Original Article

To Find Frequency of Significant Stenosis of Carotid Artery in Patients of Ischemic Stroke in a Tertiary Care Teaching Hospital

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Abstract

Objective: To find the frequency of significant stenosis of carotid artery in patients of ischemic stroke in a tertiary care teaching hospital in Lahore.

Methods: This descriptive study was performed in South Medical Ward of Mayo Hospital, Lahore during 27-05-2021 to 26-11-2021. All 131 ischemic stroke patients fulfilling inclusion criteria were enrolled. Once registered these cases underwent baseline investigations & color doppler ultrasonography to diagnose significant carotid stenosis. The outcome variable, i.e. significant carotid artery stenosis was entered in specifically designed proforma for study.

Results: Out of these 131 cases, 81 (61.8 %) were male whilst 50 (38.2 %) were female. The average age in patients was 52.31 ± 8.67 years. Out of them, 33 (25.2 %) were residing in rural areas and 98 (74.8 %) living in urban area. Socioeconomic status was poor in 46 (35.1%) and 85 (64.9%) belonged to the middle class. Diabetes Mellitus was found in 39 (29.8 %) while hypertension was seen in 81 (61.8 %) cases. Mean Body Mass Index (BMI) in our cases was 26.21 ± 1.97 kg/m2 & 17 (13 %) were obese among our cases. Significant carotid artery stenosis was noted in 52 (39.7%).

Conclusion: These results indicate high frequency of significant stenosis of carotid artery in ischemic stroke patients. Significant carotid artery stenosis was significantly associated with advancing age. All physicians treating these patients of ischemic stroke should look for significant carotid artery disease which will save them from future adverse events. This will reduce morbidity, mortality & prolonged hospitalization among these patients.

Keywords; Significant Carotid artery disease, ischemic stroke, frequency

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Introduction

Cerebrovascular accident is a leading health-related issue & perhaps leading cause of disability & mortality all over the world.[1,2] Every year almost 15 million people develop ischemic type of stroke. About 5 million develop non-fatal strokes which may lead to disability in about one third of the patients. It is also an important reason for functional disability, with 20% survivors requiring hospital care even after three months & 15-30% permanently develop disability. This has a huge impact on individual families & the community, particularly in this part of the world.[2] World Health Organization (WHO) estimated in 2020 that stroke illness remains second leading etiology of death along with ischemic heart disease all over the world.[3] In addition, in the third world countries, stroke patients are ten years younger in age than their western counterparts & therefore disability burden is greater among those who survive.[4] Ischemic stroke develops due to narrowing of an artery supplying to the brain. Ischemia is responsible for 60 to 90% of stroke related cases in Pakistan. Risk factors will be divided into those which are non-modifiable like age, family history, previous stroke, sex & ethnicity and those which are modifiable like high blood pressure, diabetes mellitus, ischemic heart disease, atrial fibrillation, hyperlipidemia, smoking, obesity, alcohol abuse & physical inactivity.[5-7] Stenosis of carotid artery, an important risk factor for stroke, and distal embolization, arising from degenerative breakdown or thrombotic occlusion of complex plaques, are significant reasons

for stroke amongst those who have atherosclerotic internal carotid artery. Duplex ultrasonography is perhaps the most precise non-invasive and inexpensive diagnostic test at present available to evaluate internal carotid artery for stenosis.[8] It will provide us information about presence and severity of carotid stenosis, velocity and characteristics of blood flow, and plaque morphology.[9] A study in Peshawar by Hadi et al[10] reported 56% significant stenosis while study by Razzaq et al[11] found 21% significant carotid stenosis. The majority of studies have reported only frequencies of carotid stenosis while this study has been proposed to ascertain significant carotid stenosis in ischemic stroke patients.

Methods

It was a descriptive type cross-sectional study performed in South Medical Ward of Mayo Hospital, Lahore for six months from 27-05-2021 to 27-11-2021 Sample size of 131, calculated using formula; $n=z^2pq/d^2$ (Where z=1.96, p=21 % (frequency of significant carotid stenosis in ischemic stroke) 11, q=100-p, d= 7 % at 95% confidence level) having non probability, consecutive sampling technique was taken. Patients of 20-70 years, of both genders, with ischemic stroke, less than 1 month duration were included. while those with hemorrhagic stroke (on CT scan), having cardiac diseases before onset of ischemic stroke, confirmed from patient's record, previously diagnosed as brain tumors (with history & medical record), not giving consent of participation were excluded. All ischemic stroke patients fulfilled inclusion criteria and were enrolled. Proper permission regarding study was granted by Institutional Ethical Committee. Written consent was also observed by every patient/attendant, who were also told about aims of concerned study, ensuring about confidential nature of all information provided and fact that there will be no risk involved to patient taking part in study. Once registered these cases underwent baseline investigations & color doppler ultrasonography to diagnose significant carotid stenosis. The outcome variable i.e. significant carotid stenosis was recorded on proforma designed for it along with demography such as age, sex, resident status, family history, diabetes, hypertension, smoking and alcohol use were entered on pre-designed questionnaire by the author. All data was recorded & scrutinized by computer program version SPSS-18. All descriptive statistics were analyzed to estimate mean & standard deviation for age & BMI. Frequencies and percentages were analyzed for categorical variables like carotid stenosis, age, sex, raised blood pressure, diabetes mellitus, resident status and obesity. Effect modifiers e.g., age, sex, hypertension, resident status, diabetes mellitus & obesity were managed by stratification. Chi-square test was applied to check their effects on the outcome. P value which will be equal to or less than 0.05 was observed very much significant.

Results

Out of 131 cases, 81(61.8 %) were male whilst 50 (38.2%) were female. The average age among these was 52.32 ±8.67 years (with minimum of 32 years whilst maximum of 70 years). Average age among males was noted to be 52.99 ± 8.02 years while that among females was 51.20 ± 9.60 years (p=0.253). Our findings indicate that most of our cases i.e. 75 (57.3 %) were having age more than 50 years (Table No. 1). Out of these 131 cases, 33(25.2 %) were from rural population & 98 (74.8 %) were from urban area. Socioeconomic status was noted to be poor in 46 (35.1%) and 85 (64.9%) were having middle class status. Diabetes mellitus was seen in 39 (29.8%) cases (Table No. 2). Hypertension was found in 81 (61.8%) cases (Table No. 3). Average body mass index in our cases was 26.21±1.97 kg/m² and obesity was seen in 17(13.0 %) cases. Significant carotid artery stenosis was noted in 52 (39.7%)(Table No. 4) and it stratified

Table 1: *Age wise distribution of study cases. (n = 131)*

Age groups	Frequency	Percentage
Up to 50 Years	56	42.7
More than 50 Years	75	57.3
Total	**131**	**100**

Table 2: *Distribution of diabetes among study cases. (n = 131)*

Diabetes	Frequency	Percentage
Yes	39	29.8
No	92	70.2
Total	**131**	**100**

Table 3: *Distribution of hypertension among study cases. (n = 131)*

Hypertension	Frequency	Percentage
Yes	81	61.8
No	50	38.2
Total	**131**	**100**

Table 4: *Distribution of significant carotid artery stenosis among study cases. (n = 131)*

Significant carotid artery stenosis	Frequency	Percentage
Yes	52	39.7
No	79	60.3
Total	**131**	**100**

with reference to sex, age, residential status, diabetes, hypertension, obesity and socioeconomic status.

Discussion

All types of strokes clinically present in a manner as neurological deficit of acute onset resulting in partial or complete weakness of one half of body. Symptoms will depend upon involved area of brain, which in turn is denoted according to arterial supply. Therefore, in acute phase, brain and neurovascular imaging is mainly required in all stroke patients. In stroke of left hemisphere, common symptoms will include loss of speech, right sided hemiparesis or hemiplegia and right sided hemianopia, while that of right hemisphere, symptoms will be left hemi-spatial neglect, left sided hemiparesis or hemiplegia and left hemianopia. Most (90%) of strokes are from anterior circulation or supratentorial stroke, so people should be explained to recognize & act accordingly using acronym FAST, i.e. facial droop, arm drop, speech disturbance and time. Posterior circulation or infratentorial stroke has different and multitude of findings, including double vision, palsies of lower four cranial nerves leading on to difficulty in swallowing, unilateral dysmetria & incoordination of movement, as well as decreased levels of consciousness. On the contrary, headache, facial pain or neck pain may be an ancillary symptom, stroke is classically painless[12]. Recently association between diabetes mellitus duration and ischemic type of stroke risk has been under scrutiny in all general population, with longer duration of diabetes mellitus have association with significantly higher risk of stroke as in comparison to those who do not have diabetes mellitus. Association between hemoglobin A1c (HbA1c), a measure of average blood glucose for last 3 months, and ischemic stroke in diabetes mellitus patients has been thoroughly investigated in general population. Raised HbA1c was an independent risk factor for stroke in diabetes mellitus cases with risk ratios of 1.17 and 2.33 for the highest two tertiles of HbA1c compared with lowest tertile over 10 years of follow-up[13].

Of these 131 cases, 81 (61.8 %) were males while 50 (38.2 %) were females. Multiple studies have found male preponderance among ischemic stroke patients. Saeed et al 14 in his study also found male dominance with 61.11 % in stroke due to ischemia. Javed et al[15] in D.G Khan also found 61% males having male dominance. Likewise, Farooq et al 16 in Faisalabad has observed 54 % males of ischemic stroke. Sico et al[17] also seen 58.01% male preponderance. Results of all above mentioned studies are similar to our results with reference to male predominance. The average age of our cases was 52.32±8.67 years (with low of 32 years while high of 70 years). Average age in males was noted to be 52.99 ± 8.02 years while that of females was 51.20 ± 9.61 years (p=0.253). Our findings showed that in most cases i.e. 75 (57.31 %) were more than 50 years. Research performed by Saeed et al 96 found mean age of 64.4 ± 11.5 years which is a little bit more than that of our research. Khan et al[18] found average age of 58.11 ±15.28 years which is closer with our findings. Soyama et al[19] in Japan found average age in males was 2.61 years higher to that of females. Our research has found the same results which are in accordance to Soyama et al[11]. Abid et al[20] found mean age of 55.96 ± 13.75 years presented with stroke due to ischemia which is similar to that of ours. Of 131 cases, 33 (25.2 %) belonged to rural areas & 98 (74.8 %) to urban area. Poor socioeconomic status was seen in 46 (35.1%) and 85 (64.9%) were having middle income. Diabetes Mellitus was found in 39 (29.8 %) cases. Javed et al[15] in Dera Gazi Khan also found 40 % diabetes. Research performed by Farooq et al[16] has also found 34.8 % diabetes mellitus in ischemic strokes which is equal to that of our results. Hypertension was seen in 81 (61.8 %) cases. Sadreddini et al[21] found in Iran that ischemic stroke presented as hypertension in 78%. Our findings are in accordance to those of Sadreddini et al[21] in Iran. Mean body mass index in ours was 26.22 ± 1.97 kg/m^2 and obesity was seen in 17 (13%) of our cases while significant carotid artery stenosis was noted in 52 (39.7%). Research conducted in Peshawar by Hadi et al[10] has seen 56% significant while another study by Razzaq et al[11] found 21% significant carotid stenosis in ischemic stroke. These results are very much equivalent to those of our findings.

Conclusion

Our findings indicate increased frequency of significant narrowing of carotid artery in patients of ischemic stroke. Significant carotid artery stenosis was highly associated with advancing age. All clinicians treating these patients of ischemic stroke should monitor for significant carotid artery disease which will save them from future adverse events. This will reduce disease morbidity, mortality and prolonged hospitalization among these.

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