STUDY OF SERUM LIPID PROFILE IN CEREBROVASCULAR DISEASES

Obulapuram Suneetha

ABSTRACT

BACKGROUND
Studies of cholesterol level in stroke patients have revealed results varying from insignificant changes to a moderate elevation. The meagre reports available in the Indian patients whose social living and dietary habits are different from western populations prompted us to study serum cholesterol and lipoprotein fraction in cerebrovascular disease.

MATERIALS AND METHODS
Present study was done to determine the serum lipid profile in 60 patients of cerebrovascular disease (44 with thrombotic stroke and 16 with haemorrhagic stroke) with a view to determine lipid abnormalities if any. 40 controls were also studied. In all cases, total cholesterol, serum LDL cholesterol, serum HDL cholesterol, serum VLDL cholesterol and serum triglycerides were estimated.

RESULTS
The total number of patients in Group-I were 44 with 12 females and 32 males. 13.6% of the patients with Thrombotic stroke and 25% of patients with Haemorrhagic stroke had serum cholesterol values greater than 240 mg%. Serum HDL Cholesterol lesser than 45% was seen in 54.54% patients of Thrombotic stroke and 25% patients of Haemorrhagic stroke. Comparison between female patients and female controls and male patients and male controls revealed significant difference in their mean cholesterol concentration.

CONCLUSION
The results obtained in the present study were positive for some groups of patient and negative for others. The results correlate with some of the previous studies and are in conflict with some studies.

KEYWORDS
Serum Lipid Profile, Cerebrovascular Diseases, Thrombotic Stroke, Haemorrhagic Stroke.


BACKGROUND
The relationship between atherosclerosis and elevated serum lipids is well established. Recent studies have demonstrated that not only the serum lipid concentrations but also the distribution of triglycerides and cholesterol within major lipoprotein classes are of importance for the development of atherosclerosis. Elevated plasma concentration of low density lipoprotein (LDL) and a low high density lipoprotein concentration (HDL) are associated with an increased risk of atherosclerosis.[1]

The scientific community recognises the association between blood lipid levels and risk of cardiovascular disease. Strong association has been found between high levels of serum cholesterol - especially of low density lipoprotein (LDL) cholesterol and the development of atherosclerosis, while elevated levels of high density lipoprotein (HDL) cholesterol seem to play a protective role.[2]

While there is an overwhelming amount of evidence relating high levels of total LDL cholesterol and low level of HDL cholesterol with coronary atherosclerosis, the relation between blood lipids and lipoproteins and cerebrovascular atherosclerosis is less clear.[3]

Studies of cholesterol level in stroke patients have revealed results varying from insignificant changes to a moderate elevation. The meagre reports available in the Indian patients whose social living and dietary habits are different from western populations prompted us to study serum cholesterol and lipoprotein fraction in cerebrovascular disease.

Objective
To determine the prevalence of abnormal serum lipid profile in patients with cerebrovascular disease viz. cerebral thrombosis and cerebral haemorrhage.

MATERIALS AND METHODS
- A total of 60 cases of cerebrovascular disease (completed stroke) were studied.
- Group-I: Patients with thrombotic stroke.
- Group-II: Patients with Haemorrhagic stroke.
- Study period – July 2016 to June 2017.
- Forty normal individuals of comparable age and sex taken as control.

Study Design
Hospital-based observational study.

The diagnosis of cerebrovascular disease was made on the basis of disease history and neurological examination. Group-I comprised of patients who were admitted in Government General Hospital, Guntur with a diagnosis of...
thrombotic stroke. A focal neurological deficit in the absence of prolonged unconsciousness, nuchal rigidity and CT scan evidence was considered to be thrombotic.

Patients with suspected emboli of cardiac origin were excluded. None of the patients in the study was on a diet, or medication that would lower plasma lipid levels, or a diabetic.

In all cases, total cholesterol, serum LDL cholesterol, serum HDL cholesterol, serum VLDL cholesterol and serum triglycerides were estimated. Blood samples were collected from patients after an overnight fast (12 hrs.) and 10 days after the onset of neurological deficit to cancel out any effect of stroke on lipid levels as recommended by Feldman et al. 5-6 mL of blood was collected from each patient and after retraction of clot in about 45-60 minutes, serum was separated, centrifuged to free from cells and the clear serum used for estimation of following parameters.

Laboratory procedure: The lipoprotein assay was done using Enzopak – Reckon equipment. Statistical analysis: Data was entered using Microsoft excel 2010 version and analysis using EPI INFO version 7. Numerical data was presented in mean and standard deviation and categorical variables in percentages. Student ‘t’ test was used to determine any significant differences between two groups with p<0.05 considered to be statistically significant.

RESULTS

The total number of patients in Group-I were 44 with 12 females and 32 males. The mean age of the patients was 53.8 ± 10.8 years, with a range of 25 – 75 years. The duration of the symptoms ranged from 11 days to 22 days.

Group-II comprised of 16 patients of haemorrhagic stroke who were identified on the basis of focal neurological deficit accompanied by headache, loss of consciousness and on the basis of CT scan findings. The age of these patients ranged from 30-60 years (mean 52.12 ± 11.5 years). The duration of symptoms ranged from 11 days to 14 days.

Present study was done to determine the serum lipid profile in 60 patients of cerebrovascular disease (44 with thrombotic stroke and 16 with haemorrhagic stroke) with a view to determine lipid abnormalities if any. 40 controls were also studied. Abnormal serum lipid profile (serum total cholesterol greater than 240 mg% or serum HDL cholesterol less than 45 mg% or serum LDL cholesterol greater than 160 mg%) was noted in 60% of patients. The most striking feature noted was a low HDL cholesterol concentration, which was present in 43.3% of patients.

13.6% of the patients with Thrombotic stroke and 25% of patients with Haemorrhagic stroke had serum cholesterol values greater than 240 mg%. Serum HDL Cholesterol lesser than 45% was seen in 54.54% patients of Thrombotic stroke and 25% patients of Haemorrhagic stroke.

<table>
<thead>
<tr>
<th>Serum Lipids</th>
<th>Controls</th>
<th>Thrombotic Stroke Patients</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serum Triglyceride (mg%)</td>
<td>118 ± 21.06</td>
<td>108.31 ± 27.80</td>
<td>0.07 (Not Significant)</td>
</tr>
<tr>
<td>Total Cholesterol (mg%)</td>
<td>176.3 ± 19.13</td>
<td>197.59 ± 37.57</td>
<td>0.001 (Significant)</td>
</tr>
<tr>
<td>HDL Cholesterol (mg%)</td>
<td>56.22 ± 6.63</td>
<td>45.22 ± 10.28</td>
<td>0.000001 (Significant)</td>
</tr>
<tr>
<td>LDL Cholesterol (mg%)</td>
<td>117.72 ± 21.02</td>
<td>130.72 ±34.92</td>
<td>0.05 (Not Significant)</td>
</tr>
<tr>
<td>VLDL Cholesterol (mg%)</td>
<td>23.68 ± 4.07</td>
<td>21.63 ± 5.59</td>
<td>0.06 (Not Significant)</td>
</tr>
</tbody>
</table>

Table 2. Triglyceride and Cholesterol Concentrations in whole Serum and their Individual Lipoprotein Classes in Controls and in Patients with Thrombotic Stroke

With regards to serum lipids, comparison between thrombotic stroke patients and controls found that significantly higher levels of total cholesterol was found among thrombotic stroke patients (p=0.001). HDL cholesterol levels were significantly lower among thrombotic stroke patients. Other lipid parameters such as serum triglycerides, LDL cholesterol and VLDL cholesterol were not significant statistically.

<table>
<thead>
<tr>
<th>Serum Lipids</th>
<th>Controls</th>
<th>Haemorrhagic Stroke Patients</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serum Triglyceride (mg%)</td>
<td>118 ± 21.06</td>
<td>112.375 ± 25.64</td>
<td>0.4 Not Significant</td>
</tr>
<tr>
<td>Total Cholesterol (mg%)</td>
<td>176.3 ± 19.13</td>
<td>196.87 ± 47.40</td>
<td>0.02 Significant</td>
</tr>
<tr>
<td>HDL Cholesterol (mg%)</td>
<td>56.22 ± 6.63</td>
<td>50.125 ± 11.02</td>
<td>0.01 Significant</td>
</tr>
<tr>
<td>LDL Cholesterol (mg%)</td>
<td>117.72 ± 21.02</td>
<td>124.275 ± 50.87</td>
<td>0.5 Not Significant</td>
</tr>
<tr>
<td>VLDL Cholesterol (mg%)</td>
<td>23.68 ± 4.07</td>
<td>22.475 ± 5.12</td>
<td>0.3 Not Significant</td>
</tr>
</tbody>
</table>

Table 3. Serum Triglyceride and Cholesterol Concentrations in whole Serum and their Individual Lipoprotein Classes in Controls and in Patients with Haemorrhagic Stroke

Comparison between Haemorrhagic stroke patients and controls also found significantly higher levels of total cholesterol among Haemorrhagic stroke patients (p=0.02). HDL cholesterol levels were significantly lower among Haemorrhagic stroke patients. Other lipid parameters such as serum triglycerides, LDL cholesterol and VLDL cholesterol were not significant statistically.
Between thrombotic stroke patients and Haemorrhagic stroke patients, no statistically significant differences were noted among all the types of serum lipids.

Comparison between female patients and female controls and male patients and male controls revealed significant difference in their mean cholesterol concentration.

DIscusion

The prevalence of hyperlipidaemia is dependent on cut-off limits. The expert panel on detection, evaluation and treatment of high blood cholesterol in adults considers a value of total plasma cholesterol greater than 240 mg% and LDL cholesterol greater than 160 mg% as high.

Taking the above values as cut-off limits, the prevalence of hypercholesterolaemia in present study was 16.6% and nearly half (43.3%) of our patients had serum HDL cholesterol lesser than 45 mg%.

In present study, the difference in the mean serum cholesterol concentration between controls and cases of cerebrovascular disease was significant on statistical analysis.

Rai ON et al[5] found abnormal lipid values were found in 54% of patients. Total cholesterol was abnormal in 83% of ischaemic stroke and 17% of haemorrhagic stroke. LDL cholesterol was abnormal in 86% of ischaemic stroke patients and 14% of haemorrhagic stroke patients. In the present study, the difference in the mean serum cholesterol levels between controls and patients with CVD was significant in patients with thrombotic stroke and for patients with cerebral haemorrhage.

In our study, serum cholesterol and lipoprotein levels showed no significant difference between the cases of cerebral thrombosis and cerebral haemorrhage. This correlates with the study of R. Chandra et al.[5]

In a study by Siddeswari et al, dyslipidaemia in stroke patients was 14%. Most of the patients were having low HDL (<40) which is a risk factor for stroke.[6]

The mean TC and LDL-C levels were significantly much higher in the ischaemic stroke patients when compared to patients with haemorrhagic stroke by Gnanamoorthy K et al[7] (183.7 ± 34.5 versus 148.5 ± 30.6 and 118.7 ± 26.7 versus 81.4 ± 22.0).

In present study, the difference in the serum cholesterol level and HDL cholesterol level between male patients and male controls was statistically significant. This observation is in accordance with that of R. Chandra et al[5] and K Sreedhar et al.[8]

The difference in the mean total cholesterol level and HDL cholesterol between female patients and female controls was significant in our study. This observation is in accordance with that of R. Chandra et al[5] and K Sreedhar et al.[8]

The subcommittee on risk factors and stroke of the Stroke Council concluded that if the increased serum total cholesterol and other abnormal lipids are a risk factor for CVD, the increased risk is for individuals under the age of 50 years.[9] In the present study, we found significant difference between mean serum cholesterol concentration in patients below 50 years and controls of similar age group. This is in accordance with R. Chandra et al.[8]

The differences in serum cholesterol, HDL and VLDL cholesterol levels between patients above the age of 50 years and controls of similar age group was significant statistically in our study. This correlates with the study by K Sreedhar et al.[8]

Despite extensive studies, no definite conclusions can be drawn concerning the role of lipids and lipoproteins in the development of CVD, since conflicting results have been reported on all five lipid and lipoprotein components. The factors which could possibly explain part of discrepancy found in the literature could be lack of accordance in body weight between patients and controls and each study measured serum lipid levels at different times after the occurrence of stroke. We studied serum lipid profile in all our patients 10 days after the occurrence of stroke.

In the present study, 63.6% (28 out of 44) of patients with thrombotic stroke and 50% of patients with haemorrhagic stroke had at least one abnormal value in their serum lipid profile, i.e. a serum total cholesterol greater than 240 mg% or LDL cholesterol greater than 160 mg% or HDL cholesterol less than 45 mg%.

Conclusion

The results obtained in present study were positive for some groups of patients and negative for others. The results correlate with some of the previous studies and are in conflict with some studies. A precisely designed, clinical and epidemiological research is required to ascertain the association of lipids and lipoprotein abnormalities with cerebrovascular disease.

References


