

Prevalence of Hypertriglyceridemia and Risk Factors of Ischemic Versus Hemorrhagic Stroke

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ABSTRACT

Objective: To find the prevalence of hypertriglyceridemia in ischemic and hemorrhagic strokes and to assess the risk factors associated with them.

Methodology: This cross-sectional study was conducted in Medical OPD/ Emergency, PAF Hospital Mushaf, Sargodha over a period of six months from Nov-2010 to May-2011. All patients of either gender diagnosed as having stroke, with hyper dense or hypo dense area on CT scan brain and of age more than 30 years were included in the study. Patients on anti-hyperlipidemic drugs, with previous history of stroke, having blood disorders, like hemophilia and idiopathic thrombocytopenic purpura and, on warfarin therapy were excluded from the study.

Results: 203 patients were enrolled in the study. Out of these 203 patients 138(68%) were males, 65 (32%) were females. 127(62.6%) stroke patients had hypertriglyceridemia. In multivariate analysis, hypertriglyceridemia was found to be the only risk factor associated with ischemic stroke adjusting for all the other variables. It was found that patients with hypertriglyceridemia had 3.24 times higher odds of having ischemic stroke (P-value=0.017).

Conclusion: Hypertriglyceridemia was found in majority of the patients with stroke. Furthermore, it was found to be an independent risk factor of ischemic stroke.

Keywords: Ischemic stroke, Hemorrhagic stroke, Hypertriglyceridemia

INTRODUCTION:

Stroke is a medical emergency and can bring about consistent neurological disability. It is the third leading cause of functional impairment and mortality.¹⁻³ According to the World Health Organization (WHO) stroke results in cerebral malfunction rapidly, with symptoms continuing 24 hours or more prompting death with no apparent cause other than of vascular origin.⁴ WHO anticipated stroke cases to ascend from around 38 million Disability-Adjusted Life Years (DALYs) universally in 1990 to 61 million Disability-Adjusted Life Years (DALYs) in 2020.⁵ In Gulf states, yearly rate of stroke ranges from 27.6 to 57 for each 100,000

individuals with ischemic stroke being most widely recognized subtype.⁶ In Pakistan the epidemiological studies on stroke is scarce. Few studies done on this subject reported that its incidence in Pakistan is as low as 4.8%-6.4% and as high as 64.9%.⁷⁻⁹

Hypertriglyceridemia is a lipid anomaly with raised levels of triglycerides. Several clinical trials showed an association between high concentrations of serum cholesterol and ischemic stroke.^{10,11} According to Adult Treatment Panel-III rules, serum triglyceride levels can be classified as normal less than 150 mg/dl, marginal high 150-199 mg/dl, high 200-499 mg/dl and very high more than 500 mg/dl. ATP III reported the rate of hypertriglyceridemia to be 33% globally.¹² Several studies reported multiple risk factors for stroke like age, gender, smoking, hypertension, diabetes mellitus, triglycerides, serum total and HDL cholesterol, along with hypertriglyceridemia.^{13,14} Hypertriglyceridemia has been reported as an independent risk factor for ischemic stroke.^{15,16} In any case, considering hypertriglyceridemia as an autonomous risk factor for ischemic stroke is still disputable and vast scale studies are required to evaluate this problem.^{17,18} Keeping this background in mind, we investigated the prevalence of hypertriglyceridemia in ischemic and hemorrhagic strokes and assessed the risk factors associated with both types of stroke.

METHODOLOGY:

This cross-sectional study was conducted in Medical OPD/Emergency, PAF Hospital Mushaf, Sargodha, over a period of six months from November-2010 to May-2011. All patients of either gender, diagnosed as having stroke (hyper or hypodense area) on CT scan brain and of age more than 30 years were included in the study. Patients on anti-hyperlipidemic drugs, with previous history of stroke, blood disorders like hemophilia, idiopathic thrombocytopenic purpura and on warfarin therapy were excluded from the study. Fasting serum

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triglycerides was sent within 24 hours of onset of symptoms of all the eligible patients. Demographic details and medical history was also taken. All the data was entered and analyzed using SPSS version 21.0. Mean (SD) was computed for all the quantitative variables. Frequency and percentage were computed for all the qualitative variables. Chi-square/Fisher-exact test/Likelihood ratio chi-square test was applied to assess significant association of various qualitative variables with stroke. Univariate and multivariate logistic regression were applied to assess associated significant risk factors. P-value < 0.05 was considered significant.

RESULTS:

A total of 203 patients were enrolled in the study. Out of these 203 patients 138(68%) were males and 65 (32%) were females. More than half of the stroke patients (62.6%) were found to have hypertriglyceridemia. Most common comorbidities reported were diabetes 63.6%,

followed by hypertension 56.6% and obesity 42.8%. Majority of the patients 179 (88.2%) had ischemic stroke and 24 (11.8%) had hemorrhagic stroke (Table-1). Average age of the patients was 53.5 years (±SD:10.02). 85 (41.9%) patients were of age 51-60 years, 52 (25.6%) were of age 41-50 years, 37(18.2%) 61-70 years and 29 (14.3%) 30-40 years. No significant difference was observed in mean age of the patients between both types of stroke (P-value=0.601, Table-1). Hypertriglyceridemia, smoking and hypertension were the risk factors found to be significantly associated with both types of stroke (P-value: 0.024, 0.014 and 0.018 respectively; Table-1). Gender, family history of stroke, diabetes mellitus, and obesity were not found to be significant risk factors (Table-1). In multivariate analysis, hypertriglyceridemia was found to be the only risk factor associated with ischemic stroke adjusting for all the other variables. It was found that patients with hypertriglyceridemia had 3.24 times higher probability of having ischemic stroke (P-value=0.017, Table-2).

Table 1:
Univariate analysis of risk factors of strokes

Risk factors	Type of stroke						P-value
	Haemorrhagic		Ischemic		Total		
	n	%	n	%	n	%	
Age in years	Mean	SD	Mean	SD	Mean	SD	0.601
	52.17	13.69	53.69	9.45	53.69	9.45	
Gender							
Male	18	75%	120	67.0%	138	68.0%	0.432
Female	6	25.0%	59	33.0%	65	32.0%	
Total	24	100.0%	179	100.0%	203	100.0%	
Family history of stroke							
Yes	11	45.8%	57	31.8%	68	33.5%	0.173
No	13	54.2%	122	68.2%	135	66.5%	
Total	24	100.0%	179	100.0%	203	100.0%	
Smoking							
Yes	16	66.7%	72	40.2%	88	43.3%	0.014*
No	8	33.3%	107	59.8%	115	56.7%	
Total	24	100.0%	179	100.0%	203	100.0%	
Hypertriglyceridemia							
Yes	10	41.7%	117	65.4%	127	62.6%	0.024*
No	14	58.3%	62	34.6%	76	37.4%	
Total	24	100.0%	179	100.0%	203	100.0%	
Diabetes mellitus							
Yes	18	75.0%	111	62.0%	129	63.5%	0.214
No	6	25.0%	68	38.0%	74	36.5%	
Total	24	100.0%	179	100.0%	203	100.0%	
Hypertension							
Yes	19	79.2%	96	53.6%	115	56.7%	0.018*
No	5	20.8%	83	16.1%	88	43.3%	
Total	24	100.0%	179	100.0%	203	100.0%	
Obesity							
Yes	13	54.2%	74	41.3%	87	42.9%	0.233
No	11	45.8%	105	58.7%	116	57.1%	
Total	24	100.0%	179	100.0%	203	100.0%	

*P-value<0.05, **P-value<0.0001, † Chi-square test, ‡ Independent sample T-test

Table: 2
Possible risk factors associated with ischemic stroke

Risk factors	Univariate Ischemic stroke ^a		Multivariate Ischemic stroke ^a	
	OR (95% CI)	P-value	OR (95% CI)	P-value
Age in years	1.02 (0.97 - 1.06)	0.483	1.02 (0.97 - 1.07)	0.375
Gender				
Male	0.89 (0.26 - 1.80)	0.435	0.98 (0.29 - 3.26)	0.977
Female	Ref		Ref	
Family history of stroke				
Yes	0.552 (0.23 - 1.31)	0.177	0.75 (0.25 - 2.23)	0.607
No	Ref		Ref	
Smoking				
Yes	0.336 (0.14 - 0.83)	0.018*	0.41 (0.15 - 1.13)	0.086
No	Ref		Ref	
Diabetes mellitus				
Yes	0.54 (0.21 - 1.44)	0.220	0.76 (0.26 - 2.17)	0.601
No	Ref		Ref	
Hypertension				
Yes	0.30 (1.1 - 0.85)	0.023*	0.37 (0.12 - 1.11)	0.077
No	Ref		Ref	
Obesity				
Yes	0.59 (0.25 - 1.40)	0.237	0.79 (0.28 - 2.25)	0.660
No	Ref		Ref	
Hypertriglyceridemia				
Yes	2.64 (1.11 - 6.29)	0.028*	3.24 (1.24 - 8.47)	0.017*
No	Ref		Ref	

a: Reference category is hemorrhage stroke; *P-value<0.05, **P-value<0.0001, Binary logistic regression

DISCUSSION:

Association of serum triglyceride concentration with risk of stroke is well known. A few studies showed negative results while others demonstrated a positive relationship with high serum triglyceride concentration¹⁹. A previous study established a direct relationship between serum triglyceride level and non-hemorrhagic stroke, while no affiliation was found of high plasma triglyceride concentration as a risk factor for both types of stroke.^{19,20}

In this study, we found that the incidence of ischemic stroke was higher than that of hemorrhagic stroke. The results of this study suggested that the factor of advanced age was of similar importance to both types of stroke. Ischemic stroke was found to be prevalent in men, patients with family history of stroke, diabetics, and obese patients but the results were not statistically significant.

Previous studies revealed that hypertension was the most important autonomous risk factor for both ischemic and hemorrhagic stroke, and that in 50%-60% of patients, stroke was triggered by hypertension²¹. Variable risk factors of stroke include hypertension, diabetes mellitus, atrial fibrillation, dyslipidemia and hyperfibrinogenemia.²² In our study, hypertension and smoking were not found to be the risk factors for ischemic stroke; however, both were associated with hemorrhagic stroke. Antonios et al. reported hypertriglyceridemia as an independent possible risk factor for ischemic stroke^{17,24}.

Our study also supported this result. In this study, hypertriglyceridemia was found to be the only possible risk factor associated with ischemic stroke in the multivariate analysis adjusting for age, gender, family history of stroke, diabetes mellitus, smoking, hypertension and obesity^{14,23,24,25}. The results showed that patients with hypertriglyceridemia had 3.2 times higher odds of having ischemic stroke.

The limitation of this study is less number of patients with hemorrhagic stroke that might be a cause of insignificant results of various important variables and we also did not study other lipid abnormalities that might be the latent risk factors.

CONCLUSION:

Hypertriglyceridemia was found in majority of the patients with stroke. Furthermore, it was found to be an independent risk factor for ischemic stroke. We recommend studies to be conducted on larger scale enrolling similar number of both ischemic and hemorrhagic stroke patients; and study all the lipid abnormalities along with other risk factors.

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