A STUDY OF LIPID PROFILE IN CEREBROVASCULAR ACCIDENTS

General Medicine

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ABSTRACT

BACKGROUND AND OBJECTIVES: A stroke, or cerebrovascular accident, is defined as an abrupt onset of a neurologic deficit that is attributable to a focal vascular cause. Stroke is a medical emergency. Stroke is the second leading cause of death worldwide, causing 6.2 million deaths in 2015.

Serum lipid levels have an established effect on short term mortality due to strokes. It is important to evaluate the serum lipid levels in both types of strokes to guide lipid lowering therapy which can reduce incidence of stroke and related mortality by adapting primary and secondary preventive measures among the stroke patients.

The present study was designed to evaluate the lipid profile levels of patients who had experienced an acute cerebrovascular events, either hemorrhagic or ischemic stroke.

v   The objectives of the study were:
1.   To correlate serum lipid profile in patients of cerebrovascular stroke.
2.   To identify commonest lipid abnormality in patients of cerebrovascular stroke.
3.   To identify other risk factors of dyslipidemia (like diabetes mellitus, hypothyroidism, alcoholism) in patients of cerebrovascular accidents.

METHOD:
This Observational cross-sectional study was done at Sir T. General Hospital and Government Medical College, Bhavnagar over a period of 1 year. The study included 100 patients. The study was conducted in patients of cerebrovascular accidents admitted in the medical wards of Sir Takhtasinhji General Hospital, Bhavnagar. Detailed history, clinical examination and laboratory investigations were carried out in all patients. History of smoking, alcoholism, diabetes, hypertension, ischemic heart disease and other co-morbidities and previous history of stroke are recorded. All patients were subjected to haemogram, blood biochemistry (which included urea, creatinine, electrolytes) and serum lipid profile(including total cholesterol, triglycerides, LDL, HDL and VLDL) and neuroimaging (CT or MRI).

RESULT:
• In this study, 100 cases of CVA admitted to Sir Takhtasinhji General Hospital, Bhavnagar were studied during the study period of 1 year.
• In this study, out of 100 patients, 54 were males while 46 were females with high prevalence in male, with sex ratio of 1.17:1.
• Mean age of the patients in our study was 60.53 ± 14.45.
• Out of 100 patients of CVA, 83% were of infarct while 17% of ICH.
• Out of 59% patients with co morbidities, HTN was present in 33% of patients which is a commonest risk factor for CVA. DM was present in 15% patients, IHD and RHD was present in 8% and 3%, respectively.
• In our study 51% of patients were having dyslipidemia, 26% of patients were having high total cholesterol level with 36% and 55% of patients were having high serum triglycerides level and high serum LDL-C level, respectively. Low serum HDL-C (<40 mg/dl) level was present in 46% of patients
• In our study, Mean total cholesterol level was 171.10 ± 45.08, mean serum triglycerides level was 133.01 ± 53.77, mean serum LDL-C level was 108.44 ± 36.63, mean serum VLDL-C was 28.26 ± 11.30 and mean serum HDL-C level was 44.45 ± 16.89.

CONCLUSION:
• It can conclude from our study that males suffer more from CVA than females.
• Most of the CVA occurs in age group 51-70 years, among elderly people.
• HTN is the commonest risk factor followed by DM and IHD.
• Dyslipidemia is one the major risk factors in CVA patients, thus early detection of dyslipidemia and treatment with drugs along with dietary modifications and life style changes can reduce the risk of CVA.
• Most common lipid abnormality found in our study was high serum LDL-C level followed by low serum HDL-C level.

Regular monitoring of lipid profile among CVA patients may decrease the risk of atherosclerosis and cardiovascular diseases among the CVA patients.

KEYWORDS

INTRODUCTION

Stroke or a cerebrovascular accident is an acute neurological injury which occurs due to vascular pathology and presents as a brain infarction or hemorrhage. Stroke is a medical emergency. Stroke is the second leading cause of death worldwide, causing 6.2 million deaths in 2015. It is one of the leading causes of mortality and disability globally. The prevalence of stroke in India varies in different regions of country, and the estimated prevalence rates increase from 0.3/1000 in < 45 years age group to 12-20/1000 in the 75-84 years age group.

The various risk factors of stroke have been identified. The modification of risk factors in stroke has brought down both mortality and morbidity of stroke remarkably in the last 30 years.

Prevention is the best option but ability to forecast the stroke is challenging making the detailed study of risk factors essential. Risk factors for stroke have been classified as traditional and novel; modifiable and non-modifiable. The non-modifiable factors include sex, age, race, family history, genetic and low birth weight while the modifiable traditional risk factors include hypertension, diabetes mellitus, hyperlipidemia, atrial fibrillation, smoking, obesity and carotid artery disease. Novel risk factors include hyperhomocy steinemia, hypercoagulable states and selective biomarkers. About 80% of stroke incidents can be reduced by lifestyle modifications.

Dyslipidemia as a major risk factor for stroke is studied for many years. Various studies in different population had shown dyslipidemia is associated with stroke. Dyslipidemia is a correctable risk factor. Dyslipidemia are generally characterized by increase plasma levels of cholesterol, triglycerides or both, variably accompanied by reduced levels of HDL cholesterol. It has been shown that reduction of total cholesterol, LDL cholesterol, triglycerides, VLDL cholesterol and

increasing HDL cholesterol by drugs has decreased the incidence of stroke.

Serum lipid levels have an established effect on short term mortality due to strokes. It is important to evaluate the serum lipid levels in both types of stroke to guide lipid lowering therapy which can reduce incidence of stroke and related mortality by adapting primary and secondary preventive measures among the stroke patients. Many of the previous clinical investigations have suggested that increased serum cholesterol is a risk factor for ischemic stroke.

Although elevated total cholesterol (TC) and low high-density lipoprotein (HDL) are clearly established risk factors for coronary heart disease, there are many observational studies which yielded mixed results for lipid levels and cerebrovascular disease risk.

The present study was designed to evaluate the lipid profile levels of patients who had experienced an acute cerebrovascular event, either hemorrhagic or ischemic stroke.

AIM AND OBJECTIVES
AIM:
• To Study Lipid Profile in Patients of cerebrovascular accidents and to determine the significant Correlation between them.

OBJECTIVES:
• To correlate serum lipid profile in patients of cerebrovascular stroke.
• To identify commonest lipid abnormality in patients of cerebrovascular stroke.
• To identify other risk factors of dyslipidemia (like diabetes mellitus, hypothyroidism, alcoholism) in patients of cerebrovascular accidents

MATERIAL & METHOD
Source of Data
The study was conducted on patients of cerebrovascular accidents diagnosed clinically and radiologically admitted in the medical wards at Sir Takhtasinhji General Hospital, Bhavnagar.

Sample Size: 100 cases
Sample procedure: Observational cross-sectional study
Duration: 2018-2019

Inclusion criteria:
• All Patients diagnosed with cerebrovascular accidents clinically and radiologically
• Patients above the age of 12 years

Exclusion criteria:
Patient not giving consent
Pregnancy

Collaborating Department
• Department of Medicine, Government Medical College & Sir Takhtasinhji General Hospital, Bhavnagar.

METHOD
After written consent, all patients of cerebrovascular accidents admitted to Sir T. Hospital were subjected to detailed history(including risk factors and co morbidities) and thorough clinical examination. Confirm diagnosis of cerebrovascular accidents has been made on the basis of neuroimaging (CT or MRI). On the next morning after admission, samples of serum were obtained after 12 hours of overnight fasting. The blood samples were collected into plain tubes after which the samples were centrifuged at 4ºC for 15 minutes after incubation of 20 minutes for extraction of serum. With the help of enzymatic colorimetric method using chemistry auto-analyzer, the sera were analyzed for serum lipid profile that included total cholesterol, triglyceride, LDL-cholesterol, HDL-cholesterol and VLDL-cholesterol respectively. All the data was collected and statistical analysis was done.

Statistical Analysis
The data was entered into excel sheet and was analysed using SPSS version 21.0. Descriptive analysis was done in the form of frequency and percentage and was presented in the form of tables. Quantitative data was given in the form of mean and standard deviation. Qualitative data were expressed as percentage. Chi-square test was performed as test of significance, with p value less than 0.05 taken to be significant.

OBSERVATION AND RESULT
• In this study, 100 cases of CVA admitted to Sir Takhtasinhji General Hospital, Bhavnagar were studied during the study period of 1 year. The following observations were noted:

TABLE 1: AGE WISE DISTRIBUTION

| Age (years)	No. of Patients	% of Patients	P value**
<40	09	9%	0.630
40-50	18	18%	
51-60	27	27%	
61-70	24	24%	
>70	22	22%	
Total	100	100%	
Mean Age	60.53 ± 14.45		

Almost 50% of our patients were in the 6th and 7th decades. The mean age was **60.53 ±14.45,** with p value of 0.630 which was not significant.

TABLE 2: SEX WISE DISTRIBUTION
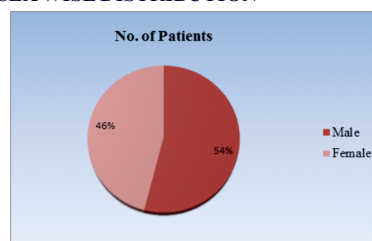
Out of 100 patients, 54 (54%) were males while 46 (46%) were females. The sex ratio is **1.17:1.**

TABLE 3: TYPE WISE DISTRIBUTION
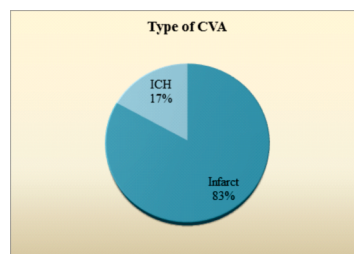
Out of 100 patients of CVA, 83 (83%) were of infact while rest 17 (17%) patients were of ICH.

TABLE 4: CO-MORBIDITIES WISE DISTRIBUTION

| Co-morbidity	No. of Patients
Hypertension	33
DM	15
RHD	03
IHD	08
Old CVA	02
SLE	01
Others	06

Co-morbidities were absent in 41 patients. Out of the 59 patients with co-morbidities, HTN was present in 33 patients (33%), DM was present in 15 patients (15%), IHD was present in 8 patients (8%), RHD was present in 3 patients (3%) and past history of old CVA was present in 2 patients (2%). Thus HTN followed by DM was common risk factor for CVA in our study.

TABLE 5: TOTAL CHOLESTEROL WISE DISTRIBUTION
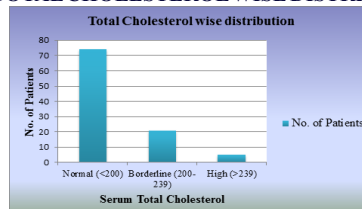
Out of 100 patients of CVA, total cholesterol level was normal in 74% of patients, with rest 26% patients were found to have dyslipidemia. Mean total cholesterol level was **171.10 ± 45.08**.The p value was <0.001 which shows positive correlation between total cholesterol and CVA.

TABLE 6: SERUM TRIGLYCERIDES WISE DISTRIBUTION
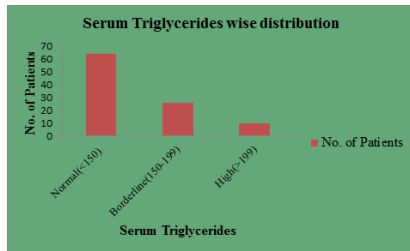
Out of 100 patients of CVA, serum triglycerides level was normal in 64% of patients, with rest 34% patients were found to have dyslipidemia. Mean serum triglycerides level was **133.01 ± 53.77**. The p value was <0.001 which shows positive correlation between serum triglycerides and CVA.

TABLE 7: SERUM LDL-C WISE DISTRIBUTION

S.LDL level (mg/dl)	No. of Patients	% of Patients	P value
Normal (<100)	45	45%	<0.001*
Borderline (100-159)	46	46%	
High (>159)	09	9%	
Mean Serum LDL-C level	108.44 ± 36.63		

Out of 100 patients of CVA, serum LDL-C level was normal in 45% of patients, while other 46% and 9% of patients were having borderline and high serum LDL-C level, respectively. Mean serum LDL-C level was **108.44 ± 36.63**. The p value was <0.001 which shows positive correlation between serum LDL and CVA.

TABLE 8: SERUM HDL-C WISE DISTRIBUTION

Serum HDL level (mg/dl)	No. of Patients	% of Patients	P value
Normal (>60)	13	13%	0.003*
Borderline (40-60)	41	41%	
Low (<40)	46	46%	
Mean Serum HDL-C level	44.45 ± 16.89		

Out of 100 patients of CVA, serum HDL-C level was normal in 13% of patients, while other 41% and 46% of patients were having borderline low and low serum HDL-C level, respectively. Mean serum HDL-C level was **44.45 ± 16.89**. The p value was 0.003 which shows positive correlation between serum HDL and CVA.

TABLE 9: SERUM VLDL-C WISE DISTRIBUTION

Serum VLDL-C level (mg/dl)	No. of Patients	% of Patients	P value
Normal (2-30)	56	56%	<0.001*
High (>30)	44	44%	
Mean Serum VLDL-C level	28.26 ± 11.30		

Out of 100 patients of CVA, serum VLDL-C level was normal in 56% of patients with 44% of patients were having high serum VLDL-C level. Mean serum VLDL-C level was **28.26 ± 11.30**. The p value was <0.001 which shows positive correlation between serum VLDL and CVA.

DISCUSSION

We studied 100 cases of CVA admitted to Sir Takhtasinhji General Hospital, Bhavnagar during the study period of 1 year.

AGE :

	Present Study	Siddeswari et al[7]	Hamzullah et al[9]
Mean Age (in years)	60.53	57.6	58.5

Age is the single most important risk factor for stroke. Almost 50% of our patients were in the 6th and 7th decades. The mean age was **60.53 ± 14.45**. This result is consistent with the result of **Siddeswari et al** and **Hamzullah et al** For each successive 10 years after age 55, the stroke rate more than doubles in both men and women.

SEX :

	Present Study	Onkar Nath et al[8]	Siddeswari et al[7]	Hamzullah et al[9]
Male	54%	59%	72%	59.72%
Female	46%	41%	28%	40.28%
Sex Ratio	1.17:1	1.44:1	2.57:1	1.48:1

In our study, out of 100 patients, male were predominant than female which were 54% cases and 46% cases respectively. Similar result was found in other three studies with higher prevalence in male. Stroke incidence rates are 1.17 times greater in men. Men develop ischemic strokes at higher rates than women up to the age of 75 years.

TYPE OF CVA :

Type of CVA	Present study	Onkar Nath et al[8]	Siddeswari et al[7]	Sagui E et el[14]
Infarct	83%	46%	82%	75%
ICH	17%	54%	18%	32%

Out of 100 patients of CVA, 83 (83%) were of infarct while rest 17 (17%) patients were of ICH in present study. This is comparable to the study conducted by **Siddeswari et al and Sagui E et al**, where 82% and 75% patients were of ischemic stroke and 18% and 32% patients were of hemorrhagic stroke, respectively.

CO-MORBIDITIES :

	Present Study	Kazi Zannat et al[27]	Hamzullah et al[9]
HTN	33%	52.8%	68%
DM	15%	14.1%	24%
IHD	8%	5.6%	19%

In present study, co-morbidities were present in 59% of patients. HTN (33%) was major modifiable risk factor for stroke, followed by DM (15%) and IHD (8%). These observations were also correlated with study conducted by **Kazi Zannat et al** and **Hamzullah et al.** Diabetes is also a strong risk factor for ischemic stroke due to accompanying risk factors, such as obesity and high blood pressure.[20]

LIPID ABNORMALITIES :

Lipid Abnormality	Present Study		Anuradha et al[16]		Siddeswari et a[17]	
	% of Patients	Mean	No. of Patients	Mean	No. of Patients	Mean
High S. Total Cholesterol	26%	171.10	64%	225.83	20%	151.73
High S.Triglycerides	36%	133.01	66%	183.80	8%	119.43
High S. LDL-C	55%	108.44	96%	156.43	21%	93.28
Low S. HDL-C	87%	44.45	80%	32.49	66%	35.29

In our study, 26% of patients were having high total cholesterol level with 36% and 55% of patients were having high serum triglycerides level and high serum LDL-C level, respectively.

Lipid profile changes are thought to be a risk factor in the occurrence of stroke. On the other hand, stroke itself is also associated with changes in the lipid levels probably because of the accompanying stress and catecholamine overproduction that occurs during an acute stroke. In fact, the available reports have pointed out that stress is associated with considerable decrease in the lipid profile[35.]

In present study number of patients with dyslipidemia including high TC and high TG was 51%. In a study by **Siddeswari et al[7]**, dyslipidemia in stroke patients was 14%. This was similar to study by **Onkar Nath Rai et al[8]** they found increased total cholesterol was present in 30 patients. Similar prevalence (34%) of hyper cholesteremia was reported by **Sreenivasulu et al.[4]** Qizilbash et al[5], concluded that there was a significant association between serum lipid profile and prevalence of stroke.[1] **Tanveer et al[6]**, proved that hyperlipidemia was present in 16% patients of stroke.

In our study, Mean T. Cholesterol was 171.10. This result is higher than the study of **Siddeswari et al[7]** and lower than the study of **Anuradha et al[16]** This result is consistent with the study of **Mahmood et al[18]** but contradict with the study of **Zhang et al[15]** and **Dey et al[13]**.

The mean LDL-C was 108.44 mg/dl. This result is consistent with the study of **Siddeswari et al[7]** and lower than the study of **Anuradha et**

al[16], in which there was significantly higher level of LDL-C (156.43). This result is consistent with the study of **Mahmood et al**[18]

The mean HDL was 44.45 mg/dl in present study, which is slightly higher than the study of **Siddeswari et al**[7] and **Anuradha et al**[16] This result is concordant with the study of **Dey et al**[13] But **Zhang et al**[15] and **Mahmood et al**[18] found HDL is significantly higher in haemorrhagic stroke patients than that of ischaemic stroke patients.

In our study, most of the patients (87%) were having low HDL, which is a risk factor for stroke. It is also consistent with the study of **Anuradha et al**[16] Serum HDL cholesterol has anti-atherogenic properties with ability to trigger the flux of cholesterol from peripheral cells to the liver and thus having a protective effect.

The mean Triglyceride was 133.01 mg/dl in present study, which is not consistent with **Anuradha et al**[16] and **Siddeswari et al.**[7] This result is lower than the result of **Saadatnia et al**[19] and **Ziakas et al**[20] Serum triglyceride level showed no significant effect on stroke (p>0.05).

CONCLUSION

- It can conclude from our study that males suffers more from CVA than females.
- Most of the CVA occur in age group 51-70 years, among elderly people.
- HTN is the commonest risk factor followed by DM and IHD.
- Dyslipidemia is one the major risk factors in CVA patients, thus early detection of dyslipidemia and treatment with drugs along with dietary modifications and life style changes can reduce the risk of CVA.
- Most common lipid abnormality found in our study was high serum LDL-C level followed by low serum HDL-C level.
- Regular monitoring of lipid profile among CVA patients may decrease the risk of atherosclerosis and cardiovascular diseases among the CVA patients.

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