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Original Article

Undiagnosed Hypertension and Proteinuria in a Market Population in Ile-Ife, Nigeria

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Abstract

Introduction: Hypertension and chronic kidney disease (CKD) are common in our urban and rural communities but the majority of affected individuals are not aware of their condition. We conducted free medical examination and screening during one of the market days in Odo-Ogbe market, Ile-Ife, Nigeria to evaluate the magnitude of undiagnosed hypertension and proteinuria.

Methods: Participants were taken through a brief medical history and had their socio-demographic data taken. Weight and height were measured and body mass index (BMI) calculated. Blood pressure (BP) was measured using a mercury sphygmomanometer and urinalysis was done with the aid of dipstick test.

Results: A total of 286 participants aged 13-90 years (Mean 49.5 ± 15.7 years) were screened. Females constituted 90.2% of the study population. One-hundred and eight (37.7%) of participants had hypertension and only 20 (6.7%) were previously diagnosed. Sixty-nine participants (24.1%) had stage-1 hypertension while 39 (13.6%) had stage-2 hypertension. Fifty-nine percent of participants had BMI above 25 kg/m^2. Eighty five participants (29.7%) had proteinuria while only 13 (4.5%) had glycosuria. A significantly higher percentage of participants with stage-1 and stage-2 hypertension had proteinuria compared with non hypertensives. There was a positive correlation between age and BMI ($r = 0.171$, $P = 0.004$), age and systolic BP ($r = 0.378$, $P < 0.0001$) as well as age and diastolic BP ($r = 0.197$, $P = 0.001$).

Conclusion: A high percentage of the studied population (31%) had undiagnosed hypertension and proteinuria (29.7%). Community screening for these disabling non communicable diseases and lifestyle modifications should be encouraged.

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Introduction

The prevalence of hypertension and chronic kidney disease (CKD) have increased exponentially in both the developing and developed countries in the last decade [1-3]. Hypertension is recognised to be a cause as well as a complication of CKD [4, 5]. While the prevalence of hypertension in rural and urban communities in Nigeria varies between 12-32.8% in different studies, the prevalence of CKD is still largely speculative as data is just emerging [1, 3, 6, 7]. The majority of patients with CKD undergo a progressive decline of renal function over years before requiring renal replacement therapy which is largely unafforadable in developing countries [1, 4, 5]. Hypertension and proteinuria are important risk factors for further deterioration in renal function irrespective of the cause of CKD [8, 9]. Furthermore, studies have established that interventions that decrease blood pressure (BP) level in patients with proteinuria and renal insufficiency consistently delay the progression of CKD [8-11]. As a result of the poor outlook of CKD in developing countries, which is particularly worse in sub-Saharan Africa, the International Society of Nephrology (ISN), Commission for the Global Advancement of Nephrology (ISN-COMGAN) now reffered to as ISN Global Outreach Programs has made the fight against CKD one of its major priorities. These programs focus on promoting awareness, early detection and effective treatment as outlined by the Bellagio conference [12]. In a bid to create awareness of kidney disease, its causes and preventive strategies, we organised health education and screening in different populations in Nigeria as a way of commemorating World Kidney Day (WKD). This is a day set aside by the International Federation for Kidney Foundations (IFKF) and International Society of

Table 1: Distribution of proteinuria and glycosuria according to blood pressure category

	Normal BP	Stage-1 HTN	Stage-2 HTN	P value
Presence of proteinuria				
Negative	140 (78.7%)	38 (55.1%)	23 (59%)	0.0001
Positive	38 (21.3%)	31 (44.9%)	16 (41%)	
Presence of glycosuria				
Negative	172 (96.6%)	63 (91.3%)	38 (97.4%)	0.01
Positive	6 (3.4%)	6 (8.7%)	1 (2.6%)	

Nephrology (ISN) on the second Thursday in the month of March every year. A major aspect of our WKD activities is screening for kidney disease or its markers and factors predisposing to it. On the 12th March 2009, we conducted health education, free medical examination and screening among a market population in Ile-Ife as part of the World Kidney Day celebration. Our objective was to define (if any) the magnitude of undiagnosed hypertension and proteinuria in this market population and assess factors that may influence both, including anthropometric indices. This study was presented at the Hypertension Teaching Seminar and International Federation for Hypertension in Africa conference held in Abuja in 2009.

Methods

All participants were recruited after an informed consent. They were taken through a brief medical history and had their sociodemographic data recorded. The BP was measured on the left arm using a mercury sphygmomanometer (Accoson, England) at heart level using appropriate cuff size. The subjects were allowed to relax for 3-5 minutes in a sitting position before assessment of BP. Hypertension was defined as a systolic blood pressure ≥140 mmHg or diastolic blood pressure ≥ 90 mmHg and/or commitant use of antihypertensive medications by self report [7]. Blood Pressure was categorized according to the Seventh Joint National Committee Report on Detection, Evaluation and treatment of High Blood pressure [7]. The categories were as follows; normal: systolic BP (SBP) <120 and diastolic BP (DBP) of <80 mmHg, prehypertension: SBP 120-139 or DBP 80-89 mmHg, stage-1: SBP 140 -159 or DBP 90-99 mmHg and stage-2: SBP ≥160 or DBP≥100mmHg.

Subjects were instructed on modality of collecting midstream urine specimen. Menstruating females were excluded from urinalysis. The participants thereafter provided urine samples which were tested using urinary medi-test Combi 2 test strips (Macherey-Nagel, Germany). Blood glucaose was not assessed as the majority of participants had taken breakfast before the screening.

Weights were taken using bathroom scale (Hana Weighing Scale, China) after removal of shoes and heavy clothings, while the heights were recorded using stadiometer. The body mass index (BMI) was calculated from the measured weight (in kilograms) and height (in meters) and was categorized as not obese (BMI < 25 kg/m^2), overweight (BMI = 25-29.9 kg/m^2) or obese (BMI ≥ 30 kg/m^2) according to the 2000 WHO criteria [13].

Data was analysed using SPSS package version 16. Results are presented as frequencies and proportions or mean ± SD. Chi-square and Fishers exact tests were used for comparison of data where appropriate. Bivariate linear regression analysis was used to determine the association between anthropometric parameters and hypertension. P value <0.05 indicated statistical significance.

Results

A total of 286 participants were screened. Their age ranged between 13-90 years (mean ± SD; 49.5 ± 15.7). There was female preponderance with 278 of participants (90.2%) being females. Systolic and diastolic blood pressures ranged between 90-220 mmHg and 50-120 mmHg respectively. One-hundred and eight participants (37.7%) had hypertension out of which only 20 (6.7%) were previously diagnosed. Sixty nine (24.1%) of participants had stage-1 hypertension while 39 (13.6%) had stage-2 (JNC VII).

The BMI ranged between 15.6 and 46.6 kg/m^2 (Mean ± SD; 26.76 ± 5.28 kg/m^2). Twenty one (7.4%) subjects had BMI <20 kg/m^2, 96 (33.4%) had BMI between 20-25 kg/m^2 and the remaining 169 (59.2%) of participants had BMI above 25 kg/m^2 (35.6% of them had BMI between 25-29.9 kg/m^2 and 23.6% had BMI greater than 30 kg/m^2).

Eighty-five participants (29.7%) had proteinuria while only 13 (4.5%) had glycosuria. A significantly

Figure 1: Correlation between age (years) and BMI (kg/m^2) (r = 0.171, P=0.004)

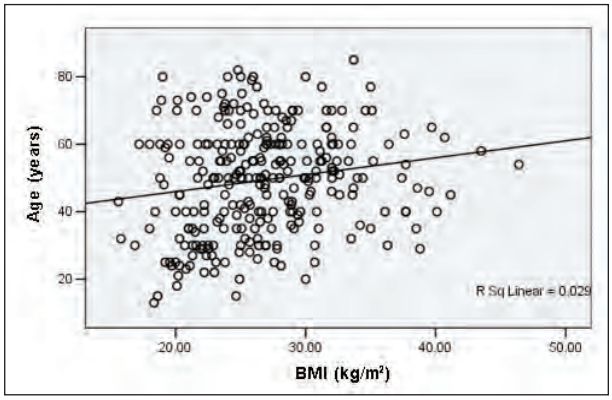


Figure 2: Correlation between age (years) and systolic BP (mmHg) (r = 0.378, P=0.0001)

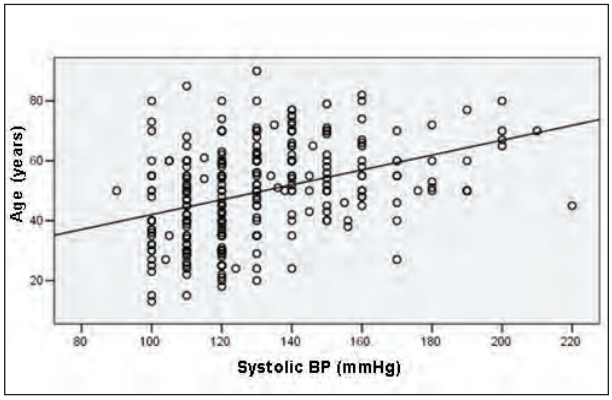
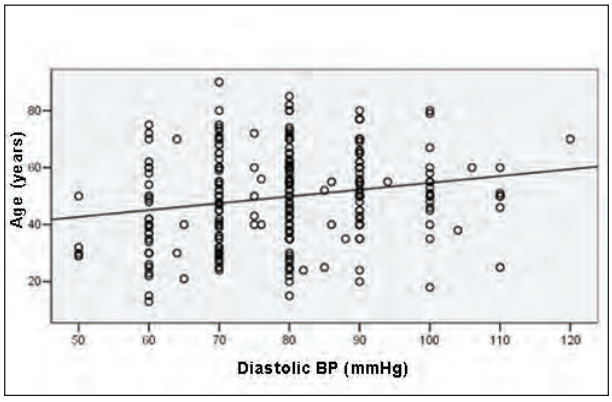


Figure 3: Correlation between age (years) and diastolic BP (mmHg) (r = 0.197, P=0.001)



higher percentage of participants with stage-1 and stage-2 hypertension had proteinuria compared with non-hypertensive subjects (Table-1). Similarly a significantly higher percentage of participants with stage-1 hypertension had glycosuria compared with non-hypertensive participants (P = 0.01) (Table-1). There was a significant positive correlation between age and BMI (r = 0.171, P = 0.004), age and systolic BP (r = 0.378, P < 0.0001) as well as age and diastolic BP (r = 0.197, P = 0.001) (Figures 1-3).

Discussion

Hypertension and CKD are assuming epidemic proportions globally and both contribute significantly to cardiovascular morbidity and mortality in developed and developing economies [1-11]. Prevalence of hypertension in Nigeria varies between 12 and 32.8% in available data sources and one third of hypertensive subjects are unaware of their hypertensive status [3, 6, 7]. About 38% of participants in this study had hypertension which was severe in 14%. Our findings are in agreement with the findings of Ulasi *et al* [7] who found a prevalence of hypertension of 32.8% in their population based survey. These figures are higher than earlier reports from this environment and this may probably be a consequence of the high prevalence of overweight and obese subjects in both study populations. The National non-communicable disease survey conducted about 18 years ago revealed a prevalence of 12% which is significantly lower than the prevalence found in this study [14]. Our figures and those of Oladapo *et al* [6] in western Nigeria and Ulasi *et al* [7] in eastern part of the country suggest that the prevalence of hypertension in our environment is increasing.

Chronic kidney disease not only predisposes to ESRD but also imposes a huge cardiovascular disease burden which is one of the leading causes of death in CKD patients all over the world [5, 15, 16]. A number of factors have been shown to be associated with CKD, these include, ageing, hypertension, impaired glucose tolerance or diabetes mellitus, dyslipidemia, obesity and smoking [17-24]. An interventional approach that would prevent the development and progression of CKD at a community level would thus involve the control of all these factors simultaneously, the so called multi-hit hypothesis. The high prevalence of undiagnosed and untreated hypertension in this study is a clarion call for institution of efforts towards prevention of hypertension and its risk factors even in our rural and semi-urban populations. This would on the long term contribute to reduction in CKD burden and its associated cardiovascular risk [17, 18].

In addition, this study demonstrated that about a third of screened subjects had proteinuria which worsened with the severity of hypertension. Some earlier studies have documented that subjects with macroproteinuria are the groups at high risk of cardiovascular disease and CKD progression [25-32]. Identifying individuals in the early stages of CKD with proteinuria is of utmost importance,

especially as there is strong evidence that the CVD risk associated with stages 1 and 2 is nearly equal to that of stage 3 CKD [25].

The finding that elevated BP, both SBP and DBP were associated with proteinuria was not unexpected as the relationship between hypertension and CKD has been well established [5, 29, 30]. In addition, hypertensive nephrosclerosis is one of the leading causes of ESRD in our environment [33]. The Multiple Risk Factor Interventional Trial (MRFIT) [5] clearly established the fact that hypertension leads to chronic kidney damage. In another analysis of MRFIT data after 10 year follow-up, it was shown that for every 9 mmHg increase in DBP, there was an associated odd ratio of 1.37 for the presence of dipstick-positive proteinuria [28]. Elevated intraglomerular pressure which results in glomerulosclerosis and eventual increased protein trafficking has been suggested as the mechanism responsible for proteinuria in hypertension [28, 29]. This study also established that age positively correlated with BMI and BP. The age dependent increase in BP may be partly due to age dependent vascular sclerosis, glomerulosclerosis and salt sensitivity [4, 5, 17, 30-32]. Previous data have supported the hypothesis that increasing age is associated with increasing susceptibility to the effects of dietary sodium on BP [30].The ability of the kidney to excrete a salt load decreases with age, therefore older people may respond to high salt load with a greater increase in BP [30, 31]. This was also corroborated by a Kenyan longitudinal study, in which subjects were followed up for 18 months and there was a significant increase in BP with advancing age; in addition, older subjects had a greater increase in BP than younger ones [32]. The relationship between BMI and BP might be potentially confounded by dietary salt intake and physical activity level, both of which are difficult to standardize and measure across different ethnic groups. However, the risk of hypertension has been reported to be higher among groups with overweight and obesity in previous studies [7, 8, 34, 35].

Conclusion

This study demonstrated the high prevalence of undiagnosed hypertension and proteinuria in this market population. Age significantly correlated with BMI and BP. Therefore, community screening for these potentially disabling non-communicable diseases as well as institution of lifestyle modification should be encouraged. Strict control of BP and proteinuria is consequently recommended as the bedrock for prevention of CKD and its progression.

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