Serum Lipids and Uric Acid Relationship in Ischemic Thrombotic Cerebrovascular Disease

BY B. C. BANSAL, M.D., R. R. GUPTA, M.D., M. R. BANSAL, M.B.B.S., AND C. PRAKASH, M.D.

Abstract: Serum lipids and serum uric acid have been studied in 50 patients with ischemic thrombotic cerebrovascular disease. Patients having diseases known to predispose to hyperuricemia were excluded. Abnormalities of large vessels were present in 14 of 30 cases (46.6%) as a whole, and in 9 of 16 cases (56.5%) below 40 years of age. Thirty percent of the cases showed hyperuricemia. A statistically significant rise in serum triglycerides, pre-beta lipoproteins and serum uric acid was found in all 50 patients and in patients below 40 years of age. In patients above 40 years of age, only the rise in serum triglycerides and pre-beta lipoproteins was found to be statistically significant. A statistically significant rise in serum triglycerides, pre-beta lipoproteins, cholesterol, and uric acid was found in patients with abnormal angiograms. A statistically significant correlation was observed between serum uric acid and serum triglycerides in all the groups, between serum uric acid and pre-beta lipoprotein in patients below 40 years of age, and between serum uric acid and serum phospholipids in patients with abnormal angiograms. These factors may be playing a role in the causation of ischemic thrombotic cerebrovascular disease in general and especially in patients below 40 years of age.

Additional Key Words
- risk factors
- pre-beta lipoprotein
- triglycerides
- age
- cholesterol

Ischemic thrombotic cerebrovascular disease is more common in older individuals than in younger individuals. Increasing numbers of cases are being observed in younger age groups. However, the etiological factors responsible for this are not understood. The role of abnormalities of blood lipids and uric acid has been mentioned in relationship to the etiology of coronary artery disease. The part played by elevated values of blood lipids and uric acid in the causation of ischemic thrombotic cerebrovascular disease is not understood. The present study was undertaken to assess the status of lipids and uric acid in patients who had ischemic thrombotic cerebrovascular disease.

Methods
Fifty cases of ischemic thrombotic cerebrovascular disease (stroke) were studied. All cases had sudden development of neurological deficit and satisfied currently accepted diagnostic criteria for stroke. Patients having diseases known to predispose to hyperuricemia were excluded. Patients with cerebral venous sinus thrombosis occurring during puerperium, patients with cerebral or subarachnoid hemorrhage, or patients with some systemic cause for embolism also were excluded from the study. Clinical history and detailed physical examination were recorded on special forms. The biochemical investigations were done three weeks after the onset of stroke. These included the following: hemoglobin, total and differential leukocyte count, BSR, blood for STS, blood sugar, blood urea, urine, stools, chest x-ray, ECG, serum uric acid, serum triglycerides, serum phospholipids, serum free fatty acid, serum lipoprotein, and serum cholesterol. Percutaneous carotid angiography was done in 30 cases. The contrast material used was meglumine iohexol and 60% (CONRAY-280). An equal number of age-matched and sex-matched healthy individuals were taken as controls for these special investigations except for arteriography.

A total of 50 cases of nonembolic cerebral infarction was studied. These patients were divided into the following groups for analysis: Group A: 50 patients as a whole; Group B: 25 patients over 40 years of age; Group C: 25 patients below 40 years of age; Group D: 14 patients with abnormal angiograms, and Group E: 16 patients with normal angiograms.

Groups A, B, and C were compared with corresponding controls while Group D was compared with Group E.

Results
The age and sex distribution of these 50 cases is shown in table 1. Clinical features are shown in table 2.

Sixteen patients had normal angiograms and 14 revealed various abnormalities, as displayed in table 3.
SERUM LIPIDS AND URIC ACID RELATIONSHIP

TABLE 1
Age and Sex Distribution of 50 Patients With Ischemic Thrombotic Cerebrovascular Disease

<table>
<thead>
<tr>
<th>Sex</th>
<th>Below 40 years</th>
<th>Above 40 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>11</td>
<td>21</td>
</tr>
<tr>
<td>Female</td>
<td>14</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>25</td>
<td>25</td>
</tr>
</tbody>
</table>

Abnormalities of large vessels were present in 46.6% of the cases (14 of 30) in Group C and 56.5% of the cases (9 of 16) in Group A.

Table 4 shows that the mean levels of most of the lipid fractions were higher in Groups A, B and C. However, the rise in levels of only serum triglycerides and pre-beta lipoprotein were statistically significant (P < 0.05). No rise in the mean level of serum cholesterol was observed in these patients. A statistically significant increase in the mean level of serum triglycerides, pre-beta lipoprotein, and serum cholesterol was found in Group D as compared to Group E (P < 0.05).

The mean for serum uric acid levels in the controls was 5.8 mg % (± SD 0.77). Patients having a uric acid level above 7.3 mg % were considered hyperuricemic. Thirty percent of the patients had hyperuricemia of this degree. The mean level of serum

TABLE 3
Angiographical Findings in 30 Patients

<table>
<thead>
<tr>
<th>Findings</th>
<th>No. of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group D (abnormal angiograms)</td>
<td>14*</td>
</tr>
<tr>
<td>Internal carotid block (extracranial)</td>
<td>5</td>
</tr>
<tr>
<td>Internal carotid atheroma (intracranial)</td>
<td>4</td>
</tr>
<tr>
<td>Middle cerebral artery block</td>
<td>4</td>
</tr>
<tr>
<td>Anterior cerebral artery block</td>
<td>5</td>
</tr>
<tr>
<td>Group E (normal angiograms)</td>
<td>16</td>
</tr>
</tbody>
</table>

*Four had multiple abnormalities

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The serum uric acid values were correlated with each of the lipid fractions. In assessing the relationship between hyperuricemia and elevated lipid fractions, the intercorrelation (Pearson's Product Moment) was calculated between serum uric acid and the lipid fractions. A statistically significant correlation (P < 0.05) was observed between serum uric acid and triglycerides in Groups A, B, C and D; between serum uric acid and phospholipids in Group D; and between serum uric acid and pre-beta lipoprotein in Group C. These relationships are shown in table 6.

**Table 6**

**Intercorrelation of Serum Uric Acid and Lipid Fraction in Various Groups of Patients**

<table>
<thead>
<tr>
<th>Lipoprotein</th>
<th>Group A</th>
<th>Group B</th>
<th>Group C</th>
<th>Group D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uric acid</td>
<td>0.5814*</td>
<td>0.592*</td>
<td>0.7682*</td>
<td>0.5271*</td>
</tr>
<tr>
<td>Triglycerides</td>
<td>0.1346</td>
<td>0.1163</td>
<td>0.4159</td>
<td>0.5592*</td>
</tr>
<tr>
<td>Phospholipids</td>
<td>0.0898</td>
<td>0.133</td>
<td>0.0348</td>
<td>0.4343</td>
</tr>
<tr>
<td>Free fatty acid</td>
<td>0.1500</td>
<td>0.204</td>
<td>0.1585</td>
<td>0.1263</td>
</tr>
<tr>
<td>Cholesterol</td>
<td>0.0978</td>
<td>0.0826</td>
<td>0.2265</td>
<td>0.2812</td>
</tr>
<tr>
<td>Lipoprotein</td>
<td>0.0378*</td>
<td>0.211</td>
<td>0.3444*</td>
<td>0.062</td>
</tr>
<tr>
<td>Pre-beta</td>
<td>0.118</td>
<td>0.098</td>
<td>0.0004</td>
<td>0.133</td>
</tr>
<tr>
<td>Alpha</td>
<td>0.038</td>
<td>0.211</td>
<td>0.0004</td>
<td>0.133</td>
</tr>
</tbody>
</table>

*P < 0.05 (significant).

**References**

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