Volume : 5 | Issue : 6 | June 2016 • ISSN No 2277 - 8179 | IF : 3.508 | IC Value : 69.48

Research Paper

Role of Low HDL Cholesterol in Ischemic Stroke

Medical Science

KEYWORDS : Cerebrovascular disease, ischemic stroke, HDL cholesterol, Total cholesterol(TC), Triglycerides(TG).

DR.B.Sudarsi	Assistant Professor, Department of General Medicine, Osmania General Hospital,Hyderabad.
Dr.R.Siddeswari	Professor, Department of General Medicine, Osmania Medical College Hyderabad, Telangana.
Dr.Shiva Prasad	HOD and Professor, Department of General Medicine, Osmania Medical College, Hyderabad, Telangana.
Dr.N.Srinivas	Professor and Head of the Department, Department of General Medicine, Osmania General Hospital, Hyderabad.

ABSTRACT

Background: Dyslipidemia is one of the important cause for ischemic stroke. Low HDL-C pose a greater risk for ischemic stroke .Objective of the present study is to study the association of low-HDL-C in ischemic stroke.

Materials& Methods: This is a retrospective study of 100 patients of ischemic stroke admitted in Osmania general hospital(OGH), Hyderabad. Detailed history was taken and complete clinical examination was done in all patients who were admitted with ischemic stroke. Computerised Tomography/Magnetic Resonance Imaging brain was done. 5ml fasting venous blood was collected and used for the measurement of lipid profile and creatinine. Patients with malignant disease, renal disease, thyroid disorder, liver disease and hemorrhagic stroke were excluded from study.

Results: Total 100 subjects of both sexes of ischemic stroke were included. Among them 69 were males and 31 were females. Patients with age <40years were 6 and age≥40years were 94. Among them 59 were hypertensives, 22 were diabetics, 43 were smokers and 42 were alcoholics. Number of patients with HDL-C(High density lipoprotein cholesterol) <40mg/dl are 72, non HDL-C >130 mg/dl were 31 (31%), ratio of Total cholesterol/HDL-C <2 is one , 2-3.99 were 37, 4-6 were 49, >6 were 13. The mean HDL-C is 33.8+/-10.4 mg/dl. Mean TC (total cholesterol) is 147.2+/-47.4 mg/dl. Mean triglycerides is 119.1+/-48.8mg/dl. Mean LDL-C (low density lipoprotein cholesterol) is 89.3 +/-39.2 mg/dl. Mean non HDL C is 113.4 +/-44.7 mg/dl.

Conclusion: Low HDL-C levels pose a greater risk to stroke and the ratio of TC/HDL-C above 2 is probably a better indicator for ischemic stroke.

Introduction:

Ischemic stroke is due to occlusion of a cerebral blood vessel and causes cerebral infarction. The resultant neurologic syndrome corresponds to a portion of the brain that is supplied by one or more cerebral vessels.[1] 'Stroke' is defined as rapid onset of focal neurological deficit, resulting from diseases of the cerebral vasculature and its contents. Three types of major strokes are ischaemic, haemorrhagic and lacunar strokes. Ischaemic variety with cerebral infarction results from atherothrombosis or brain embolism to cerebral vessels. The term 'transient ischaemic attacks' (TIA) implies complete recovery of such a deficit within 24 hours[2]

Stroke, after heart disease and cancer, is the third most common cause of death. Since 1950, coincident with the introduction of effective treatment for hypertension, there has been a substantial reduction in the frequency of stroke, the mortality rate from stroke has declined by 12 percent, but the total number of strokes may again be rising. Stroke assumes importance both because of its high rate of mortality and the residual disability that it causes[1].

For India, community surveys have shown a crude prevalence rate for 'hemiplegia' in the range of 200 per 100,000 persons, nearly 1.5% of all urban hospital admissions, 4.5% of all medical and around 20% of neurological Cases[2]

This is an area of major public health importance in that several modifiable factors are known to increase the liability to stroke. The most important of these are hypertension, atrial fibrillation, diabetes mellitus, cigarette smoking and hyperlipidemia.[3]

Atherosclerosis and its clinical presentation as coronary artery disease, stroke and peripheral vascular disease is likely to be the product of several path physiologies. Depending on the patient and setting, arterial disease results from a varying reaction to lipid infiltration, arterial damage and macrophage inflammation. Population, genetic and therapeutic data suggest that atherosclerosis is frequently caused by cholesterol deposition within the arterial wall. It is estimated that about 50% of all atherosclerosis is attributable to hyperlipidemia and other known cardiac risk factors[4]

High density lipoproteins (HDLs) are the smallest and densest of the plasma lipoproteins. These are a heterogeneous class of lipoproteins with relatively high protein content (40% to 55%), which is the reason for their high density. HDL-C accounts for approximately 25% of blood cholesterol and is a source of Cholesterol for endocrine tissues such as the adrenal glands, ovaries, and testes. HDL-C is an important contributor to reverse cholesterol transport, the process whereby cholesterol from peripheral tissues is transported to the liver, where it can be disposed of in bile. HDL is also reported to have anti-oxidant and anti-inflammatory properties that prevent development of atherosclerotic plaques or atheromas. These effects include the inhibition of apoptosis, the inhibition of thrombosis and the restoration of endothelial function.[5]

High level of LDL cholesterol was considered to be a predictor of cardiovascular and Cerebrovascular diseases(CVD) in the general population. But in the past several years recently, the role of high density lipoprotein cholesterol (HDL cholesterol) was continued to be known. The relation between HDL cholesterol and the risk of ischemic stroke was inconsistent. In the current opinions, more studies supported an inverse association between

Volume : 5 | Issue : 6 | June 2016 • ISSN No 2277 - 8179 | IF : 3.508 | IC Value : 69.48

HDL cholesterol and the risk of ischemic stroke [6,7] despite this was not confirmed in the populations of Asia [8].

The purpose of present study was to evaluate the role of low HDL cholesterol on the risk of ischemic stroke events in general population.

Objectives: To study the association of low -HDL cholesterol with ischemic stroke.

Materials & Methods: This was a retrospective study carried out on 100 patients of ischemic stroke in Osmania general hospital during the period between November 2014 to June 2015. Dyslipidemia was considered according to (LDL >130;TC>200;HDL<40 Non HDL-C >130mg/dl) as per ATP III guidelines.

Inclusion criteria: 100 patients of both sexes above age of 18 years with ischemic stroke who were admitted in OGH were studied.

Exclusion criteria: Malignant disease, renal disease, thyroid disorder, liver disease and hemorrhagic stroke were excluded from study subjects.

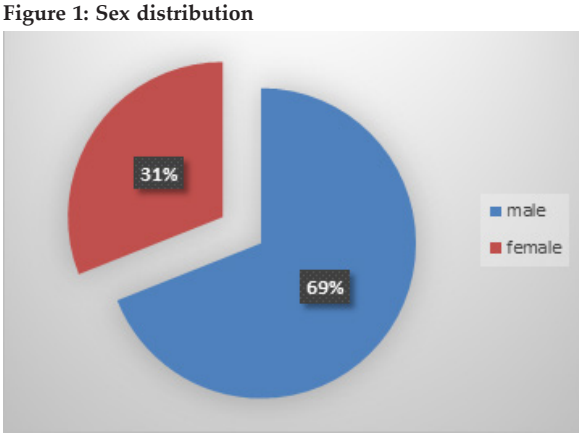
Detailed history was taken and complete clinical examination was done in all study subjects .CT/MRI brain was done. 5ml fasting venous blood was collected from all study subjects with full aseptic precaution; blood was allowed to clot and then centrifuged. Separated serum was then collected and used for the measurement of lipid profile and creatinine.

Results: Total 100 subjects of both sexes of ischemic stroke were included. Among them 69 were males and 31 were females as shown in fig 1. Patients with age <40years were 04 and age >40years were 96 as shown in figure 2.

Among them 59 were hypertensive, 22 were diabetic, 43 were smokers and 42 were alcoholics.

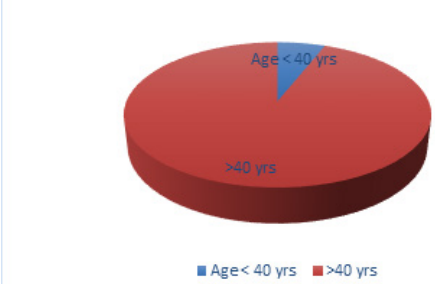
Total number of patients with HDL cholesterol <40mg/dl were 72, with non HDL cholesterol >130 mg/dl were 31 (31%), with ratio of TC /HDL-C <2(1), 2-3.99(37), 4-6(49), >6(13) as shown in fig:3.The mean HDL-C is 33.8+/-10.4 mg/dl. Mean TC is 147.2+/-47.4 mg/dl. Mean triglycerides is 119.1+/-48.8mg/dl. Mean LDL cholesterol is 89.3 +/-39.2 mg/dl. Mean non HDL cholesterol is 113.4 +/-44.7 mg/dl as shown in figure 4.

Figure 1: Sex distribution



Among 100 patients n= 69 were males and n= 31 were females.

Figure 2: Age distribution



Patients with age <40years n=04 and age >40years were n=96.

Figure: 3 SHOWING TC/HDL-C RATIO

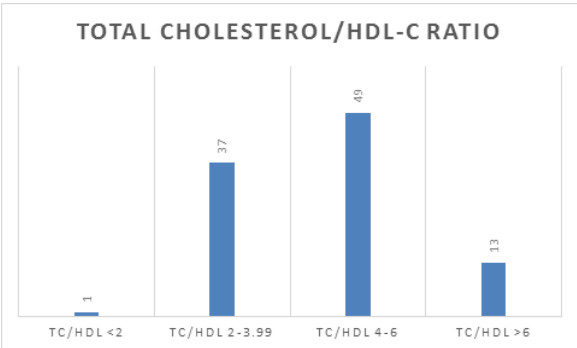
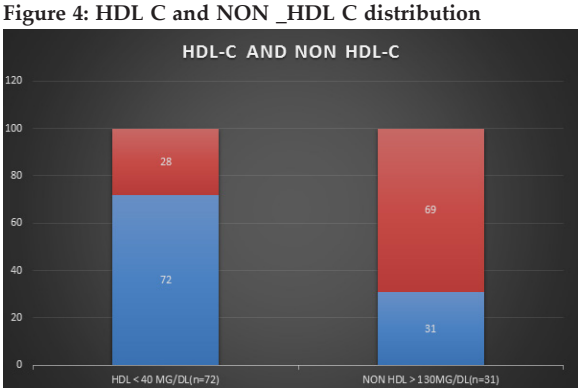


Figure 4: HDL C and NON _HDL C distribution



Discussion:

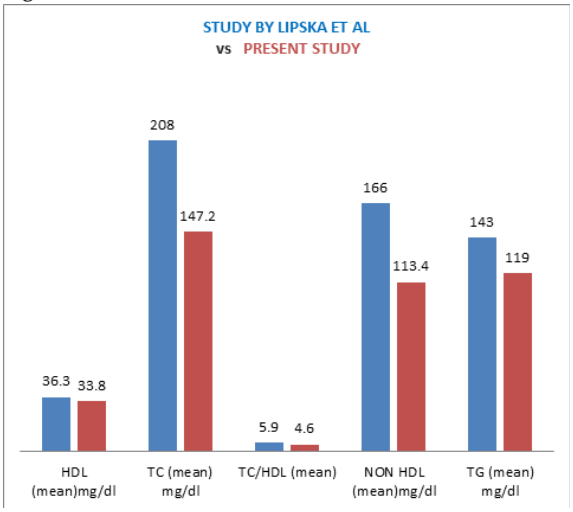
Atherosclerosis is claimed to be involved with coronary artery disease (CAD), Cerebrovascular disease (CVD) and peripheral vascular disease (PVD). Lipids and lipoprotein disorders are important metabolic risk factors of atherosclerosis. There is overwhelming convincing evidences relating hypercholesterolemia, increased LDL cholesterol, decreased HDL cholesterol and increased total cholesterol and HDL cholesterol ratio (TC/HDL) with CAD but their relation to CVD is controversial. Some studies showed positive correlation of Ischemic CVD with total cholesterol, LDL cholesterol, TG and (TC/HDL) but negative correlation with HDL cholesterol[9, 10, 11]

Regular physical activity (at least 150 minutes a week of moderate-intensity physical activity, such as brisk walking) strongly reduces the risk of developing type 2 diabetes as well as the metabolic syndrome. The metabolic syndrome is defined as a condition in which people have some combination of high blood pressure, a large waistline (abdominal obesity), an adverse blood lipid profile (low levels of high-density lipoprotein [HDL] cholesterol, raised triglycerides), and impaired glucose tolerance[12].

Incidence of stroke is more in patients above 40 years (96%) in present study compared to Muhammad Nazim Khan et al., where peak incidence of stroke was more in patients above 65 years (32.4%).

In present study 59% patients had hypertension & 22% had diabetes compared to 74.6% and 20.5% respectively in a study by Muhammad Nazim Khan et al. [13]

Figure: 5 COMPARISION WITH LIPSKA ETAL STUDY



In the present study we found that while low HDL cholesterol and high total cholesterol to HDL cholesterol ratio were more frequent among patients, total serum cholesterol, triglycerides and low density lipoprotein cholesterol levels did not significantly differ similar to a case control study involving 204 patients with acute ischemic stroke of all ages by Sridharan .R et al from South India[14]. The mean HDL c ,TC, TC/HDL ratio ,non HDL C and TG in present study are 33.8 mg/dl, 147.2mg/dl ,4.6,113.4mg/dl and 119mg/dl as compared to another study by Lipska et al the values were 36.8mg/dl,208mg/dl,5.9,166mg/dl and 143 mg/dl respectively (figure :5)[15]

Conclusion

This study showed significant relation of low HDL cholesterol with development of ischemic stroke. The ratio of total cholesterol/HDL cholesterol above 2 is probably a better indicator for ischemic stroke. Low HDL c can be improved by simple measures like dietary changes and regular physical exercise. So screening high risk individuals with metabolic syndrome and motivating them for life style modifications can reduce the risk of stroke

References

1. Allan A Hopper et al Cerebrovascular diseases Ch 35;Adam's and Victor's Principles of Neurology 10th edition;pg 778-884; Mc Graw Hill Education publication 2014.
2. P.M.Dalal Ischemic Cerebrovascular diseases API text book of medicine 9th edition Jaypee brother medical publications 2012 ch 20.8 pg 1401
3. Allan H Ropper ;Martin A Sameul; Joshua P Klein;Cerebrovascular diseases, ch 34 Adams and Victor's principles of neurology 10th edition by Mc Graw Hill 2014 pg 778-880
4. Wilson PW, D'Agostino RB, Levy D, et al. Prediction of coronary heart disease using risk factor categories. *Circulation*. 1998;97:1837-1847
5. Soneil Guptha. Ch 18.3 Lipids and Lipoprotein metabolism. . Pg 1232-39API Text Book Of Medicine vol ii edition 9th Published by:The Association of Physicians of India 2012
6. Zhang Y, Tuomilehto J, Jousilahti P, Wang Y, Antikainen R, Hu G. Total and high-density lipoprotein cholesterol and stroke risk. Stroke. 2012;43:1768–1774. doi: 10.1161/STROKEAHA.111.646778. .[PubMed] [Cross Ref)
7. Amarenco P, Labreuche J, Touboul PJ. High-density lipoprotein-cholesterol and risk of stroke and carotid atherosclerosis: a systematic review. Atherosclerosis. 2008;196:489–496 doi: 10.1016/j.atherosclerosis.2007.07.033.[PubMed] [Cross Ref)
8. Woodward M, Barzi F, Feigin V, Gu D, Huxley R, Nakamura K, Patel A, Ho S, Jamrozik K, Asia Pacific Cohort Studies Collaboration Associations between high-density lipoprotein cholesterol and both stroke and coronary heart disease in the Asia Pacific region. Eur Heart J. 2007;28:2653–2660. doi: 10.1093/eurheartj/ehm427.[PubMed] [Cross Ref)
9. Pedro-Botet J, Senti M, Nogues X, Rubies-Prat J, Roquer J, D'Olhaberriague L, et al. Lipoprotein and apolipoprotein profile in men with ischemic stroke: role of lipoprotein(a), triglyceride-rich lipoproteins and apolipoprotein E polymorphism. *Stroke*. 1992; 23: 1556-62.
10. Lindenstrom E, Boysen G, Nyboe J. Influence of total cholesterol, high density lipoprotein cholesterol, and triglycerides on risk of cerebrovascular disease: the Copenhagen city heart study. *BMJ*. 1994; 309: 11 -5
11. Hachinski V, Graffagnino C, Beaudry M, Bernier AAG, Buck C, Donner A, et al. Lipids and stroke: a paradox resolved. *Arch Neurol*. 1996; 53: 303-8.
12. physical activity guidelines for americans health.gov/paguidelines/ chapter 2: physical activity has many health benefits 5 days ago - The Physical Activity Guidelines for Americans (PAG) are an essential resource for health professional and policymakers. Based on the latest .
13. Muhammad Nazim Khan et al Serum Total and HDL-Cholesterol in Ischemic and Hemorrhagic Stroke; Ann. Pak. Inst. Med. Sci. 2014; 10(1)22-26 23
14. Sridharan R. Risk factors for ischemic stroke: a case control analysis. Neuroepidemiology 19921124–30.30 [PubMed] J Neurol Neurosurg Psychiatry. 2007 Sep; 78(9): 959–963
15. K Lipska, P N Sylaja, P S Sarma, K R Thankappan,et Risk factors for acute ischaemic stroke in young adults in South India . Published online 2007 Jan 12. doi: 10.1136/jnnp.2006.106831 PMCID: PMC2117871