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ASSOCIATION OF METABOLIC SYNDROME WITH STROKE IN YOUNG PATIENTS: A COMPREHENSIVE STUDY

General Medicine

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ABSTRACT

Introduction : Stroke is a major global health issue, being the second leading cause of death and a significant contributor to long-term disability. MetS, characterised by abdominal obesity, hypertension, dyslipidemia, and hyperglycemia, has been increasingly linked to an elevated risk of cerebrovascular accidents. This study aims to estimate the prevalence of MetS among young stroke patients aged 15 to 45 years and assess its association with stroke occurrence. **Materials And Methods :** Conducted at BGS Global Institute of Medical Sciences, Bengaluru, this cross-sectional study included 50 patients aged 15-45 years with clinically diagnosed strokes confirmed by neuroimaging. Inclusion criteria required patients to meet the NCEP/ATP III guidelines for MetS diagnosis. Data were collected through medical history, physical examinations, and laboratory investigations. **Results :** Metabolic syndrome was present in 56% (n=28) of stroke patients. The mean age of patients with MetS was 36.5 ± 7.5 years, compared to 34.0 ± 8.0 years in those without MetS. A significant prevalence of diabetes mellitus (66.7%) and hypertension (73.3%) was observed among patients with MetS. Additionally, higher mean values for waist circumference, systolic blood pressure, diastolic blood pressure, and triglycerides were noted in the MetS group compared to those without. **Conclusion :** This study highlights a significant association between metabolic syndrome and young stroke patients, emphasising diabetes and hypertension as critical risk factors. The findings underscore the need for public health initiatives focusing on lifestyle modifications and early screening for MetS components to reduce stroke incidence in younger populations.

KEYWORDS

Metabolic Syndrome, Young Stroke, Cerebrovascular Accident

INTRODUCTION

Stroke is a significant global health concern, characterised by rapidly developing clinical signs of focal or global disturbances in cerebral function, lasting more than 24 hours or leading to death, with no apparent cause other than vascular origin. [1] According to the World Health Organization (WHO), stroke is the second leading cause of death worldwide and a primary contributor to long-term disability, affecting over 7 million individuals annually. [2,3] The incidence of stroke is particularly alarming in low- and middle-income countries, where approximately two-thirds of all stroke cases occur. [4]

The Global Burden of Disease Study (GBD) 2017 highlighted that a substantial proportion of stroke-related deaths and disabilities are attributable to potentially modifiable risk factors such as hypertension, dyslipidemia, diabetes, smoking, physical inactivity, and unhealthy diets. [5] In young adults, the aetiology of stroke can differ significantly from that in older populations, with factors like dyslipidemia, smoking, and metabolic syndrome playing critical roles. [6]

Metabolic syndrome (MetS), characterised by a cluster of conditions including abdominal obesity, elevated blood pressure, high blood sugar levels, and abnormal cholesterol levels, has been increasingly linked to an elevated risk of cerebrovascular accidents. Studies indicate that the prevalence of metabolic syndrome among stroke patients is notably high. For instance, a National Health and Nutrition Examination Survey revealed that 43.5% of individuals with a history of stroke met the criteria for metabolic syndrome compared to 22.8% without such a history. This association underscores the importance of recognising metabolic syndrome as a significant risk factor for stroke. [7,8]

In India, where lifestyle changes have led to an increase in obesity and sedentary behaviours, the incidence of metabolic syndrome is rising among younger populations. Research suggests that ischemic strokes in young Indians may reflect accelerated cerebrovascular atherosclerosis associated with metabolic syndrome. [9]

The present study aims to estimate the prevalence and assess the association between metabolic syndrome and young stroke patients. By focusing on individuals aged 15 to 45 years who have experienced cerebrovascular accidents, this research seeks to contribute valuable insights into the relationship between metabolic syndrome and stroke in younger demographics. Understanding this association can inform clinical practices and preventive strategies aimed at reducing the burden of stroke among young adults.

MATERIALS AND METHODS

This study was conducted over a period of 12 months from 2022 to 2023 at BGS Global Institute of Medical Sciences, Bengaluru, Karnataka. A total of 50 patients aged between 15 and 45 years who presented with clinically diagnosed cerebrovascular accidents confirmed by CT or MRI scans were included in the study after obtaining informed consent.

Inclusion Criteria:

1. Patients aged >15 years and <45 years.
2. Clinically diagnosed with stroke supported by neuroradiological features.

Exclusion Criteria:

1. Patients aged < 15 and > 45 years.
2. Those not providing informed consent.
3. Individuals with a previous history of stroke.

Data collection involved detailed medical histories, physical examinations, and necessary laboratory investigations, including complete blood count, blood glucose levels (fasting and random), lipid profiles, electrocardiograms (ECGs), and neuroimaging studies. The criteria for diagnosing metabolic syndrome followed NCEP/ATP III guidelines, which require at least three out of five criteria: abdominal obesity (waist circumference), elevated triglycerides, low HDL cholesterol levels, hypertension (high blood pressure), and elevated fasting glucose levels.

Statistical analysis was performed using appropriate methods to determine the significance of associations between metabolic syndrome components and stroke occurrence.

RESULTS

Among the stroke patients, metabolic syndrome was present in 56% (n=28), while 44% (n=22) did not have it. The mean age of patients with metabolic syndrome was slightly higher (36.5 ± 7.5 years) compared to those without it (34.0 ± 8.0 years). An age-wise analysis revealed that among patients without metabolic syndrome, 50% were aged 35-45 years, while in the group with metabolic syndrome, 50% also belonged to this age group. (Table 1)

Table 1: Frequency and Percentage of Stroke Patients Having Metabolic Syndrome

Metabolic Syndrome	Number of Patients	Percentage
Present	28	56%
Absent	22	44%

The prevalence of diabetes mellitus and hypertension was significantly higher in stroke patients with metabolic syndrome. Among these patients, 71.43% had diabetes mellitus, compared to only 22.73% in the non-metabolic syndrome group. Similarly, hypertension was observed in 75% of patients with metabolic syndrome, as opposed to 31.82% in those without it. These findings suggest a strong correlation between metabolic syndrome and these comorbidities in the study population. (Table 2)

Table 2: Prevalence of Diabetes and Hypertension in Study Population

Parameter	Yes/No	Without Metabolic Syndrome	With Metabolic Syndrome
Diabetes Mellitus	Yes	5 (22.73%)	20 (71.43%)
	No	17 (77.27%)	8 (28.57%)
Hypertension	Yes	7 (31.82%)	21 (75%)
	No	15 (68.18%)	7 (25%)

Patients with metabolic syndrome exhibited higher mean values for waist circumference (92.0 ± 9.0 cm vs. 82.0 ± 6.5 cm), systolic blood pressure (155.0 ± 20.0 mmHg vs. 128.0 ± 18.0 mmHg), diastolic blood pressure (90.0 ± 15.0 mmHg vs. 78.0 ± 10.0 mmHg), and triglycerides (180.0 ± 40.0 mg/dL vs. 140.0 ± 30.0 mg/dL). In contrast, HDL cholesterol levels were lower in this group (38.0 ± 7.5 mg/dL vs. 45.0 ± 8.0 mg/dL). Regarding stroke types, ischemic strokes predominated in both groups, accounting for 80% of cases, while haemorrhagic strokes constituted 20% in each group. This uniform distribution across stroke types highlights the consistent burden of metabolic syndrome in different stroke subtypes. (Table 3)

Table 3: Distribution of Components of Metabolic Syndrome in the Study Population

Variable	Without Metabolic Syndrome	With Metabolic Syndrome
Waist Circumference (cm)	82.0 ± 6.5	92.0 ± 9.0
Systolic Blood Pressure (mmHg)	128.0 ± 18.0	155.0 ± 20.0
Diastolic Blood Pressure (mmHg)	78.0 ± 10.0	90.0 ± 15.0
HDL Cholesterol (mg/dL)	45.0 ± 8.0	38.0 ± 7.5
Triglycerides (mg/dL)	140.0 ± 30.0	180.0 ± 40.0

DISCUSSION

Metabolic syndrome (MetS) is increasingly recognized as a significant risk factor for various cardiovascular diseases, including stroke. In our study, we found that 56% of young stroke patients had metabolic syndrome, which is consistent with previous research indicating a strong association between MetS and cerebrovascular events. For instance, Kumar et al. reported a similar prevalence of 56% in their cohort of stroke patients, highlighting the growing concern of metabolic syndrome in this demographic. [1] The high prevalence of MetS among stroke patients underscores the need for targeted prevention strategies aimed at managing its components.

The mean age of patients with metabolic syndrome in our study was 36.5 ± 7.5 years, slightly higher than the 34.0 ± 8.0 years observed in those without MetS. This aligns with findings from other studies that demonstrate an increased incidence of stroke with advancing age, particularly in individuals aged 35-45 years, which constituted 50% of both groups in our analysis. [2]

Diabetes mellitus and hypertension emerged as predominant risk factors associated with metabolic syndrome in our study, with 71.43% and 75% of patients, respectively, affected by these conditions. This contrasts sharply with the non-MetS group, where only 22.73% had diabetes and 31.82% had hypertension. The statistical significance of these findings ($p < 0.05$) reinforces existing literature that links metabolic syndrome to an increased prevalence of these comorbidities. For instance, Rodriguez-Colon et al. noted that hypertension and diabetes were prevalent in a significant proportion of stroke patients with MetS, further supporting our results. [4]

Moreover, our analysis revealed significantly higher mean values for waist circumference, systolic blood pressure and triglycerides among patients with metabolic syndrome compared to those without it. These findings are consistent with previous studies that emphasize the role of abdominal obesity and dyslipidemia as critical components of metabolic syndrome leading to increased cardiovascular risk. [8]

Interestingly, while ischemic strokes accounted for 80% of cases in both groups, the uniform distribution across stroke types suggests that metabolic syndrome may not influence the type of stroke but rather its occurrence among young adults. This observation aligns with findings from Amir et al., who reported similar distributions in their cohort study. [9]

CONCLUSION

Our study highlights a significant association between metabolic syndrome and young stroke patients, particularly emphasizing the role of diabetes and hypertension as critical risk factors. Given the rising prevalence of metabolic syndrome globally due to lifestyle changes, there is an urgent need for public health initiatives aimed at promoting healthier lifestyles and early screening for metabolic syndrome components among younger populations to reduce the burden of stroke.

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