ORIGINAL RESEARCH PAPER

DYSLIPIDEMIA IN NON-DIABETIC STROKE

General Medicine

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ABSTRACT

Stroke represents third most common cause of death in developed nations .' Stroke' is de-fined as rapid onset of focal neurological deficit, resulting from diseases of the cerebral vasculature and its contents. In India, now there is an increase in the burden of cerebrovascular disease. Hence it is very important that we should have a thorough knowledge of the risk factors for stroke and the ways of preventing its occurrence The role of dyslipidemia as a risk factor for stroke is questionable. Objective of the study was to know whether there is a role for dyslipidemia in the occurrence of stroke and if there is any difference in the lipid profile of patients with ischemic and hemorrhagic stroke.

INTRODUCTION

Stroke or cerebrovascular accident is defined as an abrupt onset of a neurological deficit that is attributable to a focal vascular cause`1 . Stroke is the second leading cause of death worldwide [1]. Stroke is a common medical emergency. It is also a major cause of long term disability. Thus, cerebrovascular disease is a huge public health problem imposing both a large disease burden and a large economic burden on our country. This has tremendous social impact in a country like India as it has been seen that stroke affects younger individuals in the Indian population[2] .The risk factors of stroke include various fixed and modifiable risk factors, notable among them are age, gender, heredity, diabetes mellitus, hypertension, dyslipidemia, smoking, atherosclerosis, excessive intake of alcohol and other rare causes [3].

Studies have shown that elevated levels of serum lipids are important risk factors for the development of atherosclerosis which is the precursor of stroke[4]

Recent studies have shown that distribution of triglycerides and cholesterol within major lipoprotein classes are of importance for the development of atherosclerosis, which is the precursor to stroke[5]. Hypercholesterolemia is a moderate risk factor for stroke5 .
MRFIT (Multiple Risk Factor Intervention Trial) showed high cholesterol level to be associated with increased mortality while there was reciprocal relation between cholesterol level less than 200mg /dl and haemorrhagic stroke [6].An Iranian study found significant association between dyslipidaemia and ischemic stroke[7].

METHODS

The objective of the study was to observe the serum lipid profile in non-diabetic patient with stroke and to determine any significant correlation between abnormal lipid profile.

The present study was conducted on non-diabetic stroke patients admitted to the Department of General Medicine, SRG hospital and medical college Jhalawar between January 2016 to January 2018. The Ethics committee clearance was obtained.

The study included a total of 100 adult cases (more than 18years of age) of completed stroke and 100 control.

They were divided into two categories: 1. Patients with ischaemic stroke, 2. Patients with haemorrhagic stroke.

Diabetic stroke patients, cerebrovascular accidents associated with head injury or brain tumour, pregnancy, puerperium, patients who were on lipid lowering drugs, patients with suspected emboli of cardiac origin and patients with subarachnoid hemorrhage were excluded from the study.

Data was collected with meticulous history, clinical examination with detailed neurological examinations along with appropriate investigations.

Blood samples were collected for CBC, fasting and post prandial blood sugars, HbA1c, blood urea, serum creatinine, fasting lipid profile (Serum total cholesterol, serum Triglycerides, Serum high density Lipoproteins, Serum very low density Lipoproteins, Serum low density Lipoproteins), serum Electrolytes, ECG, CT scan of brain.

RESULTS

In the present study, a total of 100 patients with complete stroke were included. Among males, the age group 60-69 was mostly affected by ischaemic stroke, and the patients in the age group 40-49 were largely affected by haemorrhagic stroke. Among females, the age group 60-69 was largely affected by ischemic as well as haemorrhagic stroke, which was two decade later than the males.

Table 1: Sex distribution in study population

Groups	Male	Female	Total
Control	60	40	100
Ischaemic	59	21	80
Haemorrhagic	14	6	20

Table 2: Age and sex distribution of study population.

Age group	Ischaemic		Haemorrhagic	
	MALE	FEMALE	MALE	FEMALE
20-29	2	0	0	0
30-39	4	1	2	0

40-49	12	4	5	1
50-59	13	4	3	1
60-69	16	8	2	3
>80	12	4	2	1
Total	59	21	14	6

Table 3: Distribution of total cholesterol in study population and their statistical analysis

Group		Total cholesterol			Total
		<200	200-240	>240	
Control	Count	58	42	00	100
	% within Total cholesterol	63.04%	73.68%	00%	
Ischaemic	Count	24	11	45	80
	% within Total cholesterol	26.08%	19.29%	88.23%	
Haemorrhagic	Count	10	4	6	20
	% within Total cholesterol	10.86%	7.01%	10.52%	
Total	Count	92	57	51	200
	% within Total cholesterol	100.00	100.00	100.00	

Analysing the distribution of total cholesterol in study population (Table 3) it was found that, 88.23% of patients having elevated serum cholesterol levels (total cholesterol > 240 mg% according to Adult Treatment Panel (ATP) – III guidelines6) fall in ischaemic category whereas 10.52% fall in haemorrhagic stroke category. The differences across the groups on the basis of their total cholesterol level was found to be significant (p <0.0001).

Table 4: Distribution of serum triglyceride in study population and their statistical analysis

Group		Serum triglyceride			Total
		<150	150-199	200-499	
Control	Count	60	35	5	100
	% within Total cholesterol	62.50%	50%	14.70%	
Ischaemic	Count	26	32	22	80
	% within Total cholesterol	27.08%	45.71%	64.70%	
Haemorrhagic	Count	10	3	7	20
	% within Total cholesterol	10.41%	4.29%	20.58%	
Total	Count	96	70	34	200
	% within Total cholesterol	100.00	100.00	100.00	

Analysing serum triglyceride in study population it was observed that 64.70% of patients among elevated serum triglyceride (serum triglyceride >200 mg% according to ATP – III guidelines) had ischaemic stroke and 20.58% had haemorrhagic stroke. The differences across the groups on the basis of their total serum triglyceride level was found to be significant (p -0.0303)(Table 4).

Table 5: Distribution of serum LDL cholesterol in study population and their statistical analysis.

Group		LDL Cholesterol				Total
		<100	100-130	131-160	>160	
Control	Count	45	40	14	1	100
	% within Total cholesterol	64.28%	70.17%	40.00%	2.63%	
Ischaemic	Count	16	12	18	34	80
	% within Total cholesterol	22.85%	21.05	51.42%	89.47%	
Hemorrhagic	Count	9	5	3	3	20
	% within Total cholesterol	12.85%	8.77%	8.57%	7.89%	
Total	Count	70	57	35	38	200
	% within Total cholesterol	100.0 0	100.00	100.00	100.00	

Analyzing serum LDL cholesterol within study population (Table 5) it is found that 89.47% of patients having elevated serum LDL cholesterol (serum LDL cholesterol >160 mg% according to ATP – III guidelines) suffered from ischaemic stroke whereas 7.89% had haemorrhagic stroke. The differences across the groups on the basis of their total serum LDL level was found to be significant (p - 0.0008).

Table 6: Distribution of serum HDL cholesterol in study population and their statistical analysis.

Group		HDL cholesterol		Total
		<40	>40	
Control	Count	40	60	100
	% within Total cholesterol	66.67%	42.86%	
Ischaemic	Count	16	64	80
	% within Total cholesterol	26.66%	45.72%	
Haemorrhagic	Count	4	16	20
	% within Total cholesterol	6.67%	11.42%	
Total	Count	60	140	200
	% within Total cholesterol	100.0O	100.O0	

Analysis of serum HDL shows, 60 cases have low HDL cholesterol levels (serum HDL Cholesterol levels < 40 mg% according to ATP III guidelines). 6.67% of haemorrhagic stroke patients had low HDL levels as compared to 26.66% of ischaemic stroke patients indicating greater abnormality levels in haemorrhagic stroke patients. The differences across the groups on the basis of their total serum HDL cholesterol level was found to be insignificant (p - 0.3224). (Table 6).

Table 7: Distribution of serum VLDL cholesterol in study population and their statistical analysis

Group		VLDL Cholesterol		Total
		<30	>30	
Control	Count	55	45	100
	% within Total cholesterol	56.12%	44.12%	
Ischaemic	Count	32	48	80
	% within Total cholesterol	32.65%	47.06%	
Haemorrhagic	Count	11	09	20
	% within Total cholesterol	11.23%	8.82%	
Total	Count	98	102	200
	% within Total cholesterol	100.00	100.00	

Analyzing the distribution of VLDL cholesterol in the study population, it was found that 102 cases had high VLDL cholesterol levels (serum VLDL Cholesterol levels >30 mg% according to ATP III guidelines). The differences across the groups on the basis of their total serum VLDL cholesterol level was found to be insignificant (p -0.4677) (Table 7).

DISCUSSION

Stroke is a common clinical problem . The relationship between serum cholesterol levels and the risk of stroke is not clear[8]. A U-shaped relation between the level of serum total cholesterol and the risk of stroke of all types has been proposed, derived from an inverse association with haemorrhagic stroke and a direct association with ischaemic stroke [9]. Effective risk factor interventions offer a real hope of reducing stroke morbidity and mortality. Dyslipidemia is also one of the major risk factor noted in patients of stroke without diabetes[9] .

 Age is an important risk factor for stroke. The mean age of stroke onset in India (i.e. 63 years)[10]. Cerebral atherosclerosis with atheroma formation is the basic underlying patho-physiologic mechanism in ischemic stroke.Out of 100 patients 20 had hemorrhagic stroke and 80 had ischemic stroke in present study. This is comparable to the study conducted by Sreenivasulu et al, where out of 100 cases 84 patients were Ischemic stroke and 16 patients were hemorrhagic stroke[11]

In this study we could demonstrate that dyslipidemia is indeed a risk factor in stroke, both ischemia and haemorrhage The patients in our study group were aged between 28 to 84 years. Amongst

the males, the age group of 60-69 were most commonly affected by ischaemic stroke whereas age group of 40-49 were most commonly affected by haemorrhagic stroke. In females, the age group 60-69 was largely affected by ischaemic as well as haemorrhagic stroke. This finding was similar to study by Khan and Rehman [12] and by Sreedhar K, Srikant B, Joshi L, Usha G, [13]

The incidence of stroke in females was two decades later than in males in our study.this finding was similar to study by Roquer et al [14] where they found that the mean age of affected patients was higher in women.

We have found a positive association between serum cholesterol and risk of stroke [15,16] This finding was similar to study by Benfante et al and Di Mascio et al. Iso et al found an inverse relation between cholesterol level and haemorrhagic stroke but a positive association with non haemorrhagic stroke [17].

There was no correlation between serum cholesterol and risk of stroke in a study by Harmsen et al Rastenyte et al and Hart CL et al [18-20]. Found that serum cholesterol levels are not related to risk of death from stroke.

Among patients having ischaemic and haemorrhagic stroke, serum triglycerides were high in 34 patients (>200 mg% according to ATP – III guidelines), which is significant as p value is < 0.05 by Chi-square test. So, our study finds out a positive relation between triglyceride levels and risk of stroke as compared to control group. This finding was similar to study by Hachinski et al[21]. But this type of correlation was not found in the study conducted by Sridharan R et al [22].

we conclude that the study group was largely affected by abnormal LDL levels than that of control group. Botet et al and Hachinski et al in their studies have found positive correlation between LDL Cholesterol levels and risk of ischaemic stroke [23].

Patients suffering from ischaemic stroke had low serum HDL cholesterol levels (<40mg% according to ATP – III guidelines). we found that the haemorrhagic group patients had greater abnormal levels than ischemic group patients which was greater than the control group which is insignificant and thus we conclude that the experimental group is not largely affected by abnormal HDL levels. Simons et al in their study observed that increase in HDL cholesterol is protective in ischemic stroke[24]. The Northern Manhattan Stroke Study group concluded that increased HDL – C levels is associated with reduced risk of ischaemic stroke[25]

In patients of ischaemic and haemorrhagic stroke, serum VLDL levels was high (>30 mg% according to ATP – III guidelines) The study group had higher levels of serum VLDL cholesterol than control group but was not found to be statistically significant (p>0.05).

CONCLUSION
Our study concluded a positive correlation between serum total cholesterol, triglyceride, LDL level and risk of stroke. Dyslipidemia is one of the major risk factors in non diabetic stroke patients. Thus early detection of dyslipidemia and treatment with drugs along with dietary modifications & lifestyle changes can reduce the risk of stroke.

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