Prevalence and pattern of hypertension in a semiurban community in Nigeria

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Background: Hypertension has been reported to be a major problem of the blacks. There is a paucity of studies, however, on community-based surveys on the prevalence and pattern of hypertension in Nigeria in the recent time. This study sought to investigate the prevalence and pattern of hypertension in the adult population living in the ancient semiurban community of Ile-Ife, southwest Nigeria.

Design and methods: Two thousand and ninety-seven adults of above 20 years of age were recruited into the door-to-door survey through a multistage cluster sampling technique. Diagnosis of hypertension was based on blood pressure (BP) threshold of 160/95 mmHg and the World Health Organization /International Society of Hypertension guidelines (Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure guidelines) definitions. Resting blood pressure was taken using electronic sphygmomanometer.

Results: The mean age and BP of the participants were aged 44.2 ± 11.6 years and 127/77 mmHg, respectively. The participants (36.6%) had a BP of greater than or equal to 140/90 mmHg whereas 13.3% had BP of greater than or equal to 160/95 mmHg. 22.1% had isolated systolic hypertension whereas 14.5% had isolated diastolic hypertension using the BP of greater than or equal to 140/90 mmHg cut off-point. Using the BP of greater than or equal to 160/95 mmHg, isolated systolic hypertension and isolated diastolic hypertension were 6.63%, respectively. A male-to-female ratio of 1.7 : 1 and 1 : 5 was observed for BP greater than or equal to 140/90 mmHg and BP greater than or equal to 160/95 mmHg, respectively. Hypertension prevalence increased across age gradient from young to old adults.

Conclusion: The prevalence estimates of hypertension obtained in this study was higher than those found in most earlier studies from Nigeria, other West Africa nations and for African–Americans.

Keywords: blood pressure, epidemiology, hypertension, pattern, prevalence

Introduction

Hypertension is regarded as a major public health problem [1] and important threat to the health of adults in sub Saharan Africa (SSA) [2,3]. It has been identified as a major cause of morbidity and mortality in SSA and all over the world [2–7]. Hypertension is widely reported in Africa and is the most common cause of cardiovascular disease in the continent [8–10]. According to Amakiri *et al.* [11] and Aligbe *et al.* [12], hypertension is the commonest cause of sudden unexpected natural death.

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 healthcare provision [13–15]. Given the difficulty of long-term drug treatment in low-income countries, primary prevention assumes a greater public health importance [16,17]. The basis for a prevention strategy lies in precise estimates of the prevalence of hypertension in the community. Several reports on epidemiology of hypertension have emerged from West Africa [18–23]. By comparison, most of the earlier epidemiological reports on hypertension are either on a particular sector of the population or hospital based [22–26]. 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. Inadvertently, the majority of the affected population may be neglected or left out in those studies among specific populations. In America the newest projections estimate is that one in three of Americans who have high blood pressure (BP) do not know it [27]. The national survey on hypertension in Nigeria [21] and another study by Kadiri *et al.* [23] confirms that the awareness of BP status was general low in the community. Therefore, the true prevalence of hypertension in the community is unknown.

Reliable estimates of the prevalence of hypertension have been hampered by lack of a fixed definition of the condition in the earlier studies, which adopted various cut-off points or BP threshold [28,29]. This in turn may limit easy comparison with earlier studies [26]. In Nigeria, the largest black nation in the world, the crude prevalence of hypertension has been documented as 11.2% (on the basis of BP threshold of 160/95 mmhg) [21,28]. Nonetheless, a number of communities-based studies on the prevalence and pattern of hypertension in Nigeria have been reported, but they are from in and around Ibadan, a metropolitan city in the western part of Nigeria [18,22,23,26]. There seems to be no up-to-date communities based studies on the prevalence and pattern of hypertension in the present decade. Considering that hypertension is becoming more common as urbanization increases, this study sought to investigate the prevalence and patterns of hypertension in adult population living in the semiurban community of Ile-Ife, southwest Nigeria.

Methods

The setting for this study was the historical ancient town of Ile-Ife, Nigeria. (Ile-Ife is referred to as the cradle and ancestral place of origin of the Yoruba race; one of the major ethnic tribes in Nigeria). Using the World Health Organization [30] guidelines for conducting community surveys, five out of the eleven political wards into which Ile-Ife central local government area was divided were randomly chosen. In each ward, three census enumeration areas were randomly selected. Each enumeration area was expected to include approximately 150 adults aged 20 years and older. Houses with odd numbers were selected for survey. All eligible and consented adults were recruited until approximately 150 participants were measured in an enumeration area. The study design intended to recruit a total of 2250 adults. A total 2097 consented adults whose ages ranged between 21 and 100 years, however, participated in the door-to-door house survey therefore yielding a response rate of 93.2%.

Procedure

The consent of the chiefs and elders in each of the quarters within the five political wards was obtained. The participants were fully informed about the purpose of the study and their consents were obtained.

Data were collected at the close of day when the participants could be met at home (1600–2000 h). After about 10 min of quiet sitting, three readings of BP were taken at intervals of 3–5 min using an electronic BP monitor (Omron Healthcare Inc., Vernon Hills, Illinois, USA). The mean BP value was used for analysis. In the pilot study, good agreement was found between the readings from the automatic BP device and measurements taken with a conventional sphygmomanometer ($r = 0.97$). The appropriate cuff size (13 x 23 cm or 16 x 30 cm) was used.

Height was measured with a stadiometer. The participant's heels, the back, and the occiput were touching the scale with the participants looking straight ahead during measurement. Weight was measured in kilograms with a bathroom-weighing scale with the participant in standing and shoes off.

Hypertension was defined as a mean systolic blood pressure (SBP) and diastolic blood pressure (DBP) 160/95 mmHg [21,23,28] or being on regular drug therapy for hypertension. With the current definition of hypertension, however, based on the recently published seventh Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC VII) guidelines [29] and the World Health Organization and International Society of Hypertension guide- lines [31]; a second cut-off point of 140/90 mmHg for hypertension was adopted for comparison with other studies that used this criterion.

Using the JNC VII classifications of hypertension [29], the participants were categorized for SBP as follows: normal = less than 120 mmHg, prehypertension = 120–139 mmHg, stage 1 hypertension = 140–159 mmHg, and stage 2 hypertension = greater than 160 mmHg; whereas for DBP the participants were categorized as follows: normal = less than 80 mmHg, prehypertension = 80–89 mmHg, stage 1 hypertension = 90–99 mmHg, and stage 2 hypertension = greater than 100 mmHg.

Data analysis

Data were summarized using descriptive statistics of means and standard deviations. Inferential statistics of independent *t*-test was used to compare the sex difference in physical characteristics and BP of the participants. Significant level was set at *P* value of less than 0.05. The analysis was carried out using SPSS 13.0 version software (SPSS Inc., Chicago, Illinois, USA).

Results

Characteristics of the study population

A total 2097 adults participated in the study [886 (42.2%) men and 1211 (57.8%) women]. The mean age, weight, height, and body mass index were 44.2 ± 11.6 years, 64.9 ± 12.9 kg, 1.64 ± 0.85 m, and 24.2 ± 4.68 kg/m^2, respectively (5th–95th percentile of aged 25.9–65 years). The mean BP of the of all the participants were 126.5 ± 19.7 mmHg and 77.7 ± 11.5 mmHg for SBP and DBP, respectively whereas the pulse rate was 73.7 ± 11.1beats/min. Table 1 shows the general characteristics of the participants by sex.

Prevalence and pattern of hypertension

The total prevalence estimate of hypertension based on 160/95-mmHg definition was 13.3% with a male-to-female distribution of 4.48 and 8.77%, respectively. Isolated systolic hypertension (ISH) was 6.63% (males = 2.58% and females = 4.05%). Isolated diastolic hyper- tension (IDH) was 6.63% (males = 1.90% and females = 4.72%). The total prevalence estimate of hypertension based on 140/90-mmHg definition was 36.6% with a male-to-female distribution of 15.54 and 20.03%, respectively. ISH was 22.1% (males = 10.0% and females = 12.1%) whereas IDH was 14.5% (males = 5.53% and females = 8.92%). Body mass index, BP levels, and hypertension prevalence according to age and sex is presented in Table 2. Pattern of BP categories according age and sex is presented in Table 3. With regards to both stage 1 and stage 2 hypertension (for both SBP and DBP); no clear pattern with age was observed in the percentages among the male participants. Among the female participants, however, the percentage of SBP rose more steadily with increasing age especially for the stage 2 hypertension. Stage 1 hypertension (SBP and DBP) was higher among males than females whereas stage 2 hypertension (SBP and DBP) was higher among women than men. A male-to-female ratio of 1.7 : 1 and 1 : 5 was observed for BP greater than or equal to 140/90 mmHg and BP greater than or equal to 160/95 mmHg from this study.

Table 1 General characteristics of the participants by sex

Variables	Male participants (*n* = 886)	Female participants (*n* = 1211)	*t* value	*P* value
Age (years)	44.2 ± 10.7	44.2 ± 12.3	−072	0.943
Height	1.67 ± 0.08	1.62 ± 0.08	13.8	0.000[a]
Weight	66.1 ± 12.2	64.0 ± 13.4	3.729	0.000[a]
BMI	23.8 ± 4.19	24.5 ± 4.99	−3.209	0.001[a]
SBP	127.5 ± 18.0	125.8 ± 20.9	1.91	0.057
DBP	77.3 ± 10.8	77.9 ± 11.9	−1.216	0.224
PR	72.4 ± 9.9	74.6 ± 11.7	−4.388	0.000[a]

BMI, body mass index; DBP, diastolic blood pressure; PR, heart rate; SBP, systolic blood pressure. [a]Indicate significance difference at $P < 0.05$.

Discussion

From this study the estimated prevalence of hypertension in Ile-Ife community was 13.3 and 36.6% using the BP threshold of 160/95 mmHg and JNC-VI definitions, respectively. The prevalence of hypertension in this study was higher compared with prevalence estimate of 32.9% in another study in semiurban communities from Kumasi, Ghana using the 140/90 mmHg definition [2]. The setting of both studies are alike in characteristics, as a semiurban community was described in term of availability of real infrastructure such as main water supply or sewage, electricity and proximity to urban centers compared with the rural setting where most of these are missing [2]. The hypertension prevalence, however, reported in this study was higher than the prevalence estimate of 16% in West Africa by Cooper *et al.*, [4] using the 140/90 mmHg definition.

Hypertension prevalence in this study was higher than the prevalence of 4.5% using BP greater than or equal to 160/95 mmHg among rural dwellers from earlier studies in Ghana [14]. This finding corroborates earlier studies that have observed lower BPs and prevalence of hypertension in rural compared with urban and semiurban populations in Africa [13,14,32–35]. In contrast to earlier findings of higher hypertension prevalence in urban communities compared with semiurban communities [13,14,33–35], the prevalence of hypertension in this study was higher than the 8–13% reported among urban populations in Africa using BP greater than or equal to 160/95 mmHg [14]. In addition, the prevalence estimate (BP Z 140/90 mmHg) in this study was higher than that found in a recent study in Accra, Ghana by Amoah [15] who found overall crude and age-standardized prevalence rates of hypertension to be 28.3 and 27.3%, respectively. Remark- ably, the prevalence estimate (BP Z 140/90 mmHg) found in this study was higher than the value of 32.6% for African–Americans [4].

We found that the prevalence of hypertension was higher in women (8.77%) than men (4.48%) using the BP greater than or equal to 160/95 mmHg cut-off point. This finding is dissimilar with the report of most earlier reports that found the prevalence of hypertension to be higher in men than women [6,18,20,23,36]. In our study, prevalence rates showed a consistent increase with age in men and women in both rural and semiurban villages. Using the BP greater than or equal to 140/90 mmHg BP threshold, however, the findings of this study

shows that hyper- tension was more common in men than women. This finding disagrees with other studies that found hypertension to be commoner among women than men [2,3,15] based on this cut-off point. Though the degree of hypertension varies among the sexes, no clear pattern of association between hypertension and sex has emerged.

In this semiurban community, on the basis of the 160/95 mmHg cut-off point, one in 10 adults was found to be hypertensive. On the basis of the 140/90 mmHg cut-off point, however, four in 10 adults was found to be hypertensive compared with one in three adults in the United States [37].

The hypertension prevalence rates in this study show a consistent increase with age with no sex bias. This finding corroborates earlier reports, which indicated that the prevalence of hypertension increased with age [18,23,38]. The peak age of affectation of hypertension in the study population was 40–49 years. The age-specific prevalence of hypertension show that the prevalence of hypertension increased sharply from age 50–59 years in both sexes.

The pattern of hypertension in this study showed that prevalence of ISH and IDH was remarkably similar in the general population using the 165/95 mmHg criterion. Using the 140/90 mmHg cut-off point, however, the prevalence of ISH was higher than IDH. From this study, ISH was commoner than IDH, which corroborates earlier reports that ISH was the most common type of hypertension and the most prevalent type of untreated hypertension among the elderly [39].

Table 2 Body mass index (BMI), blood pressure levels, and hypertension prevalence according to age and sex

					Hypertension	
Age (years)	No	BMI	SBP (mmHg)	DBP (mmHg)	160/95 mmHg *n* (%)	140/90 mmHg *n* (%)
Men						
20–29	76	21.9 ± 3.28	128 ± 17.6	76 ± 12.1	6 (0.29)	27 (1.29)
30–39	168	23.1 ± 3.54	125 ± 14.6	76 ± 10.8	6 (0.29)	50 (2.38)
40–49	372	24.0 ± 4.0	126 ± 15.6	78 ± 9.32	23 (1.10)	116 (5.53)
50–59	204	24.3 ± 4.89	128 ± 19.2	78 ± 11.2	29 (1.38)	76 (3.62)
60–69	46	25.3 ± 4.76	142 ± 26.2	81 ± 15.0	20 (0.95)	36 (1.72)
70 or more	20	24.6 ± 4.21	146 ± 27.2	79 ± 13.1	10 (0.48)	20 (1.00)
Total	886	23.8 ± 4.19	128 ± 18.0	77 ± 10.8	94 (4.48)	326 (15.5)
Women						
20–29	132	22.9 ± 4.10	121 ± 74.0	74 ± 11.6	10 (0.48)	24 (1.15)
30–39	271	23.9 ± 4.94	122 ± 18.4	77 ± 11.5	22 (1.05)	77 (3.67)
40–49	411	24.5 ± 5.00	123 ± 17.5	78 ± 10.6	37 (1.76)	129 (6.15)
50–59	246	25.1 ± 4.85	127 ± 21.6	79 ± 13.2	53 (2.53)	99 (4.72)
60–69	108	25.6 ± 5.64	141 ± 26.4	82 ± 13.5	43 (2.05)	75 (3.58)
70 or more	43	25.9 ± 5.46	149 ± 27.1	82 ± 12.4	19 (0.91)	37 (1.76)
Total	1211	24.5 ± 4.99	126 ± 20.9	78 ± 11.9	184 (8.77)	441 (21.0)

BMI, body mass index; DBP, diastolic blood pressure; SBP, systolic blood pressure.

Table 3 Pattern of blood pressure categories according age and sex among adult Nigerians from a semiurban community

					Distribution of blood pressure % of participants	
Age group (years)	Sex	No	Normal	Pre-HYP (mmHg)	Stage 1 HYP (mmHg)	Stage 2 HYP (mmHg)
SBP 20–29			< 120	120–139	140–159	Ζ160
	M	76	30.3	44.7	17.1	7.89
	F	132	56.1	32.6	9.85	1.52
30–39	M	168	34.5	46.4	17.9	1.19
	F	271	50.6	34.7	12.5	2.21
40–49	M	372	35.2	45.2	16.9	2.69
	F	246	40.2	38.2	13.0	8.54
50–59	M	204	33.8	41.7	16.7	7.84
	F	246	40.2	38.2	13.0	8.54
60–69	M	46	21.7	21.7	28.3	28.3
	F	108	22.2	30.6	23.2	24.1
70 or more	M	20	30.0	15.0	10.0	45.0
	F	43	14.0	27.9	23.3	34.9
Total	M	886	33.5	42.7	17.8	5.98
	F	1211	43.8	35.2	13.9	7.18
DBP			< 80	80–89	90–99	Ζ100
20–29	M	76	65.8	22.4	7.89	3.94
	F	132	75.8	18.2	3.03	3.03
30–39	M	168	66.1	22.0	10.1	1.79
	F	271	62.4	24.0	9.59	4.06
40–49	M	372	51.1	37.4	11.3	0.27
	F	246	56.1	15.3	17.3	11.4
50–59	M	204	55.9	30.3	9.31	4.41
	F	246	50.8	30.5	11.0	7.72
60–69	M	46	52.2	21.7	10.9	15.2
	F	108	50.0	27.8	10.1	12.0
70 or more	M	20	50.0	10.0	30.0	10.0
	F	43	39.5	30.2	23.3	6.98
Total	M	886	56.3	30.5	10.4	2.82
	F	1211	57.2	27.3	10.3	5.20

DBP, diastolic blood pressure; F, female; HYP, hypertension; M, male; SBP, systolic blood pressure.

Conclusion

This study is the first community-based survey on hypertension from a semiurban setting in Nigerin. The prevalence estimates of hypertension obtained in this study was higher than those found in most earlier studies from Nigeria, West Africa and for African–Americans. It also overshot the 10% trigger point using 160/95 mmHg [28]. It seems that the influence of modernization with an associated economic, dietary, and lifestyle change may have altered trend in BP. These may most noticeably affect semiurban settings because of the quest for urbanization and western lifestyle than the urban communities, where modern lifestyle has become perennial and the possibility of physiological adaptation cannot be ruled out. The knowledge of this current prevalence rates is obviously critical for the development of strategies to prevent and treat hypertension.

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