

## Review Article

# Prevalence and correlates of hypertension-outcome of a free medical screening in Oke-Ogun area of Oyo state, Nigeria, West Africa

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## Abstract

Literature abounds on prevalence of hypertension in Nigeria and urban areas of Oyo state but none in Oke-Ogun geopolitical zone, which constitutes 10 local governments of the 33 in Oyo state, despite the fact that they have high genetic and environmental predisposition to developing high blood pressure. The purpose of the study was to determine the prevalence of high blood pressure and associated risk factors among indigenes of Oke-ogun, Oyo state. A total of 10,000 respondents were recruited using proportionate sampling techniques. Hypertension was defined according to Joint National Committee-8 criteria. The fasting plasma glucose of the respondents were classified as normal ( $\leq 6$  mmol/L), prediabetes (6.1–6.9 mmol/L), and diabetes ( $\geq 7$  mmol/L). Body mass index was calculated as weight (kg)/height ( $m^2$ ) and classified as malnutrition/underweight ( $< 16$ –18.49), normal (18.5–24.9), overweight (25–29.9), and obese (30– $\geq 40$ ). Data were analyzed using descriptive statistics, Chi-square and binary logistic regression tests at  $P < .05$ . The mean systolic and diastolic blood pressure was  $138 \pm 27.81$  and  $86.13 \pm 14.39$  respectively. The overall prevalence of hypertension was 38.5%. 64.1% were diabetics. 63.4% had no formal education. Majority (82.95%) earned less than N18,000 (\$59) per month. 43.3% had family history of hypertension. There is high prevalence of hypertension among the people of Oke-ogun, in Oyo state. Their low socioeconomic status, low educational background, malnutrition, and genetic predisposition were identified risk factors. *J Am Soc Hypertens* 2018;■(■):1–7. © 2018 American Society of Hypertension. All rights reserved.

## Introduction

High blood pressure is the most common noncommunicable disease in Nigeria.<sup>1</sup> It constitutes approximately 25% of emergency medical admission in hospitals in

Nigeria<sup>2</sup> and the most frequently diagnosed cardiovascular disorder in Nigeria.<sup>3,4</sup>

Hypertension in Nigeria is characterized by lower levels of plasma rennin, angiotensin converting enzyme, and atrial natriuretic peptide.<sup>5</sup> There is also higher erythrocyte sodium,<sup>6,7</sup> sodium-lithium counter-transport activity,<sup>8</sup> plasma noradrenaline,<sup>9</sup> as well as higher salt taste and salt taste threshold.<sup>10,11</sup>

The etiology of hypertension is multifactorial.<sup>12,13</sup> Genetic factors and socioeconomic factors can put an individual at risk.<sup>14</sup> Metabolic risk factors like obesity, can lead to the development of hypertension.<sup>15</sup> Lifestyle modification

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is pertinent for prevention and management of hypertension.<sup>16</sup> According to the World Health Organization (WHO), the prevalence of hypertension is highest in the West African Region.<sup>17,18</sup>

Determining the prevalence of hypertension will assist in estimating its magnitude in the community.<sup>1</sup> It is clear that by the time hypertension is clinically obvious, all therapeutic manipulations will be at their best; producing only slight improvement in the prognosis.<sup>19</sup> It is therefore important that emphasis should be placed on prevention rather than treatment. This can be achieved by mounting public health awareness programs to identify individuals who are prone. In a study of the prevalence and patterns of hypertension, Adedoyin et al<sup>20</sup> reported a prevalence of 36.6%. The purpose of the study was to determine the prevalence of high blood pressure and associated risk factors among indigenes of Oke-ogun in Oyo State, Nigeria.

## Methodology

Oke-Ogun consists of 10 local governments of the present 33 in Oyo state. It has a population of 1.8 million, according to 1996 Nigerian census. Oyo state has the largest landmass in the South West geographical zone; 60% of the landmass is Oke-Ogun with an area of about 13,537 sq km, larger than 29 other states of the 36 in the present Federation of Nigeria. There is a disparity in socioeconomic development as reflected by lack of adequate health facilities, economic investment, and educational facilities. The consequence is the preponderance of low quality of life of the people in the area.

This study took place from March 4 to May 6, 2016 on every Friday and Saturday; beginning from 7 AM to 10 AM at the Health Centres of the respective local governments. Permission was sought from the 10 local government chairmen. The purpose of the research and details of the tests were explained to the respondents, and informed consent was obtained. This was to allay fear and suspicion.

The sample size was estimated using the Lesley Kish<sup>21</sup> statistical formula.

$$n = \frac{Z^2 pq}{d^2}, q = 1 - p$$

where n = designed sample size, p = national prevalence of diabetes in Nigeria was 2.2%,<sup>5</sup> d = degree of accuracy desired usually set at 0.05, z = standard normal deviation, usually set at 1.96 which corresponds to 95% confidence level. The calculated sample size was 3306, but 10,000 was used to increase the power of the study.

The 10 local governments of Oke-Ogun and the respective wards are Atisbo (10 wards), Iseyin (11 wards), Irepo (10 wards), Iwajowa (10 wards), Itesiwaju (10 wards), Kajola (11 wards), Olorunsogo (10 wards), Orelope (10

**Table 1**

Sociodemographic characteristics

Variables	Frequency	%
Age groups		
18–35 y	2415	34.9
36–60 y	4212	60.9
61 y and above	288	4.2
Total	6915	100
Sex		
Male	3417	49.4
Female	3498	50.6
Total	6915	100
Educational level		
No formal education	4383	63.4
Primary	1518	22.0
Secondary	721	10.4
Tertiary	293	4.2
Total	6915	100
Religion		
Christian	2190	31.7
Muslim	4712	68.1
Traditional	13	0.2
Total	6915	100
Marital status		
Married	5750	83.2
Single	566	8.2
Widows/widowers	599	8.7
Total	6915	100
Occupation		
Unemployed	501	7.2
Civil servant	904	13.1
Selfemployed	4077	59.0
Students	1084	15.6
Farmer	349	5.1
Total	6915	100
Income (N)		
<18,000	5735	82.9
18,000–45,000	968	14.0
>45,000	212	3.1
Total	6915	100

Official exchange rate by the Central Bank of Nigeria is \$1–\$N306.

wards), Saki East (11 wards), and Saki West (11 wards). The first stage involved using the mechanical balloting system. Names of the wards in each local government were printed and placed in a container. It was properly mixed. With eyes closed, the first five wards were pulled out from each local government. A total of 50 wards were selected. The second stage involved selection of 40 respondents, by simple random sampling each on Friday and Saturday until a total of 1000 in each local government was obtained.

A structured questionnaire designed to obtain information regarding age, sex marital status, educational status, and salary scale was administered to the respondents by trained assistants. Weight, height, blood pressure, and

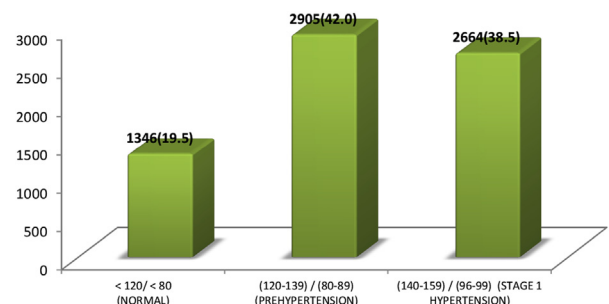
**Table 2**

Association between hypertension and sociodemographic factors

Variables	Blood Pressure in mmHg			Chi Square	P-value
	<120/<80 (Normal)	120–139/80–89 (Prehypertension)	140–159/96–99 (Hypertension)		
Age group					
18–35 y	1262 (93.7)	883 (30.4)	270 (10.1)	2.976	<.001
36–60 y	35 (4.1)	1810 (62.3)	2347 (88.1)		
>60 y	29 (2.2)	212 (7.3)	47 (1.8)		
Total	1346 (100)	2905 (100)	2664 (100)		
Sex					
Male	1137 (97.8)	1562 (53.8)	538 (20.2)	2.195	<.001
Female	29 (2.2)	1343 (46.2)	2126 (79.8)		
Total	1346 (100)	2905 (100)	2664 (100)		
Education					
No formal education	1317 (30.0)	2062 (97.8)	1004 (71.0)	3.200	<.001
Primary	0 (0)	334 (0.0)	10,751 (15.2)		
Secondary	0 (0)	234 (0.0)	487 (8.1)		
Tertiary	29 (9.9)	166 (2.2)	98 (5.7)		
Total	1346 (100)	2905 (100)	2664 (100)		
Religion					
Christian	1024 (76.1)	969 (33.4)	197 (7.4)	1.971	<.001
Muslim	322 (23.9)	1924 (66.2)	2466 (92.6)		
Traditional	0 (0)	12 (0.4)	1 (0.0)		
Total	1346 (100)	2905 (100)	2664 (100)		
Marital status					
Married	1346 (100)	2518 (86.7)	1886 (70.8)	9.788	<.001
Single	0 (0)	37 (1.3)	529 (19.9)		
Widows/widowers	0 (0)	350 (12.0)	249 (9.3)		
Total	1346 (100)	2905 (100)	2664 (100)		
Occupation					
Unemployed	0 (64.0)	132 (3.4)	369 (4.6)	3.832	<.001
Civil servant	219 (16.3)	656 (22.6)	29 (1.1)		
Self-employed	266 (19.8)	1868 (64.3)	1943 (72.9)		
Student	861 (0.0)	100 (4.5)	123 (13.9)		
Farmer	0 (0.0)	149 (5.1)	200 (7.5)		
Total	1346 (100)	2905 (100)	2664 (100)		
Income (N)					
<18,000	1317 (97.8)	2408 (82.9)	2010 (75.5)	6.277	<.001
18,000–45,000	7 (0.5)	314 (10.8)	647 (24.3)		
>45,000	22 (1.6)	183 (6.3)	7 (0.3)		
Total	1346 (100)	2905 (100)	2664 (100)		

fasting blood glucose were measured using standardized instruments. A stadiometer was used to measure height with the respondent standing upright without foot wares and against the wall with the feet together and the respondent gazing forward. The weighing scale was used to measure the weight with the respondents wearing light clothing and removing their foot wares.

The World Health Organization criteria for diabetes were used. The fasting plasma glucose of the respondents was classified as normal ( $\leq 6$  mmol/L), prediabetes (6.1–6.9 mmol/L), and diabetes ( $\geq 7$  mmol/L). The body mass index (BMI) was calculated by dividing the weight in kilograms by the square of the height in meters.<sup>22</sup> BMI was

**Figure 1.** Hypertension.

**Table 3**

Association between BMI and hypertension

BMI in Kg/m <sup>2</sup>	Blood Pressure mm Hg			Chi-Square Test	P-value
	<120/<80 (Normal)	120–139/80–89 (Prehypertension)	140–159/96–99 (Hypertension)		
<18.5 (malnutrition)	1286 (95.5)	1594 (54.9)	1509 (56.6)	8.959	<.001
18.5–24.9 (normal)	60 (4.5)	693 (23.9)	468 (17.6)		
25–29.9 (overweight)	0 (0)	364 (12.5)	236 (8.9)		
30–≥40 (obese)	0 (0)	254 (8.7)	451 (16.9)		
Total	1346 (100)	2905 (100)	26,649 (100)		

classified as malnutrition (<18.5), normal (18.5–24.9), overweight (25–29.9), and obese (30–≥40).<sup>23</sup> Blood pressure was taken from the nondominant arm after 10 minutes of rest using appropriate cuff size and Accoson brand of mercury sphygmomanometer. Systolic blood pressure (SBP) and diastolic blood pressure (DBP) were the first and the fifth korokoff sounds, respectively. Three consecutive measurements were made at an interval of 2 minutes after a 10-minute rest. The mean SBP and DBP determined from the second and third measurements were used for the data analysis. Hypertension was defined as SBP ≥140 mmHg and/or DBP ≥90 mmHg or being on drug therapy for hypertension.

The data were analyzed using the Statistical Packages for Social Sciences (SPSS), version 20 statistical software (SPSS Inc. Chicago, IL, USA). For continuous variables, means and standard deviations were calculated, and the means were compared using the independent sample *t* test. Pearson Chi-square test was used to analyze the relationship between hypertension and sociodemographic variables. Pearson correlation coefficient test was used to determine the relationship between blood pressure, age, and anthropometric variables. Values of *P* < .05 were considered statistically significant.

## Results

A total of 10,000 respondents participated in this study, 1000 from each of the 10 local government areas of the geopolitical zone. However 6915 had analyzable data; the

remaining 3085 could not be analyzed due to incomplete data. The mean age of the respondents was 55.20 ± 15.70 years, minimum of 18 while maximum was 95. The mean weight in kilograms was 60.80 ± 15.40; minimum was 39.9 while maximum was 126.6. The mean SBP in mmHg was 138 ± 27.81, whereas the mean DBP was 86.13 ± 14.39. The mean fasting blood glucose in mmol/L was 5.51 ± 2.21.

Table 1 shows the demographic characteristics of the respondents. There was female preponderance. Majority 63.4% had no formal education. They were mainly self employed (59.0%). Majority of the participants (82.9%) earned less than N18,000 (\$59) per month which is the minimum wage in the public service in Nigeria.

Table 2 shows that high blood pressure was common (88.1%) above 36 years, more in the female (79.8%) than male, among those with nonformal education (71.0%) and especially in those with income less than N18,000 (75.5%).

Figure 1 shows the blood pressure pattern of the respondents. Forty two percent were prehypertensive, 38.5% hypertensive, and 19.5% had normal blood pressure.

Table 3 shows the relationship between BMI and hypertension. Malnourished respondents had the highest number of hypertensives (56.6%). This was statistically significant.

Table 4 shows the relationship between hypertension and diabetes. Many of the hypertensives were diabetic (84.3%), whereas many of the prehypertensives were prediabetic.

**Table 4**

Association between diabetes and hypertension

FBG in mmol/L	Blood Pressure in mmHg			Chi Square	P-value
	<120/<80 (Normal)	120–139/80–89 (Prehypertension)	140–159/96–99 (Hypertension)		
≤6 (normal)	1332 (98.9)	194 (6.7)	202 (7.6)	2.161	<.001
6.1–6.9 (prediabetes)	9 (0.7)	2603 (89.6)	216 (8.1)		
≥7 (diabetes)	5 (0.4)	108 (3.7)	2246 (84.3)		
Total	1346 (100)	2905 (100)	2664 (100)		

FBG, fasting blood glucose.

**Table 5**

Association between hypertension and family history of hypertension

Blood Pressure in mm Hg	Family History		Chi Square	P-value
	No	Yes		
<120/<80 (normal)	1286 (20.9)	60 (7.9)	71.966	<.001
120–139/80–89 (prehypertension)	2538 (41.2)	367 (48.8)		
140–159/96–99 (hypertension)	2338 (37.9)	326 (43.3)		
Total	6162 (100)	753 (100)		

Table 5 shows the association between hypertension and family history of hypertension. Among the hypertensives, 43.3% had a family history of hypertension. This is statistically significant.

Table 6 shows the association between hypertension and impaired vision. Among the hypertensive, 53.8% had impaired vision. This is statistically significant.

## Discussion

The purpose of the study was to determine the prevalence of high blood pressure and associated risk factors among indigenes of Oke-ogun, Oyo state. In this study, there was female preponderance. This was similar to the findings of Ikeoluwapo et al,<sup>24</sup> Daniel et al,<sup>25</sup> and Adediran et al<sup>26</sup> in Nigeria. A study carried out in Kumasi, Ghana by Cappuccio et al,<sup>27</sup> as well as Mufunda et al,<sup>28</sup> shows that men have higher blood pressure than women. This is contrary to the findings in our study. The highest proportion (70.8%) of hypertensive patients was found among the married respondents.

Majority had no formal education and were of low socioeconomic group. Abject poverty and poor had been reported as contributory to high blood pressure.<sup>29</sup> The low income also contributed to the high degree of malnutrition. This is in agreement with previous reports that BMI is a positive predictor of hypertension.<sup>30–34</sup> Contrary to the usual knowledge that obesity is a major cause of hypertension; in Oke-Ogun, malnutrition is the underlying risk factor for hypertension.

The overall prevalence of hypertension among the Oke-Ogun indigenes was high. This was higher than the prevalence reported in most other studies in the south west and Nigeria in general.

Hypertension was found to be associated with a family history of hypertension among the study population. This was in agreement with the findings of Isezuo et al,<sup>35</sup> Mijinyawa et al,<sup>36</sup> and Alabi et al<sup>37</sup> but contrasted with that of Olatunbosun et al.<sup>38</sup> Our result showed that a family history of hypertension was a significant predictor of hypertension. This explains the role of genetics in the pathophysiology of primary hypertension.

## Conclusion

Oke-Ogun, geopolitical zone of Oyo state, has a high prevalence of hypertension which was hitherto unreported. Many of the hypertensives were diabetic and grossly malnourished because of their low socioeconomic status. This result underscores the need for urgent steps to create hypertensive-diabetics clinics in Oke-ogun and to create awareness and implement intervention for prevention, early detection, and treatment of hypertension and diabetes as well as improving the socioeconomic status of the people.

## Limitations and Strength

The diagnosis of hypertension was made based on a mean of two blood pressure measurements at a sitting. This usually requires three separate measurements at one-month interval. “White coat” hypertension arising from fright and apprehension or both could not be ruled out. This may have affected the overall prevalence. Glycylated hemoglobin would have been preferred to FBG. Diabetes was diagnosed following two abnormal, more than 7 mmol/L of FBG on two different occasions.

**Table 6**

Association between hypertension and impaired vision

Hypertension	Impaired Vision		Chi Square	P-value
	No	Yes		
<120/<80 (normal)	1232 (19.4)	114 (20.7)	75.749	<.001
120–139/80–89 (prehypertension)	2765 (43.4)	140 (25.5)		
140–159/96–99 (hypertension)	2368 (37.2)	296 (53.8)		
Total	6365 (100)	550 (100)		



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