

# Does Diagnosis Of Hypertension Prevent Stroke? A Preliminary Investigation Of Relative Frequency Of Undiagnosed And Previously Diagnosed Hypertension Before First Stroke In a Lagos Hospital

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## SUMMARY

**Introduction:** The present study was designed to determine the relative frequency of previously diagnosed and undiagnosed hypertension in first stroke in order to evaluate if previous diagnosis of hypertension can prevent stroke.

**Patients and Methods:** One hundred and twenty nine first stroke patients presenting at the emergency unit of a tertiary hospital in Lagos, Nigeria, were prospectively studied. Presence of hypertension and other modifiable risk factors was documented. History of diagnosis of hypertension before onset of focal neurological features was sought to categorize patients as having either known (previously diagnosed) or unknown (previously undiagnosed) hypertension.

**Results:** Significantly higher percentage of the 102 first stroke patients with hypertension were known hypertensives (77.4% versus 22.6% unknown). This was so irrespective of whether the patients had other modifiable risk factors.

**Conclusion:** Majority of our patients presenting with stroke were previously diagnosed hypertensives. Thus, diagnosing hypertension alone does not prevent stroke. Further studies are required to clearly define the impact of inadequate blood pressure control after diagnosis of hypertension (including poor drug compliance) and other risk factors.

## INTRODUCTION

Hypertension (HBP) has been identified as a powerful risk factor for the occurrence of acute stroke in all races. In Nigerians, it consistently predominates as the most frequently encountered modifiable risk factor for stroke<sup>1</sup>. Despite increased awareness and availability of antihypertensive medications, the frequency of strokes in our environment does not appear to be declining. According to the National Survey on Non-communicable diseases, the epidemiology of hypertension as regards treatment status is that only one-third of HBP are diagnosed. Of these, one-third are on treatment and of those on treatment, only one-third are on adequate treatment<sup>2</sup>. Results from clinical trials have established the benefit of antihypertensive therapy in preventing the morbidity and mortality associated with high blood pressure, including stroke<sup>3,4</sup>. These considerations form the thrust of the present study to assess the relative frequency of undiagnosed (unknown) and previously diagnosed (known) HBP as risk factors for first acute stroke,

and its impact on outcome in our cohort of patients.

## OBJECTIVES

- i. To determine the frequency of previously undiagnosed HBP and previously diagnosed HBP as risk factors for first stroke.
- ii. To determine the frequency of HBP as the sole modifiable or co-modifiable risk factor for first stroke in previously diagnosed versus undiagnosed HBP.

## PATIENTS AND METHODS

The study was a prospective study of 129 stroke patients admitted via the emergency unit of the Lagos University Teaching Hospital (LUTH), Lagos, Nigeria, over a 24 month period (May 1999 to March 2001). Patients with a history of previous stroke or presenting later than one week post onset of focal neurologic deficit were excluded from the study. Hypertension was defined as blood pressure elevation at or above 140mmHg systolic and 90mmHg diastolic on two occasions. The patient was regarded as a known hypertensive if there was a diagnosis of hypertension known to the patient or informant prior to the onset of the focal neurologic deficit. In patients with suspected raised intracranial pressure with BP elevation, additional evidence of hypertension was sought prior to confirmation of diagnosis as follows:

- i. Persistent BP elevation despite clinically apparent reduction of raised intracranial pressure.
- ii. Absence of other clinical components of Cushing's reflex (e.g. bradycardia).
- iii. Evidence of end-organ effect of hypertension (hypertensive heart disease by electrocardiogram, echocardiography, or chest x-ray).

The presence of other modifiable risk factors was documented utilizing history, physical findings, biochemical and haematologic parameters (random blood sugar on admission, lipid profile, full blood count, genotype and VDRL where relevant) and results of ancillary investigations (electrocardiogram, echocardiogram where relevant, and chest x-ray).

## Statistical analysis

Data were expressed as means  $\pm$  standard deviation. For comparison of mean values of subjects and controls,

the students' t-test was used. Differences in categorical variables were tested by Pearson's  $\chi^2$  test. A p value less than 0.05 was regarded as significant.

## RESULTS

### Clinical characteristics of study population

The study population comprised of 129 first stroke patients (84 male and 45 female) aged between 22 to 86 years (mean age (SD)  $59.5 \pm 12.8$  years). Age and sex distribution is as shown in Table I. There was no significant difference between mean age of hypertensives and normotensives, nor between the mean age of known hypertensives and unknown hypertensives (t-test; p value  $> 0.05$ )

### Frequency of hypertension as a risk factor for first stroke

Hypertension was identified in 102 (79.1%) of the patients. Of these a significantly higher number (79 i.e 61.2%) were known (previously diagnosed) while 23 (17.8%) were unknown hypertensives (chitest; p value  $< 0.05$ ) (Table II). Amongst the hypertensive patients, HBP was the sole modifiable risk factor identified in 55 (42.6%), and a co-modifiable risk factor in 47 (36.4%). The values for known and unknown hypertensives are as shown in Table II. A significantly higher proportion of unknown hypertensives had HBP as a sole-modifiable risk factor compared to co-modifiable risk factor (chitest; p value  $< 0.05$ ), in contrast to the known hypertensives who had fairly equal distribution of HBP as either a sole or co-modifiable risk factor (chitest; p value  $> 0.05$ ).

### Mean blood pressures on admission for first stroke

The mean systolic and diastolic blood pressure on admission were similarly elevated in hypertensive patients irrespective of whether the patients were known or unknown hypertensives (chitest; p value  $> 0.05$ ). Mean blood pressures (both systolic and diastolic) were however significantly higher in hypertensives compared to normotensives (chitest; p value  $< 0.05$ ) (Table 3).

Table I

#### Age and Sex Distribution of Study Population

Category	No.	Sex Distribution		M:F Ratio	Age Range	Distribution Mean $\pm$ SD
		M	F			
All 1st Stroke	129	84	45	1.9:1	22-86yrs	$59.5 \pm 12.8$
All HBP	102	64	38	1.7:1	22-86yrs	$60.8 \pm 11.0$
Known HBP	79	53	26	2.0:1	38-86yrs	$60.9 \pm 10.5$
Unknown HBP	23	11	12	1.1:1	37-79yrs	$60.3 \pm 12.8$
Normotensives	27	20	7	2.9:1	22-78yrs	$54.8 \pm 17.5$

Table II

#### Frequency of HBP as a Sole Modifiable Compared to Co-Modifiable Risk Factor for first stroke

Category	Total (n=129) Number (%)	Sole Modifiable Risk Factor Number (%)	Co-Modifiable Risk Factor Number (%)
All			
Hypertensives	102 (79.1%)	55 (42.6%)	47 (36.4%)
Known HBP	79 (61.2%)	38 (29.5%)	41 (31.8%)
Unknown HBP	23 (17.8%)	17 (13.2%)	6 (4.6%)

Table III

#### Mean Blood Pressure of Patients on Admission for First Stroke

Category	No.	Mean SBP $\pm$ SD	Mean DBP $\pm$ SD
All 1st Stroke	129	$168.9 \pm 39.9$	$101.0 \pm 21.8$
Known HBP	79	$178.2 \pm 35.8$	$106.8 \pm 19.9$
Unknown HBP	23	$183.9 \pm 35.0$	$108.0 \pm 16.2$
All Hypertensives	102	$179.5 \pm 35.5$	$107.1 \pm 19.1$
Normotensives	27	$128.9 \pm 28.9$	$77.8 \pm 14.8$

## DISCUSSION

Hypertension was identified as a risk factor in 79.1% of first stroke patients in this study, a finding that lends credence to its importance as the leading modifiable risk factor for stroke. The mechanisms underlying this relationship are complex, and include endothelial damage and local thrombi formation, fibrinoid necrosis, accelerated arteriosclerosis, and increased peripheral vascular resistance from adaptive structural changes in the resistance vessels<sup>5</sup>. Considering the varied mechanisms, primary prevention of stroke by risk factor modification remains the most tenable option for reducing the incidence of stroke. Good evidence for direct stroke reduction exists for hypertension treatment<sup>6</sup>. It is thus disturbing that more than three quarters of the patients in this study had been identified as being hypertensive prior to the stroke. Interventions offered these patients as well as compliance to therapy could not be reliably evaluated in this study. However, the possibilities include delayed diagnosis permitting prolonged end organ damage, lack of compliance to therapy (pharmacologic and non-pharmacologic), and inadequate drug treatment to normalize BP or optimize blood pressure control. In a study of 100 consecutive stroke patients, Roy et al similarly found that 66% of the patients were aware that they were hypertensive though only 12.9% were taking antihypertensive drugs regularly<sup>7</sup>. Another study found that among stroke patients who had ever been told they had hypertension, 73% were receiving treatment for HBP at the time of the stroke. Despite pretreatment BP similar to a control group who had not suffered a stroke, the last recorded BP level was higher among those who developed a stroke, suggesting that poor control of BP regardless of treatment may be important aetiologically for stroke occurrence<sup>8</sup>. The Melbourne Risk Factor Study Group identified that the risk of intracerebral hemorrhage from hypertension was significantly greater among those who had ceased taking medication, supervised or unsupervised, giving the first evidence for a link between stopping antihypertensive medication use and stroke risk<sup>9</sup>. An additional plausible factor promoting stroke despite prior diagnosis of hypertension is the additive effect of other modifiable and non-modifiable risk factors. This may be substantiated by the finding in this study that HBP was more frequently (and significantly) a sole modifiable risk factor in the unknown hypertensives compared to the known hypertensives. A smaller percentage of unknown hypertensives had HBP in addition to other modifiable risk factors. The uniformity in race, gender and mean age in the two groups of hypertensives makes it unlikely that differences in non-modifiable risk factor distribution could account for the disparity. The risk for cardiovascular disease (including stroke) has been shown to be increased

substantially with each additional risk factor<sup>10</sup>. As such, a comprehensive approach to primary prevention tailored towards early identification and modification of the recognized modifiable risk factors should be the approach.

The mean BP value were at levels considered as moderate HBP and severe HBP for known and unknown HBP respectively using the 1999 WHO/ISH criteria<sup>11</sup>, although the difference between the groups did not reach statistical significance. This finding further attests to the importance of normalization of blood pressure, not mere diagnosis or treatment, as the most effective strategy in primary stroke prevention.

The findings in the present study appear to support the impression that diagnosis of HBP does not suffice for stroke prevention. This may be related to the finding in our population that less than a third of diagnosed hypertensives are on treatment, and less than a third of those on treatment are well controlled<sup>2</sup>. Further studies are needed to investigate the role of compliance and prescribing practices as contributory factors to the findings in this study.

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