

Hypertension and Sudden Unexpected Deaths: An Autopsy Study of Four Hundred and Seventy-Seven Brought-in-Dead in a Tertiary Health Center

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Abstract

Introduction: Hypertension is an important and major public health concern globally. One of the major causes of sudden death worldwide is hypertension. This study is to present the morphological pattern of deaths at autopsy of those patients who were brought-in-dead (BID) and who had hypertensive heart disease (HHD) as the underlying illness. **Materials and Methods:** This is a 6-year retrospective autopsy study of BID patients as a result of HHD seen at our department between January 1, 2010, and December 31, 2015. The autopsy findings and data retrieved were analyzed using IBM Statistical Package for Social Sciences version 20. Test for statistical significance was set at $P < 0.05$. **Results:** A total of 477 deaths (44%) as a result of HHD were recorded out of the 1016 BID during the period under study. The age ranged from 21 to 92 years with a mean age of 52 ± 14.0 years and a male to female ratio of 1.8:1. The 5th decade of life was the most common age group encountered. The most common cause of death was acute left ventricular failure (67.8%), and myocardial infarction was the least common (1.7%). **Conclusions:** Acute left ventricular heart failure was the most common cause of sudden death as a result of hypertension and was followed by intracerebral hemorrhage. In the female gender, sudden deaths were most common in the 6th decade and in the male gender most sudden deaths were seen in the 5th decade.

Keywords: Acute left ventricular failure, intracerebral hemorrhage, myocardial infarction

INTRODUCTION

Hypertension is a commonly encountered, important, and major public health concern globally.¹ A study in 2008 by Twagirumukiza *et al.* shows the comparison of the prevalence of hypertension in different parts of sub-Saharan Africa, including Nigeria. The overall prevalence of hypertension was put at 18.4% for Nigeria compared with a prevalence of 10.35% for Ethiopia and 23.0% for Ghana.² In Western Europe, its prevalence was found to be 44% and 28% in North America. It has been documented as a threat to the health of people in sub-Saharan Africa and a major contributor to morbidity and mortality in the subregion.³⁻⁵ Supplementary to the forgoing, it is estimated that hypertension affects about 1 billion people all over the world, and it is the main risk factor for many other cardiovascular diseases.⁶⁻⁹

Globally, the burden of hypertension and other noncommunicable diseases is rapidly increasing, and the African continent may be

the most affected region in the world.¹⁰ A question of whether it is the number one cause of stroke, heart failure, myocardial infarction, and renal failure is no longer in doubt. With this rising trend, economic and health challenges are imminent if the tide is not aborted.

Having established that hypertension is becoming a major cause of morbidity and mortality in Nigeria and sub-Saharan Africa at large and with the dearth of studies on sudden unexpected deaths as a result of hypertensive heart disease (HHD), this work is to present the morphological pattern of death at autopsy of cases of brought-in-dead (BID) who had HHD as the underlying illness.

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MATERIALS AND METHODS

This is a 6-year retrospective autopsy study of BID patients deposited at the Department of the Pathology and Forensic Medicine of the Lagos State University Teaching Hospital, Ikeja between January 1, 2010, and December 31, 2015. All cases of BID that presented at the hospital were sent to the department for autopsy as prescribed by the Lagos State Coroner's law of 2007. The ethical approval was obtained from the departmental ethical committee.

All cases of BID in which HHD was confirmed at autopsy were used for this study. The standard autopsy dissection was adopted, and the diagnosis of hypertension at autopsy was made based on the following criteria: heart weight in excess of 300 g for females and 350 g for males; left ventricular wall thickness of more than 1.5 cm taken at a point 1–2 cm below the mitral valve; and papillary muscle thickness of more than 1.5 cm. Gross findings on the pericardium, myocardium, walls, coronaries, valves, ostia, and papillary muscles were noted. Any other causes of ventricular hypertrophy such as aortic stenosis were excluded. The data retrieved from the autopsy reports included the demographic profile as well as the autopsy findings. Where applicable, contacts were made with next of kin to provide dates of births of decedents. The data retrieved were analyzed using IBM Statistical Package for the Social Sciences software version 18 (USA) and were presented in tables, percentages, and bar chart. Test for statistical significance was done using Chi-square, and $P < 0.05$ was taken as statistically significant.

RESULTS

A total of 477 BID deaths as a result of HHD were recorded out of the 1016 BID during the period under study. This accounted for 44% of all BIDs and 4.3% of all hospital deaths. The age range of the deceased was 21–92 years with a mean age of 52 ± 14.0 years. The male to female ratio was 1.8:1. The 5th and the 6th decades of life were the most common and second most common age groups encountered, respectively, while the 3rd decade is the least common age group. Most deaths occurred in the 5th decade among the male gender and 6th decade among female gender, respectively [Table 1].

The most common cause of death was acute left ventricular failure representing 67.8% while myocardial infarction was the least common representing 1.7% [Table 2].

Table 3 shows the age in relation to the various causes of death. The trio of ventricular heart failure, congestive cardiac failure, and intracerebral hemorrhage were the most common causes of death in all age groups. There was no relationship with the cause of death with regard to the age of patients, $P = 0.077$.

DISCUSSION

The mean age in this study was 52 ± 14.0 years; this is higher than the 47.33 ± 12.18 years (14–85 years) seen in an autopsy study in Lagos on trends in acute emergency

Table 1: Demographic profile showing the age and sex distribution

Age category	Gender (%)		Total
	Male	Female	
21-30	16 (5.2)	8 (4.8)	24 (5.0)
31-40	44 (14.2)	31 (18.6)	75 (15.7)
41-50	97 (31.3)	31 (18.6)	128 (26.8)
51-60	72 (23.2)	43 (25.7)	115 (24.1)
61-70	50 (16.1)	28 (15.8)	78 (16.4)
Above 70	31 (10.0)	26 (15.6)	57 (11.9)
Total	310 (100.0)	167 (100.0)	477 (100.0)

$P=0.051$

Table 2: The primary causes of death

Cause of death	Frequency (%)
Acute left ventricular failure	324 (67.9)
Intracerebral hemorrhage with ventricular extension	59 (12.4)
Congestive cardiac failure	59 (12.4)
Brainstem hemorrhage	17 (3.5)
Massive subarachnoid hemorrhage	10 (2.1)
Myocardial infarction	8 (1.7)
Total	477 (100)

room hypertension-related deaths by Mbakwem *et al.*¹¹ Furthermore, an echocardiographic study on the pattern of heart failure in Abuja by Ojji *et al.* showed a mean age of 50.6 ± 15.29 which is close to the index study.¹² Ojji *et al.* also found out that hypertension was the most common cause of heart failure (62.6%) in their study,¹² and our study revealed heart failure as the most common cause of sudden death in hypertensive patients (67.8%). This finding is also in tandem with other previous works in sub-Saharan Africa.¹³⁻¹⁶

The mean age of heart failure in studies in some developed countries was 76 years which is higher than other studies on patients with heart failure in sub-Saharan Africa as well as the mean age of sudden death of 52 ± 14.0 years in the index study.¹⁵⁻¹⁸ The reasons for the higher mean age in the developed countries might be due to the accessibility of antihypertensive drugs, high diagnostic apparatus, and drugs' compliance among hypertensive patients in these developed countries unlike patients in sub-Saharan Africa who have limited access to good health care, usually consult alternative medical practitioners, and sometimes could not afford the drugs. Ojji *et al.* also opined that the finding of hypertension as the leading cause of heart failure in their study further supported the fact that hypertension tends to run a more severe course with more target organ damage in negroids compared to Caucasians.¹² They went further to state that early presentation of heart failure portends a bad trend as it has the potential to undermine national productivity as a consequence of the number of active years lost by the most active workforce of the population.¹² Our belief is that the low mean age of 52 ± 14.0 years seen in this study is the sequela of the untreated and poorly treated

Table 3: Cross tabulation of the cause of death with age groups

Cause of death	Age category (years) (%)						Total (%)
	21-30	31-40	41-50	51-60	61-70	Above 70	
Acute left ventricular failure	11 (45.8)	51 (68)	83 (64.9)	83 (72.1)	58 (74.3)	38 (66.8)	324 (68)
Intracerebral hemorrhage with ventricular extension	5 (20.8)	5 (6.7)	22 (17.2)	16 (13.9)	6 (7.7)	5 (8.8)	59 (12.4)
Congestive cardiac failure	6 (25.0)	12 (16.0)	14 (10.9)	7 (6.1)	9 (11.5)	11 (19.3)	59 (12.4)
Brainstem hemorrhage	1 (4.2)	5 (6.7)	3 (2.3)	5 (4.3)	2 (2.6)	1 (1.8)	17 (3.6)
Massive subarachnoid hemorrhage	-	2 (2.7)	5 (3.9)	1 (0.9)	2 (2.6)	-	10 (2.1)
Myocardial infarction	1 (4.2)	-	1 (0.8)	3 (2.6)	1 (1.3)	2 (3.5)	8 (1.7)
Total	24 (100.0)	75 (100.0)	128 (100.0)	115 (100.0)	78 (100.0)	57 (100.0)	477 (100.0)

$P=0.077$

hypertension causing sudden deaths and hence presented as BID in our hospitals.

The male to female ratio in our study was 1.8 to 1. This is in agreement with similar study done on the causes of sudden cardiac death in India and Jamaica in 2014 with a male to female ratio of 10 to 1.¹⁹

Mbakwem *et al.* in Lagos in 2009 showed that stroke (intracerebral hemorrhage) was the most common cause of death which was closely followed by heart failure.¹¹ This pattern is the reverse in our findings where left ventricular failure comes before intracerebral hemorrhage. This difference may be attributable to the individuals in Mbakwem *et al.*'s study who were patients treated in the emergency room as against BID in our study; it may also be that Mbakwem *et al.* were able to treat heart failure better than intracerebral hemorrhage in the emergency room which will reduce the number of deaths from heart failure.

The index study revealed congestive cardiac failure accounted for 12.4% coming next to intracerebral hemorrhage and left ventricular failure. Other previous studies have also supported these findings.^{11,20} The very low occurrence of myocardial infarction in this study (1.7%) is also in tandem with the works of Ukoh in Benin,²¹ Ojji *et al.* in Abuja,^{12,15} and Onwuchekwa and Asekomeh in Port Harcourt.²² The incidence of myocardial infarction is still very low compared with what is obtainable in the Western world.

CONCLUSIONS

Left ventricular heart failure was the most common cause of death in patients who were BID to the hospital. This was followed by intracerebral hemorrhage. In the female gender, sudden deaths were most common in the 6th decade and in the male gender most sudden deaths were seen in the 5th decade of life. Myocardial infarction is still a rare cause of death in this part of the world.

Limitations

Triphenyltetrazolium chloride and newer methods in the ascertainment of myocardial infarction in postmortem examination such as three-tesla magnetic resonance imaging, immune histochemical detection of S100 calcium-binding

protein A1 (S100A1), and quantitative myoglobin assay were not done due to lack of facility. There is therefore a possibility of underdiagnosing myocardial infarction in this study.

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Conflicts of interest

There are no conflicts of interest.

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