Prevalence of hypertension and associated cardiovascular risk factors in patients attending a family practice clinic in Ile- Ife, southwest Nigeria

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Abstract:

The prevalence of hypertension and its complications amongst the black race is high and constitute a significant disease burden worldwide. Even though Hypertension is common, majority of affected individuals are not aware. This study determined the prevalence of hypertension amongst the family practice population and ascertained the anthropometric and clinical correlates of the studied population.

Methods: All new patients attending the family practice clinic over a period of six months were screened for hypertension. Patients were taken through a brief medical history and had their socio-demographic data and anthropometric data taken. Laboratory investigations assessed include: Serum chemistry, fasting blood glucose and lipid profile.

Results: One thousand one hundred and six (1106) patients were screened; out of which two hundred and fifteen (215) were hypertensive representing a prevalence of 19.6%. Age range was 17 to 82 years (Mean ± SD; 57.53 ± 13.02yrs). Majority were females (61.4%). 4.7% smoked while 12.1% consumed alcohol. Fifty-eight percent of the patients were either overweight or obese, 5.8% had hyperglycaemia while 40% had glomerular filtration rate (GFR) less than 60 mls/min. There was a positive correlation between age and Systolic BP ($r=0.231$, $p<0.001$) as well as Diastolic BP ($r=-0.304$, $p<0.001$). Also, there was a positive correlation between serum creatinine and Systolic BP ($r=0.158$, $p=0.04$) as well as Diastolic BP ($r=.272$, $p<0.0001$).There was also positive correlation between Triglyceride levels and BMI ($r=0.176$, $p=0.035$) as well as waist - hip ratio ($r=.226$, $p=0.007$).

Conclusion: The prevalence of hypertension and associated CVD risk factors were high among the study population. A high proportion of our patients had chronic kidney disease (CKD). Regular community screening and preventive programme at the primary and secondary care levels would reduce this trend.

Key words: Hypertension, kidney disease, proteinuria, GFR, CKD

Introduction

Hypertension is a common public health problem as well as cardiovascular risk factor in both developed and developing countries[1,2]. Hypertension is estimated to

cause 4.5% global disease burden and 6% of adult death worlwide[3,4]. In the recent NHANES survey in the US, it affects 24% of all adults above 18 years and 67% of those greater than 60 years[5]. Hypertension causes end-organ damage, including left ventricular hypertrophy, congestive heart disease, coronary heart failure, stroke, renal failure, and PAD[6-10]. In Nigeria, the crude prevalence of hypertension has been reported to be 11.2% using blood pressure threshold of 160/90mmHg[11]. However, based on the current definition of hypertension according to seventh Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC VII) guidelines[12], 25% of Nigerians can be classified hypertensives. Similarly, major target organ damage has also been well documented by various workers in Nigeria[13-18]. Despite current high prevalence rates of hypertension in Nigeria, there is inadequate assessment of blood pressure as well as low hypertension control rates[13-18]. In addition, many patients cannot afford the cost of treatment thus, leading to increased morbidity and mortality[13-18]. We therefore carried out this study to determine the prevalence of hypertension and associated cardiovascular risk factors among our family practice population and also to ascertain the anthropometric and clinical correlates in the studied population.

Materials and Methods

Study site

Obafemi Awolowo University Teaching Hospital Complex (OAUTHC), Ile-Ife, Osun State, Nigeria started operations as the Ife Teaching Hospital Complex. It is made up of 6 units that is the Ife hospital unit; Wesley Guild Hospital, Ilesa; the Dental Hospital, OAU, Ife; Urban Comprehensive Health Centre, Eleyele, Ife; Rural Comprehensive Health Centre, Imesi-Ile; and Multipurpose Maternal and Child Health Centre, Ilesa.

This study took place at the Ife hospital unit which is a 342 bedded hospital OAUTHC catchment area is extremely large including the whole of Osun, Ekiti, Ondo, part of Oyo state, Kwara, Kogi, Lagos and Edo states. While the primary base is the Ife/Ijesa senatorial district, the institution provides tertiary, secondary and primary health care services to the areas mentioned.

Sample size calculation:

The required sample size of 317 was calculated using an appropriate statistical formula for estimating the minimum sample size in descriptive health studies [$n = Z^2pq/d^2$] and finding from a previous study where 26% studied were hypertensive.[19] The minimum sample size was increased by 10% to take care of attrition during the study.

Participants:

All new patients attending the family medicine clinic of Obafemi Awolowo University Teaching Hospital Complex, Ile-Ife, Osun State, Nigeria over a period of six months (April-September, 2007) were recruited and screened for hypertension. All patients who gave their consent were included in the study. Very ill and non-consenting patients were excluded from the study.

Screening Protocol:

The screening was conducted by trained physicians and nurses. After giving an

informed consent, Patients were taken through a brief medical history including their socio-demographic characteristics and anthropometric data. Weight was recorded in kilograms using a standard weighing scale on a firm horizontal surface with the patient wearing light clothing; measurement of height was done using a stadiometer in a standing position on a flat surface and recorded in meters with the patient not wearing shoes or headgear. Body mass index (BMI) was calculated as the ratio of measured weight to the square of the measured height (Kg/m^2) and was categorized as not obese ($<25kg/m^2$), overweight (25 to $29.9kg/m^2$) or obese ($\geq 30kg/m^2$) according to the 2000 WHO criteria[20]. Waist circumference and hip circumference were also recorded. Subject had abdominal obesity or central obesity if waist-to-hip ratio was over 0.9 for males and 0.85 for females[21], or if the waist circumference is ≥102cm for males and ≥88cm for females[22].Blood pressure (BP) was measured in the left arm in the sitting position using Accoson mercury sphygmomanometer with appropriate cuff size after the patient had rested for at least 5 minutes. The average of 3 readings was recorded. Hypertension was defined as a systolic blood pressure >140mmHg or diastolic blood pressure > 90mmHg and/or commitant use of antihypertensive medications by self report[23]. BP was categorized according to the Seventh Joint National Committee Report on Detection, Evaluation and treatment of High Blood pressure[23].

Serum chemistry, lipid profile and fasting blood sugar were assessed using standard laboratory procedures:

1. Serum Creatinine level determination using the standard hospital laboratory method of Jaffe's method (kinetic alkaline picrate).
2. Serum urea level determination using the colorimetric test i.e. the diacetyl mono-amine oxidase method.
3. Serum fasting plasma glucose was determined using glucose oxidase method.

Glomerular filtration rate (GFR) was determined using the Cockroft and Gault equation for creatinine clearance (CrCl) [24] and GFR of < 60 mls/min/$1.73m^2$ body surface area was taken as suggestive of Chronic Kidney Disease (CKD)

Serum total cholesterol and high density lipoprotein cholesterol (HDL) were analyzed using cholesterol oxidase method; triglyceride assessment was by glycerol kinase method while low density lipoprotein cholesterol (LDL) was obtained using Frieldewald formula:

LDL = Cholesterol – HDL – (TG/2.19) in mmol/L.

Dyslipidaemia was defined using the National Cholesterol Education Program (NCEP)/ATP III guidelines[25].

The data were entered and cleaned, and statistical analyses performed using the Statistical Package for Social Sciences (SPSS), version 11 (IBM, Chicago, USA).The data were summarized using mean and standard deviation (SD) for continuous variables and frequencies/percentages for categorical variables. Tests of significance were

conducted using the Pearson's correlation coefficient.

Ethical approval was obtained from the OAUTHC Ethics and Research Committee. Informed consent was obtained from each respondent before administering the questionnaire. No names were recorded to ensure anonymity though subject's hospital numbers were recorded to avoid multiple recruitment of participants . Confidentiality of collected data was maintained throughout the study. Data were stored by the principal investigators on a password protected computer.

Results

One thousand one hundred and six (1106) patients were screened; out of which two hundred and fifteen (215) were found to be hypertensive representing a prevalence of 19.6%. Age range: 17 – 82 years (Mean ± SD; 57.53 ± 13.02yrs). There was female preponderance (61.4% being females). Five percent smoked while 12.1% consumed alcohol. Mean systolic blood pressure (SBP), diastolic blood pressure (DBP), serum creatinine, serum urea were 172.9mmHg (±19.20mmHg), 95.42mmHg (±14.72mmHg), 94.50µmol/L (±42.13µmol/L), 5.94mmol/L (± 11.62mmol/L) respectively (Table 1). The mean total cholesterol, LDL, triglyceride, HDL and Fating blood glucose were 4.39mmol/L ± 0.99mmol/L, 3.3±2.1mmol/L, 1.07mmol /L ± 0.66mmol/L, 1.20mmol /L ± 0.61mmol/L and 7.5±1.8mmol/L respectively.

Table 1- Clinical and Laboratory parameters in studied patients.

Parameter	***Value***	***SD***
Age (Years)	57.53	13.02
Mean systolic BP(mmHg)	172.9	±19.20
Mean diastolic BP(mmHg)	95.42	±14.72
Mean serum creatinine (µmol/L)	94.50	±42.13
Mean serum urea (mmol/L)	5.94	±11.62
Total cholesterol(mmol/L)	4.39	±0.99
LDL (mmol/L)	3.3	±2.10
Triglyceride (mmol/L)	1.07	±0.66
HDL (mmol/L)	1.20	±0.61

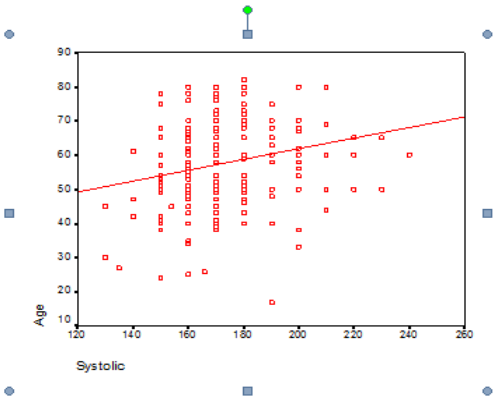

Figure 1: Correlation between age (years) and systolic BP (mmHg) (r =0.231, p<0.001)

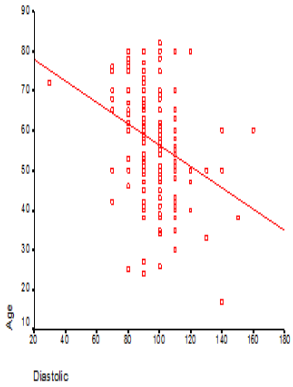

Figure 2: Correlation between Age (years) and diastolic BP (mmHg) (r =-0.304, p<0.001)

Twenty-three percent had dyslipidaemia while 5.8% had fasting hyperglycaemia. Fifty-eight percent of the patients were either overweight or obese while 40% had glomerular filtration rate (GFR) less than 60 mls/min. There was a positive correlation between age and Systolic BP(r=0.231, p<0.001) as well as Diastolic BP (r=-0.304, p<0.001) (fig 1-2). The correlations were sustained even after correcting for age on multivariate analysis. There was a positive correlation between serum creatinine and Systolic BP (r=0.158, p=0.04) as well as Diastolic BP (r=0.272, p<0.0001).There was also positive correlation between Triglyceride levels and BMI (r=0.176, p=0.035).

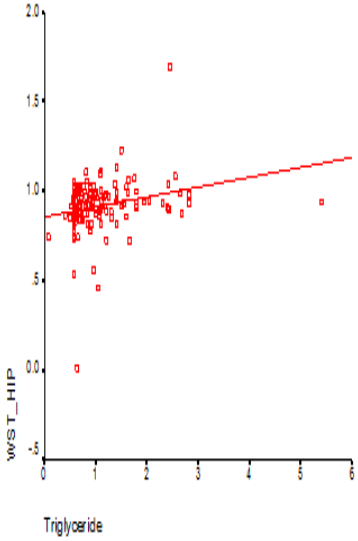

Figure 3: Correlation between Waist-Hip (years) and Triglyceride (r =0.226, p=0.007).

Figure 3 shows a positive correlation between waist-hip ratio and triglyceride levels (r=.226, p=0.007). There was a negative correlation between GFR and age (r=-0.493, p<0.0001) (fig 4) as well as systolic blood pressure (r=-0.249, p=0.002).

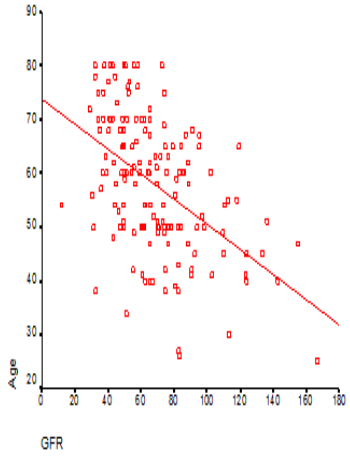

Figure 4: Correlation between age (years) and GFR (mls/min) (r = -0.493, p<0.0001)

Discussion

Hypertension is a major risk factor for the development of cardiovascular complications, including the development and progression of chronic kidney disease. The findings of our study showed that hypertension together with chronic kidney disease is prevalent in our family practice setting. About 19% of our studied population was documented to be hypertensive. This is in agreement with the findings of Ulasi *et al*[26] who reported prevalence of hypertension to be about 18% in their CKD population in Enugu, south-eastern Nigeria. Kadiri *et al*[27] however reported a lower prevalence of 9.3% in their urbanized population survey in Ibadan. The disparity may be due to the high prevalence of chronic kidney disease in our study population since hypertension can be a cause or consequence of CKD. It is also possible that there may have been a transition in the population with a change in the prevalence as the latter study was carried out more than 15 years ago.

The prevalence of chronic kidney disease (defined as GFR < 60 mls/min) has assumed epidemic proportion globally and this conforms with our finding in this study. The prevalence of CKD as defined by glomerular filtration rate less than 60ml/min was 40%. This is significantly higher than that of two previous community-based studies carried out in this environment[28,29]. The prevalence of 26% and 19% were documented in the northern and southern Nigeria respectively[28,29]. The magnitude of CKD in this study could be due to high prevalence of hypertension in the studied population. Hypertension is a strong independent risk factor for ESRD. It is a major promoter of decline in GFR in both proteinuric and non-proteinuric kidney disease[30-31]. It is therefore not surprising that our study demonstrated a strong inverse relationship between blood pressure and kidney function. This is in support of findings of Multiple Risk Factor Interventional Trial (MRFIT). The relative risk for ESRD in male patients with severe HT (SBP >210 mmHg or DBP >120 mmHg) was 20-fold higher than for male patients with optimal BP levels (SBP <120 mmHg and DBP <80 mmHg)[32]. Furthermore, Okinawa study[33] in Japan also confirmed this relationship in female patients as well. Hsu et al[34] in their study also suggested that the relationship between level of blood pressure and risk of development and progression of CKD among individuals without baseline kidney disease is linear. Hence, there exist a graded relationship between elevated blood pressure and risk of CKD.

It is also worthy of note that a sizeable number of the participants in this study had obesity, dyslipidaemia, fasting hyperglycaemia and metabolic syndrome. Epidemiological studies have showed that hypertension is most commonly associated with obesity and metabolic syndrome[35-36]; these risk factors in turn accelerate development and progression of CKD[37-38]. This again may explain the magnitude of CKD in this study.

It is therefore a call to action to aggressively institute lifestyle intervention as a primary prevention strategy for hypertension and the associated cardiovascular risk factors in the general population; and this includes weight reduction to maintain normal body weight, adopting the dietary approach to stop

hypertension (DASH) plan, reducing sodium intake to 6g sodium chloride in a day and increasing physical activity to at least 30mins for most days of the week. Moreover, 5% and 12% of the participants in our study smoked cigarette and consumed alcohol respectively; it is therefore plausible to encourage cessation of smoking as well as limiting alcohol consumption to not more than about 20g per day. Therefore, prevention and control of these cardiovascular risk factors should form the cornerstone of our CKD prevention program. Individual with CKD or elevated serum creatinine will be an excellent candidate for angiotensin converting enzyme inhibitors and/or angiotensin receptor blockers[12].

In conclusion, hypertension and associated cardiovascular risk factors including CKD is prevalent in our general medical practice. There is need to ensure early blood pressure monitoring and scrutinizing CVD risk factors in order to have maximal impact on CKD prevention.

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Competing interest

The authors declare that they have no competing interests.

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