ESTIMATION OF SERUM URIC ACID LEVELS IN NORMAL PREDIABETIC AND DIABETIC PERSON
Prakash Gurupad Mantur¹, Rajendra Chandrashekar Bidri²

¹Associate Professor, Department of Medicine, BLDEU, Shri B. M. Patil Medical College, Hospital and Research Centre, Vijayapura.
²Professor, Department of Medicine, BLDEU, Shri B. M. Patil Medical College, Hospital and Research Centre, Vijayapura.

ABSTRACT

BACKGROUND
Raised serum uric acid has been associated with a lot of diseases like hypertension, cardiovascular diseases, chronic kidney disease, peripheral vascular diseases and metabolic disorders. But, the association of serum uric acid levels to that of diabetes mellitus has not been successfully understood. A sincere effort has been put in this study to find out the serum uric acid levels in normal individuals, prediabetics and diabetics and come to a conclusion on the correlation of serum uric acid in diabetes mellitus.

MATERIALS AND METHODS
One hundred eighty people who visited the Department of Medicine were selected. The study included ninety males and ninety females and in each group there were thirty non-diabetic, thirty prediabetics and thirty diabetics. Prediabetics were considered as 110 to 125 mg/dL (6.1 mM/L to 6.9 mM/L) - that is WHO criteria was followed. All the subjects were aged between 40-60 years. The correlations were made between the serum uric acid levels and serum fasting glucose, serum postprandial and HbA1c.

RESULTS
The results show a rise in the serum uric acid levels in the prediabetic and not so much in the non-diabetics and the confirmed diabetics.

CONCLUSION
The serum uric acid level measurements can be used as a powerful tool in identifying the prediabetic condition and help an individual to make the necessary lifestyle adjustments so that the progression of the diseases can be stopped or maybe infinitely delayed.

KEYWORDS
Serum Uric Acid, Diabetes Mellitus, Prediabetic, Purine Nucleotide Catabolism.

HOW TO CITE THIS ARTICLE: Mantur PG, Bidri RC. Estimation of serum uric acid levels in normal prediabetic and diabetic person. J. Evid. Based Med. Healthc. 2017; 4(27), 1612-1614. DOI: 10.18410/jebmh/2017/315

BACKGROUND
The end product of purine nucleotide catabolism is uric acid. The degradation is taking place in the liver. The xanthine oxidase is a metalloflavoprotein containing FAD, molybdenum and iron. As xanthine is oxidised to uric acid, the electrons are transferred first to molybdenum, then to FAD and finally to molecular oxygen, when hydrogen peroxide (one of the reactive oxygen species) is produced. Strecker in 1857 showed the presence of uric acid in urine. In 1892, Sir Frederick Hopkins (Nobel Prize, 1929) estimated uric acid. In 1895, Emil Fischer (Nobel Prize, 1902) showed that uric acid is derived from purine.

Normal blood level of uric acid ranges from 2-5 mg/dL in females and 3-7 mg/dL in males. The daily excretion varies from 500-700 mg. Nucleic acid content is more in non-vegetarian diet. Uric acid is sparingly soluble in water. Uric acid is an antioxidant.¹

Raised serum uric acid has been associated with a lot of diseases like hypertension,²,³,⁴ cardiovascular diseases,⁵ chronic kidney disease,⁶ peripheral vascular diseases⁷ and metabolic disorders.⁸

But, the association of serum uric acid levels to that of diabetes mellitus has not been successfully understood. In some studies, the results showed a positive association between high serum uric acid levels and diabetes,⁹,¹⁴ whereas other studies reported no association¹⁵ or an inverse relationship.¹⁶,¹⁷ With this background, a sincere effort has been put in this study to find out the serum uric acid levels in normal individuals, prediabetics and diabetics and come to a conclusion on the correlation of serum uric acid in diabetes mellitus. The correlation of serum uric acid with that of fasting serum glucose level, postprandial serum glucose level and HbA1c was also done to get a correct answer for the above-discussed problem.
AIMS AND OBJECTIVES
1. To estimate the serum uric acid level in normal, prediabetic and diabetic subjects.
2. To correlation of serum uric acid with that of fasting serum glucose level, postprandial serum glucose level and HbA1c.

MATERIALS AND METHODS
One hundred eighty people who visited the Department of Medicine from September 2016 to February 2017 were included in the study.

The study was done in the Department of Medicine, OPD/IPD. The study included ninety males and ninety females and in each group there were thirty non-diabetic, thirty prediabetics and thirty diabetics.

Prediabetics were considered as 110 to 125 mg/dL (6.1 mM/L to 6.9 mM/L) - that is WHO criteria was followed. All the subjects were aged between 40-60 years. Informed consent was taken. All the subjects underwent serum uric acid estimation. Then, the mean serum fasting glucose, mean serum postprandial and mean HbA1c was estimated in prediabetics and diabetics.

There were the correlations were made between the serum uric acid levels and serum fasting glucose, serum postprandial and HbA1c.

Inclusion Criteria
1. The subjects were between 40-60 years old.
2. WHO criteria was taken into consideration. So, 100-125 mg/dL serum fasting glucose levels were considered as prediabetics and were considered for study.

Exclusion Criteria
1. Other muscle wasting, starving, liver disease patients were omitted.
2. Patients with serum creatinine >1.0 mg/dL (sign of renal failure) were excluded.

RESULTS

<table>
<thead>
<tr>
<th>Sex</th>
<th>Number of Patients</th>
<th>Mean Uric Acid Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>30</td>
<td>3.84 ± 0.62</td>
</tr>
<tr>
<td>Female</td>
<td>30</td>
<td>4.77 ± 0.71</td>
</tr>
</tbody>
</table>

Table 1. Mean Serum Uric Acid Levels in Non-Diabetic Subjects

<table>
<thead>
<tr>
<th>Sex</th>
<th>Number of Patients</th>
<th>Mean Uric Acid Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>30</td>
<td>5.96 ± 0.17</td>
</tr>
<tr>
<td>Female</td>
<td>30</td>
<td>7.43 ± 0.54</td>
</tr>
</tbody>
</table>

Table 2. Mean Serum Uric Acid Levels in Prediabetic Subjects

<table>
<thead>
<tr>
<th>Sex</th>
<th>Number of Patients</th>
<th>Mean Uric Acid Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>30</td>
<td>4.32 ± 0.73</td>
</tr>
<tr>
<td>Female</td>
<td>30</td>
<td>4.79 ± 0.12</td>
</tr>
</tbody>
</table>

Table 3. Mean Serum Uric Acid Levels in Diabetic Subjects

<table>
<thead>
<tr>
<th>Sex</th>
<th>Prediabetics (Fasting Glucose Level)</th>
<th>Prediabetics (Uric Acid Level)</th>
<th>Diabetics (Fasting Glucose Level)</th>
<th>Diabetics (Uric Acid Level)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>114 ± 0.73</td>
<td>5.96 ± 0.17</td>
<td>179 ± 0.54</td>
<td>4.32 ± 0.73</td>
</tr>
<tr>
<td>Female</td>
<td>109 ± 0.21</td>
<td>7.43 ± 0.54</td>
<td>194 ± 0.71</td>
<td>4.79 ± 0.12</td>
</tr>
</tbody>
</table>

Table 4. Mean Fasting Blood Glucose Levels and Mean Uric Acid Levels

<table>
<thead>
<tr>
<th>Sex</th>
<th>Prediabetics (Postprandial Glucose Level)</th>
<th>Prediabetics (Uric Acid Level)</th>
<th>Diabetics (Fasting Glucose Level)</th>
<th>Diabetics (Uric Acid Level)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>182 ± 0.73</td>
<td>5.96 ± 0.17</td>
<td>206 ± 0.62</td>
<td>4.32 ± 0.73</td>
</tr>
<tr>
<td>Female</td>
<td>167 ± 0.21</td>
<td>7.43 ± 0.54</td>
<td>243 ± 08</td>
<td>4.79 ± 0.12</td>
</tr>
</tbody>
</table>

Table 5. Mean Postprandial Blood Glucose Level and Mean Uric Acid Level

<table>
<thead>
<tr>
<th>Sex</th>
<th>Prediabetics (HbA1c)</th>
<th>Prediabetics (Uric Acid Level)</th>
<th>Diabetics (HbA1c)</th>
<th>Diabetics (Uric Acid Level)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>5.9 ± 0.2</td>
<td>5.96 ± 0.17</td>
<td>7.4 ± 0.5</td>
<td>4.32 ± 0.73</td>
</tr>
<tr>
<td>Female</td>
<td>6.2 ± 0.6</td>
<td>7.43 ± 0.54</td>
<td>7.6 ± 0.3</td>
<td>4.79 ± 0.12</td>
</tr>
</tbody>
</table>

Table 6. Mean HbA1c and Mean Uric Acid Level

The results show a rise in the serum uric acid levels in the prediabetic and not so much in the non-diabetics and the confirmed diabetics.

DISCUSSION
Impaired fasting glucose or prediabetes refers to a condition in which the fasting blood glucose is elevated above what is considered normal levels, but is not high enough to be classified as diabetes mellitus. It is associated with insulin resistance and increased risk of cardiovascular pathology. It is thought to be lesser risk than Impaired Glucose Tolerance (IGT). In 50% cases, it progresses to type 2 diabetes mellitus. There is a 50% risk over 10 years of progressing to overt diabetes.

Studies have shown that uric acid is significantly elevated in prediabetic stages and low in diabetes and rises again
after the development of renal insufficiency.\textsuperscript{18} Measurement of uric acid is easy in terms of screening can be performed with simple methods in routine laboratories and is inexpensive. Thus, a preventive, cost-effective approach is available with potential implications for public health. It can be used as a powerful tool in identifying the prediabetic condition and help an individual to make the necessary lifestyle adjustments, so that the progression of the diseases can be stopped or maybe infinitely delayed.

CONCLUSION
The serum uric acid level measurements can be used as a powerful tool in identifying the prediabetic condition and help an individual to make the necessary lifestyle adjustments, so that the progression of the diseases can be stopped or maybe infinitely delayed.

REFERENCES