Original Research Article

A Three Year (2017–2019) Review of Hypertension in the University of Port Harcourt Teaching Hospital (UPTH)

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Abstract

Aims: Include determining the prevalence of hypertension in UPTH from January 2017 to December 2019, to describe the risk factors associated with hypertension, to describe the demographic distribution of patients with hypertension and to determine the outcome of hypertension in UPTH. *Study design:* The study is a descriptive cross-sectional study. *Place and Duration of Study:* The research was carried out at the University of Port Harcourt Teaching Hospital between January and June, 2020. *Methodology:* A multi-stage random sampling method was used in selecting the records of all patients admitted to the medical wards of the UPTH (between January 2017 – December 2019), with essential hypertension. The first stage involved the use of disproportionate sampling method (where each of the years, 2017-2019 constituted a stratum) to select all the hypertensive cases admitted in each of the years. Simple random sampling was then used in the second stage to select 70 samples from each year, to make up the 210 sample size. This was generated through the use of random numbers. The data were analyzed manually by sorting, tallying and collated into data sheet. Both descriptive and inferential statistics were used to analyze the data. *Results:* There were a total of 3,200 medical admissions during the period under review (2017-2019), and the prevalence of hypertension was 16.8% (537).The records of 210 (6.6%) hypertensive patients were reviewed and analyzed. There were 109 (51.9%) males and 101 (48.1%) females with a male: female predilection of 1.1:1. The mean age was 55.7 ± 4.5 years with a mode of 62 years. Urban dwellers were 63.3% while 36.7% were rural dwellers. Also, 57.1% of these patients were in social class V (unskilled workers, farmers, traders and housewives); and only 2.9% in social class I (professionals). More so, chronic alcohol intake accounted for 16.7% of the admitted cases, followed by diabetes mellitus with 12.4%.Smoking and obesity were 1.9% each. Heart failure was the commonest complication of hypertension (39.5%), while stroke was the commonest cause of fatality (25.0%). *Conclusion:* Hypertension is an important health problem in the world over. Hence emphasis should be placed on the primary prevention of hypertension through intensive campaigns on lifestyle modifications and regular blood pressure checks. In addition, efficient record keeping and the establishment of a stroke registry would help in the management of hypertension.
Keywords: Review; Hypertension; UPTH.

INTRODUCTION

1.1 study background

Hypertension is common and now regarded as a public health problem in the world over. It has been acknowledged as one of the greatest and established risk factors for cardiovascular diseases [1]. Hypertension is a threat to the health of adults in Sub-Saharan Africa (SSA) [2].

Despite, the attendant consequences and complications of hypertension, its detection, treatment, and control have been reported to be very poor in SSA, because of scarce resources and inadequate health care provision [3]. 3% of hypertensive Nigerians dies each year and the population–attributable risk has been established at 7% [4]. Given the difficulty of long-term drug treatment in low–income countries, primary prevention assumes a greater public health importance [5]. The prevalence may be worse in the general public as many people with hypertension do not seek medical care and are therefore not included in the hospital-based prevalence estimates.

Studies in the 1920's demonstrated the public health impact of untreated High blood pressure, treatment options were limited at the time and deaths from its complications were common [6]. Elevated

blood pressure is a chronic medical condition in which there is sustained elevation of the systemic arterial blood pressure. Clinically, it is said to occur when the blood pressure is > 140/> 90 mmHg on two or more consecutive occasions, one week apart.

The risk factors for hypertension are divided into modifiable and non-modifiable risk factors. The modifiable risk factors include: excessive alcohol intake, environmental stress, socio economic status, physical activity, smoking, Obesity, etc., while familial, age, sex etc. are the non-modifiable risk factors.

Besides, hypertension is classified as either primary (essential) or secondary hypertension based on aetiology. About 90-95% of cases are termed "essential hypertension" because no medical cause can be found [7]. The remaining 5-10% of cases is secondary hypertension, and their aetiology is known. The causes of secondary hypertension include: renal disease, endocrine causes (Cushing's syndrome, hyperthyroidism, hypothyroidism, primary aldosteronism, pheochromocytoma, etc.), pre-eclampsia, coarctation of the aorta; and drugs (steroids, NSAIDS). There exist literatures on the prevalence of hypertension by other authors

1.2 Study justification
Considering that hypertension with its attendant complication is becoming more common as urbanization increases, this study sought to determine the prevalence of hypertension, the morbidity and mortality patterns and its risk factors of patients admitted in the University Of Port Harcourt Teaching Hospital (UPTH) in the period under review.

Although, blood pressure is easily measured, it had taken several decades to realize that arterial hypertension is a frequent world- wide health disorder [8].

Nigeria has a population of greater than 160 million people and is the largest black nation in the world. The crude prevalence of hypertension has been documented as 11.2% (based on blood pressure threshold of 165/95mmHg), with an age adjusted ratio of 9.3%. This number translates into approximately 4.33million Nigerians hypertensive aged > 15 years (According to the latest National census figure) [9].

Also in a study of cardiovascular disease in multiple centers in Nigeria, hypertension was ranked first. Hypertension and its complications constitute approximately 25% of emergency medical admissions in urban hospitals in the country, and is one of the causes of morbidity and mortality in the population in question, hence a public health issue [10].

Port Harcourt is a cosmopolitan city in the heart of Rivers State, and UPTH is the only tertiary health institution located in the city. It serves as the main referral centre for Rivers and its neighbouring states of Bayelsa, Abia, Delta, Imo and Akwa Ibom. Therefore the above statistics reflect the burden of hypertension, its morbidity and mortality rates in this region. Hence, there is the urgent need to review the subject in question, determine its prevalence, and describe the risk factors associated with it, the pattern of morbidities and mortalities and make useful recommendations that will help in reducing the burden of this medical condition.

2. MATERIAL AND METHODS
2.1. Study area
The University of Port Harcourt Teaching Hospital (UPTH) is a tertiary health institution located in Alakahia community in Obio-Akpor Local Government Area of Rivers State (The Garden City).Rivers State, (where UPTH is sited) is the hub of the oil industry in Nigeria. It has two petroleum refineries, a petrochemical industry, a fertilizer plant, a gas plant, two Sea-Ports, and an International Airport.

The Teaching Hospital is the main referral centre for the people of Rivers State and its neighbouring states of Bayelsa, Abia, Delta, Imo, and Akwa- Ibom .It has 500 bed spaces distributed among the various specialties (Internal Medicine, Surgery, Obstetrics and Gynaecology, Paediatrics and Child-health, Ophthalmology, Haematology, Psychiatry, Orthopaedics, etc).UPTH has the highest number of medical professionals amongst health institutions in the state.

2.2. Study population
The study population entails records of all patients admitted to the medical wards of UPTH with hypertension or any of its complication arising from hypertension over a three year period, between Jan. 2017–Dec. 2019 were retrieved from the ward and medical records, and analyzed. The criteria for inclusion in the study were the occurrence of a systolic blood pressure of ≥ 140 mmHg and diastolic blood pressure of ≥ 90 mmHg. Cases in which the outcome was not certain (missing data), and blood pressure below the above cut-off were excluded.

Data extracted included the age, sex, address, occupation (social class), date of admission, risk factors, complications, and outcome. The complications and outcome of hypertension were based on clinical, radiological, biochemical, and electrocardiographic results of patients.

2.3. STUDY DESIGN

The study is a descriptive cross-sectional study.

2.4. Sample size determination

The sample size for this study was 210; and these were patients aged 20 years and $\geq$ 90 years admitted for hypertension.

The sample size was derived as follows using the formula:

$$n = \frac{pq}{\left(\frac{e}{1.96}\right)2}$$

Where n = sample size
p = estimated prevalence =14.5%[11]
q = 100 − p = 85.5%
e = estimated sampling error at 95% CI = 5%

$$n = \frac{14.5 \times 85.5}{\left(\frac{5}{1.96}\right)2}$$
= 190.5

Adjusted sample size (for missing records) = 10/100 x 190.5 +190.5 = 210 hypertensive patients.

2.5. Sampling method

A multi-stage random sampling method was used in this study. The first stage involved the use of disproportionate sampling method (where each of the years; 2017-2019 constituted a stratum), to select all the hypertensive cases admitted in each of the years. Simple random sampling was then used in the second stage to selected 70 samples from each of years; to make up the 210 sample size. This was generated through the use of random numbers.

2.6. METHOD OF DATA ANALYSIS

The data were analyzed manually by sorting and tallying and collated into data sheet. Both descriptive and inferential statistics were used to analyze the data.

2.7. LIMITATIONS OF THE STUDY

Myriads of factors affected this project work adversely. These factors include:
1. Inadequate timing for the research work.
2. Some folders were missing, may be due to the movement of medical records to a new site.
3. Missing data in some of the patients' folders, due to poor record-keeping.

3. RESULTS AND DISCUSSION

3.1. Socio-demographics

There were a total of 3,200 medical admissions during the period under review (2017-2019). The number identified as having hypertension was 537 (16.8%) of the total medical admission. Out of these, 210 (6.6%) patients formed the basis for this report. The group comprised of 101 (48.1%) females and 109 (51.9%) males. The male to female ratio was 1.1:1.The ages ranged from 20years to $\geq$ 90 years with a mean of 55.7 $\pm$ 4.5 years and a mode of 62 years. The peak age was 60 years, followed by the 50th, 40th and the 70th years (table 4.1 and fig. 4.1). The results from this study confirm the presently held view that the prevalence of hypertension is high in most African populations [12, 13]. The prevalence of hypertension was 16.8% among the in-patients in this study compares well with the result of 28.7% in Ghana [14], 14.5% in Nigeria [11], 14% in Port Harcourt [15] and 27.8% in Ibadan [16], but is much higher than the previous reports of 9.3% by Abengowe in Kaduna [17]. This may be because the criterion for hypertension diagnosis used in this table was 140/$\geq$ 90 mmhg as against the previous studies which used 165/95 mmhg as blood pressure cut-off value. Valid conclusions from this study are hindered by the poor record keeping noted. This is evidenced by the findings that only 210 out of 537 patients with hypertension had sufficient record to be analyzed and hence, the results got.

The results could have been strengthened if all the records had been retrieved and all the data entered. The current high prevalence of hypertension observed in Africans suggests that certain factors may have come into operation in recent years which act as trigger factors to the development of hypertension.

Prevalence of hypertension in this study was greater in males than females, which corroborates other reports from many centres in Nigeria [11, 15, 24] and in other countries such as Zimbabwe, Cameroon [25, 26] respectively. However, in Lagos, Johnson [18]; in Ghana, Cappuccio [14] and in rural south-western Nigeria, Raimi [27] and in other African countries, Pengpid *et al.* [28]. Robbiati *et al.* [29] found a higher prevalence in females than males after the age of 45 years. This could be because these females were more obese than their male counterparts. Obesity is a risk factor for hypertension.

Table-1: Age group distribution of patients with hypertension

Age Group (yrs)	Number of patients (n)		Total	Relative frequency (%)
	Males	Females		
20-29	2	7	9	4.3
30-39	15	8	23	11.0
40-49	21	22	43	20.5

50-59	18	26	44	21.0
60-69	30	20	50	23.8
70-79	20	13	33	15.7
80-89	3	3	6	2.9
≥ 90	-	2	2	1.0
Total	109	101	210	100

Also, this study is in agreement with those of Cappuccio [14] in Ghana who reported that hypertension is common in semi-urban areas than rural areas. In Ghana, earlier studies revealed a hypertension prevalence of 5% among rural dwellers and 13% in the town [19]. Hypertension is becoming more as urbanization increases, and this has been shown in several studies in Africa [20]. See table 2.

Table-2: Distribution of hypertension between rural and urban dwellers

Location	Number of patients with hypertension	Percentage (%)
Urban	133	63.3
Rural	77	36.7
Total	**210**	**100**

Besides, of the 210 patients seen, 120 (57.1%) were in social class V, but there were only 73 (34.8%), 6(2.9%); 6 (2.9%) and 5 (2.4%) in social classes III, I, IV and II respectively (Table 3). The study revealed that hypertension is common among the low socio-economic groups in Nigeria. This is supported by the reports of Johnson in Lagos [18], Abengowe in Kaduna [17], and Kadiri in Ibadan [21]. In a national survey by Akinkugbe [9], the prevalence of hypertension seemed system exposes them to. These include: overcrowding, incessant power failure, the rush to public transport, poor dietary habits, and lack of access to health facilities. From this study, it seems that higher at both extremes of the socio-economic spectrum. The high prevalence of hypertension among the low socio-economic group in this series may be related to the stressful lives they live, and the deprivation which the being a professional carries a lower risk of developing hypertension or its complications compared to the unemployed or a civil servant. This could be because the professionals are relatively wealthier and could afford to buy their drugs when diagnosed. Most of the oil companies operating in the region own clinics for their staff. Some professionals prefer to attend private clinics rather than government owned ones in order to avoid bureaucratic bottlenecks and reduce waiting time. Besides, if complications arise, most professionals are referred immediately to UPTH which has the required facilities and resource persons to handle such complications and therefore reducing the fatality rate. Also, the reason for the low prevalence of hypertension among the professionals could be because of their easier access to the mass media which must have influenced their life style to attain more effective blood pressure control.

Table-3: Distribution of hypertension among social classes

Social class	Description	Number	Percentage (%)
I	Professionals	6	2.9
II	Executive management workers	5	2.4
III	Skilled workers, students	73	34.8
IV	Semi-skilled workers, craft-men	6	2.9
V	Unskilled workers, farmers, traders and house-wives	120	57.1
Total		**210**	**100**

Heart failure was responsible for 83 (39.5%) hypertensive complications. Stroke occurred in 51 (24.3%) cases while renal failure, encephalopathy, dementia, stroke/heart failure, renal failure/heart failure, chronic liver disease; and encephalopathy/chronic renal failure accounted for 22 (10.5%), 4 (1.9%), 1(0.5%), 3 (1.4%), 12 (5.7%), 2 (1.0%); and 1 (0.5%) respectively (Table 4). There were a total of 40 deaths, out of which 15 (37.5%) were due to stroke, 10 (25.0%) were due heart failure, 8(20.0%) were due to renal failure 3 (7.5%) were due to encephalopathy; and 1 (2.5%) and 2(5.0%) were due to stroke/heart failure and renal failure/ heart failure (Table 4).The commonest complication was heart failure which occurred in 83 (39.5%) of patients, followed by stroke in 51 (24.3%), renal failure in 22 (10.5%); encephalopathy in 4 (1.9%), and dementia in 1 (0.5%). This study is akin to findings in Port Harcourt where heart failure was 22.9% and stroke, 39.9% [22]. It also corresponds with the reports of Odia [23] and Onwuchekwa who showed that stroke account for 15.9% of overall mortality from hypertension, and that the cardiovascular diseases were the most cause of morbidity. Furthermore, mortality from stroke was highest with 15 (37.5%) deaths,

followed by heart failure with 10 (25.0%) deaths, chronic renal failure with 8 (20.0%) death, and encephalopathy with 3 (7.5%) deaths. This also agrees with report of Chinenye [22].

Table-4: Complications of hypertension and fatality rates

Complication	Sex		% (N = 210)	No of deaths	Fatality rate (%)
	Male	Female			
CVD/Stroke	34	17	51 (24.3%)	15	37.5
Heart failure	35	48	83 (39.5%)	10	25.0
Renal failure	15	7	22 (10.5%)	8	20.0
Encephalopathy	3	1	4 (1.9%)	3	7.5
Dementia	0	1	1 (0.5%)	0	0
Stroke/heart failure	2	1	3 (1.4%)	1	2.5
Renal failure/heart Failure	6	6	12 (5.7%)	2	5.0
Chronic liver disease	2	0	2(1.0%)	0	0
Encephalopathy/CRF	1	0	1(0.5%)	0	0
None	12	19	31(14.8%)	1	2.5
Total	**110**	**100**	**210(100%)**	**40**	**100**

4. CONCLUSION

Hypertension is an important health problem in Port Harcourt and its neighbouring states. It is predominant among urban dwellers and people of low socio-economic status. Heart failure was the commonest complication whereas stroke contributed to most of the deaths. Hence, concerted efforts should be made towards creating the awareness of hypertension with the people at the base of the social class pyramid as major target. Also, emphasis should be placed on intensive campaigns for life style changes and the need for regular blood pressure checks. This will help to prevent the early development of hypertension in those at risk, early detection and treatment, and complications, thus, reducing the morbidity and mortality impact of hypertension.

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Competing Interests

There is no conflicting or competing interest.

Authors' contributions

We write to state that all authors have contributed significantly, and that all authors are in agreement with the contents of the manuscript. 'Authors A' (Arugu, GM) designed the study and protocol, wrote the first draft of the manuscript; 'Authors B' (Tobin-West, C) 'reviewed the design, protocol; 'Author C' (Paul JN) examined the intellectual content of the manuscript. Authors A and C' (Arugu, GM & Paul JN) did the statistical analysis of the study, and literature search. All authors read and approved the final manuscript.

Consent

Written permission was sought from the Departments of Internal medicine and medical records for the use of patients records (folders) in their custody

REFERENCES

1. Miura, K. (2004). Strategies for Prevention and Management of Hypertension Throughout life. Journal of Epidemiology, 14:112–117.
2. Cappuccio, F.P., Cook, D.G., Atkinson, R.W., Strawzzullo, P. (1997). Prevalence, Detection, and Management of Cardiovascular Risk Factors in Different Ethnic Groups in South London. Heart, 78; 555–563.
3. Seedat, Y.K., Seedat, M.A., Hackland, D.B.T. (1998). Prevalence of Hypertension in the Urban and Rural Zulu. Journal Epidemiology of Community Health; 36: 256–261.
4. Ogah, O.S. (2006). Hypertension in Sub-Saharan African Populations: the Burden of Hypertension in Nigeria. Ethnicity and Disease, 16: 765.
5. Nissinen, A., Bothig, S., Granroth, H. (1988). Hypertension in Developing Countries. World Health Statistics, 41; 141–151.
6. Dustan, H.P., Roccella, E.J., Garrison, H.H. (1996). "Controlling Hypertension-A Research Success Story". Archive of Internal Medicine, 156 (17):1926 – 1935.
7. Carretero, O.A., Oparil, S. (2000). "Essential Hypertension, Part I: Definition and Aetiology". Circulation; 101(3); 329¬335.
8. WHO. (1983). Technical Report Series No 686.
9. Akinkugbe, O.O. (1997). "Non-communicable Diseases in Nigeria; Final Report of a National Survey, Lagos: Federal Ministry of Health"- National Expert Committee on NCD, 1-12.
10. Ekere, A. U., Yellowe, B. E., & Umune, S. (2005). Mortality patterns in the accident and emergency department of an urban hospital in

Nigeria. Nigerian Journal of clinical practice, 8(1), 14-18.

11. Cooper, R., Rotimi, C., Ataman, S., McGee, D., Osotimehin, B., Kadiri, S., & Wilks, R. (1997). The prevalence of hypertension in seven populations of west African origin. American journal of public health, 87(2), 160-168.

12. Cooper, R. S., & Rotimi, C. (1993). Establishing the epidemiologic basis for prevention of cardiovascular diseases in Africa. Ethnicity & disease, 3, S13-22.

13. Van der, Sand, M.A. (2003). "Cardiovascular Disease in Sub-Saharan Africa; A Disaster Waiting to Happen. Netherland Journal of Medicine, 61; 32-36.

14. Cappuccio, F.P., Micah, F.B., Emmett, L. (2004). Prevalence, Detection, Management and Control of Hypertension in Ashanti, West Africa. Journal of Hypertension, 43; 1017.

15. Ofuya, Z.M. (2007). "The Incidence of Hypertension among a Select Population of Adults in the Niger Delta Region of Nigeria". South East Asian Journal of Tropical Medicine and Public Health, 38(50): 947 - 949.

16. Ogunniyi, A., Baiyewu, O., Gureje, O. (2001). "Morbidity Pattern in a Sample of Elderly Nigerians Resident in Idikan Community, Ibadan". West African Journal of medicine, 20(4):227- 231.

17. Abengowe, C.U., Jain, J.S., Siddique, A.K. (1980). "Pattern of Hypertension in the Northern Savanna of Nigeria. Tropical Doct; 10:3-8.

18. Johnson, T.O. (1971). "Arterial Blood Pressures and Hypertension in an Urban African Population Sample". British Journal of Preventive and Social Medicine, 25; 26-33.

19. Cappuccio, F.P., Plange- Rhule, J., Phillip, R.O., Eastwood, J.B. (2000). "Prevention of Hypertension and Stroke in Africa". Lancet; 356:677- 678.

20. Cooper, R.S., Rotimi, C.N., Kaufman, J.S., Muna, W.F., Mensah, G.A. (1998). "Hypertension Treatment and Control in Sub- Saharan Africa; the Epidemiological Basis for Policy". British Medical Journal, 316; 614- 617.

21. Kadiri, S., Olutade, B.O., Osobamiro, O. (2000.) "Factors Influencing the Development of Malignant Hypertension in Nigeria". Journal of Human Hypertension, 14; 171-174.

22. Onwuchekwa, A. C., & Chinenye, S. (2010). Clinical profile of hypertension at a University Teaching Hospital in Nigeria. Vascular health and risk management, 6, 511.

23. Odia, O. J., & Wokoma, F. S. (1992). Mortality patterns in the medical wards of a Nigerian Teaching Hospital. Orient J Med, 4, 96-101.

24. Ofori, S. N., & Obosi, J. (2019). Prevalence of hypertension among office workers in a multi-national company in the Niger-Delta with the 2017 American College of Cardiology/American Heart Association Blood Pressure Guidelines. Preventive medicine reports, 15, 100899.

25. Damasceno, A., Azevedo, A., Silva-Matos, C., Prista, A., Diogo, D., & Lunet, N. (2009). Hypertension prevalence, awareness, treatment, and control in Mozambique: urban/rural gap during epidemiological transition. Hypertension, 54(1), 77-83.

26. Simo, L. P., Agbor, V. N., Noubiap, J. J. N., Nana, O. P., Nkosu, P. S. M., Anouboweh, A. F. A., ... & Mbanya, D. (2020). Hypertension prevalence, associated factors, treatment and control in rural Cameroon: a cross-sectional study. BMJ open, 10(9), e040981.

27. Raimi, T.H., Odusan, O. (2020). Association of hypertension with generalized obesity in rural south-western Nigeria. J Surg Med, 1;4(3):177-81.

28. Pengpid, S., Vonglokham, M., Kounnavong, S., Sychareun, V., & Peltzer, K. (2019). The prevalence, awareness, treatment, and control of hypertension among adults: the first cross-sectional national population-based survey in Laos. Vascular health and risk management, 15, 27.

29. Robbiati, C., Putoto, G., Da Conceicao, N., Armando, A., Segafredo, G., Atzori, A., & Cavallin, F. (2020). Diabetes and pre-diabetes among adults reaching health centers in Luanda, Angola: prevalence and associated factors. Scientific reports, 10(1), 1-8.