Section: General Medicine

Original Research Article

DYSLIPIDEMIA IN RURAL PATIENTS WITH ISCHEMIC CEREBROVASCULAR ACCIDENT: A DESCRIPTIVE OBSERVATIONAL STUDY FROM MIMSR MEDICAL COLLEGE, LATUR, MAHARASHTRA

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ABSTRACT

Background: Dyslipidemia is a major contributing determinant in the development of ischemic heart diseases, stroke, and other vascular diseases. An earlier study conducted by ICMR documented that 79% of the people had abnormalities in one of the lipid parameters. Earlier studies have documented that dyslipidemia account for 47 % of ischemic heart diseases and 26% of strokes. So, it becomes necessary to address prevention of dyslipidemia in today's scenario that will further prevent the incidence of cerebrovascular accidents and minimize the risk in future. **Objectives:** To study lipid profile in rural patients with ischemic cerebrovascular accident.
Materials and Methods: The present descriptive observational study was carried out in General Medicine OPD and IPD at tertiary care centre during October 2017 to October 2019 involving 67 cases diagnosed of ischemic CVA from rural population of both sex.
Results: Majority of the subjects in our study were from 51 to 60 years age group i.e. 19 (28.4%). Majority of the cases in our study were males i.e. 42 (62.7%) and 25 i.e. 37.3% were females. Male preponderance was observed in our study with male to female ratio as 1.68:1. In majority of the patients, HDL values were abnormal i.e. 47 (70.1%). This is followed by TG in 42(62.7%), VLDL in 42(62.7%), TC in 11(16.4%) and LDL in 9(13.4%) cases.
Conclusion: Dyslipidemia was seen as reduced HDL values-70.1%, hypertriglyceridemia as 62.7%, hypercholesterolemia as 16.4%, elevated LDL as 13.4% and elevated VLDL as 62.7%.
Key words: lipid profile, rural patients, ischemic cerebrovascular accident.

INTRODUCTION

The World Health Organization (WHO) definition of stroke is: "rapidly developing clinical signs of focal (or global) disturbance of cerebral function, with symptoms lasting 24 hours or longer or leading to death, with no apparent cause other than of vascular origin".[1]
By applying this definition transient ischemic attack (TIA), which is defined to last less than 24 hours, and patients with stroke symptoms caused by subdural hemorrhage, tumors, poisoning, or trauma are excluded.[2]
Stroke is a global health problem. It is the leading cause of adult disability and the second leading cause of mortality worldwide. Mortality from strokes is the second leading cause worldwide.[3] About 15 million people suffer from non-fatal strokes leading to disability in about a third of patients. It is a leading cause of functional impairments, with 20% of survivors requiring institutional care after three months and 15-30% being permanently disabled.[4,5]

The incidence and mortality of stroke vary greatly among different populations. There are various risk factors such as age, gender, familial trends, race and ethnic groups and modifiable factors such as hypertension, cardiac disease, diabetes mellitus, dyslipidemia, smoking, alcohol abuse, physical inactivity, asymptomatic carotid stenosis and transient ischemic attacks.[6] Risk factors for strokes have been studied locally.[7,8]

Dyslipidemia is a major contributing determinant in the development of ischemic heart diseases, stroke, and other vascular diseases.[9] An earlier study conducted by ICMR documented that 79% of the people had abnormalities in one of the lipid parameters.[10] Earlier studies have documented that dyslipidemia account for 47 % of ischemic heart diseases and 26% of strokes.[11,12]

So, it becomes necessary to address prevention of dyslipidemia in today's scenario that will further prevent the incidence of cerebrovascular accidents and minimize the risk in future.

Our study area is one of the socio-economically deprived districts of Maharashtra and caters a larger rural population. As such no study highlighting the lipid profile and its role in stroke among rural population was conducted till date in this area. So, the present study is planned in order to assess the lipid profile of patients with cerebrovascular accident.

Objectives: To study the prevalence of dyslipidemia in in rural patients with ischemic cerebrovascular accident.

MATERIALS AND METHODS

Type of study: Descriptive observational study.

Study setting: Medicine OPD and IPD at MIMSR and YCRH, Latur.

Duration of study: From October 2017 to October 2019

Study population: All diagnosed cases of ischemic CVA from rural population of both sex.

Sample size: 35

Calculation of sample size

Formula for sample size

$$n = \frac{Z1^2 S^2}{d^2}$$

With ref to article title Raadha AM et al Study of Lipid profile as an individual risk factor in CVA. International journal of Modern Research and Reviews 2016;4(9):1269-1271.

M	Your guess of Population M	102.15
S	Standard deviation of M	23.11
1-α	Set level of confidence (value < 1.0)	0.99
Z1	Z value associated with confidence	2.576
d	Absolute precision (=Value <M)	10.2
n	Minimum sample size	35

So, my minimum sample size is 35

We planned to include more maximum number of patients fulfilling our eligibility criteria. Hence, we could able to collect a sample 67 patients during the period of data collection.

- **Sampling method used:** Systemic random sampling method

Inclusion Criteria

- All patients from rural area presenting to Medicine OPD and IPD with stroke and confirmed clinically as well as radiologically as ischemic CVA.
- Those who are willing to participate in study after written consent

Exclusion Criteria

- Patients below 18 and above 80 years age
- CVA patients from urban residence or locality
- Patient with other forms of stroke like ICH / SAH / post traumatic neoplasms (primary or secondary), CNS infections
- Patients with cardio-embolic stroke
- Stroke related to hematological disorder
- Hypercoagulable state like nephrotic syndrome, antiphospholipid antibody syndrome, Protein-C & Protein-S deficiency, anti-thrombin III deficiency
- Patients on oral contraceptive pills
- Those not willing to give consent
- Those CVA patients who are on lipid lowering agent

Data collection: After obtaining informed consent, detailed history, clinical examination, lab investigation reports were entered in the proforma specially designed for this study

Laboratory investigations

- RBS
- Lipid profile
- CT brain/MRI brain

Lipid estimation

Serum Total Cholesterol: was estimated by enzymatic cholesterol oxidase method CHOD-PAP (Cholesterol Oxidase – Peroxidase – 4-aminophenazone) method**.** Cholesterol is measured enzymatically in serum or plasma in a series of coupled reactions that hydrolyze cholesteryl esters and oxidize the 3-OH group of cholesterol. One of the reactions by-products, H2O2 is measured quantitatively in a peroxidase catalyzed reaction using chromogen 4-aminoantipyrine (4-AAP)/ 4-aminophenazone that produces a color. Absorbance is measured at 500 nm. The color intensity is proportional to cholesterol concentration.[13]

Serum triglyceride levels were estimated by lipase/ GPO- PAP (glycero phosphate oxidase-peroxidase-

4-aminophenazone) method. Triglycerides are measured enzymatically in serum or plasma using a series of coupled reactions in which triglycerides are hydrolyzed to produce glycerol. Glycerol is then oxidized using glycerol oxidase, and H2O2, one of the reaction products, is measured using chromogen 4-aminoantipyrine (4-AAP)/ 4-aminophenazone. Absorbance is measured at 500 nm.[14]

HDL cholesterol: estimation of HDL cholesterol was done using direct enzymatic colorimetric method. The method depends on the properties of a detergent which solubilizes only the HDL so that the HDL-cholesterol is released to react with the cholesterol esterase, cholesterol oxidase and Chromogens to give colour. The non- HDL lipoproteins LDL, VLDL and chylomicrons are inhibited from reacting with the enzymes due to absorption of the detergents on their surfaces. The intensity of the colour formed is proportional to the HDL cholesterol concentration in the sample**.**

VLDL cholesterol concentration was obtained by dividing Sr. triglyceride concentration by 5.

LDL cholesterol concentration was obtained by using Friedewald formula.[142] LDL = TC — HDL — (TG/5) mg/dl Where all values are expressed in mg/dl. LDL= Low density lipoprotein cholesterol, HDL = High density lipoprotein cholesterol and TG = triglyceride Various lipid ratios like LDL cholesterol/ HDL cholesterol, Total cholesterol/ HDL cholesterol were calculated.

Blood collection

A venous blood sample was collected in the morning after overnight fast of 12 hours. The blood sample was collected in plain bulb; serum was obtained and was subjected to test. The lipid profile (total cholesterol, serum triglycerides, HDL cholesterol, VLDL cholesterol, LDL cholesterol) with the use of fully automated analyzer Erba Mannheim XL 640‘ in laboratory.

National Cholesterol Education Programme (NCEP) [15] guidelines were used for definition of dyslipidemia as follows:

Hypercholesterolemia-serum cholesterol levels ≥200 mg/ dl ≥5.2 mmol/l). Hypertriglyceridemia-serum triglyceride levels ≥150 mg/ dl (≥1.7 mmol/l).

Low HDL cholesterol-HDL cholesterol levels ≤40 mg/dl (≤1.04 mmol/l).

High LDL cholesterol-LDL cholesterol levels ≥130 mg/dl (≥3.4 mmol/l) calculated using the Friedewald equation.

Statistical analysis and methods

Data was collected by using a structure proforma. Data entered in MS excel sheet and analysed by using SPSS 24.0 version, IBM USA. Qualitative data was expressed in terms of proportions. Quantitative data was expressed in terms of Mean and Standard deviation. Descriptive statistics of each variable was presented in terms of Mean, standard deviation, standard error of mean. Association between two qualitative variables was found out by using chi square/Fischer’s exact test.

A p value of <0.05 was considered as statistically significant whereas a p value <0.001 was considered as highly significant.

RESULTS

Table 1: Distribution according to age group

		Frequency	Percent
Age in years	≤ 30	3	4.5
	31-40	3	4.5
	41-50	10	14.9
	51-60	19	28.4
	61-70	16	23.9
	> 70	16	23.9
	Total	67	100.0

In our study, we included total 67 patients fulfilling our inclusion criteria. Majority of the subjects in our study were from 51 to 60 years age group i.e. 19 (28.4%). This is followed by 23.9% each from 61-70 and more than 70 years age group. Less number of cases were seen below 40 years age group (4.5% from 31-40 and below 30 years each).

Table 2: Distribution according to gender

		Frequency	Percent
Gender	Male	42	62.7
	Female	25	37.3
	Total	67	100.0

Majority of the cases in our study were males i.e. 42 (62.7%) and 25 i.e. 37.3% were females. Male preponderance was observed in our study with male to female ratio as 1.68:1

Table 3: Distribution according to clinical features

	Yes		No	
	Frequency	Percent	Frequency	Percent
Hemiplegia/paresis	56	83.6	11	16.4

Vision	1	1.5	66	98.5
Speech disturbance	26	38.8	41	61.2
Giddiness	8	11.9	59	88.1
Facial nerve palsy	32	47.8	35	52.2

Clinical examination of patients revealed that 56 (83.6%) had hemiplegia/paresis. 32 (47.8%) had facial nerve palsy and 38.8% had speech disturbances.

Table 4: Distribution according to vascular territory involvement

		Frequency	Percent
Vascular territory	Anterior cerebral artery	3	4.5
	Anterior Cerebral middle cerebral artery	5	7.5
	Middle cerebral artery	46	68.7
	Vertebro-basilar and posterior cerebral	13	19.4
	Total	67	100.0

Commonly involved artery was middle cerebral artery in 46 i.e. 68.7% patients. This is followed by vertebro-basilar and posterior cerebral in 13 i.e. 19.4% cases. Least involved was anterior vertebral artery in 3 i.e. 4.5% patients.

Table 5: Distribution according to lipid profile

	Normal		Abnormal	
	Frequency	Percent	Frequency	Percent
Total cholesterol	56	83.6	11	16.4
Triglycerides	25	37.3	42	62.7
HDL	20	29.9	47	70.1
VLDL	25	37.3	42	62.7
LDL	58	86.6	9	13.4

In majority of the patients, HDL values were abnormal i.e. 47 (70.1%). This is followed by TG in 42(62.7%), VLDL in 42(62.7%), TC in 11(16.4%) and LDL in 9(13.4%) cases.

Table 6: Abnormal lipid profile in different morbid conditions

	NON-DM+NON HTN (n-13)		HTN (n=43)		DM (n=23)		HTN+DM (n=12)	
	No	%	No	%	No	%	No	%
TC	2	15.38	8	18.6	6	26.1	5	41.7
TG	4	30.77	30	69.8	19	82.6	11	91.7
HDL	9	69.23	31	72.1	18	78.3	11	91.7
VLDL	4	30.77	30	69.8	19	82.6	11	91.7
LDL	2	15.38	6	14	4	17.4	3	25

Our study findings revealed 43 hypertensive, 23 diabetic, 12 hypertension as well as diabetic and 13 non-hypertensive as well as non- diabetic patients. When all the four groups are collectively seen, following observations can be drawn: Abnormal TC values were seen in more number of patients (41.7%) having diabetes as well as hypertension followed by 26.1% diabetic patients. Abnormal TG values were seen in more number of patients (91.7%) having diabetes as well as hypertension followed by 82.6% diabetic patients. Abnormal HDL values were seen in more number of patients (91.7%) having diabetes as well as hypertension followed by 78.3% diabetic patients and 72.1% hypertensive. Abnormal VLDL values were seen in more number of patients (91.7%) having diabetes as well as hypertension followed by 82.6% diabetic patients and 69.8% hypertensive. Abnormal LDL values were seen in more number of patients (25%) having diabetes as well as hypertension followed by 17.4% diabetic patients. It was also observed from the above table that majority of patients with abnormally elevated lipid markers were having diabetes as well as hypertension as a co-morbid condition. This is followed by diabetic patients and then hypertensives.

DISCUSSION

Demographic profile of study participants

In our study, we included total 67 patients fulfilling our inclusion criteria. Majority of the subjects in our study were from 51 to 60 years age group i.e. 19 (28.4%). This is followed by 23.9% each from 61-70 and more than 70 years age group. Less number of cases were seen below 40 years age group (4.5% from 31-40 and below 30 years each). Mean age of the study population was found to be 60.88±13.33 years. Majority of the cases in our study were males i.e. 42 (62.7%) and 25 i.e. 37.3% were females. Male preponderance was observed in our study with male to female ratio as 1.68:1

Hakim Mohammad Shafi,[16] conducted study in Department of Radiodiagnosis, SMHS hospital, Jammu and Kashmir, India. A total of 100 subjects (59 males and 41 females) were registered for the study. The mean age of the subjects was 57.41±12.4 years with a male: female ratio of 1.44:1.

Deshpande JJ et al,[17] from Maharashtra conducted a study on lipid profile in patients with Ischemic Stroke in Rural coastal region of Maharashtra. Average age of Patients of Stroke was 60 ± 4.56 Yrs. The male and Female ratio in both the group was comparable with each other 1.25.

Onkar Nath Rai et al18 from Gorakhpur conducted study in 100 stroke patients. He reported that males were (59.0%) more commonly affected with stroke as compared to females (41.0%). Maximum incidence of stroke was observed in those aged above 60 years (29%).

Our study findings are consistent with the findings of above-mentioned authors.

Age is an important risk factor for stroke. The mean age of stroke onset in India (i.e. 63 years).[19]

Vascular territory involvement

In our study, commonly involved artery was middle cerebral artery in 46 i.e. 68.7% patients. This is followed by vertebro-basilar and posterior cerebral in 13 i.e. 19.4% cases. Least involved was anterior vertebral artery in 3 i.e. 4.5% patients

Our findings are matching with the findings of Onkar Nath Rai et al,[18] from Gorakhpur conducted study in 100 stroke patients. He reported that most common site involved was along the MCA distribution (70.37%) followed by vertebra basilar artery (25.92%). Internal carotid artery involved in only 3.7% of patients

Clinical profile

Clinical examination of patients revealed that 56 (83.6%) had hemiplegia/paresis. 32 (47.8%) had facial nerve palsy and 38.8% had speech disturbances.

Our findings are matching with the findings of Madhu Hingorani et al,[20] who reported that 88% of the patients had hemiplegia/hemiparesis, and this was accompanied by cranial nerve involvement in majority of the cases (79%). Unconsciousness at the onset was present in 16% patients and 18% patients experienced headache. Speech disturbance was noted in 61% cases.

Dyslipidemia prevalence

Overall prevalence of dyslipidemia in our study is as follows-TG- 62.7%, VLDL- 59.7%, TC-16.4%, LDL-13.4% and abnormal HDL-70.1%

Our findings are almost comparable with the findings of the other authors as stated below:

A population-based study of 4737 people aged 45-69 years in Shahroud, Iran, reported that the prevalence of dyslipidemia was 63.4% (CI 95%: 62.0-64.9%). According to this cohort study, the prevalence of high TG, low HDL-C, high LDL-C, and high cholesterol level was 28.8%, 42.3%, 13.4%, and 13.4%, respectively.[16]

In the SuRFNCD-2007 study, the prevalence of hypertriglyceridemia >=150 mg/dl and hypercholesterolemia >=240 mg/dl was 36.4 (34.1-38.9) and 14.1 (12.6-15.9), respectively.[19]

Similar prevalence (34%) of hypercholesteremia was also reported by Sreenivasulu et al,[21] Qizilbash et al,[22] concluded that there was a significant association between serum lipid profile and prevalence of stroke. Tanveer et al,[23] proved that hyperlipidaemia was present in 16% patients of stroke. In a study by Siddeswari et al,[24] dyslipidemia in stroke patients was 14%.

CONCLUSION

- Our study indicates that, there is prevalence of dyslipidemia in ischemic cerebrovascular accident patients. These lipid abnormalities include increased triglyceride and reduced HDL level in major percentage of patients, few patients indicating raised total cholesterol and LDL level.
- Dyslipidemia was seen as reduced HDL values-70.1%, hypertriglyceridemia as 62.7%, hypercholesterolemia as 16.4%, elevated LDL as 13.4% and elevated VLDL as 62.7%.

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