have been reported that elevated serum uric acid is found to be associated with diabetes mellitus **(8).** The present study was conducted to evaluate the insulin resistance and prevalence of hyperuricemia among patients with diabetes mellitus at our tertiary care center.

MATERIALS & METHODS

The present observational prospective study was conducted at the Department of general medicine of our tertiary care hospital. The study duration was of one year from January 2020 to December 2020. A sample size of 200 was calculated at a 90% confidence interval at a 10% acceptable margin of error by epi info software version 7.2. All newly diagnosed patients (diagnosed within 3 months) of diabetes mellitus were enrolled in the present study. Patients were enrolled from outdoor and from the ward by simple random sampling. Clearance from Institutional Ethics Committee was taken before the start of the study. Written informed consent was taken from each study participant.

All the study participants were subjected to the recording of the present, past, and family history details as per the proforma along with general physical and clinical examination. Patients with a history of alcoholism, B12 deficiency, thyroid disorder, drugs causing hyperuricemia ex. Pyrazinamide and Pregnant mothers were excluded from the present study. All the study participants who had previously diagnosed diabetes mellitus disease and study participants who were taking diabetes treatment, patients' age less than 18 years, patients with chronic diseases or malignancies, patients on medications such as Thiazides,

corticosteroids, and Phenytoin were excluded from the present study. All the study participants were subjected to HbA1c levels and serum uric acid levels along with routine blood and urine investigations such as CBC, ESR, RBS, FBS, urine routine, and microscopy. All the data was recorded on a Microsoft excel spreadsheet and data analysis was done at 10% alpha and 90% confidence interval using SPSS v22 software. Test of significance was applied on collected and organized data and a p-value less than 0.05 was considered as a statistically significant association between study variables.

RESULTS

In the present study, we enrolled 200 diagnosed patients (diagnosed within 3 months) with diabetes mellitus. Clearance from Institutional Ethics Committee was taken before the start of the study. Written informed consent was taken from each study participant. Study participants were enrolled from outdoor and from the ward by simple random sampling. The age of study participants was ranged from 24 years to 76 years. The mean age of cases was 42.6 ± 4.7 years. Out of total study participants, it was reported that males 57% were likely affected more than females 43%. The mean BMI of cases was 26.4 ± 2.45. A family history of diabetes mellitus was present in 61 % of patients. The incidence of hyperuricemia among study participants was seen in 38 % of patients. (Table 1)

Table 1: Distribution of study participants according to the study parameters.

Study parameters		
Mean age	42.6 ± 4.7 years	
Gender	Male	57%
	Female	43%
BMI (Kg/m2)	26.4 ± 2.45	
Family history of diabetes mellitus	61 % patients	
Incidence of Hyperuricemia	38 % patients	

In the present study, based on HbA1c levels and hyperuricemia, out of the total majority of study participants 34% patients had HbA1C levels 6.5-8

out of these 11% patients had hyperuricemia which was followed by 26% patients had HbA1C levels >11 out of these 12% patients had hyperuricemia which was followed by 25% patients had HbA1C levels 8.1-9.5 out of these 10% patients had hyperuricemia which was followed by 15% patients had HbA1C levels 9.6-11 out of these 5% patients had hyperuricemia. This difference was statistically non-significant. (Table 2)

Table 2: Association between HbA1c levels and hyperuricemia among study participants.

HbA1C levels	No. of patients	Hyperuricemia	P-value
6.5-8	68 (34%)	22 (11%)	>0.05 (NS)
8.1-9.5	50 (25%)	20 (10%)	
9.6-11	30 (15%)	10 (5%)	
>11	52 (26%)	24 (12%)	
Total	200 (100%)	76 (38%)	

DISCUSSION

In the present study, we enrolled 200 diagnosed patients (diagnosed within 3 months) with diabetes mellitus. Clearance from Institutional Ethics Committee was taken before the start of the study. Written informed consent was taken from each study participant. Study participants were enrolled from outdoor and from the ward by simple random sampling. The age of study participants was ranged from 24 years to 76 years. The mean age of cases was 42.6 ± 4.7 years. Out of total study participants, it was reported that males 57% were likely affected more than females 43%. The mean BMI of cases was 26.4 ± 2.45. Similar results to the present study were obtained in a study conducted by Deep HS et al among 100 patients diagnosed with diabetes mellitus. They reported Insulin resistance was observed in 79 patients out of 100 patients. The p-value is <0.001 which is statistically highly significant **(9)**.

In the present study, based on the Family history of diabetes mellitus was present in 61 % of patients. The incidence of hyperuricemia among study participants was seen in 38 % of patients. Similar results to the present study were obtained in a study

conducted by Grover A et al among 50 patients diagnosed with diabetes mellitus. They reported Out of which 29 patients were Males and 21 patients were females. Out of 29 male patients, 20% patients had HbA1c Levels in the range of 6.5-8, 8% patients in the range 8.1-9.5, 12% patients in the range of 9.1-11 and18% patients had HbA1C >11 whereas out 21 female patients, 06 patients had HbA1c Levels in the range of 6.5- 8,14% patients in the range 8.1-9.5, 4% patients in the range of 9.1-11 and 12% patients had HbA1C>11. The total no. of study participants with newly diagnosed diabetes with hyperuricemia was 64% **(10).**

In the present study, based on HbA1c levels and hyperuricemia, out of the total majority of study participants 34% patients had HbA1C levels 6.5-8 out of these 11% patients had hyperuricemia which was followed by 26% patients had HbA1C levels >11 out of these 12% patients had hyperuricemia which was followed by 25% patients had HbA1C levels 8.1-9.5 out of these 10% patients had hyperuricemia which was followed by 15% patients had HbA1C levels 9.6-11 out of these 5% patients had hyperuricemia. This difference was statistically non-significant. Similar results to the present study were obtained in a study conducted by Tae W et al among 53477 patients diagnosed with diabetes mellitus. They reported similar results to the present study **(11).**

CONCLUSION

We concluded from the present study that hyperuricemia (serum uric acid levels) can be used as a sole and supplementary diagnostic marker for the progression and development of diabetes from prediabetes and its severity and complications. Patients who have high HbA1C levels (more than 6.5) should be tested for hyperuricemia (serum uric acid levels).

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