CODEN [USA]: IAJPBB ISSN: 2349-7750

INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES
http://doi.org/10.5281/zenodo.3590228

Available online at: http://www.iajps.com Research Article

# FREQUENCY OF ISCHEMIC AND HEMORRHAGIC STROKE IN HYPERTENSIVE PATIENTS PRESENTING WITH STROKE

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**Abstract:**

***Objective:*** *To determine the frequency of ischemic and hemorrhagic stroke in patients with Hypertension presenting with stroke*

***Material and Methods:*** *The design of this study is Descriptive Cross-Sectional Study and the duration of this study was from August 2017 to February 2018. 180 consecutive patients satisfying the inclusion and exclusion criteria were offered to enroll in the study. The study was conducted at Department of Medicine,* Bolan Medical Complex Hospital Quetta. *Age, Gender, factors like smoking, diabetes, hypertension and hypercholesterolemia were recorded on a proforma. CT scan was done in all the patients and the type of stroke according to CT findings was then entered into the proforma. The data were entered and analyzed by using SPSS v23.0. Effect modifiers like age, gender, DM, smoking (5 packs per year), atrial fibrillation (pulse >300/min) and obesity (BMI >30 kg/m$^2$) were controlled through stratification by applying Chi-Square test.* ***Results:*** *In this study, 180 patients with hypertension were enrolled. Among these patients, 105(58.3%) were males, while 75(41.7%) were females. Most of the patients 130(72.2%) had ischemic stroke, while 50(27.8%) had hemorrhagic stroke. Among 180 patients, 30(16.7%) were obese, while 23(12.8%) were diabetic. 18(10%) were smoker and 6(3.3%) had atrial fibrillation.*

***Conclusion:*** *Hypertension is an important risk factor for ischemic and hemorrhage stroke. An effort should be placed to control blood pressure and other modifiable risk factors to reduce incidence of ischemic and hemorrhage stroke and improve patient outcomes.*

***KEY WORDS:*** *Stroke, Hypertension, Ischemic, Hemorrhagic, Intracerebral, Angiopathy.*

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***Please cite this article in press*** *Aurangzaib Khan* ***et al., Frequency Of Ischemic And Hemorrhagic Stroke In Hypertensive Patients Presenting With Stroke., Indo Am. J. P. Sci, 2019; 06(12).***

## INTRODUCTION:

Intracerebral hemorrhage is caused by rupture or leak of blood vessel within the brain parenchyma that extends into the ventricles and in rare cases, the subarachnoid spaces, most of stroke are ischemic 87%.

Important causes of intracerebral hemorrhage include hypertension, amyloid angiopathy, aneurysms, vascular malformation and hemorrhagic infarcts (both venous and arterial). The most common modifiable risk factor of intracerebral hemorrhage is hypertension seen in 78% at presentation. Hypertension is the one of the cause of death and disability in adult and the hospital admission due to intracerebral hemorrhage, which is increasing gradually worldwide in the past 10 years and the mortality has not been decreased. The risk of intracerebral hemorrhage is more in males than female.

In Pakistan a study conducted on adult pushtoon community residing in Karachi shows prevalence of 4.8% of hemorrhagic stroke which was alike in men and women. And the incidence rate of intracerebral hemorrhage on CT scan brain is 10 to 30 cases per 100,000 persons in the western countries. The worldwide incidence of stroke has variation from nation to nation, suggesting the importance of genetic and environmental factors. According to WHO, 15 million people suffering from stroke worldwide each year.

Intracerebral hemorrhage has a high morbidity and mortality in hospitalized patients worldwide. Diagnosis is mostly clinical but it was wrong in 10-15% of cases so the brain imaging is necessary for accurate diagnosis like CT scan brain and MRI brain, which are helpful to rule out stroke mimics and clinical management. Intracerebral hemorrhage and subarachnoid hemorrhage are managed by supportive therapy and prevention of the complication by controlling the blood pressure and intracranial pressure through medication and ventriculostomy. Hemorrhagic stroke appears to be more common in Pakistan relative to the Western world. It accounts for 10-15% of all stroke cases in Western countries but causes 21% to 31% of hospitalized stroke cases in Pakistan. One reason for higher rates of hemorrhagic stroke might be undiagnosed and poorly controlled hypertension. A recent urban population-based study from a multiethnic community looked at lifetime prevalence of cerebrovascular disease (CVD), stroke, and Transient ischemic attack (TIA) in Pakistan. In comparison with existing worldwide literature, this study showed a much higher prevalence of stroke 19,000 per 100,000 populations (19.1%), almost twice the highest reported prevalence in the world to date.

## MATERIALS AND METHODS:

The design of this study is Descriptive Cross-Sectional Study and the duration of this study was from August 2017 to February 2018. 180 consecutive patients satisfying the inclusion and exclusion criteria were offered to enroll in the study. The study was conducted at Department of Medicine, Bolan Medical Complex Hospital Quetta. Age, Gender, factors like smoking, diabetes, hypertension and hypercholesterolemia were recorded on a pre-designed proforma. CT scan was done in all the patients and the type of stroke according to CT findings was then entered into the proforma. The sample size of 180 cases was calculated with 95% confidence level with 6% margin of error and by taking expected percentage of hemorrhagic stroke in patients with hypertension as 21%. The inclusion criteria of patients in this study was Patients of either gender male or female, Patients of ages between 20-65 years, Patients with history of hypertension more than two year and Patients with stroke either ischemic or hemorrhagic and the patients which were excluded from our study they were the Patients with Transient lschemic attacks (TlAs). After approval of synopsis, 180 consecutive patients satisfying the inclusion and exclusion criteria were offered to enroll in the study. Age, Gender, factors like smoking, diabetes, hypertension and hypercholesterolemia were recorded on a pre-designed proforma. CT scan was done in all the patients and the type of stroke according to CT findings was then entered into the proforma. The collected data were entered and analyzed by using Statistical Package for Social Sciences (SPSS) software v23.0. Quantitative variable such as Age was presented as Mean±SD. Qualitative variable such as Gender, Stroke subtype, Obesity, DM (BSR >200 mg/dl), Smoking and AF were presented as frequencies and percentages. Effect modifiers like age, gender, DM, smoking (5 packs per year), atrial fibrillation (pulse >300/min) and obesity (BMI >30 $kg/m^2$) were controlled through stratification by applying Chi-Square test. A p-value $\leq 0.05$ was considered as significant.

## RESULTS:

In this study, 180 patients with hypertension were enrolled. Among these patients, 105(58.3%) were males, while 75(41.7%) were females. Age range in this study was from 20 to 65 years with mean age of 41.5±13.3 years. Majority of the patients 67(37.2%) were between 20 to 35 years of age. While 56(31.1%) and 57(31.7%) patients were between 36-50 and >50 years of age respectively. Most of the patients 130(72.2%) had ischemic stroke, while 50(27.8%) had hemorrhagic stroke. Among 180 patients, 30(16.7%) were obese, while 23(12.8%) were diabetic. 18(10%) were smoker and 6(3.3%) had atrial fibrillation. By applying Chi-Square test,

it was concluded that, there is no difference between gender and stroke subtype (p<0.955). By applying Chi-Square test, it was concluded that, there is no difference between age and stroke subtype (p<0.371). By applying Chi-Square test, it was concluded that, there is no difference between obesity and stroke subtype (p<0.297). By applying Chi-Square test, it was concluded that, there is no difference between DM and stroke subtype (p<0.761). By applying Chi-Square test, it was concluded that, there is no difference between smoking and stroke subtype (p<1.000). By applying Chi-Square test, it was concluded that, there is no difference between atrial fibrillation and stroke subtype (p<0.537).

**Table-1: Frequency Distribution of Gender**

| Gender | Frequency | Percent |
|---|---|---|
| Male | 105 | 58.3 |
| Female | 75 | 41.7 |
| **Total** | 180 | 100.0 |

**Table-2: Frequency Distribution of Age**

| Age Groups | Frequency | Percent |
|---|---|---|
| 20-35 years | 67 | 37.2 |
| 36-50 years | 56 | 31.1 |
| >50 years | 57 | 31.7 |
| **Total** | 180 | 100.0 |

**Table-3: Frequency Distribution of Stroke Subtype**

| Stroke Subtype | Frequency | Percent |
|---|---|---|
| Ischemic | 130 | 72.2 |
| Hemorrhagic | 50 | 27.8 |
| **Total** | 180 | 100.0 |

Table-4: Frequency Distribution of Obesity

| Obesity | Frequency | Percent |
|---|---|---|
| Yes | 30 | 16.7 |
| No | 150 | 83.3 |
| **Total** | 180 | 100.0 |

**Table-5: Frequency Distribution of Diabetes Mellitus**

| Diabetes Mellitus | Frequency | Percent |
|---|---|---|
| Yes | 23 | 12.8 |
| No | 157 | 87.2 |
| **Total** | 180 | 100.0 |

**Table-6: Frequency Distribution of Smoking**

| Smoking | Frequency | Percent |
|---|---|---|
| Yes | 18 | 10.0 |
| No | 162 | 90.0 |
| **Total** | 180 | 100.0 |

Table-7: Frequency Distribution of Atrial Fibrillation

| Atrial Fibrillation | Frequency | Percent |
|---|---|---|
| Yes | 6 | 3.3 |
| No | 174 | 96.7 |
| **Total** | 180 | 100.0 |

**Table-8: Stratification of Stroke Subtype with Respect to Gender**

| Gender | Stroke Subtype | | Total | p-value |
|---|---|---|---|---|
| | Ischemic | Hemorrhagic | | |
| Male | 76 | 29 | 105 | 0.955 |
| | 72.4% | 27.6% | 100.0% | |
| Female | 54 | 21 | 75 | |
| | 72.0% | 28.0% | 100.0% | |
| **Total** | 130 | 50 | 180 | |
| | 72.2% | 27.8% | 100.0% | |

**Table-9: Stratification of Stroke Subtype with Respect to Age**

| Age Groups | Stroke Subtype | | Total | p-value |
|---|---|---|---|---|
| | Ischemic | Hemorrhagic | | |
| 20-35 years | 45 | 22 | 67 | 0.371 |
| | 67.2% | 32.8% | 100.0% | |
| 36-50 years | 44 | 12 | 56 | |
| | 78.6% | 21.4% | 100.0% | |
| >50 years | 41 | 16 | 57 | |
| | 71.9% | 28.1% | 100.0% | |
| **Total** | 130 | 50 | 180 | |
| | 72.2% | 27.8% | 100.0% | |

**Table-10: Stratification of Stroke Subtype with Respect to Obesity**

| Obesity | Stroke Subtype | | Total | p-value |
|---|---|---|---|---|
| | Ischemic | Hemorrhagic | | |
| Yes | 24 | 6 | 30 | 0.297 |
| | 80.0% | 20.0% | 100.0% | |
| No | 106 | 44 | 150 | |
| | 70.7% | 29.3% | 100.0% | |
| **Total** | 130 | 50 | 180 | |
| | 72.2% | 27.8% | 100.0% | |

**Table-11: Stratification of Stroke Subtype with Respect to Diabetes Mellitus**

| Diabetes Mellitus | Stroke Subtype | | Total | p-value |
|---|---|---|---|---|
| | Ischemic | Hemorrhagic | | |
| Yes | 16 | 7 | 23 | 0.761 |
| | 69.6% | 30.4% | 100.0% | |
| No | 114 | 43 | 157 | |
| | 72.6% | 27.4% | 100.0% | |
| **Total** | 130 | 50 | 180 | |
| | 72.2% | 27.8% | 100.0% | |

**Table-12: Stratification of Stroke Subtype with Respect to Atrial Fibrillation**

| Atrial Fibrillation | Stroke Subtype | | Total | p-value |
|---|---|---|---|---|
| | Ischemic | Hemorrhagic | | |
| Yes | 5 | 1 | 6 | 0.537 |
| | 83.3% | 16.7% | 100.0% | |
| No | 125 | 49 | 174 | |
| | 71.8% | 28.2% | 100.0% | |
| **Total** | 130 | 50 | 180 | |
| | 72.2% | 27.8% | 100.0% | |

**Table-13: Stratification of Stroke Subtype with Respect to Smoking**

| Smoking | Stroke Subtype | | Total | p-value |
|---|---|---|---|---|
| | Ischemic | Hemorrhagic | | |
| Yes | 13 | 5 | 18 | 1.000 |
| | 72.2% | 27.8% | 100.0% | |
| No | 117 | 45 | 162 | |
| | 72.2% | 27.8% | 100.0% | |
| **Total** | 130 | 50 | 180 | |
| | 72.2% | 27.8% | 100.0% | |

## DISCUSSION:

Stroke is the third most common cause of death and leading cause of disability in developing and developed countries. WHO estimates nearly 20% of deaths in South Asia. As no large scale, community based epidemiological studies are available in Pakistan, but annual incidence is nearly 250/ 100,000. The highest prevalence reported in Pakistan was in adult Pushtoon community in Karachi i.e. 4.8%, which is the highest ever reported prevalence in the world. Ischemic strokes being more common than hemorrhagic strokes, but the rate of hemorrhagic stroke is higher compared to Western population. In our study the frequency of ischemic stroke seen in hypertensive were 72.2% which was most commonly seen among males. This ratio was consistent with previous studies on gender, as rate in men has been declined from 2.8% in 2006 to 2.5% in 2009, and then increased to 2.7% in 2010. In our study three quarters of all the patients presented with ischemic stroke were under 50 years of age and the remaining one fourth were less than 65 years.

However, Khan JA et al reported 26% of patients in 15-45 years of age. Syed et al reported a frequency

of 28% of young stroke under age of 55 years. Strokes can occur at any age but risk doubles each decade after age of 55 according to American Heart Association. Vohra et al also reported 34% of patients fewer than 55 years of age. Among Americans age 65 and older prevalence is 40/ 1000 persons and one in 10 Americans over 75 has experienced stroke. The major vascular risk factors like hypertension, diabetes mellitus, smoking, dyslipidemia and obesity is enormous in Pakistan. In our study, hypertension was the risk factor for the ischemic stroke. Longer the duration of hypertension, more was the incidence of the stroke. Hypertension is the leading cause of stroke especially ischemia, but this rate is declining in developed countries largely due to efforts to control blood pressure and smoking. In Pakistan, a cross sectional survey conducted in tertiary care hospital revealed 39% of the people who had hypertension, dyslipidemia and history of active smoking were in age range of 18-55 yrs.

Only 40% of hypertensive patients had controlled blood pressure. It is also more prevalent in Southeastern region of the United States. The Framingham Heart Study showed the declining response of stroke over past 50 years, but lifetime risk is declining at a slower rate. Other common risk factor is diabetes, which in our study was present in 12.8% of cases. Usually the patient which presented with stroke were of male gender with duration of diabetes was 5-10 years in most of cases. However previous studies showed 27-42% cases with diabetes. Study in 2004, in tertiary care hospital showed a much less incidence of diabetes among patients with stroke i.e. 15%. Same study showed incidence of obesity 24% of cases. In our study, there were 16.7% of cases who were obese according to WHO criteria. While the other modifiable risk factor like smoking was found in 3.3% cases. Study of 100 patients conducted in 2008, smoking reported to account for 94.7% of cases of stroke both hemorrhagic and ischemic stroke. While another study on risk factors of stroke showed 43% of smokers. Our study was consistent with the findings of the previous studies; therefore, the efforts should be made to reduce these modifiable risk factors in order to overcome this disabling disease.

## CONCLUSION :

Hypertension is an important risk factor for ischemic and hemorrhage stroke. An effort should be placed to control blood pressure and other modifiable risk factors to reduce incidence of ischemic and hemorrhage stroke and improve patient outcomes.

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