Study of Total Cholesterol, LDL, HDL in Non-diabetics with Stroke

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Abstract
Background: Stroke is an acute neurological injury which occurs due to vascular pathology with many modifiable risk factors, dyslipidemia being one of them. In this study lipid profile was studied in non-diabetic patients with stroke, because diabetes itself is associated with hyperlipidemia.

Materials and Methods: The study was conducted on 60 non-diabetic stroke patients and 60 age and sex matched controls who did not have stroke, after obtaining consent.

Results: The study shows the effect of Total Cholesterol, LDL and HDL on stroke.

Conclusion: This study showed significant association of total cholesterol, LDL cholesterol in non-diabetics with stroke. High levels of total cholesterol, LDL were associated with a higher level of stroke. Low levels of HDL were not associated with a higher risk of stroke.

Keywords: dyslipidemia, stroke, cholesterol, cerebrovascular accident, diabetes mellitus.

Background
Stroke or cerebrovascular accident is an acute neurological injury which occurs due to vascular pathology [1] and presents as a brain infarction or hemorrhage. Stroke is a medical emergency. The risk factors of stroke have been identified [2]. The modification of risk factors in stroke has brought down both mortality and morbidity of stroke remarkably in the last 30 years [3]. Dyslipidemia as a major risk factor for stroke is studied for many years. Various studies in different population have proved it to be true. Dyslipidemia is a correctable risk factor. It has been shown that reduction of total cholesterol, LDL and increasing HDL cholesterol by drugs has decreased the incidence of stroke.

In our study, lipid profile was studied in non-diabetic patients with stroke. Diabetes itself is associated with hyperlipidemia and increases atherosclerosis which makes it an undisputed risk factor for stroke. The atherogeneity of diabetics and non-diabetics is different. So non-diabetic patients were included in the study.

Materials and Methods
This is a Case Control Study conducted over a period of six months at Kilpauk medical college, Chennai.
Detailed history was taken. Clinical examination, radiological examination was done. Serum Total Cholesterol, LDL, HDL were estimated by enzymatic method. 

**Inclusion Criteria**

All patients with infarct in CT Brain.

**Exclusion Criteria**

- Patients with diabetes mellitus
- Patients with drugs for dyslipidemia.
- Patients on dietary modification for dyslipidemia.
- Cerebral infarct associated with trauma or tumor.

**Results**

**Total Cholesterol**

<table>
<thead>
<tr>
<th>Cholesterol</th>
<th>&lt;200 Count/ % within Diagnosis</th>
<th>&lt;200 Count/ % within Diagnosis</th>
<th>Control</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count/ % within diagnosis</td>
<td>26/43.3%</td>
<td>54/90%</td>
<td>80/66.7%</td>
<td></td>
</tr>
<tr>
<td>200-240 Count/ % within diagnosis</td>
<td>10/16.7%</td>
<td>3/5%</td>
<td>13/10.8%</td>
<td></td>
</tr>
<tr>
<td>&gt;240 Count/ % within diagnosis</td>
<td>24/40%</td>
<td>3/5%</td>
<td>27/22.5%</td>
<td></td>
</tr>
<tr>
<td>Total Count/ % within diagnosis</td>
<td>60/100%</td>
<td>60/100%</td>
<td>120/100%</td>
<td></td>
</tr>
</tbody>
</table>

The data shows associations of non diabetics with stroke and their controls with total cholesterol. 43.3% of stroke patients had normal values and 56.7% had high total cholesterol values. In the control 90% had normal total cholesterol values and 10% had high Total Cholesterol values. The significance calculated was 0.000(p<0.001) which is highly significant[5].

<table>
<thead>
<tr>
<th>Value</th>
<th>Df</th>
<th>Asymp. Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi square</td>
<td>29.903</td>
<td>2</td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>32.580</td>
<td>2</td>
</tr>
<tr>
<td>Linear by Linear association</td>
<td>28.484</td>
<td>1</td>
</tr>
<tr>
<td>No. of valid cases</td>
<td>120</td>
<td></td>
</tr>
</tbody>
</table>

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**Comparison between T.cholesterol and diagnosis**

![Comparison between T.cholesterol and diagnosis](image_url)
The data shows association of non-diabetics with stroke and their controls to LDL. Only 35% of the patients had normal LDL levels. 65% had high values. In the control group 91.7% had normal LDL values and the remaining 8.3% had high values. The significance calculated was 0.000 (p > 0.001) which is highly significant.\[7\]

**HDL CROSSTAB**

The data shows association of non-diabetics with stroke and their controls to HDL. Of the majority of the patients with stroke, 53.3% had low HDL values in contrast to controls whereas 63.3% had high HDL values. The significance calculated was 0.067 which is not significant.\[6\]
In non-diabetics with stroke, 71.7% had HDL/LDL ratio < 0.39. Only 28.3% of the same group had HDL/LDL ratio >0.4 and 16.7% had HDL/LDL ratio >0.4, which is normal.
**Discussion**

Dyslipidemia is a modifiable risk factor for stroke. Increased age, Male sex are associated with dyslipidemia. Dyslipidemia is associated with 1.8 – 2.6 times the relative risk of stroke. Fasting Lipid Profile provides a better guide to treatment of dyslipidemia.

Diet consists of saturated fat < 7% of total calories, Monounsaturated fat up-to 20% of total calories, Polyunsaturated fat up-to 10% of total calories, Cholesterol content less than 200mg/dl.

From the above study, it is inferred that increase in Total Cholesterol and LDL are associated with an increase in risk of stroke, while decrease in HDL is not associated with an increase in risk of stroke, and increase in HDL/LDL ratio is associated with a decrease in risk of stroke.

**Conclusion**

Our study was conducted on 60 non diabetic stroke patients and 60 controls. Exclusion of diabetic patients was done because diabetes is associated with hyperlipidemia and atherosclerosis.

This study showed significant association of Total Cholesterol, LDL, HDL cholesterol in non-diabetics with stroke. High levels of total cholesterol, LDL were associated with a higher level of stroke.

HDL cholesterol levels were not significantly associated with stroke.

Dyslipidemia is a tip of an iceberg. The hidden cases are to be diagnosed and treated. Dyslipidemia if properly treated can reduce the incidence of stroke thereby reducing the morbidity and mortality of stroke leading to a healthier society.

**Bibliography**