

Metabolic Syndrome in Ischemic Stroke Patients at Liaquat University Hospital

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ABSTRACT

Objective: To determine the metabolic syndrome in patients with ischemic stroke at Liaquat University Hospital.

Study design: Cross-sectional study

Place and Duration: Department of Medicine, Liaquat University Hospital Hyderabad from January 2015 to July 2015.

Methodology: A total of 184 patients diagnosed with ischemic stroke with age ranged from 30 to 80 years of either gender were included. Blood samples were drawn from the patients in fasting state and were sent to the laboratory for serum triglyceride, serum HDL, and LDL cholesterol and fasting glucose level. Patients were diagnosed as metabolic syndrome on the basis of the National Cholesterol Education Program – Third Adult Treatment Panel (NCEP ATP III, 2001) criteria.

Results: Mean age of the patients was 51.1±9.04 years. Males were in majority 96(52.17%). Metabolic syndrome in patients with ischemic stroke was observed in 39.67% of the cases. Patients with age of >50 years were significantly on risk of metabolic syndrome as compared to those having age less than 50 years p-value 0.001. No significant impact of gender was found on metabolic syndrome p-value 0.78.

Conclusion: It is concluded that metabolic syndrome was in 39.67% of the patients presented with ischemic stroke. Old age individuals were on more risk of the development of metabolic syndrome.

Key Words: Ischemic stroke, metabolic syndrome.

Introduction

Stroke is the leading cause of mortality with more than 5.5 million people dying every year. Stroke not only adds to mortality but morbidity as well.¹ Stroke is now the sixth most common cause of disability-adjusted life in years (DALYs) in the world.² However its prevalence is falling in the western nations, while rising in the countries of South Asia as Pakistan, India, Sri Lanka and Bangladesh, and it is assumed that the rate of the stroke and its related mortality will be doubled by the year 2030.³ In Pakistan, the prevalence of stroke was found to be 4.5%.⁴ Over the years much stress has been given to traditional risk factors like old age, sex, hypertension, diabetes mellitus, smoking, body mass index "BMI", and dyslipidemia which possibly contributing the development of the ischemic stroke.^{5,6} Metabolic syndrome is the well-known risk factor for stroke independently. The overall prevalence of metabolic

syndrome in vascular diseases is 46.3%.⁷ The metabolic syndrome rate depends on genetic and nongenetic factors.^{8,9} It is also categorized by the collection of different risk factors as hypertension, insulin resistance, hypertension, diabetes, hypertriglyceridemia and low HDL cholesterol.¹⁰ In Pakistan, metabolic syndrome's incidence in stroke patients was found to be 37.4%.¹¹ Reaven in 1983 firstly described the metabolic syndrome. Since then, metabolic syndrome has been linked to increased risk of ischemic stroke.¹² It is assumed that various components of metabolic syndrome interact synergistically, thereby accelerating atherosclerosis.¹³ This study is carried out to identify the frequency of metabolic syndrome in cases presented with ischemic stroke. Previous local studies done, to see the prevalence of metabolic syndrome, but they include all type of stroke patients. Prevalence of metabolic syndrome in

ischemic stroke is still unknown. Therefore, this study is designed to identify the frequency of metabolic syndrome specifically in patients with ischemic stroke, as simple lifestyle modifications have the potential to reduce the severity of metabolic syndrome at every stage of progression. So, by the implementation of lifestyle modification and, if necessary, drug treatment prevent or minimizes the morbidity and mortality of ischemic stroke.

Methodology

This cross sectional study was conducted at Department of Medicine, Liaquat University of Medical and Health Science Jamshoro/Hyderabad. Study duration was 6 months from January 2015 to July 2015. All patients with a diagnosis of ischemic stroke, age from 30 to 80 years of either gender were included in the study. All the patients with hemorrhagic Stroke (by Brain CT scan), stroke with space occupying lesion such as tumor, abscesses etc. (by Brain CT scan or MRI), patients using statins during past three months and severe cardio-renal or nutritional disorder that would affect blood pressure or lipid and glucose were excluded from the study. An informed written consent for the study was obtained from the patients and their relatives. Blood pressure was checked of each patient after 15 minutes of the rest. Waist circumference has been assessed by using the "measuring tape positioned midway between the lowest rib and the iliac crest" by the trained examiner. All the patients were interviewed individually by a structured questionnaire to assess the knowledge on socio-demographic characteristics, smoking, habits of the exercise and physical activity. Blood samples were drawn from the patients in the fasting state and were sent to the laboratory where it was analyzed by a qualified pathologist for serum triglyceride, serum HDL and LDL cholesterol and fasting glucose level. Patients were diagnosed as metabolic syndrome on the basis of the National Cholesterol Education Program 3rd Adult Treatment Panel (NCEP ATPIII, 2001) ¹⁰² criteria which include presence of at least three features: 1) blood pressure of $\geq 130/85$ mmHg 2) serum triglyceride level of ≥ 150 mg/dl (1.7 mmol/l), 3) HDL cholesterol of < 40 mg/dl in men and < 50 mg/dl in women, 4) fasting glucose of more than 110 mg/dl. All the data was recorded in the proforma.

Data was entered and analyzed in statistical program SPSS version 16.0. The continuous variables were calculated as a mean and standard deviation. Categorical variables were extracted as percentage and frequency. Chi-square test was applied to compare the frequency of metabolic syndrome according to the age and gender. A p value of ≤ 0.05 was taken as significant.

Results

There were 184 patients of ischemic stroke included in this study. Most of the patients were above 40 years of age. According to the age distribution, the average age of the patients was 51.1 ± 9.04 years. Similarly, descriptive statistics of Triglycerides and HDL was also presented as 178.53 ± 59.05 mg/dl, 48.99 ± 12.04 mg/dl respectively. Mean of systolic BP was 136.09 ± 11.97 mmHg, diastolic BP 83.41 ± 3.74 mmHg. Mean of fasting blood sugar and waist circumference was found 98.40 ± 16.13 mg/dl and 87.01 ± 8.14 cm, respectively. **Table I.**

Table I: Demographic Descriptive Statistics of Patients (n=184)

Variables	Mean \pm Std. Deviation
Age (Years)	51.10 \pm 9.04
Triglycerides (mg/dl)	178.53 \pm 59.05
HDL(mg/dl)	48.99 \pm 12.04
Systolic BP (mmHg)	136.09 \pm 11.97
Diastolic BP (mmHg)	83.41 \pm 3.74
Fasting Blood Sugar (mg/dl)	98.40 \pm 16.13
Waist Circumference (cm)	87.01 \pm 8.14

Out of 184 cases, 96(52.17%) were males and 88(47.83%) were females. Males were found in the majority as compared to females. Figure 1

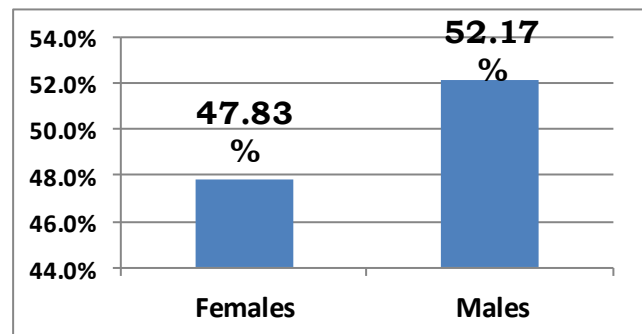


Figure 1. Gender Distribution of the Patients (n=184)

Metabolic syndrome in patients with ischemic stroke was observed in 39.67%. (73/184) cases as presented in Figure 2. Metabolic syndrome was found significantly associated with Triglyceride ≥ 150 mg/dl as compared to < 150 mg/dl p-value 0.0005. Blood pressure more than 130/85mmHg was found

significantly associated with metabolic syndrome in 81.6% patients p-value 0.0005. Fasting blood sugar >110mg/dl was in majority of the cases 84.7% as compare to <110mg/dl, p-value 0.0005. Table 2

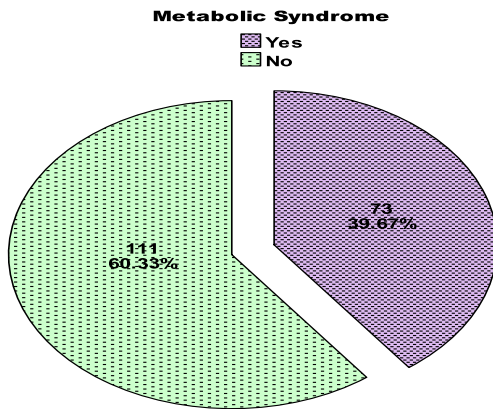


Figure 2. Metabolic Syndrome in Patients with Ischemic Stroke (n=184)

	Metabolic Syndrome		Total	P-Values
	Yes n=73	No n=111		
Triglyceride level				
≥ 150 mg/dl	69(67%)	34(33%)	103	0.0005
<150 mg/dl	4(4.9%)	77(95.1%)	81	
Low HDL				
Yes	61(91%)	6(9%)	67	0.0005
No	12(10.3%)	105(89.7%)	117	
Blood Pressure				
≥ 130/85	62(81.6%)	14(18.4%)	76	0.0005
<130/85	11(10.2%)	97(89.9%)	108	
Fasting Blood Sugar				
≥ 110 mg/dl	50(84.7%)	9(15.3%)	59	0.0005
< 110 mf/dl	23(18.4%)	102(81.6%)	125	
Abnormal Obesity on the bases of waist circumference				
Yes	45(40.9%)	65(59.1%)	110	0.67
No	28(37.8%)	46(62.2%)	74	

Chi-Square

Age groups of 51-60 years and 61-70 years were found significantly associated with metabolic syndrome as compared to those having age less than 50 years, p-value 0.001. While on another hand no significant difference was found in the prevalence of metabolic syndrome with respect to the gender p-value 0.78. Table III

Table III: Metabolic Syndrome In Patients With Ischemic Stroke With Respect To Age And Gender

Age groups	Metabolic Syndrome		P-value
	Yes	No	
31 to 40 Years	3(12.5%)	21(87.5%)	0.001
41 to 50 Years	26(32.9%)	53(67.1%)	
51 to 60 Years	24(54.5%)	20(45.5%)	
61 to 70 Years	20(54.1%)	17(45.9%)	
Gender			
Male	39(40.6%)	57(59.4%)	0.78
Female	34(38.6%)	54(61.4%)	

Chi-Square test applied

Discussion

Stroke is the commonest community health event with a high rate of complications including main neurologic disabilities. It is also particularly characterized by a higher rate of mortality and recurrences. A rising body of indication supports metabolic syndrome as the risk factor for the recurrent stroke and cerebral ischemic events in the future. According to this study metabolic syndrome is the major predictor for the development of vascular events causing ischemic stroke, as we found in our study metabolic syndrome in patients with ischemic stroke was observed in 39.67% (73/184) cases. In the favor of this study, Koren-Morag et al¹⁴ reported that metabolic syndrome was present in 56% of patients with ischemic stroke. De Silva et al¹⁵ stated that metabolic syndrome was in 61% of cases having an ischemic stroke. Boden-Albala et al.¹⁶ Ovbiagele et al.¹⁷ and Liu et al.¹⁸ observed the prevalence of 44%, 43%, and 40% respectively. While on another hand in some studies lower values of metabolic syndrome have been demonstrated from 14–26%.^{19,20} These variations may reflect the difference in cohort enrolled, as well as ethnic variations and occurrence or absence of CVD or cerebro-vascular disease (comprising previous stroke history) at time of the recruitment. Greatest consistency is stated with respect to the elevated risk of the 1st or recurrent stroke in cases having metabolic syndrome (hazard ratio 1.5 to 2.4).^{16,18} On another hand a population-based analysis suggests that the metabolic syndrome could be estimated for approximately 19% of all strokes.¹⁶ Some studies showed a low prevalence of metabolic syndrome and this difference may be due to geographical variations and sample size of studies.

In our study, it was found that male gender is predominant in having metabolic syndrome. It was found that 40.6% of males out of 96 and 38.6% of females out of 88. This data is in accordance with a study done by Marawan M. Atiyah²¹ who found that metabolic syndrome was high in the males 55.7% and in females 44.3%. Our findings were agreed with the

criteria of the IDF. Screening program on the resident's aged ≥ 40 years demonstrated the lower prevalence of metabolic syndrome in women.²²

In our study rate of metabolic syndrome was significantly high in patients aged above 50 years. Similarly, Thomas et al.²³ reported that the Metabolic syndrome prevalence, raises evermore with the age particularly in older females and this may be due to physical inactivity, obesity, menopause and sedentary life. While age remains the greatest risk factor for stroke, evident by the exponential increase in risk with each decade, modifiable risk factors such as smoking, hypertension, diabetes, dyslipidemia, and obesity are contributing to a significantly heightened risk for ischemic stroke.¹⁶

We found also that FBS greater than 110mg/dl, in 84.7% of patients. These results correlated with the finding of a study, which stated that hyperglycemia is associated with higher infarct size and the poor functional outcome.²⁴ Also, an elevated level of TG was seen associated with increased relative risks of death, in our study triglycerides greater than 150 mg/dl were found in 67% of patients having metabolic syndrome. It is stated that hypercholesterolemia may be linked with elevated risk of disability resulting in the stroke and co-morbidities independently.²⁵ Alternatively, cholesterol-lowering medications had been presented to produce beneficial effects on the outcome of stroke.²⁶ On the other hand Ashtari F et al²⁷ reported that incidence of high blood pressure was significantly associated with stroke cases as compared to the controls such as; "68% vs. 35%" and fasting blood sugar (>110) was significantly linked with 57% stroke cases as compared to controls 23%. Jia et al.²⁸ demonstrated that metabolic syndrome was linked with the first-ever stroke in elderly cases or with middle-age groups, but blood pressure was highly significant than metabolic syndrome in these cases. In the study of Korea, by Hwang et al.²⁹ reported that metabolic syndrome and fasting blood sugar were commonest predicting factors of cardiovascular diseases. In this series age, more than 50 years was found significantly associated with metabolic syndrome as compared to those having age less than 50 years, p-value 0.001. While no significant difference was found in the prevalence of metabolic syndrome with respect to the gender p-value 0.78. Whereas inconsistently Naeem HA et al³⁰ reported that metabolic syndrome was in 43.6% male and 65% in female. In the epidemiologic research reported that metabolic syndrome significantly increased the risks of stroke leading death.³¹ Additionally, Arenillas and colleagues stated that metabolic syndrome is correlated with the resistance to clot lysis after the therapy of tissue plasminogen activator, and

showed that metabolic syndrome presentation may hamper the arterial re-canalization process,³² which is suggested as the poor stroke prognosis.

Conclusion

It is concluded that metabolic syndrome was 39.67% in patients presented with ischemic stroke. It is a predisposing factor of ischemic stroke. However, screening of the metabolic syndrome should be necessary on the clinical level to identify the cases those at high risk for vascular diseases. Its prevention may reduce the mortality and morbidity. Good lifestyle strategies should be developed to reduce the burden of metabolic syndrome.

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