Original article

Study on occurrence of metabolic syndrome among patients with stroke: a descriptive study

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ABSTRACT:

BACKGROUND: Stroke is associated with considerable morbidity and mortality, hence deserves attention towards its prevention by detecting it early and adequately treating the manageable risk factors. There are hardly few studies which have documented the association of metabolic syndrome with acute ischemic stroke in elderly subjects. Hence, the present study was conducted with an objective to study the association of metabolic syndrome in stroke patients.

METHODS: A total of 60 patients aged more than 18 years presenting with neuro-radiological features of stroke admitted in the Department of General Medicine, S. Nijalingappa medical college and Hanagal Shri Kumareshwara hospital & research centre, Bagalkot for a period of 1 year were included in study. Relevant detailed history, physical examination and necessary investigations were done. Data were analyzed using SPSS version 16.0. The association of metabolic syndrome with stroke were analyzed by chi-square and independent sample t-tests. A P value of < 0.05 was considered statistically significant.

RESULTS: Majority (46.7%) were aged more than 60 years. The commonest presenting symptoms of stroke patients were weakness (74%), loss ofconsciousness and aphasia (17.1%) each, and deviation of angle of mouth (14.3%). Ischemic stroke was more common in patients with metabolic syndrome. Majority i.e., 60% and 62.9% of metabolic syndrome patients with stroke had history of diabetes mellitus and hypertension respectively compared to patients with stroke without metabolic syndrome and it was statistically significant (p<0.05).

CONCLUSION: Metabolic syndrome is associated with the occurrence of Stroke. Hence there is a need to take a step in controlling the factors associated with Metabolic syndrome.

KEYWORDS: Stroke, Body mass index, Metabolic syndrome

INTRODUCTION:

Stroke is a worldwide health problem and is an important contributor to morbidity, mortality and disability in developed as well as developing countries.[1] Stroke is defined by WHO as "rapidly developing clinical signs of focal disturbance of cerebral function, lasting more than 24 hours or leading to death, with no apparent cause other than vascular origin".[2] Stroke manifests by various neurological signs and symptoms viz., coma, hemiplegia, paraplegia, monoplegia, cranial nerve palsy, speech disturbance, sensory impairment, etc.[3]

Cerebrovascular disease remains a leading cause of death from Non Communicable Diseases and it accounted for 6.1 million deaths worldwide. Majority of deaths occurred in people living in developing countries and 33.72% of the subjects were aged less than 70 years.[4] The prevalence rate of stroke in India is about 1.54/1000 and death rate about 0.6/1000. And the total disability-adjusted life years lost were 597.6/1,00,000 populations.[5] The modifiable risk factors for ischemic stroke

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include arterial hypertension, diabetes mellitus, dyslipidemia, cigarette smoking, alcohol consumption, etc.[6] More than five definitions of metabolic syndrome have been proposed by various medical societies. Among them new International Federation of Diabetes Foundation (IDF) definition is suitable for Indian population as it gives different waist circumferences for different ethnic groups.[7] According to a recent study on south Indians, the prevalence of the metabolic syndrome was estimated to be 23.2%, 18.3% and 25.8% according to World Health Organization, National Cholesterol Education Program-Adult Treatment Panel III and IDF definitions respectively.[8] Thus stroke, which is associated with considerable morbidity and mortality, deserves attention towards its prevention. The step towards prevention can be taken by detecting and adequately treating modifiable risk factors. In addition to that, there are very few studies which have documented the association of metabolic syndrome with acute ischemic stroke in elderly subjects in India. Hence, the present study was conducted with an objective to study the association of metabolic syndrome in stroke patients.

MATERIALS and METHODS:

This is a Cross-sectional study conducted for a period of one year from 1st December 2014 to 30th November 2015. A total of 60 patients with stroke aged more than 18 years presenting with neuro-radiological features of stroke (clinically and CT scan proven including major and minor stroke) admitted in the Department of General Medicine, S. Nijalingappa medical college and Hanagal Shri Kumareshwar hospital & research centre, Bagalkot were included in the study.

The criteria used in the clinical diagnosis of stroke were those set forth by the Adhoc committee of national institute of neurological diseases and blindness was included in study. Informed consent was taken, and ethical clearance was obtained from IEC. The relevant socio-demographic data, clinical history were collected using a pre-tested questionnaire. A detailed history of all subjects especially family history of hypertension, diabetes mellitus, history of weight gain, alcohol use and history of other cerebrovascular disease risk factors (including obesity, smoking, hyperlipidemia, diabetes) were taken. Thorough physical examination viz., blood pressure measurements, palpating for peripheral pulses to rule out atherosclerosis including carotids of all the patients were done according to standard protocols. Waist and hip circumferences, Optic fundoscopic examination for any hypertensive changes, cardiovascular, respiratory, abdominal and CNS examinations were done. Venous blood samples were drawn and processed for routine blood tests for Hb%, TC, DC, ESR, Blood Urea, Serum Creatinine, fasting blood glucose, post prandial blood glucose and Lipid profile. ECG and CT Scans for all the patients and MRI scan for necessary patientswere done.

Definition of Metabolic Syndrome according to International Federation of Diabetes Foundation (IDF) 2005:

In addition to Central obesity (defined as waist circumference $\geq$ 90 cm for South Asian men and $\geq$ 80 cm for South Asian women, with ethnicity specific values for other groups) any two of the following four factors:

• Raised TGs level: $\geq$ 150 mg/dl or on specific treatment.

• Reduced HDL-C: <40 mg/dl (M) and <50 mg/dl (F) or on specific treatment.

• Raised blood pressure: systolic BP $\geq$ 130 mmHg or diastolic BP $\geq$ 85 mmHg, or on anti-hypertensive medication.

• Fasting plasma glucose of $\geq$100 mg/dl, or previously diagnosed type 2 diabetes.

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Statistical Analysis: Data were entered in excel and analysed with recent available software. Results were presented as mean ± SD. Data were analyzed using SPSS version 16.0. Categorical variables were analyzed by chi-square test and the continuous variables with independentt- test between the groups. A *P* value < 0.05 was considered statistically significant.

RESULTS:

In the present study, out of 60 study subjects with stroke, 35 (58.3%) of the patients had metabolic syndrome. The mean age of the study participants was 59+13years with a range of 28 to 88years. Majority i.e., 65.7% of the study subjects with metabolic syndrome were males and remaining 34.3% were females. The most common mode of presentation among patients with and without metabolic syndrome was weakness followed by loss of consciousness, aphasia and deviation of angle of mouth. Age and gender were not associated with the occurrence of metabolic syndrome among stroke patients. Among the risk factors of stroke viz., Diabetes mellitus, hypertension, alcohol, smoking and family history, diabetes and hypertension were significantly associated with the occurrence of metabolic syndrome among stroke patients. [Table-1]

In our study, it was observed that ischemic stroke was more common in patients of stroke with metabolic syndrome than in stroke without metabolic syndrome. [Graph-1] However, the occurrence of ischemic stroke was not significantly associated with metabolic syndrome (*P*>0.05). [Table-2]It was observed that all the components were significantly more among the study subjects with metabolic syndrome compared to those without metabolic syndrome (*P*<0.05). [Table-3] All the components of metabolic syndrome occurred more commonly among the subjects with metabolic syndrome. [Graph-2]

Table 1: Baseline Characteristics of the study population

Particulars of the study subjects with Stroke	With Metabolic Syndrome (n=35)	Without Metabolic Syndrome (n=25)	*P*-Value
Age [years]	59.74±12.89	58.64±13.89	0.75
Male gender	23 (54.7%)	19 (45.3%)	0.73
Presenting symptoms (n>60 - Multiple responses)			
1. **Weakness**	26 (60.4%)	17 (39.6%)	-
2. **Deviation of angle of mouth**	05 (62.5%)	03 (37.5%)	-
3. **Loss of Consciousness**	06 (42.8%)	08 (57.2%)	-
4. **Aphasia**	06 (42.8%)	08 (57.2%)	-
Hypertension	22 (75.8%)	07 (24.2%)	<0.01*
Diabetes mellitus	21 (75.0%)	07 (25.0%)	0.01*
Smoking	09 (69.2%)	04 (30.8%)	0.37
Alcohol	08 (57.2%)	06 (42.8%)	0.92
Family History of Stroke	02 (66.7%)	01 (33.3%)	0.76

*indicates a significant statistical difference between the groups with *P*<0.05

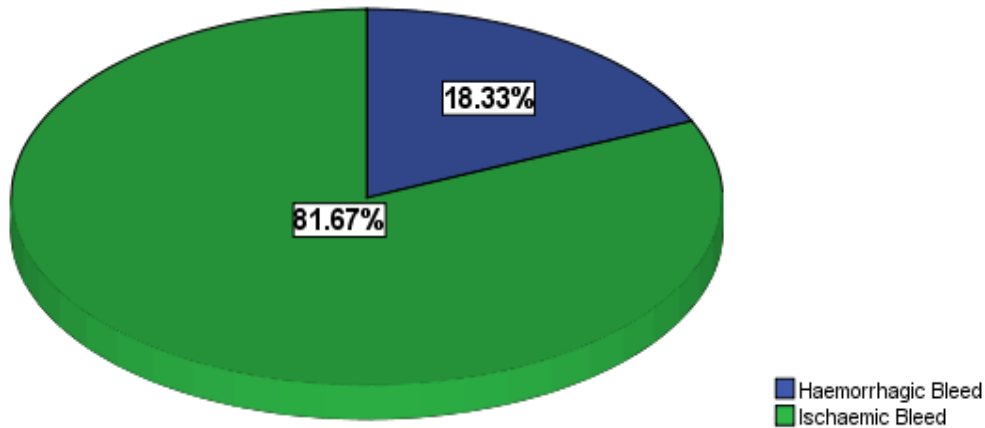**Graph 1: Type of stroke among the study subjects**

Table 2: Association of type of stroke with Metabolic Syndrome

| Type of Stroke	Metabolic Syndrome		χ2 Value (*P*-Value)
	Yes (n=35)	No (n=25)	
Ischaemic	29 (82.9%)	20 (80.0%)	**0.08**
Haemorrhagic	06 (17.1%)	05 (20.0%)	**(0.78)**

Table 3: Comparison of components of metabolic syndrome among the patients with stroke

Particulars of Stroke patients	With metabolic syndrome [n=35] (Mean±SD)	Without metabolic syndrome [n=25] (Mean±SD)	t-value (95% C.I)	*P*-value
Waist circumference	93.77 ± 6.61	89.64±8.76	2.08 (0.16 to 8.10)	0.042*
FBS (mg/dl)	151.2±51.07	121.12±29.30	2.64 (7.33 to 52.83)	0.010*

SBP (mmHg)	148.97±29.52	131.12±24.02	2.49 (3.49 to 32.20)	0.016*
DBP (mmHg)	88.17±14.16	78.72±13.74	2.58 (2.12 to 16.78)	0.012*
TG (mg/dl)	167.37±63.51	122.08±20.35	3.43 (18.89 to 71.69)	0.001*
HDL (mg/dl)	38.963±7.90	45.60±7.27	-3.31 (-10.65 to -2.63)	0.002*

*indicates a significant statistical difference between the groups with *P*<0.05

Graph 2: Occurrence of Metabolic Syndrome among stroke patients
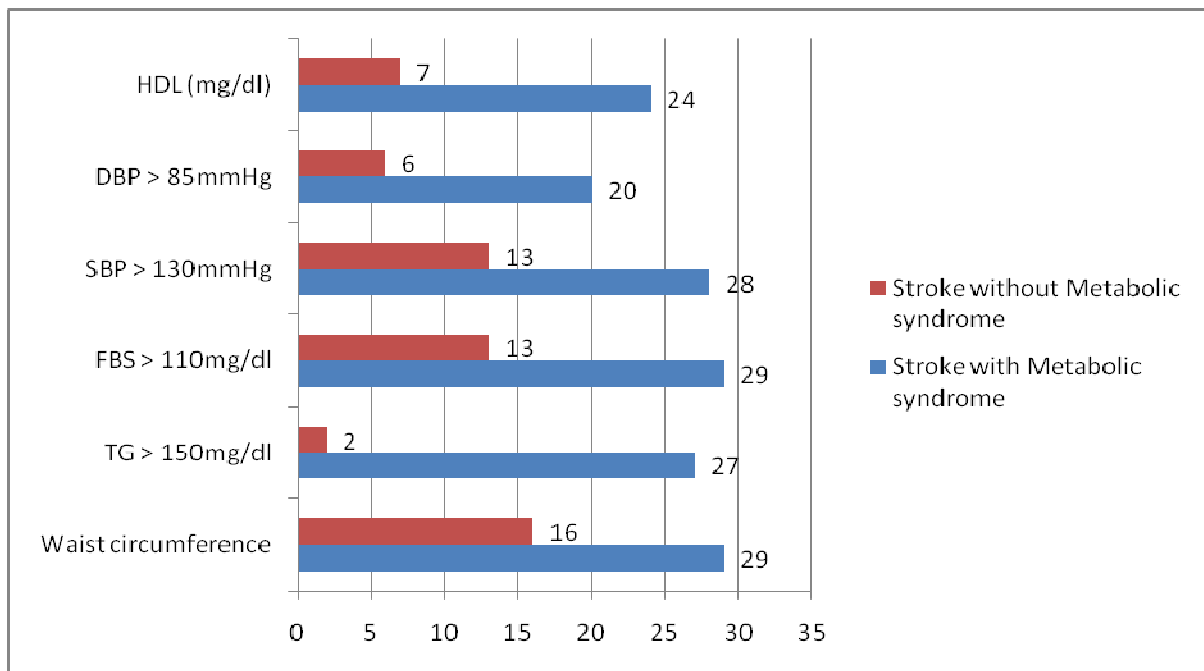
DISCUSSION:

Metabolic syndrome has emerged as an important risk factor due to its potential for predicting occurrence of stroke. The strong association between stroke and metabolic syndrome make it a great burden and a challenge to the health care in India. Occurrence of metabolic syndrome in stroke was observed among 58.3% of patients and was more in the elderly (>60 Years) age group. The study group with metabolic syndrome consisted more of Males and all these findings are in concordance with study findings by Mathew B *et al.*[9]

In the present study, weakness, deviation of angle of mouth, loss of consciousness and aphasia are the common symptoms at the time of presentation comparable to studies conducted by Cronin S*et al*[10] and Rodriguez-Colon *et al.*[11]

In the present study, ischemic stroke was more common and the same has been noted in the studies conducted by Cronin S *et al*[10], Rodriguez-Colon *et al*[11] and Zhang S *et al.*[12]

In a study conducted by Kala SN *et al.*, in Thiruvananthapuram, Kerala has found a strong association of metabolic syndrome with ischemic stroke and also among the various determinants of metabolic syndrome, HTN, DM, increased waist circumference showed strong association with ischemic stroke except for hyperlipidemia. Smoking and alcohol were more common among the

study subjects with metabolic syndrome. These study findings are similar to our study findings except for hyperlipidemia which has shown significant association with metabolic syndrome. However when the association was seen for only ischemic stroke patients, hyperlipidemia was not significantly associated with metabolic syndrome which is similar to the study by Kala SN *et al.*[13]It was a purposive sampling and the sample size being small, study lacks the generalizability and hence needs to be carried out in larger samples as a population based study to assess the prevalence of metabolic syndrome among those with stroke.

CONCLUSION:

The occurrence of stroke is significantly more common among those with metabolic syndrome and hence necessitates a further evaluation in eliciting and quantifying the risk of occurrence of stroke among those with metabolic syndrome.

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