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ISCHEMIC AND HEMORRHAGIC STROKE;

COMPARATIVE STUDY TO ASSESS THE FREQUENCY OF ISCHEMIC AND HEMORRHAGIC STROKE AND ASSOCIATED RISK FACTORS IN PATIENTS WITH HYPERTENSION.

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ABSTRACT… Objectives: The aim behind this study was assess the frequency of ischemic and hemorrhagic stroke and associated risk factors in patients with hypertension. **Study Design:** Cross sectional study. **Period:** One year from (1st April 2016 to 28th February 2017). **Setting:** Department of Medicine People's Medical University, Shaheed Benazirabad. **Material and Methods:** This study was a hospital based study in which sampling was done through a purposive sampling technique. A total of 160 patients admitted with stroke were included in our study. After taking informed consent patient's relevant history and examination were carried out. CT-Scan was done to confirm and different between ischemic and hemorrhagic stroke. SPSS version 17.0 was used to analyze the collected data. **Results:** Ischemic stroke was observed in 105 (66%) patients and 55 (34%) were suffered hemorrhagic stroke. Hypertension was 100% in both types of storks in ischemic stroke and hemorrhagic stroke. Rate of diabetes mellitus, dyslipidemia and smoking were significantly high in hemorrhagic stroke than ischemic stroke ($p<0.01$). **Conclusion:** We found a high prevalence of ischemic stroke than hemorrhagic stroke in our population. Among associated factors gender, hypertension, dyslipidemia, diabetes and smoking were prevalent in both ischemic and hemorrhagic stroke patients.

Key words: Type of cereberovascular Accident, Risk Factors, Ischemic Stroke, Hypertension.

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INTRODUCTION

Cerebrovascular accident or sometimes called as brain stroke is one of a medical emergencies which should be dealt immediately to prevent lifelong disability or in worse cases death which also causes financial burden on family but also on their members. Those patients who have experienced stroke immediately shows signs of focal deficit due to loss of functioning of that affected part pf a body caused by the occlusion of thrombus.[1-4]

Developed countries are more affected with CVA than developing world. The CVA is accounted for third most common cause of deaths in developed world while it is second most common cause of death worldwide. An annual estimated death rate of stroke based on WHO data was 5.5 million and most of them belong from South-Asian population but over the past three decades, the number of new cases has declined significantly in western countries and increased in Asian countries including Pakistan, India, and Bangladesh.[5-9]

Stroke is common complication of hypertension and may be due to cerebral hemorrhage or cerebral infarction. Carotid atheroma and transient cerebral ischemic attacks are more common in hypertensive patients. Hypertension is major risk factor for ischemic as well as hemorrhagic strokes. Hypertension is found in 72-81% of patients with intracerebral hemorrhage.[10] It is already well known that there are certain modifiable and certain non-modifiable risk factors are present which contribute in the development of cerebrovascular accident. Well studied and most known non-modifiable risk factors are increasing age, sex, racial origin, family history of CVA, and ethnicity while the modifiable risk factors are those which can be controlled or treated and the risk of CVA can be decreased by managing these modifiable risk factors such as cigarette

smoking, alcohol abuse, hypertension, diabetes mellitus, metabolic syndrome, dyslipidemia, and physical inactivity, asymptomatic carotid stenosis and other cardiac disorders are all potentially treatable conditions that predispose to stroke.[11-14]

Based on the above data and scientific gap we conducted a study to scientifically determine the actual burden of CVA (ischemic and hemorrhagic) in patients with diagnosed cases of systemic hypertension and compared their associated factors in patients hospitalized at Peoples University Hospital Nawabshah Sindh.

PATIENTS AND METHODS

This study was a hospital based study in which sampling was done through a purposive sampling technique using a cross sectional study design for a period of one year from 1st April 2016 to 28th February 2017 in the Department of Medicine People's Medical University, Shaheed Benazirabad.

We have enrolled in this study diagnosed cases of cereberovascular accident with age more than 25 and having systemic hypertensive of more than five years and of either gender. Those patients whose age was less than 25 and more than 80 years and those whose cereberovascular accident was other than ischemic or hemorrhagic stroke were excluded from this study. Before commencement of the study, the ethical approval was taken from both the patients and from the hospital.

Patients fulfilling the inclusion criteria attending the ER of PMCH Nawabshah were selected. After taking detailed history of stroke and of associated factors like hypertension, Diabetes Mellitus, smoking with neurological examination, CT scan were done, than patients was subject to relevant investigations to look for associated factors ECG to see cardiac cause, blood CP, fasting lipid profile, random blood sugar, serum urea and creatinine. Proforma was filled accordingly.

DATA ANALYSIS

Mean and standard deviation was calculated for quantitative variable like age while frequency and percentage was calculated for qualitative variable like sex, smoking, diabetes mellitus and dyslipidemia as well as ischemic and hemorrhagic stroke. Using chi square test and effect modifier/ confounders like age, gender, duration of hypertension, were controlled by stratification; chi square test was applied to compare risk factor and stroke among age groups and gender. p value ≤ 0.05 was taken as significant.

After collection of data the analyses were conducted by using Statistical Package for Social Science (SPSS) software, Version 16.

RESULTS

A total of 160 patients with hypertension were included in this study. Most of the patients were 51 to 70 years of age as presented in Figure-1. The average age of the patients was 59.5 $\pm$ 11.1 years.

Out of 160 stroke patients, 99 (61.9%) were males and 61 (38%) were females with 1.62: 1 male to female ratio as shown in Figure-2. Ischemic stroke was observed in 105 (66%) patients and 55 (34%) were suffered hemorrhagic stroke as shown in Figure-3.

Frequency of risk factors of stroke is presented in Table-I. Out of 160 patients, 78.1% patients were diabetic mellitus, 100% patients were hypertensive, 39.4% patients were dyslipidemic, and 31.9% patients were smokers.

Frequency of modifiable risk factors with respect to stroke is presented in Table-II. Hypertension was 100% in both types of storks in ischemic stroke and hemorrhagic stroke. There were 85.7% patients were diabetic in ischemic stroke and 63.6% in hemorrhagic stroke. Dyslipidemia and smoking were also observed in 52.4% and 42.9% in ischemic and 14.5% and 10.9% in hemorrhagic stroke respectively. Rate of diabetes mellitus, dyslipidemia and smoking were significantly high in hemorrhagic stroke than ischemic stroke ($p<0.01$) as presented in Table-II. Similarly modifiable risk factors with respect to age groups, gender and duration of hypertension are also presented in Table-III to VII.

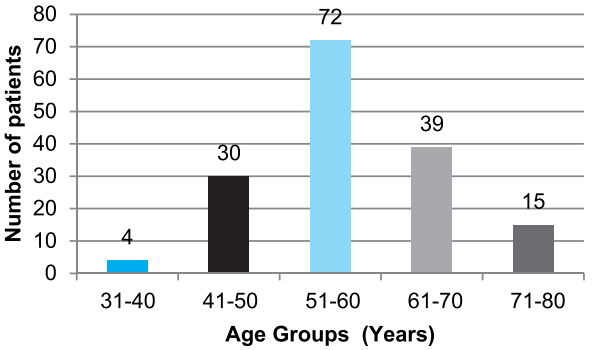

Figure-1. Age distribution of the patients n=160

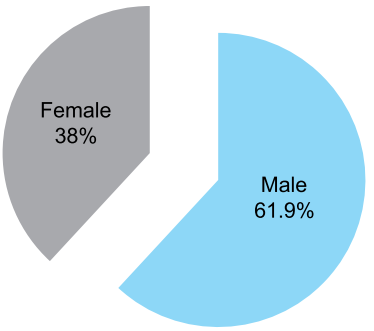

Figure-2. Gender distribution n=160

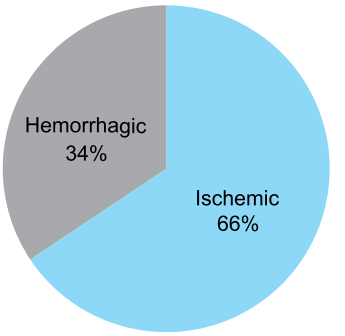

Figure-3. Ischemic and hemorrhagic stroke in hypertensive patients n=160

Risk Factors	Stroke (Ischemic and Hemorrhagic) n=160	
	N	Percentage
Hypertension	160	100%
Diabetes mellitus	125	78.1%
Dyslipidemia	63	39.4%
Smoking	51	31.9%

Table-I. Factors among ischemic and hemorrhagic stroke in hypertensive patients (n=160)

Risk Factors	Ischemic n=105		Hemorrhagic n=55		P-Values
	N	Percentage	N	Percentage	
Hypertension	105	100.0%	55	100.0%	NA
Diabetes mellitus	90	85.7%	35	63.6%	0.001*
Dyslipidemia	55	52.4%	8	14.5%	0.0002*
Smoking	45	42.9%	6	10.9%	0.0005*

Table-II. Comparison associated factors among ischemic and hemorrhagic stroke in hypertensive patients (n=160)
NA; Not Applicable because hypertension was observed in all cases. *significant

Risk Factors of Ischemic Stroke	Age Groups (Years)			P-Values
	31-50 n=24	51-60 n=51	>60 n=30	
Hypertension	24(100%)	51(100%)	30(100%)	NA
Diabetes mellitus	21(88%)	45(88%)	24(80%)	0.57
Dyslipidemia	4(17%)	26(51%)	25(83%)	0.0005
Smoking	3(13%)	22(43%)	20(67%)	0.0005

Table-III. Comparison of associated factors among ischemic stroke with respect to age groups (n=105)

Risk Factors	Male n=65	Female n=40	P-Values
Hypertension	65(100%)	40(100%)	NA
Diabetes mellitus	50(55.6%)	40(100%)	0.001*
Dyslipidemia	30(54.5%)	25(45.5%)	0.68
Smoking	20(44.4%)	25(55.6%)	0.001*

Table-IV. Comparison of associated factors among ischemic stroke with respect to gender (n=105)

Risk Factors	Age Groups (Years)			P-Value
	31-50 n=10	51-60 n=21	>60 n=24	
Hypertension	10(100%)	21(100%)	24(100%)	NA
Diabetes mellitus	5(50%)	15(71%)	15(63%)	0.51
Dyslipidemia	1(10%)	3(14%)	4(17%)	0.88
Smoking	0(0%)	3(14%)	3(13%)	0.46

Table-V. Modifiable risk factors of hemorrhagic stroke with respect to age groups (n=55)

Risk Factors	Male n=34	Female n=21	P-Values
Hypertension	34(100%)	21(100%)	NA
Diabetes mellitus	20(57.1%)	15(42.9%)	0.34
Dyslipidemia	5(62.5%)	3(37.5%)	0.96
Smoking	2(33.3%)	4(66.7%)	0.18

Table-VI. Comparison of factors of hemorrhagic stroke with respect to gender (n=55)

Stroke	Duration of Hypertension (Years)			P-Value
	≤5 n=30	6 to 10 n=70	>10 n=60	
Ischemic	20(19%)	50(47.6%)	35(33.3%)	0.29
Hemorrhagic	10(18.2%)	20(36.4%)	25(45.5%)	

Table-VII. Stroke with respect to duration of hypertension (n=105)

DISCUSSION

Besides other modifiable risk factors, high blood pressure is amongst them most commonly present in patients those who suffer from CVA irrespective of its type, which is still unclear. The burden of stroke has been increased and its associated morbidity and mortality among patients with vascular diseases, on the other hand the Pakistan has comparatively increased number of stroke and has become a major public health problem.[15,16] The underlying pathophysiologic and causative risk factors are different among two types of strokes. That is why it is an utmost important to distinguish the risk factors and to diagnose type of stroke to reduce the burden of new cases and associated complications. A study conducted in East China on 692 patients in which 540 patients were having ischemic stroke and 152 patients were having hemorrhagic stroke, in their study they have found that patients with hemorrhagic stroke shares a different risk factors than ischemic stroke ($P<0.05$). The study concluded that the most prominent factors for overall stroke in East China were hypertension, followed by higher pulse pressure and hypercholesteremia. The factors for ischemic and hemorrhagic stroke are not the same. Different effects of risk factors on stroke are found in male and female patients.[17]

Our study was conducted to identify the factors that predispose to ischemic versus hemorrhagic stroke in hypertensive patients. A cohort study was conducted at the Aga Khan University Hospital (AKUH), Karachi, including hypertensive patients. Their observation has included more than 500 diagnosed patients of CVA either due to ischemic or hemorrhagic in duration of roughly around two years. The authors have observed that more than 65% of the patients had underlying hypertension and among them around 50% of the patients were hospitalized due to CVA for the first time (18;19). Similarly our study results also support the above findings with HTN, DM, Dyslipidemia and smoking significantly high in ischemic stroke patients than hemorrhagic stroke. Moreover this difference between ischemic and hemorrhagic stroke was significant for dyslipidemia and smoking.[18]

Our study with a comparatively small sample was not able to evaluate several factors, however; we found diabetes, smoking and dyslipidemia significantly more prevalent in ischemic stroke patients than hemorrhagic stroke patients. Moreover, factors such as HTN and female

gender were almost equally prevalent in ischemic and hemorrhagic stroke.[20,21]

Differences in risk factor profiles between patients with ischemic and hemorrhagic stroke may have an impact on subsequent mortality. One of a previously conducted study for a period of 4 years in which authors have included different risk factors for stroke including CHA_2DS_2VASc score to evaluate the outcome after ischemic and hemorrhagic stroke. Certain variables such as diabetes mellitus, smoking, younger age, and dyslipidemia were more prevalent in ischemic stroke as compared to hemorrhagic stroke. On the other hand all the patients with CVA irrespective of its type were having hypertension.[4,22-24]

Those admitted patients who had higher CHA_2DS_2VASc score excluding those who were hypertensive were having comparatively increased risk of ischemic stroke than hemorrhagic stroke. On the other hand, 30 day mortality was also assessed in which the data has shown that those CVA patients who had hemorrhagic infarct were associated with increased 30 day mortality in comparison to Ischemic infarct but after 30 days of first event the rate of mortality observed to be similar in both groups (141).

Based on the above data and scientific gap we conducted a study to scientifically determine the actual burden of CVA (ischemic and hemorrhagic) in patients with diagnosed cases of systemic hypertension and compared their associated factors in patients hospitalized at Peoples University Hospital Nawabshah Sindh. One of a previously conducted study was carried out to determine the incidence of stroke in the people who have high blood pressure. Their study although had small number of patients (N = 100) but their observation has quite significant impact on scientific work done on stroke related to High Blood Pressure. The findings of their study were highly diverted towards high blood pressure is the sole significant risk factor of stroke and causes stroke in nearly more than one third of patients in which males were predominant (64 males and 36 females). Patients with High Blood Pressure in which hemorrhagic stroke have developed were mainly affect Hypothalamic and Putamen parts of brain.[24-27]

A hospital based study conducted to investigate the distribution patterns and risk factors of stroke along with 10-year probability of stroke on 1088 hypertensive patients who visited 61 community-based hospitals nationwide. Data from the scientific study has shown that uncontrolled hypertension is more than 60% prevalent irrespective of gender and is more common in females than males even after the use of anti-hypertensive therapy (59.6% women and 68.7% men; $P < 0.05$). The study has further extended and observed that overall more than 15% of hypertensive patients had risk of developing stroke and is around 4.6 times higher as compared to general population and is significantly more common in male proportion than females (14.68% women, 17.99% men; $P < 0.001$). While those patients who were taking anti-hypertensive medicines the risk of 10- year stroke is related to measurement of their blood pressure readings, higher the blood pressure higher the risk of stroke.[28,29]

CONCLUSION

We found a high prevalence of ischemic stroke than hemorrhagic stroke in our population. Among associated factors gender, hypertension, dyslipidemia, diabetes and smoking were prevalent in both ischemic and hemorrhagic stroke patients. However, similar to other studies we found dyslipidemia, diabetes and smoking more prevalent in ischemic stroke population than hemorrhagic stroke. However due to comparatively small sample and other limitations we recommend further studies with large sample sizes and multiple settings to reach the firm conclusion.

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