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ORIGINAL RESEARCH

Study of Analysis of Serum Lipid Profile as Risk Factor for Development of Ischemic Stroke at a Tertiary Care Hospital

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ABSTRACT

Background: Acute stroke is the acute onset of focal neurological deficits in a vascular territory affecting the brain, retina, or spinal cord due to underlying cerebrovascular diseases.Hence, the present study was conducted to analyzeserum lipid profile as risk factor for development of ischemic stroke.**Materials &Methods:**200 patients were enrolled who had suffered an ischemic stroke and 200 control patients who had come for a standard physical examination. All of the patients' clinical and demographic information was gathered. A brain CT scan was used to confirm the stroke diagnosis. On the day of admission, a 12-hour fast was followed by a lipid profile. It was considered typical to have serum total cholesterol less than 200 mg/dl, LDL cholesterol less than 100 mg/dl, triglycerides fewer than 150 mg/dl, and HDL higher than 40 mg/dl. All the results were recorded in Microsoft excel sheet and were subjected to statistical analysis using SPSS software. **Results:**A total of 200 patients were of ischemic stroke group and 200 were of control group. The mean age of the patients of the Ischemic stroke group and control group was 53.2 years and 50.7 years respectively. Abnormal TG, TC, LDL and HDL was present in 26 percent, 30.5 percent, 72.5 percent and 50.5 percent of the patients respectively of the ischemic stroke group and in 12 percent, 18 percent, 15 percent and 14 percent of the patients respectively of the control group. While analyzing statistically, significantly higher abnormal lipid profile was seen in ischemic stroke group.**Conclusion:**Lipid profile was a significant risk factor for occurrence of ischemic stroke. To better understand the other potential risk factors associated with the occurrence of ischemic stroke in India, more research is required.

Key words: Ischemic Stroke, Lipid.

INTRODUCTION

Acute stroke is the acute onset of focal neurological deficits in a vascular territory affecting the brain, retina, or spinal cord due to underlying cerebrovascular diseases. Stroke is prevalent across patient populations and can significantly cause morbidity and mortality. Strokes are categorized as ischemic and hemorrhagic. Hemorrhagic strokes can further be classified as intracerebral and subarachnoid hemorrhage.[1-3]

In a study done by Banerjee et al. in 2001 crude prevalence rate of stroke in India was 147/100,000 and the annual incidence rate was 36/100,000. Women had substantially higher age-adjusted prevalence rate (564/100,000 for women vs 196/100,000 for men) and incidence rate (204/100,000 for women vs 36/100,000 for men). Overall prevalence of stroke ranges from 147–922/100,000 in various studies.[4-7]India has the highest burden of acute coronary syndrome (ACS) in the world and the three most common risk factors for ACS are smoking (40%), high blood pressure (38%), and diabetes (30%).[8]

Dyslipidemia is a metabolic impairment that leads a person to atherosclerosis and causes cardiovascular disease (CVD), including stroke. According to several global estimates, increased cholesterol levels continue to be an important risk factor for overall disability and premature death. Hyperlipidemia has become a particularly significant risk factor for stroke due to extracranial and intracranial blood vessel atherosclerosis. It leads to ischemic stroke due to thrombus, embolism, or conditions that result in low

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systemic perfusion pressures in the brain vessels. It can also weaken small blood vessels, which can lead to aneurysms and spontaneous cerebral or non-traumatic hemorrhage.[9] Hence; the present study was conducted to analyze serum lipid profile as risk factor for development of ischemic stroke.

MATERIALS & METHODS

The present study was conducted to analyzeserum lipid profile as a risk factor for development of ischemic stroke. 200 patients were enrolled who had suffered an ischemic stroke and 200 control patients who had come for a standard physical examination. All of the patients' clinical and demographic information was gathered. A brain CT scan was used to confirm the stroke diagnosis. On the day of admission, a 12-hour fast was followed by a lipid profile. It was considered typical to have serum total cholesterol less than 200 mg/dl, LDL cholesterol less than 100 mg/dl, triglycerides fewer than 150 mg/dl, and HDL higher than 40 mg/dl. All the results were recorded in Microsoft excel sheet and were subjected to statistical analysis using SPSS software.

RESULTS

A total of 200 patients were of ischemic stroke group and 200 were of control group. The mean age of the patients of the Ischemic stroke group and control group was 53.2 years and 50.7 years respectively. Abnormal TG, TC, LDL and HDL was present in 26 percent, 30.5 percent, 72.5 percent and 50.5 percent of the patients respectively of the ischemic stroke group and in 12 percent, 18 percent, 15 percent and 14 percent of the patients respectively of the control group. While analyzing statistically, significantly higher abnormal lipid profile was seen in ischemic stroke group.

Table 1: Demographic data

Demographic	Ischemic stroke group	Control group
Mean age (years)	53.2	50.7
Males	122	117
Females	78	83

Table 2: Comparison of abnormal lipid profile

Lipid profile	Ischemic stroke group		Control group		p-value
	n	%	n	%	
Abnormal TG	52	26	24	12	0.001*
Abnormal TC	61	30.5	36	18	0.001*
Abnormal LDL	145	72.5	30	15	0.000*
Abnormal HDL	101	50.5	28	14	0.000*

*: Significant

DISCUSSION

Stroke is the second largest cause of mortality worldwide, only surpassed by ischemic heart disease. According to the World Stroke Organization, over 13.7 million stroke attacks are reported each year, of those cases 60% are under the age of 70. The lifetime risk of having a stroke in people who are 25 years and older is 24.9%. More than 2.7 million people die from ischaemic stroke attacks each year. The damage to the brain can be inflicted through blockage (ischaemic stroke) or rupture of a cerebral artery (hemorrhagic stroke). Acute ischaemic stroke (AIS) is the most common, accounting for approximately 85% of cases. Thromboembolism associated with large artery atherosclerosis or cardiac diseases such as atrial fibrillation are the most common etiologies.[10, 11] Arterial occlusion in ischemic stroke is most commonly embolic: either cardioembolic, from causes such as atrial fibrillation or valvular heart disease, or arteroembolic, from atherosclerotic disease in the extracranial cervical carotid or vertebral artery. Plaque rupture in the extracranial cervical arteries with thrombus formation is thought to be mechanistically identical with the same process in the coronary arteries, but most commonly results in distal embolization of thrombus to the brain (arteroembolism), rather than in situ vessel occlusion. There is increasing recognition that acute coronary syndromes may involve arteroembolic mechanisms of occlusion of distal coronary arteries, exactly analogous to ischemic stroke caused by arteroembolism from the extracranial carotid artery. A less common cause of intracranial artery occlusion is rupture of an intracranial atherosclerotic plaque within situ thrombus formation, exactly analogous to the situation in the coronary circulation.[12, 13]

A total of 200 patients were of ischemic stroke group and 200 were of control group. The mean age of the patients of the Ischemic stroke group and control group was 53.2 years and 50.7 years respectively. Abnormal TG, TC, LDL and HDL was present in 26 percent, 30.5 percent, 72.5 percent and 50.5 percent of the patients respectively of the ischemic stroke group and in 12 percent, 18 percent, 15 percent and 14 percent of the patients respectively of the control group. While analyzing statistically, significantly higher abnormal lipid profile was seen in ischemic stroke group. Willey JZ et al explored the relationship between lipid profile components and incident ischemic stroke in a stroke-free prospective cohort.

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After excluding those with a history of myocardial infarction, 2940 participants were available for analysis. Baseline high-density lipoprotein cholesterol, triglyceride, and total cholesterol levels were not associated with risk of ischemic stroke. Low-density lipoprotein cholesterol (LDL-C) and non–high-density lipoprotein cholesterol levels were associated with a paradoxical reduction in risk of stroke. There was an interaction with use of cholesterol-lowering medication on follow-up, such that LDL-C level was only associated with a reduction in stroke risk among those taking medications. An LDL-C level greater than 130 mg/dL as a time-dependent covariate showed an increased risk of ischemic stroke. Baseline lipid panel components were not associated with an increased stroke risk in this cohort.[14]

CONCLUSION

Lipid profile was a significant risk factor for occurrence of ischemic stroke. To better understand the other potential risk factors associated with the occurrence of ischemic stroke in India, more research is required.

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