A STUDY ON RISK FACTORS AND LIPID PROFILE PATTERN IN PATIENTS OF STROKE

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ABSTRACT

BACKGROUND
Stroke is usually end result of predisposing conditions that originated years before the ictus. Creating awareness and treatment of its modifiable risk factors will reduce the incidence of stroke.

OBJECTIVE
To study the risk factors and lipid profile pattern in stroke patients.

METHODS
Patients with diagnosis of stroke comprising 50 consecutive patients each of ischaemic and haemorrhagic strokes who were admitted in Jorhat Medical College & Hospital, Assam over a period of 1 year (May 2015 - April 2016) included in the study, while patients on lipid lowering therapy were excluded from the study. History of risk factors like hypertension, diabetes mellitus, smoking and alcoholism were taken. To determine the subtype of stroke, clinical examination followed by CT scan/MRI of brain were done. A serum sample after 8 hours of overnight fasting was taken on the next day of admission for both groups of patients. Total serum cholesterol, triglycerides, LDL-cholesterol, VLDL-cholesterol and HDL-cholesterol was determined, using enzymatic colorimetric method.

RESULTS
A total of 100 patients were studied, of whom 66 were males and 34 were females. The mean age for the ischaemic group was 62±12 years and for the haemorrhagic group were 55±14 years. In this study, dyslipidaemia was present in 58 (58%) patients. Patients with high total cholesterol - 33 (18 ischaemic, 15 haemorrhagic), high LDL-cholesterol was found in 38 (22 ischaemic, 16 haemorrhagic), high triglycerides in 31 (14 ischaemic, 17 haemorrhagic) and low HDL-cholesterol in 47 (29 ischaemic, 18 haemorrhagic). Among 100 patients, 66 had hypertension, 20 had diabetes mellitus, 18 had both diabetes and hypertension, 43 were smokers, 36 consumed alcohol and >2 risk factor were found in 44.

CONCLUSION
Dyslipidaemia was found in 58% of patients and most striating features were low HDL-cholesterol and elevated triglycerides level, indicating they are independent risk factors for stroke. No significant difference in dyslipidaemia was found between haemorrhagic and ischaemic stroke patients.
Preventive strategies aimed at early detection and treatment of hypertension, diabetes mellitus, public awareness about ill effects of cigarette smoking and excessive alcohol use can contribute in reduction of stroke burden.

KEYWORDS
Ischaemic Stroke, Haemorrhagic Stroke, Lipid Profile, Risk Factors.

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INTRODUCTION: Stroke or a cerebrovascular accident is the sudden death of brain cells due to inadequate blood flow. The WHO clinically defines stroke as the rapid development of clinical signs and symptoms of a focal neurological disturbance lasting more than 24 hours or leading to death with no apparent cause other than vascular origin.[1,2]

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Stroke is a clinical syndrome divided into two broad categories that define its pathophysiology:

1. Ischaemic strokes are caused by either cerebral thrombosis or embolism and account for 80% -85% of all strokes worldwide.
2. Haemorrhagic strokes are caused by subarachnoid haemorrhage or intracerebral haemorrhage and account for 1% -7% and 7% - 27% respectively of all strokes worldwide.[3]

Stroke is one of the major global health problem. It is the second leading cause of death and one of the commonest cause of disability in adult. WHO data as per 2007 world health report states that 15 million people suffer from stroke worldwide each year. Of these, 5 million die and another 5 million are permanently disabled.[4]

For India the overall age adjusted prevalence rate for stroke is estimated to lie between 84-262/1,00,000 in rural and between 334-424/1,00,000 in urban areas. Whilst individual studies have reported varying annual incidence rates for stroke, the Global Burden of Disease Study estimated a population based annual incidence of stroke in India to be 89/1,00,000 in 2005, which is projected to increase to 98/1,00,000 in 2030.[5]

The scientific community recognises the association between blood lipids levels and risk of cardiovascular disease. [6] Strong association has been found between high levels of serum cholesterol - especially of low density lipoprotein (LDL) cholesterol and the development of atherosclerosis, while elevated levels of high density lipoprotein (HDL) cholesterol seem to play a protective role. [6] Various studies have been done on dyslipidaemias and the findings indicate that dyslipidaemia is prevalent worldwide, and places an enormous burden on the health care system. The metabolic consequences associated with changes in diet and lifestyle has increased the number of hyperlipidaemic individuals who are at risk of a number of adverse effects such as stroke. The relationship of serum lipids and lipoprotein with cerebrovascular disease are being studied along with many other risk factors as in coronary heart disease.[7,8] Several clinical trials showed an association between high concentrations of serum cholesterol and ischaemic stroke.[7,9] On the other hand, case control studies of stroke which examined cholesterol as a risk factor have generally produced negative findings and prospective studies have generally failed to show a direct and strong association.[10-12] Some demonstrated an inverse relation between total cholesterol and death from haemorrhagic stroke.[13] Therefore, the association between cholesterol and stroke may not be as straightforward as for coronary heart disease. Serum lipid levels have an established effect on short term mortality due to strokes.[14] Other risk factors include older age, family history of thrombotic stroke, diabetes mellitus, Hypertension, tobacco smoking and alcohol consumption. It is important to evaluate the risk factors and the difference in serum lipid levels in subtypes of strokes to guide lipid lowering therapy which can reduce incidence of stroke and related mortality by adopting primary and secondary preventing measures.[15,16] Therefore, the present study was designed to know the risk factors and lipid profile pattern in patients of stroke.

MATERIALS AND METHODS:

Source of Data: The study was conducted in the Department of Medicine in Jorhat Medical College & Hospital, Jorhat, Assam. A total of 100 new onset acute stroke patients admitted were assessed. WHO definition of stroke was used for diagnosis. Consecutive eligible patients of stroke and willing to participate were subjected to evaluation of history and focused examination, including a detailed neurological examination. History regarding smoking, diabetes, hypertension, alcoholism was elicited. CT Scan Brain (CT) or Magnetic Resonance Imaging (MRI) of Brain was performed in all patients.

Duration of Study: The study was carried out on 100 patients (50 haemorrhagic & 50 ischaemic) presenting with stroke during 1 year period from May 2015 to April 2016 with acute stroke.

Inclusion Criteria: Patients both male and females above 18 years of age, admitted with diagnosis of stroke were included in the study.

Exclusion Criteria: Patients on lipid lowering therapy were excluded from the study.

In all cases, serum sample was taken after 8 hours of fasting on next day of admission. Total serum cholesterol, triglycerides, LDL Cholesterol, VLDL Cholesterol and HDL cholesterol was determined using enzymatic colorimetric method.

RESULTS: A total of 100 patients were studied. The mean age for the ischaemic group was 62 ± 12 years, which was higher than that of the haemorrhage group 55 ± 14 years. In this study, 66 (66%) male patients and 34 (34%) were female patients and 68% of the ischaemic group and 66% of the haemorrhagic group were male. Male patients account for a large proportion in both ischaemic and haemorrhagic groups. The male/female ratio was 1.95:1 as shown in table 1 & 2.

Age Group	<50	51-60	61-70	>70
Ischaemic	4(8%)	14(28%)	23(46%)	9(18%)
Haemorrhagic	10(20%)	19(38%)	18(36%)	3(6%)

Table 1: Age wise Distribution of Stroke Patients

Stroke Type	No. of Patients	Male	Female	Mean Age
Ischaemic	50	34	16	62±12
Haemorrhagic	50	32	18	55±14

Table 2: Demographic Data

The classical risk factors, hypertension, diabetes mellitus, smoking and alcoholism were also studied. The commonest risk factor being hypertension present in 66 (ischaemic - 31, haemorrhagic - 35) followed by >2 risk factor in 44 (ischaemic- 25, haemorrhagic – 19), smoking in 43 (ischaemic- 25, haemorrhagic – 18), alcoholism in 36 (ischaemic- 21, haemorrhagic – 15) and diabetes mellitus in 20 (ischaemic -11, haemorrhagic – 9) numbers of patients as shown in Table 3.

Risk Factor	Ischaemic	Haemorrhagic
Hypertension	31 (62%)	35 (70%)
Smoking	25 (50%)	18 (36%)
Alcoholism	21 (42%)	15 (30%)
Diabetes mellitus	11 (22%)	9(18%)
> 2 risk factors	25 (50%)	19 (38%)

Table 3: Risk factors

The lipid profile of the study sample was analysed according to the ATP III classification for identification of Dyslipidaemia. Our findings revealed that 58% patients had dyslipidaemia, thereby proving that a majority of the study population had abnormal baseline lipid profiles. Among the dyslipidaemic patients, 33% had elevated total cholesterol, 31% had elevated triglycerides and 38% had elevated LDL. However, interestingly 47% of the patients showed low HDL levels. Decreased HDL cholesterol found in 58% of ischaemic stroke patients and 36% patients with haemorrhagic stroke as shown in table 4 &5.

Lipid Fraction	No. of cases	Percentages
Total cholesterol (>200 mg/dL)	33	33%
Triglycerides (>150 mg/dL)	31	31%
HDL (<40 mg/dL)	47	47%
LDL (>130 mg/dL)	38	38%

Table 4: Percentage of Patients having Abnormal Lipid Profile

Lipid fraction	Ischaemic stroke		Haemorrhagic stroke	
	No. of patients	%	No. of patients	%
Total cholesterol (>200 mg/dL)	18	36%	15	30%
Triglycerides (>150 mg/dL)	14	28%	17	34%
HDL (<40 mg/dL)	29	58%	18	36%
LDL (>130 mg/dL)	22	44%	16	32%

Table 5: Showing Comparison of Percentage of Haemorrhagic and Ischaemic Patients having Abnormal Lipid Profile

DISCUSSION: We have studied total 100 patients of stroke (both ischaemic and haemorrhagic stroke) distributed in either sex, different age groups and associated risk factors. Our study showed a preponderance of males among the study population thus reflecting an overall male sex predisposition to stroke. The total males under study were 66%, while the females under study were 34%. This corroborated with a study done on lipid profiles in stroke in Bahrain, which also showed an increased incidence in stroke among the males when compared to females.[17]

An age distribution was also analysed and clustering of cases was found between 60-69 years of age. A majority of the study population was above the age of 50 years, thereby affirming the increasing trend of stroke with age. This also correlates with data obtained from a study on lipid profile done on stroke patients in Northern Manhattan, where the mean age was 68.8%. [18] Moving further east, a study done on lipid profile in Pakistan also showed an increased frequency of patients (28%) figuring within the 61-70 age group.[19]

This study also analysed the other risk factors frequently present in stroke such as hypertension, dyslipidaemia, smoking, diabetes mellitus and alcoholism. 66% patients were found to be hypertensive. The result correlates with that of a study in the urban population of Calcutta in 2001 where hypertension was found to be the most important risk factor.[20] In a study in Himachal Pradesh by Mahajan et al., hypertension was found in 62% and in a Pakistan study 68%.[21,22] Based on epidemiologic data, approximately 50% of strokes could be prevented if hypertension were to be eliminated. [23]

In this study, 20 (20%) patients were known cases of diabetes mellitus. Diabetes mellitus has long been recognised as a risk factor for vascular diseases. It doubles the risk of stroke compared with nondiabetics. 10-14% cases of stroke are attributable to diabetes was found in Framingham study. In a study conducted by Mahajan et al, [21] diabetes found to be present in 9% of the total patients. Diabetes mellitus has also been seen in higher percentage of patients in our study.

Forty three patients (43%) out of total 100 with stroke were smokers. In a study conducted by Mahajan et al, [21] 60% patients had smoking as a risk factor. In a study conducted in Kashmir, of the total patients with stroke, 70.3% were smokers. [24] The incidence of smoking was seen lower in our study. Cigarette smoking increases the risk of subarachnoid haemorrhage by 100% or more, perhaps by increasing the release of proteolytic enzymes that effect blood vessel integrity. [25] This study correlates with Donnan et al, who found smoking as a strong risk factor for cerebral infarction.[26]

Thirty Six (36%) patients were found to be alcoholic. For cerebral infarction, chronic heavy drinking and acute intoxication have been associated with an increased risk among young adults.[27] In older adults, risk is increased among heavy drinking men. Some studies have supported a J-shaped dose response curve between alcohol intake and ischaemic stroke risk, with protection for those drinking up to 2 drinks per day and an increased risk for those drinking >5 drinks per day compared with non-drinkers.[27] Alcohol induced hypertension, relative anticoagulation or increased cerebral blood flow may be responsible. The association between alcohol and stroke risk appears much stronger for intracerebral and subarachnoid haemorrhage than for ischaemic stroke. Reduction in alcohol consumption may be accompanied by a reduction in the risk of subsequent haemorrhagic stroke.[28] The limitation of the study was that the daily quantity and the type of alcohol could not be specified.

In our study, more than two risk factors were found in forty four (44%) patients. Naik et al. reported 70.2% in there series. [29] The incidence of more than two risk factors was seen lower in our study.

Dyslipidaemia is a primary major risk factor for Coronary Artery Disease (CAD) and ischaemic stroke. It causes insulin resistance which results in increased level of plasma

triglycerides and Low-density lipoprotein cholesterol (LDL-C) and a decreased concentration of HDL-C, as an important risk factor for peripheral vascular disease, stroke and CAD. [30] 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.[31,32]

In our study, dyslipidaemia was found in 58% of patients, 33% of the patients with elevated serum cholesterol and 38% patients had elevated LDL-Cholesterol. Most striating features were low HDL cholesterol in 47% of patients and elevated triglycerides level in 31% of patients. Different environmental factors, genetic influences and ageing are playing a wide role in the prevalence of stroke among the old age group. Hypertension, Diabetes mellitus, AF, and high cholesterol are the highest ranking controllable medical risk factors for stroke, whereas smoking, alcohol consumption and obesity rank as the most important lifestyle stroke risk factor.[33] Khan et al. and Tanveer et al. from their study they proved that hyperlipidaemia was present in 16% patients of stroke. They analysed that the serum lipid profile was third most common risk factor for stroke.[34,35] Qizilbash et al. from his study reviewed the relationship between serum cholesterol and subsequent stroke. They concluded that there was a significant association between serum lipid profile and prevalence of stroke.[36] Denti et al. reported that LDL-cholesterol concentrations over 100 mg/dL along with low HDL-cholesterol levels were associated with higher stroke risk.[37]

CONCLUSION: Preventive strategies aimed at early detection and treatment of hypertension, DM, public awareness about ill effects of cigarette smoking and excessive alcohol use can contribute in reduction of stroke burden.

Dyslipidaemia was found in 58% of patients and most striating features were low HDL cholesterol and elevated triglycerides level indicating they are independent risk factors for stroke. No significant difference in dyslipidaemia was found between haemorrhagic and ischaemic stroke patients. Performing a larger study would be helpful to figure out the definite role of HDL cholesterol and triglycerides levels in cerebrovascular accident (CVA).

REFERENCES

1. World Health Organization. Disease and injury regional estimates for 2004. Geneva Switzerland 2004.
2. World Health Organization. Preventing chronic diseases: a vital investment. Geneva, Switzerland 2005:p. 182.
3. Feigin VL, Lawes CM, Bennett DA, et al. Worldwide stroke incidence and early case fatality in 56 population based studies: a systematic review. Lancet Neurol 2009;8(4):355-369.
4. World Health Report. International cardiovascular disease statistics, a publication from the American heart association. 2007.
5. Shah B, Mathur P. Workshop report on stroke surveillance in India. Division of noncommunicable diseases, New Delhi: Indian Council of Medical Research 2006:1-9.
6. Fruchart JC, Nierman MC, Stroes ES, et al. New risk factors for atherosclerosis and patient risk assessment. Circulation 2004;109(23 Sup1):III 15-9.
7. Khan NI, Naz L, Mushtaq S, et al. Ischaemic stroke: prevalence of modifiable risk factors in male and female patients in Pakistan. Pak J Pharm Sci 2009;22(1):62-67.
8. Ali L, Jameel H, Shah MA. Risk factors in stroke. J Coll Physicians Surg Pak 1997;7:7-10.
9. Murray S, Bashir K, Langhorne P, et al. Epidemiological aspects of referral to TIA clinics in Glasgow. Scott Med J 2007;52(1):4-8.
10. Noma A, Matsushita S, Komori T, et al. High and low density lipoprotein cholesterol in myocardial and cerebral infarction. Atherosclerosis 1979;32(3):327-331.
11. Tilvis RS, Erkinjuntti T, Sulkava R, et al. Serum lipids and fatty acids in ischaemic strokes. Am Heart J 1987;113(2 Pt 2):615-619.
12. 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(6946):11-15.
13. Iso H, Jacobs DR, Wentworth D, et al. Serum cholesterol levels and six-year mortality from stroke in 350,977 men screened for the multiple risk factor intervention trial. N Engl J Med 1989;320(14):904-910.
14. Zuliani G, Cherubini A, Atti AR, et al. Low cholesterol levels are associated with short-term mortality in older patients with ischaemic stroke. J Gerontol A Biol Sci Med Sci 2004;59(3):293-297.
15. Kirshner HS. Medical prevention of stroke, 2003. South Med J 2003;96(4):354-358.
16. Laloux P, Galanti L, Jamart J. Lipids in ischaemic stroke subtypes. Acta Neurol Belg 2004;104(1):13-19.
17. Al- Jishi AA, Pochiraju KM. Profile of stroke in Bahrain. Neurosciences 2000;5(1):30-34.
18. Willey JZ, Xu Q, Albala BB, et al. Lipid profile components and risk of stroke: the Northern Manhattan study. Arch Neurol 2009;66(11):1400-1406.
19. Baluch UT, Kiani I, Badshah M, et al. Association of dyslipidaemia and ischaemic stroke. Ann Pak Inst Med Sci 2008;4(3):165-167.
20. Benerjee TK, Mukharjee CS, Sarkhel A. Stroke in the urban population of Calcutta-an epidemiological study. Neuroepidemiology 2001;20(3):201-207.
21. Mahajan SK, Kashyap R, Sood BR, et al. Stroke at moderate altitude. JAPI 2004;52:699-702.

22. Marwat MA, Usman M, Hussain M. Stroke and its relationship to risk factors. Gomal Journal of Medical Sciences 2009;7(1):17-21.
23. Gorelick PB. Stroke prevention. An opportunity for efficient utilization of health care resources during the coming decade. Stroke 1994;25(1):220-224.
24. Razdan S, Koul RL, Motta A, et al. Cerebrovascular disease in rural Kashmir, India. Stroke 1989; 20:1691-1693.
25. Meyer JS, Shimazu K, Fuleuuchi Y, et al. Impaired neurogenic cerebrovascular control and dysautoregulation after stroke. Stroke 1973;4(2):169-186.
26. Donnan GA, McNeil JJ, Adena MA, et al. Smoking as a risk factor for cerebral ischemia. Lancet 1989;2(8664):643-647.
27. Zhou BF, Zhang HY, WU YF, et al. Ecological analysis of the association between incidence and risk factors of coronary heart disease and stroke in Chinese populations. CVD Prevent 1998;1(3):207-216.
28. Longstreth WT Jr, Nelson LM, Koepsell TD, et al. Cigarette smoking, alcohol use and subarachnoid haemorrhage. Stroke 1992;23(9):1242-1249.
29. Naik M, Rauniyar RK, Sharma UK, et al. Clinico-radiological profile of stroke in eastern Nepal: a computed tomography study. Kathmandu Univ Med J 2006;4(2):161-166.
30. Sacco RL. Risk factors and outcomes for ischaemic stroke. Neurology 1995;45(2 Suppl 1):S10-S14.
31. Rodriguez-Colon SM, Mo J, Duan Y, et al. Metabolic syndrome clusters and the risk of incident stroke: the atherosclerosis risk in communities study. Stroke 2009;40(1):200-205.
32. Jia L, Bai H, Fu M, et al. Relationship between plasma HDL subclasses distribution and apo A-I gene polymorphisms. Clin Chim Acta 2005;360(1-2):37-45.
33. Goldstein LB, Adams R, Albert MJ, et al. Primary prevention of ischaemic stroke: a guidelines from the American heart association/ American stroke association stroke council: cosponsored by the atherosclerotic peripheral vascular disease interdisciplinary working group; cardiovascular nursing council; nutrition, physical activity and metabolism council; and the quality of the care and outcomes research interdisciplinary working group: the American academy of neurology affirms the value of this guideline. Stroke 2006;37(6):1583-1633.
34. Hart RG, Sherman DG, Miller VT, et al. Diagnosis and management of ischaemic stroke; selected controversies. Curr Probl Cardiol 1983;8(7):1-77.
35. Tanveer A. Localization and management in cerebrovascular accident: a comparison of clinical assessment versus CT scan. College of Physicians and Surgeons, Pakistan, Karachi 1996.
36. Quizilbash N, Duffy SW, Warlow C, et al. Lipids are risk factors of ischaemic stroke: overview and review. Cerebrovascular Disease 1992;2(3):127-136.
37. Denti L, Cecchetti A, Annoni V, et al. The role of lipid profile in determining the risk of ischaemic stroke in the elderly: a case-control study. Arch Gerontol Geriatr 2003;37(1):51-62.