



## PATTERN OF DYSLIPEDEMA IN ISCHEMIC STROKE PATIENTS – A STUDY FROM GOVERNMENT GENERAL HOSPITAL SIDDHARTHA MEDICAL COLLEGE - VIJAYAWADA – ANDHRA PRADESH

### KEYWORDS

Atherosclerotic cardiovascular disease (ASCVD), Dyslipidemia, stroke, coronary heart disease (CHD) Low Density Lipoprotein (LDL), High Density Lipoprotein (HDL).

### DR.R.SIDDESWARI M.D

Assoc Professor, Department of General Medicine, Government General Hospital, Siddhartha Medical Collage Vijayawada

### DR.T.SIKINDAR MOHAN M.D

Asst.Professor of General Medicine, Government General Hospital, Siddhartha Medical Collage Vijayawada

### DR.SATHYANARAYANA RAO M.D

Professor, & Head of the department of General Medicine, Government General Hospital, Siddhartha Medical Collage Vijayawada

### ABSTRACT

**Aim:** To study the pattern of dyslipidemia in ischemic stroke patients.

**Methods:** This a retrospective descriptive study, conducted on 100 patients admitted in Government General Hospital Vijayawada with new onset acute ischemic stroke. A detailed history, physical examination and outcome details of the patients were collected from hospital records. Fasting Lipid profile reports and computed tomography (CT) or magnetic resonance imaging (MRI) brain reports were also obtained from records and studied for pattern of dyslipidemia associated with strokes.

**Results:** A total of 100 patients were studied of whom males were 68 and females were 32. Patients with age <40 years n=4 age between 40-60 years n=63 and age >60 years n=33 with mean age 58.39 years. In the present study risk factors which were included are hypertension n= 49 diabetes n=21, both diabetics and hypertensive's n=18 smoking n= 29, alcoholism n= 31 and risk factors 2and above n=39 and dyslipidemia (LDL >130;TC>200;HDL<40; Triglycerids >150) mg/dl as per ATP III guidelines was present in n=93 patients. High LDL cholesterol (>130mg/dl) was found in n= 25 with mean LDL : 104.6 mg/dl, low HDL Cholesterol in n= 83 with mean 34.4 mg/dl, high Total Cholesterol was found in n=19 with a mean 161.73 mg/dl, high Triglycerides n= 28 with a mean 132.1mg/dl. Non HDL (total cholesterol minus HDL) >130 mg/dl was in 39 patients and Total cholesterol and HDL ratio > 4.5 was found in 43 patients.

**Conclusion:** In the present study among modifiable risk factors for dyslipidemia as per ATP III guidelines was present in 93% of stroke patients. Most of the patients were having low HDL (<40mg/dL) which is a risk factor for stroke followed by hypertension and alcoholism. As per the Indian Council of Medical Research (ICMR) surveillance project report prevalence of dyslipidemia (defined as a ratio of total to HDL cholesterol > 4.5) was present in 43 patients. Present study concludes the importance of Therapeutic life style change (TLC), diet and exercise role to cut down dyslipidemia and in reducing the incidence of stroke.

**Introduction:** Stroke is the second leading cause of death worldwide and the third most common cause of disability adjusted life years in the world, according to the Global Burden of diseases, Injuries, and Risk Factor Study (GBD 2010).<sup>1</sup> Stroke is a major disabling health problem in developing countries like India. The average annual incidence rate and case fatality rate of stroke in India is higher than the western countries<sup>2</sup>. Modifiable risk factors for ischemic stroke include hyper tension, dylipedemia, smoking, alcoholism, asymptomatic carotid artery disease and non modifiable risk factors are old age, male gender, ethnicity and prior history of stroke.<sup>3</sup>

Up to 80% of strokes in India are ischemic in nature, among which are large artery atherosclerosis both intra-and extra cranial is the most common mechanism.<sup>2</sup>

Worldwide, high cholesterol levels are estimated to cause 56% of ischemic heart disease and 18% of stroke, amounting to 4.4 million deaths annually.<sup>4</sup> Atherosclerotic cardiovascular disease(ASCVD) includes coronary heart disease(CHD) stroke, and peripheral arterial disease.<sup>5</sup> Indians have specific form of dyslipidemia with high total cholesterol and LDL-C and low HDL-C and high triglycerides(TG). There is greater preponderance of more atherogenic small dense LDL particles as compared to Caucasian subjects.<sup>6</sup> Dyslipidemia is a disorder of lipoprotein metabolism, which can include overproduction or defi ciency of lipoproteins or both. The disorder can manifest as an elevation of plasma cholesterol, TG or both, or a low high HDL or all three together that contributes to the development of atherosclerosis. World Health Organisation ( WHO) in 2002 reported that high cholesterol level is one of the main non communicable disease related risk factors in India .The Indian

Council of Medical Research (ICMR) surveillance project reported a prevalence of dyslipidemia (defined as a ratio of total to HDL cholesterol >4.5 ) of 37.5 % among adults aged between 15 years to 64 years with an even higher prevalence dyslipidemia (62%) among young male industrial workers.<sup>7</sup> Non-HDL cholesterol (total cholesterol minus HDL cholesterol) is more comprehensive measure of atherogenic lipoprotein than LDL-C alone and no need to put the patient on fasting as for LDL-C. Non HDL is the best choice when serum triglycerides >150mg/dl.<sup>8,9</sup>

This study is conducted to identify the dyslipidemia pattern as per ICMR and ATP III Guide lines in ischemic stroke patients, and the importance of modifiable risk factors in reducing the incidence of stroke.

### Materials and Methods:

This is a retrospective study of 100 patients with ischemic stroke who were admitted in Government General Hospital Vijayawada during last two years. All ischemic stroke patients with evidence of CT and MRI were included in the study. Fasting serum sample was taken after 8 hours of fasting on the next day of admission. Total serum cholesterol, Triglycerides, LDL-cholesterol, VLDL cholesterol and HDL cholesterol were collected from records. Total cholesterol and HDL ratio and Non HDL cholesterol is calculated.

Exclusion criteria: Patients with transient ischemic attack, syncopal attacks other cerebrovascular diseases, Brain tumor, head trauma, and previously on lipid lowering drugs, and presumptive diagnosis of stroke.

ATP 111 classification was followed for dyslipidemia.

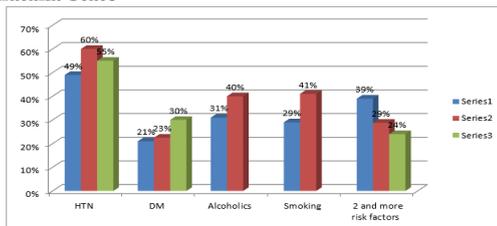
LDL cholesterol mg /dl	Total Cholesterol mg/dl	HDL Cholesterol mg/dl	Triglyceride mg/dl
<100 optimal	<200 Desirable	Low < 40	<150 Normal
100-129 near optimal/above optimal	200-239 Border line high	High > 60	150-199 Border line high
130-159 border line high	>200 High		200-499 High
160-189 High			>500 very high
>190 Very high			

**RESULTS** A total of 100 patients were studied of whom males were 68 and females were 32. Patients with age <40 years n=4 age between 40-60 years n=63 and age >60 years n=33 with mean age 58.39 years. Risk factors which were included are hypertension n=49 diabetes n=21, both diabetics and hypertensive's n=18 smoking n= 29, alcoholism n= 31 and risk factors 2 and above n=39 shown in chart 1 and fig 1

**Table 1:** Comparison of risk factors with present study with Siddeswari R et al at Telangana State (TS) and Cynthia et al Karnataka State

Risk factors	Siddeswari R et. al (Andhra Pradesh State) Series1	Siddeswari R et. al (Telangana State) Series2	Cynthia et al Karnataka State Series3
HTN	49%	60%	55%
DM	21%	23%	30%
Alcoholics	31%	40%	
Smoking	29%	41%	
2 and more risk factors	39%	29%	24%

**Fig 1:** Comparison of risk factors with present study with Siddeswari R et al at TELANGANA State and Cynthia et al Karnataka State

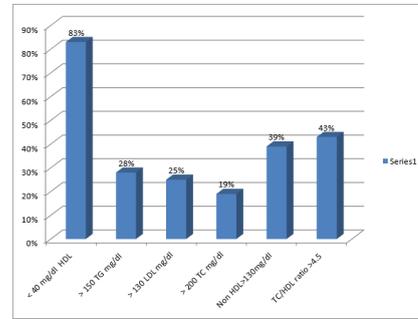


Dyslipidemia (LDL >130; TC>200; HDL<40; Triglycerids >150) mg/dl as per ATP III guidelines was present in n=93 patients. High LDL cholesterol (>130mg/dl) was found in n= 25 with mean LDL : 104.6 mg/dl, low HDL Cholesterol in n= 83 with mean 34.4 mg/dl, high Total Cholesterol was found in n= 19 with a mean 161.73 mg/dl, high Triglycerides n= 28 with a mean 132.1 mg/dl. Non HDL (total cholesterol minus HDL) >130 m/dl was in 39 patients and Total cholesterol and HDL ratio >4.5 were found in 43 patients shown in chart 2 and fig2.

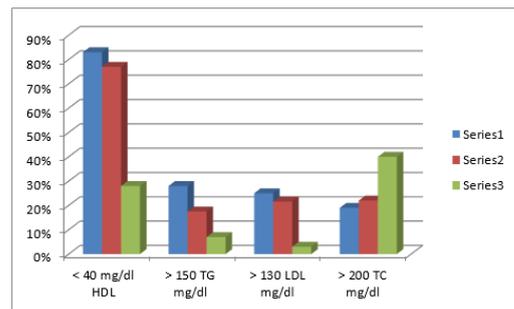
**Table 2:** DYSLIPIDEMIA PROFILE OF PATIENTS (COMPARTIVE STUDY)

LIPID PROFILE	Siddeswari R et. al (Andhra Pradesh State) Series1	Siddeswari R et. al (TELANGANA State) Series2	Cynthia et al Karnataka State Series3
< 40 mg/dl HDL	83%	77%	28.00%
> 150 TG mg/dl	28%	17.50%	7%
> 130 LDL mg/dl	25%	22%	3%
> 200 TC mg/dl	19%	22%	40%
Non HDL>130mg/dl	39%		
TC/HDL ratio >4.5	43%		

**FIG-2 :** DYSLIPIDEMIA PROFILE OF PATIENTS (PRESENT STUDY)



**Fig 3.** Comparison of lipid derangement with the study of Siddeswari. R. et.al from TELANGANA State and Cynthia et.al Karnataka State



**Discussion:** Most dyslipidemias are multifocal in etiology and reflect the effects of uncharacterized genetic influences coupled with diet, activity, smoking alcohol use and comarbid conditions such as obesity and diabetes mellitus. 10 50% of all atherosclerosis is attributable to hyperlipidemia and other known cardiac risk factors.<sup>11</sup> Hypertension contributes to each of the major intermediate causes of both ischemic and hemorrhagic stroke including carotid stenosis, intracranial atherosclerosis, small-vessel arteriosclerosis, and both macroscopic and microscopic aneurysms<sup>12</sup>. Of all the identified modifiable risk factors for stroke, hypertension appears to be the important, owing to its high prevalence and it is associated with three- to fivefold increase in stroke risk.<sup>13</sup> Measurement of fasting lipids is indicated if the total cholesterol is >200mg/dl or HDL cholesterol level is <40mg/dl. If the lipids are unremarkable and patient has no major risk factor for CHD screening can be performed every 5 years. ATP III thresholds for initiating cholesterol lowering therapy with therapeutic lifestyle change (TLC, diet exercise) and hypolipemic drugs. Etiologies for low HDL cholesterol includes physical inactivity, obesity, insulin resistance diabetes, hype triglyceredemia, cigarettsmoking,high (60% calories) carbohydrate diets and certain medications(beta blockers, anabolic steroids, progestins). Low HDL cholesterol often occurs in the setting of hyper tri glyceredemia and metabolic syndrome. Management of these conditions may result in improvement of HDL cholesterol. Anerobic exercise, weight loss smoking cessation, menopausal estrogen replacement and treatment with niacin or fibrates may elevate low HDL cholesterol.<sup>9</sup>

Non pharamacological treatment for hyper triglyceredemia includes decreasing alcohol intake, encouraging weight loss, exercise, avoiding simple sugars and very high carbohydrate diets, controlling hypeglycemia in diabetic patients. Pharmaccoloical treatment includes fibric acid derivatives or niacin for isolated hypertri glyceredemia and statins for mild to moderate hypertriglyceredemia with elevated LDL cholesterol.<sup>14</sup>

In the present study among risk factors, hypertension accounts 49% ,diabetes 21%, 2 and more risk factors 39%compared to 60%,23%,

29% done by Siddeswari R et al from Osmania Medical Collage Telengana State, and 55%, 30%, 24% from Cynthia et al Father Muller Medical college, Karnataka State.

In the present study in dyslipidemia profile low HDL was present in 83% high Triglycerids in 28%, high LDL in 25%, and high Total cholesterol in 19% compared to 77%, 17.5%, 22% and 22% done by Siddeswari R et al from Osmania Medical Collage Telengana State, and 28%, 7%, 3% and 40% respectively from Cynthia et al Father Muller Medical College, Karnataka State shown in chart 2, fig3.

#### Conclusions:

The present study concludes that dyslipidemia (93%) accounting major risk factor followed by hypertension and alcoholism in ischemic stroke patients. Among dyslipidemia 83% of the patients were having low HDL cholesterol (<40 mg/dl). 43% of patients were having Total cholesterol and HDL cholesterol ratio more than 4.5 which is nearer to ICMR project report (37.5%). Number of patients with total cholesterol and HDL cholesterol ratio more than 4.5 (43%) and patients high Non HDL cholesterol (39%) both are nearer to each other. Therapeutic lifestyle change (TLC, diet exercise) is essential to cut down dyslipidemia and risk of development of ischemic stroke.

**Acknowledgements:** None

**Conflict of Interest:** None

#### REFERENCES

1. Heiss WD. Progress in cerebrovascular disease: flow threshold holds of functional and morphological damage of brain tissue. *Stroke* 1983;14:329-31
2. Kaul S, Bandaru VC, Suvarna A et al. Stroke burden and risk factors in developing countries with special reference to India. *J Indian Med Assoc* 2009;107:358;367-70
3. Biller J, Love BB, Schneck MJ. Vascular disease of the nervous system – ischemic cerebrovascular disease, Ch. 51A. In: Daroff RB, Fenichel GM, Jancovic J, Mazziotta J (Eds) *Bradley's Neurology in clinical practice*, Vol. 1: 6th edn., 1003-1053, 2012.
4. Yusuf S, Hawken S, Ounpuu S et al. Effects of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): case control study. *Lancet*. 2004;364:937-52.
5. Stone NJ, Robinson J, Lichtenstein AH et al 2013 ACC/AHA Guidelines on treatment of blood cholesterol to reduce atherosclerotic cardiovascular risk in adults: a report of the American college of Cardiology/American Heart association Task Force on Practice Guidelines. *J Am Coll Cardiol*. 2014;63(25Pt B):2889-984.
6. Gupta R, Gupta S, Agarwal A et al. Secular trends in cholesterol lipoproteins and triglycerides and prevalence of dyslipidemia in urban Indian population. *Lipids Health Dis* 2008;7:40.
7. Soneil Gupta. *Lipids and Lipoprotein Metabolism* API text book of medicine 10th edition, Jaypee brother medical publications 2015 ch 3 pg 1690-1692
8. Hirsch GA, Vaid N, Blumenthal RS. The significance of measuring non-HDL Cholesterol. *Preventive Cardiology* 2002;5(3):156-159.
9. Expert panel on Detection, Evaluation and treatment of High blood cholesterol in Adults. Executive summary of the third report of the National Cholesterol Education programme (NCEP) Expert Panel on Detection, Evaluation and treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III). *JAMA* 2001;285:2486-2497.
10. Stone NJ, Levy RI, Fredrickson et al. Coronary heart disease in 116 kindred with familial type-II Hyperlipoproteinemia. *Circulation* 1974;49:476-488
11. Wilson PW, D'Agostino RB, Levy D, et al. Prediction of coronary heart disease using risk factor categories. *Circulation*. 1998;97:1837-1847
12. Meyer JS, Shimazu K, Fukuchi Y, et al: Impaired neurogenic cerebrovascular control and dysautoregulation after stroke. *Stroke* 4:169, 1973
13. Sacco RL. Risk factors and outcomes for ischemic stroke. *Neurology* 45:S10, 1995
14. Brunzell JD. Clinical practice. Hypertriglyceridemia. *N Engl J Med* 2007;357:1009-101