Abstract

Background: Diabetes Mellitus (DM) as a metabolic disorder of multiple etiology, characterized by chronic hyperglycaemia with disturbances of carbohydrate, protein and fat metabolism. The present study was conducted to evaluate serum uric acid as a risk factor for microvascular complications of diabetes mellitus. Subjects and Methods: The present study was conducted on 84 patients with type II diabetes mellitus of both genders. 10 ml of blood was obtained for assessment of blood glucose and uric acid level. Results: Age group 40-60 years had 46, 60-80 years had 25 and >80 years had 13 patients. Hyperuricemia was positive in 56 and negative in 28. The difference was significant (P< 0.05). Out of 56 patients with hyper tension, 42 had high and 14 had low serum uric acid level. Out of 28 patients who had not hypertension, 18 had high serum uric acid and 10 had low. The difference was significant (P< 0.05). Conclusion: Elevated serum uric acid levels in type 2 diabetes mellitus cause more micro vascular and macro vascular complications.

Keywords: Diabetes Mellitus, Uric Acid, Vascular Complications.

Subjects and Methods

The present study was conducted in the department of General Medicine. It comprised of 84 patients with type II diabetes mellitus patients and to correlates the parameters of diabetic nephropathy like microalbuminuria and serum creatinine levels with uric acid in type 2 Diabetes mellitus subjects.

The physiopathology of chronic microvascular complications of T1D is complex, involving the interaction between genetic susceptibility, metabolic, and environmental factors. Many risk factors have already been associated with the development and progression of diabetic nephropathy, such as elevated HbA1c, duration of diabetes, presence of concomitant microvascular complications and elevated albumin excretion rate. The present study was conducted to evaluate serum uric acid as a risk factor for microvascular complications of diabetes mellitus.

Results

Table 1: Age wise distribution of patients

| Age group (Years) | Number | P value |
|-------------------|--------|---------|
| 40-60             | 46     | 0.01    |
| 60-80             | 25     |         |
| >80               | 13     |         |

Table 1, Figure 1] shows that age group 40-60 years had 46,
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60-80 years had 25 and >80 years had 13 patients. The difference was significant (P< 0.05).

| Table 2: Association between Hyperuricemia and Diabetes Mellitus |
|---------------------------------------------------------------|
| Hyperuricemia | Number | P value |
| Positive      | 56     | 0.01    |
| Negative      | 28     |         |

[Table 2, Figure2] shows that hyperuricemia was positive in 56 and negative in 28. The difference was significant (P< 0.05).

| Table 3: Association between Hypertension and Serum Uric Acid Levels |
|---------------------------------------------------------------|
| Hypertension | Serum uric acid | P value |
|              | High | Low   |       |
| Yes          | 42   | 14    | 0.01  |
| No           | 18   | 10    |       |

[Table 3] shows that out of 56 patients with hypertension, 42 had high and 14 had low serum uric acid level. Out of 28 patients who had not hypertension, 18 had high serum uric acid and 10 had low. The difference was significant (P< 0.05).

| Table 4: Association between the Serum Uric Acid and Cerebrovascular Accident |
|---------------------------------------------------------------|
| Stroke | Serum uric acid | P value |
|        | High | Low    |       |
| Yes    | 28   | 20     | 0.01  |
| No     | 20   | 16     |       |

[Table 4] shows that among 48 patients who had stroke, 28 had high serum uric acid and 20 had low uric acid. The difference was significant (P< 0.05).

| Table 5: Association between the Serum Uric Acid and Urine Micro Albumin |
|---------------------------------------------------------------|
| Duration of diabetes | Number | Urine Micro Albumin in Diabetes Patients | Urine Micro Albumin |
|-----------------------|--------|----------------------------------------|----------------------|
| 0-3                   | 52     | 5.12                                   | 38.6                 |
| 4-6                   | 46     | 6.34                                   | 46.5                 |
| 7-10                  | 24     | 7.16                                   | 53.2                 |
| >10                   | 12     | 7.13                                   | 54.3                 |

[Table 5] shows that serum uric acid and urine micro albumin level was elevated with duration of diabetes mellitus.

Discussion

Recent studies reveal that high serum uric acid (SUA) could also be a risk factor for DN. Studies disagree on whether uric acid has oxidant or antioxidant properties. In vitro studies show that uric acid may have antioxidant properties. SUA works as a scavenger of free radicals, reacting with a series of oxidants, especially peroxynitrite.

Other studies, both in vitro and in vivo, suggest that high levels of SUA may promote endothelial dysfunction, hypertension, and metabolic syndrome by inducing oxidative stress. In fact, there is evidence that the use of drugs that lower serum uric acid can revert these conditions.

The present study was conducted to evaluate serum uric acid as a risk factor for micro-vascular complications of diabetes mellitus.

In present study, age group 40-60 years had 46, 60-80 years had 25 and >80 years had 13 patients. Hyperuricemia was positive in 56 and negative in 28. Kodama et al. found that a total of 120 cases of type 2 Diabetes mellitus, out of which there were 69 males (57.5%) and 51 females (42.5%), with a mean age of 59.04 ±13.47 years. Mean FBS was 186.10 ±77.53 mg/dl with majority of the subjects having elevated FBS. Mean PPBS of 274.94 ±108.66 mg/dl and of HbA1c 8.15 ± 1.7 was observed. The uric acid of majority number of our study participant males (65.22%) had level of ≥ 7.4, with a mean of 9.53 ±4.38. Mean blood urea and serum creatinine levels were 46.91 ± 15.13 and 1.44 ± 0.29 respectively. There was significant association seen between uric acid levels and urine albumin, serum creatinine, twenty four hour urinary albumin, FBS and PPBS levels and HbA1c levels. Hyperinsulinemia as a consequence of insulin resistance...
causes an increase in serum uric acid concentration by both reducing renal uric acid secretion and accumulating substrates for uric acid production. The mean serum uric acid levels were elevated statistically highly significant in type 2 diabetic. Hyperuricemia is caused by muscle wasting and weight loss in diabetes mellitus. Chronic high glucose concentration causes tissue injury, in turn leads to increasing non-protein nitrogen substances. This phenomenon accounts for increased uric acid levels. Diabetic patients have a high risk of kidney disease due to hyperglycaemia, Hyperuricemia etc. Increased glycaemic index related with Hyperuricemia lead to changes in glomerular permeability. The highly significant values seen were due to dysfunction of the rennin-angiotensin system in long term diabetes. Type 2 diabetic patients have a long asymptomatic period of hyperglycaemia and many other conditions causing micro albuminuria but hypertension and long term diabetes are main risk factors. 

We found that out of 56 patients with hypertension, 42 had high and 14 had low serum uric acid level. Out of 28 patients who had not hypertension, 18 had high serum uric acid and 10 had low.

Among 48 patients who had stroke, 28 had high serum uric acid and 20 had low uric acid. Serum uric acid and urine micro albumin level was elevated with duration of diabetes mellitus. Many studies saw association with poor glycemic control and creatinine like study by El-Wakf et al. Uric acid levels also serve as an indicator of cardiac risk, which when raised in the cases of type 2 DM, further adds the cardiac risk which is already there due to diabetes.

**Conclusion**

Authors found that elevated serum uric acid levels in type 2 diabetes mellitus cause more micro vascular and macro vascular complications.

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