Pattern of dyslipidemia in ischemic stroke

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Abstract

The study aimed to assess dyslipidemia pattern including role of non HDL cholesterol (non HDLc) in ischemic strokes. A retrospective descriptive was conducted on 80 patients who were admitted to Osmania General Hospital between May 2013 and May 2015 with new onset of stroke. A detailed history, physical examination and outcome details were collected from the hospital medical records. Data such as fasting lipid profile was noted, non HDLc was calculated, computed tomography (CT) or magnetic resonance imaging (MRI) brain reports were collected from medical records. Among enrolled patients, 55 were males and 25 were females. Age distribution: <40 years, n=4; 40-60 years, n=50; and >60 years, n=26. Dyslipidemia as per ATP III guidelines was present in 92.5% cases (n = 74). In our study, high LDL was found in 16 cases (21.62%), high total cholesterol in 16 cases (21.6%), low HDL in 57 cases (77%), high triglycerides in 13 cases (17.56%) and elevated non HDLc (>130mg/dl) in 28 patients (37.8%). Risk factors for stroke present were hypertension (n=48, 60%), diabetes (n=33, 41.25%), both diabetes and hypertension (n=15, 18.75%), smoking (n=33, 41.25%), alcoholism (n=32, 40%) and more than 2 risk factors were present in 28.75% (n=23). Total number of deaths was 05%. To conclude, most of the patients were having low HDL (<40mg/dL) which is an independent risk factor for stroke. This study also highlights the importance of elevated non HDL Cholesterol in development of ischemic stroke, which is more comprehensive measure of atherogenic lipoprotein than LDL cholesterol alone. This study upholds the importance of life style modifications to cut down the risk of development of stroke and also to evaluate the association between elevated non-HDL cholesterol in stroke patients.

Key words: Dyslipidemia, stroke, Low Density Lipoprotein cholesterol (LDL c), High Density, Lipoprotein cholesterol (HDL c), non HDL cholesterol.

Stroke represents third most common cause of death in developed nations. In India, community surveys have shown crude prevalence rate for ‘hemiplegia’ in the range of 200 per 1,00,000 persons, nearly 1.5% of all urban hospital admissions, 4.5% of all medical and around 20% of neurological Cases. ‘Stroke’ is defined as rapid onset of focal neurological deficit, resulting from diseases of the cerebral vasculature and its contents. The term cerebrovascular dis-
ease designates any abnormality of the brain from a pathologic process of the blood vessels. Pathologic process includes occlusion of the lumen by embolism or thrombus, rupture of a vessel, any lesion or altered permeability of the vessel wall, and increased viscosity or other change in the quality of the blood. The pathologic process may be considered in terms of the more basic or primary disorder, i.e., atherosclerosis, hypertensive arteriosclerotic change, arteritis, aneurysmal dilation, and developmental malformation. Older age, family history of thrombotic stroke, diabetes mellitus, hypertension, tobacco smoking, abnormal blood cholesterol [particularly, low high-density lipoprotein (HDL) and/or high low-density lipoprotein (LDL)], and other factors are either proven or probable risk factors for ischemic stroke, largely by their link to atherosclerosis. The Stroke Prevention by Aggressive Reduction in Cholesterol Levels (SPARCL) trial showed benefit in secondary stroke reduction for patients with recent stroke or transient ischemic attacks (TIA) which implies complete recovery of such a deficit within 24 hour.

The only anti atherogenic lipoprotein is the HDLc. Plasma total cholesterol represents sum of the cholesterol content of all circulating lipoproteins irrespective of their atherogenic potential. Non-HDLc (total cholesterol minus HDLc) is more comprehensive measure of atherogenic lipoprotein than LDL c alone and no need to put patient on fasting as for LDL c. Non HDL c is more accepted and technically easier to assess atherogenic potential of individual. Non-HDL c is potentially modifiable newer risk factor. It is possible to reduce the probability of stroke by lowering down the raised non-HDL cholesterol, as it is one of the risk factor for stroke.

Material and methods

A total of 80 patients records were assessed from medical records of department Osmania General Hospital. The study was carried out on patients presenting with stroke during the period of 24 months from May 2013-2015 with new onset stroke. The patients were in the age group of 20 to 80 years. A detailed history, physical examination details were collected from patients records. Data such as CT or MRI brain and fasting lipid profile were also obtained from medical records.

Patients with brain tumor, head trauma, previously on lipid lowering drugs, transient ischemic attack, other cerebrovascular diseases, syncopal attacks and presumptive diagnosis of stroke with no evidence on CT were excluded from the study.

Results

A total of 80 patients with ischemic stroke were studied. Males were 55 and females were 25. Patients with age <40 yrs n=4; between 40-60 yrs n=50 and >60 yrs n=26 with mean age: 57.25±12.27.

Dyslipidemia (LDL >130; TC>200; HDL<40) as per ATP III guidelines was present in n = 74(92.5%) patients. In our study high LDL was found in n=16(21.6%) patients with mean LDL  150.1±17.1, high total Cholesterol was found in n=16(21.6%) with a mean: 220.9±23.2, low HDL Cholesterol in n=57(77%) with mean: 28.7± 7.1, high Triglycerides n=13(17.56%) with a mean: 202.2±58.4 and elevated non HDL c (>130mg/dl) in n=28(37.8%)with mean: 167.5±28 (Figure1)

Risk factors included were hypertension n=48(60%); diabetes n=18(22.5%); both diabetics and hypertensive n=15 (18.75 %); Smoking n= 33 (40%); alcoholism n= 32 (40%). Patients with > 2 risk factors were n=23 (30%). Total number of deaths n= 4(5%).

Material and methods

![Dyslipidemia Profile](image1.png)

**Fig 1. Dyslipidemia profile of patients**
Discussion

Dyslipidemia is elevation of plasma cholesterol, triglycerides (TGs), or both, or a low high-density lipoprotein level that contributes to the development of atherosclerosis. In India, where ischemic stroke accounts for 80% of all strokes, 10% to 15% of strokes occur in people younger than 40 years and are mostly related to intracranial atherosclerosis. Atherosclerosis involving the large intracranial vessels causes about 8% of ischemic strokes.

According to the India stroke fact sheet updated in 2012, the estimated age-adjusted prevalence rate for stroke ranges between 84/100,000 and 262/100,000 in rural and between 334/100,000 and 424/100,000 in urban areas. The national commission of Macro economics and health has estimated that there will be 1.67 million stroke cases in India by 2015.

Stroke is also a leading cause of morbidity with 20% of survivors requiring institutional care after 3 months and 15-30% remaining permanently disabled.

Abnormalities of serum lipids are major risk factors for coronary heart disease and most recently established as risk factor in cerebrovascular disease.

Dyslipidemia is a primary major risk factor for CAD and ischemic stroke. It causes insulin resistance which results in increased levels of plasma triglycerides and LDL-c and a decreased concentration of HDL-c, as an important risk factor for peripheral vascular disease, stroke, and CAD. Serum HDL-c has anti-atherogenic properties with ability to trigger the flux of cholesterol from peripheral cells to the liver and thus having a protective effect. Lipid-modifying therapy with statins has definitively established that reduction of LDL-c reduces cardiovascular risk. Statins benefit stroke survivors as well. Lipid lowering agents may slow progression of atherosclerotic plaque growth and may possibly cause a regression in plaque formation. Current guidelines of the American Heart Association and proposed modifications of the NCEP-III guidelines would therefore suggest that all patients at risk for stroke or who have had a cerebral infarction should be treated to a goal LDL level of below 70 mg/dL (Grundy et al, 2004; Sacco et al, 2014).

Fig 2. Patients with derangement in more than one type of cholesterol

Fig 3. Comparison of lipid derangement with the study of Cynthia et al.
The only antiatherogenic lipoprotein is the HDL-c. Plasma total cholesterol represents sum of the cholesterol content of all circulating lipoproteins irrespective of their atherogenic potential. To calculate non-HDL cholesterol, it is enough to measure total cholesterol and HDL c for which there is no need to put the patient in fasting state so as in LDL c measurement, which need fasting sample. So, non-HDL cholesterol is more universal and technically more compliant measure to assess atherogenic potential of an individual. Relation of non-HDL cholesterol, LDL cholesterol and atherogenic risk was addressed by the NCEP-ATP III, When serum Triglycerides >150mg/dl, LDL cholesterol alone is not sufficient to define the risk associated with atherogenic lipoproteins, where non-HDL-c is the best choice.

In the present study number of patients with dyslipidemia including high TC, high LDL, low HDL and high TG was 70%, while in a study done by Cynthia A et al; done in Father Muller college Karnataka was 56%. Among risk factors Hypertensive were 48 (60%) in this study compared to 55%, diabetes was 18 (25%) compared to 30%, both diabetic and hypertensive were 18.75% compared to 24% in the study done by Cynthia A et al.

In the present study elevated non-HDL cholesterol level found to be associated with an increased risk for Cerebrovascular disease. Serum TC, TAG & LDL cholesterol concentration were also found to be elevated significantly in Cerebrovascular cases in comparison to control, which is in consistent with previous studies by Sridharan R et al., Tirschwell DL et al., Xingang Z et al. In present study non HDL c (>130mg/dl) was elevated in n= 39 (49%).

Conclusion
In present study dyslipidemia in stroke patients was 92.5%. Most of the patients were having low HDL (<40mg/dl) and elevated non HDL c (>130mg/dl) which are risk factors for stroke. Elevated non HDL c is more correlating than elevated LDL c in ischemic strokes. This study up holds the importance of life style modification like exercise to increase HDL c and reduce non HDL c.

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Conflict of interest: None

References