

# INCIDENCE OF STROKE IN CONTEXT OF HYPERTENSION IN LOCAL POPULATION

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**Background:** This study was carried out to study the incidence of stroke in the people who have high blood pressure. **Methods:** This study was conducted on patients of stroke during 2004 at department of Medicine, Liaquat University of Medical and Health sciences (LUHMS) Jamshoro, Pakistan. Study population comprised of 100 hypertensive patients of stroke (64 men, 36 women) from different wards of LUMHS Jamshoro. Each patient was examined in detail, and investigated for blood pressure measurements, blood glucose, blood urea, serum creatinine, electrocardiogram and, CT scan of brain. A hypo dense and hyper dense area on CT scan of brain was labeled as infarction and hemorrhage respectively. The stroke patients due to other risk factors or not confirmed by CT scan were excluded from study. **Results:** Nearly three quarters of patients (74) who exhibits stroke were suffered from raised blood pressure. Out in two type's i.e. hemorrhagic and infarctive stroke, the maximum number (36) of patients belongs to severe hypertension ( $p < 0.05$ ). Site wise putamen and hypothalamus were the chief anatomical sites suffered in hemorrhagic stroke ( $p < 0.8$ ), while almost all (46) patients showed infarction at corona radiata and internal capsule. Virtually every one was (88) displayed complete stroke. **Conclusion:** Cerebral hemorrhage is more common in hypertensive stroke patients as compared to cerebral infarction and hypertension is most common modifiable risk factor for stroke.

**Key words:** Hypertension, Stroke.

## INTRODUCTION

At the beginning of 21<sup>st</sup> century and emerging of new era, cerebrovascular disease is a major cause of death and disability worldwide.<sup>1</sup> Stroke is defined as the rapidly developing symptoms and / or signs of focal loss of cerebral function with no apparent cause other than that of vascular origin.<sup>2</sup> In spite of general decline in the incidence of stroke in last thirty years, approximately 780,000 individuals in the United States experience a clinically evident stroke each year; a substantially larger number of individuals—possibly more than 9,000,000 each year—seem to have clinically silent but MR imaging-detectable Tissue ischemia<sup>3,4</sup>

Up to 50% of strokes may be attributable to elevated blood pressure and hypertension is the most important modifiable risk factor for stroke<sup>5, 6</sup>. The risk of the stroke has been shown to have direct relationship to elevation of both systolic and diastolic blood pressure in men and women of all ages; the strongest association being with systolic blood pressure. The risk of stroke is increased by about 25% with each 10 mm of Hg rise in systolic blood pressure and with diastolic blood pressure of more than 110 mm of Hg; risk is 15 times more than of individual with less than 80 mm of Hg<sup>7</sup>. The factors responsible for the inadequate level of blood pressure control, include treatment resistant high blood pressure, recent start of drug therapy, patient's non compliance with treatment, and suboptimal care<sup>8</sup>.

Both ischemic and hemorrhagic stroke have strong gradients with blood pressure. For each rise of 20 mm of Hg of systolic blood pressure, the relative risk of ischemic and hemorrhagic stroke increases 2.23 and 3.18 times respectively. Fall in blood pressure observed over the 20<sup>th</sup> century may lead to bigger reduction in the incidence of hemorrhagic stroke compared with ischemic stroke<sup>9</sup>.

Stroke places tremendous burden on the health resources through out the world. Improved detection and modification of risk factors can reduce the impact of this disease<sup>10</sup>. Decline rate in stroke has been more rapid during recent decades, following the general acceptance and use of effective antihypertensive treatment<sup>11</sup>.

Keeping in view of these facts we planned this study to assess the incidence of hemorrhagic or infarctive stroke in hypertensive patients and evaluate the association of stroke with age, gender and level of blood pressure.

## MATERIAL AND METHODS

This study was conducted during the period of August 2002 to July 2004 at the department of Medicine LUMHS Jamshoro. The study population comprised of 100 hypertensive patients of either sex with stroke, which was confirmed by CT scan having age more than 30 years. The patients of stroke caused by other risk factors or not confirmed by CT scan were excluded from study.

Demographic details, brief clinical history and detailed general, physical, cardiovascular and neurological examination was carried out in the patients and recorded on a proforma specially designed for that purpose. The state of consciousness was graded according to Glasgow coma scale. Each patient was investigated for blood pressure measurements, blood glucose, blood urea, serum creatinine, electrocardiogram and CT scan of brain. Arterial blood pressure was measured twice in the right arm with a standard sphygmomanometer; average of two readings was used as the estimation of blood pressure. Patients were categorized as hypertensive if they were on antihypertensive treatment or if they had a systolic blood pressure  $\geq 140$  mm of Hg and/ or diastolic blood pressure  $\geq 90$  mm of Hg. Blood glucose, blood urea, and serum creatinine were measured by commercially available kits.

Cerebral infarction was labeled when a hypodense area on a CT scan of Brain was detected, like wise a hyper dense area on CT scan with or without intraventricular lack was diagnosed as intracerebral hemorrhage.

The data were entered and processed on the SPSS Ver.10 soft ware. The results of the tests were subjected to statistical analysis using the same programme. The numerical and categorical data was presented as percentages. Two proportions were compared using Chi square test. The level of significance was at 0.05.

**RESULTS**

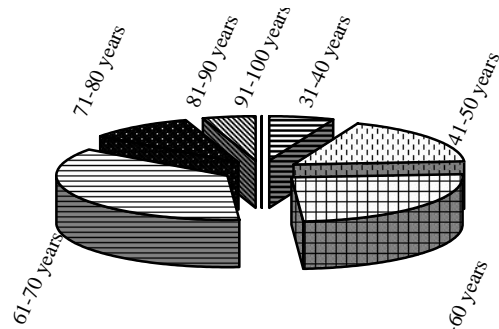
A total of 100 patients including 64 males and 36 females were studied according to age, type and site of lesion, level of blood pressure, and temporal profile. Patients of stroke were divided into seven age groups ranging 31-100 years. Maximum number of patients (36) belongs to age group IV ranging 61-70 years. Table-1.

On the basis of type of lesion, 50 patients out of total were found to have intracerebral hemorrhage, 46 patients had cerebral infarction and 04 patients had sub-arachnoid hemorrhage. (Table-2) The patients were divided into five categories according to level of blood pressure and highest number of patients (36) related to severe hypertensive group i.e.  $\geq 180/110$  mm of Hg. Out of 54 hypertensive hemorrhagic stroke patients, 24 (44.4%) were associated with severe hypertensive level of blood pressure. Similarly in infarctive hypertensive

stroke patients (46), maximum number (12) belongs also to severe hypertension. (Table-3)

According to site of lesion 28 (33.3) patients of hypertensive hemorrhagic stroke were found to have putamen hemorrhage, while all patients of infarctive stroke were exhibited infarction in corona radiata plus internal capsule. (Table-4)

Almost all of the patients (88) were showed complete stroke on the basis of temporal profile. (Table-5)



**Fig-1: Distribution of hypertensive stroke patients according to age groups**

**Table-1: Distribution of hypertensive stroke patients according to age groups (n=100)**

Age groups	Patients with hypertensive stroke (%)
Group I (31-40 years)	6 (6%)
Group II (41-50 years)	18 (18%)
Group III (51-60 years)	25 (25%)
Group IV (61-70 years)	36 (36%)
Group V (71-80 years)	10 (10%)
Group VI (81-90 years)	5 (5%)
Group VII (91-100 years)	00 (0%)

**Table-2: Gender wise distribution of hypertensive stroke patients and type of lesion (n = 100)**

Type	Male	Female
Infarctive stroke (n=46)	30	16
Hemorrhage stroke (n=50)	32	18
Subarachnoids hemorrhage (n=04)	02	02
<b>Total (N=100)</b>	<b>64</b>	<b>36</b>

**Table-3: Distribution of hypertensive hemorrhagic and infarctive stroke patients according to level of blood pressure**

Level of blood pressure	Hemorrhagic stroke Number (%)	Infarctive stroke Number (%)	Total Number
Normal < 130/85	06 (11.1%)	02 (4.3%)	08
High normal 130-139 / 85-89	08 (14.8%)	10 (21.7%)	18
Mild 140-159 / 90-99	10 (18.5%)	12 (26%)	22
Moderate 160-179 / 100-109	06 (11.1%)	10 (21.7%)	16
Severe > 180 / > 110	24 (44.4%)	12 (26%)	36

**P< 0.05**

**Table-4: Distribution of hypertensive and infarctive stroke patients according to site of lesion**

Site of hemorrhage	Hemorrhagic stroke Number (%)	Infarctive stroke number (%)
Putamen	28 (51.8%)	00
Thalamic	18 (33.3%)	00
Brain stem	04 (7.4%)	00
Sub-arachinoid	04 (7.4%)	00
Corona radiate + Internal capsule	00	46 (100%)
<b>Total</b>	<b>54</b>	<b>46</b>

**Table-5: Distribution of hypertensive and infarctive stroke patients according to temporal profile**

Temporal profile	Hemorrhagic stroke	Infarctive stroke	Total
Complete stroke	52 (96.3 %)	36 (78.3%)	88
Evolving stroke	02 (3.7 %)	04 (8.7%)	06
Transient ischemic attack	00	02 (4.3%)	02
Reversible ischemic neurological deficit	00	04 (8.7%)	04

**DISCUSSION**

Stroke is very common disorder in Pakistan and one of the major causes of morbidity and mortality after ischemic heart disease and cancer<sup>12</sup>. Increased availability of neuroimaging with CT scan and MRI brain help to localize and identify the underlying pathological condition<sup>13</sup>.

Stroke is clinical diagnosis made on comprehensive profile of neurological symptoms and signs<sup>1</sup>. There is linear relationship between stroke and hypertension as quoted by many studies<sup>14</sup>. These studies imply that treating hypertension reduces the incidence of stroke. In Pakistan, no statistical data exists as to find out the exact percentage of stroke in hypertensive patients. We have tried not only to comment on the percentages of hemorrhagic or infarctive stroke patients but also to give a broader based data regarding age, sex, type and site of lesion, and their association with level of blood pressure. In our study the incidence of stroke was found to be highest among the patients aged 61-70 years. Similar observations were reported by local as well as researchers abroad<sup>15, 16</sup>.

The mean age in our patients was 62.3 years, slightly higher (65years) than was reported by Messerli et al<sup>17</sup>. In our study the hypertensive stroke

was found more common in men as evidence by the male to female ratio (1.7:1). A lesser male preponderance ratio was found to be 1.4:1 in Taiwan population<sup>18</sup>. Regarding the type of lesion in stroke patients, infarction is more common than hemorrhage when we consider the general risk factors, but in stroke due to elevated blood pressure, the hemorrhage is more common than infarction<sup>19</sup>. Calandre et al<sup>20</sup> reported percentage of hypertensive hemorrhagic patients in a range of 45-70%, while 54% of our stroke patients exhibit hemorrhage. Many studies suggest higher percentage of infarction (52-68%) in stroke patients,<sup>21, 22</sup> which is in contrast to our observation i.e. (46%).

Regarding the site of lesion the most common site was found to be putamen followed by thalamus in hypertensive stroke patients showing hemorrhage in our study, which was in agreement with many international literature<sup>23</sup>. Similarly the corona radiata and internal capsule is the prime site of involvement in our hypertensive infarctive patients as evidenced by another study<sup>24</sup>. As hypertension was major predisposing factor for intracerebral hemorrhage and infarction. This study will help to launch a public awareness about the incidence of stroke due to increase in blood pressure. So early detection and regular treatment will decrease a

formidable burden of disability in the community. Despite racial, geographic, and dietary differences, the patterns of emergence of stroke in hypertensive patients are some what same in various populations. Primary, secondary, and tertiary care centers need to be equipped with modern facilities like CT scan for the early discovery of lesions in the stroke patients. This will not only reduce the incidence o secondary stroke but will also sort out other brain lesions presenting with stroke.

### CONCLUSION

Cerebral hemorrhage is more common in hypertensive stroke patients as compared to cerebral infarction and hypertension is most common modifiable risk factor for stroke.

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