Prevalence of Impaired Kidney Function in Hospitalized Hypertensive Patients in Maiduguri, Nigeria

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Citation

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Abstract

Background: Hypertension related kidney disease accounts for a large percentage of the population requiring renal replacement therapy worldwide. Africa Americans are over represented in the US ESRD population because of the higher rate of hypertensive nephrosclerosis. Nigeria which is a sub-Saharan African country is populated by black people and lacks a well organised public healthcare system. Our aim in this study was to determine the burden of chronic kidney disease among the hypertensive population in the Teaching Hospital in Maiduguri.

Method: In the period from February to July in 2000 we studied the hospital records and documented the demographic data of patients with hypertension which was defined as blood pressure equal or greater than 140/90 mmHg. The hypertensive patients were classified into the normal or elevated serum creatinine (>135 µmol/l) groups.

Results: One hundred and eighty five hypertensive patients with a mean age of 44.6 years and a male to female ratio of 1:1.1 were studied. The mean serum creatinine was 289.2 +/- 309.88 µmol/l with 45.5 % of the patients having elevated serum creatinine. The difference in age between the normal elevated creatinine groups was not significant.

Conclusion: Impaired kidney function occurs frequently among the hospitalized hypertensive population in Nigeria. Proactive community based preventive measures and early detection of hypertension and kidney damage are urgently needed.

INTRODUCTION

Hypertension affects about 30 % of the US population with the African Americans having upto 40 % higher rates than their aged matched white counterparts ([1]). Although the prevalence of hypertension in Black Africans in Africa has been reported to be lower than the rates from the African Americans hypertension remains a very important cause of kidney related morbidity and mortality in sub – Saharan Africa ([2]). Hypertension and diabetes are the most important risk factors in patients with ESRD in the US accounting for more than 60 % of cases of kidney failure ([3]). Hypertension in developing countries is often detected for the first time when the patients present with end organ damage chronic kidney disease, impaired cardiac function, retinopathy and stroke. This observation maybe related to the low level of awareness of hypertension since just 8 % of the population in Nigeria when compared to about 70 % in the US were aware of their blood pressure status ([2,4]). The purpose of evaluating patients with hypertension is mainly to determine the extent of target organ damage, assess cardiovascular risk status and search for causes of secondary hypertension which are often amenable to specific curative interventions. Both the British Hypertension Society and the Joint National Committee Report on Prevention, Detection, Evaluation and Treatment of High Blood Pressure (JNC VI) guidelines are in agreement that blood pressure greater than either systolic 140 or diastolic 90 or both as hypertension ([4,5]). The need for care providers to be proactive with regards to kidney disease by early detection and treatment with a view to slowing the progression is being increasingly emphasised worldwide. The findings of the Kidney Early Detection and Evaluation programme (KEEP) in the US lends support to several clinical practice guidelines on the cost effectiveness of screening at risk group for kidney disease ([6]). The National Kidney Foundation / Kidney Disease Outcome Quality Initiative (NKF-K/DOQI) clinical guidelines on the classification and evaluation of Chronic Kidney Disease (CKD) highlights the need for a holistic management of

patient irrespective of the stage of disease ([7]). CKD begins to exact its toll as a cardiovascular disease risk factor long before the patient reaches the stage requiring renal replacement therapy ([8]). In this study we sought to determine frequency of abnormal initial biochemical assessment of kidney function by the use of serum creatinine in patients with hypertension in the setting of a University Teaching hospital in sub –Saharan Africa since no such study has been reported from that area.

METHODS

This study is a retrospective analysis of part of an ongoing project in which the hypertensive patients attending the University of Maiduguri Teaching Hospital undergo biochemical evaluation with the objective of determining kidney disease.

The teaching Hospital in Maiduguri is a 500 bed tertiary hospital and it is the only such hospital in the Northeast zone of Nigeria. Though some patients attend the hospital as referrals from primary and secondary care physicians the majority choose to make the hospital their first port of call when they need medical care.

STUDY POPULATION

All adult male and female patients who had hypertension and were hospitalized in the hospital between February 2000 and July 2000 and who consented to the assessment of their renal function were included. These hospitalized patients were either on ward admission or were outpatients that were seen in the clinics. We excluded from the study those patients who could not afford to pay for the basic hospital charges because of financial constraints or did not consider such an assessment desirable. We also excluded pregnant women and children below 15 years

HYPERTENSION

We defined hypertension as measurement of blood pressure exceeding 140mmHg for systolic or 90 mmHg for diastolic or both and those receiving treatment with antihypertensive drugs.

ELEVATED CREATININE

Serum creatinine measurement that exceeded 135 ?mol/l was regarded as elevated. This level of creatinine is roughly equivalent to 1.5 mg/dl.

DATA ANALYSIS

We analysed the data using the SPSS software package and presented the result as descriptive statistics of the hypertensive adult patients. The groups were compared using the Chi - square test. Differences between groups were significant if the p – value was less than 0.05. Correlation was determined using Pearson's correlation.

RESULTS

One hundred and eighty five patients with systemic hypertension were studied. The patients were aged between 15 and 80 years with a mean age of 44.6 +/- 14.9 years. The study population was made up of 91males and 94 females. There was no difference in the mean age of individuals with normal or elevated serum creatinine being 44.9 versus 44.27 years respectively, (Table 1) although the level of serum creatinine correlated with age (p= 0.005)

IMPAIRED KIDNEY FUNCTION

The mean serum creatinine in the study group was 289.2 µmol/l with a standard deviation of 309.88 µmol/l (fig. 1). Elevated serum creatinine greater than 135 micromoles per liter was seen in 85 or 45.5 % of the study population (Table 2). The patients with impaired kidney function were made up of 54 male and 31 female patients compared to 37 male and 63 female patients with normal kidney function depicted in figure 3,(P – value < 0.001). Whereas the age group 30 – 39 years was the largest with 50 hypertensive patients (fig 2) or 27 % of study population there were 26 of them with impaired kidney function constituting 30 % of that subgroup with elevated serum creatinine (p – value = 0.79)

Figure 1

Figure 1: Frequencies of measured serum creatinine

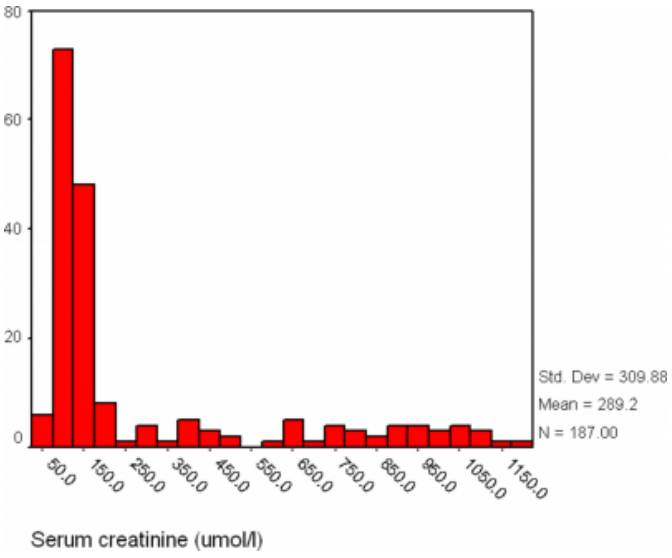

Figure 2

Figure 2: Age group distribution of the study group

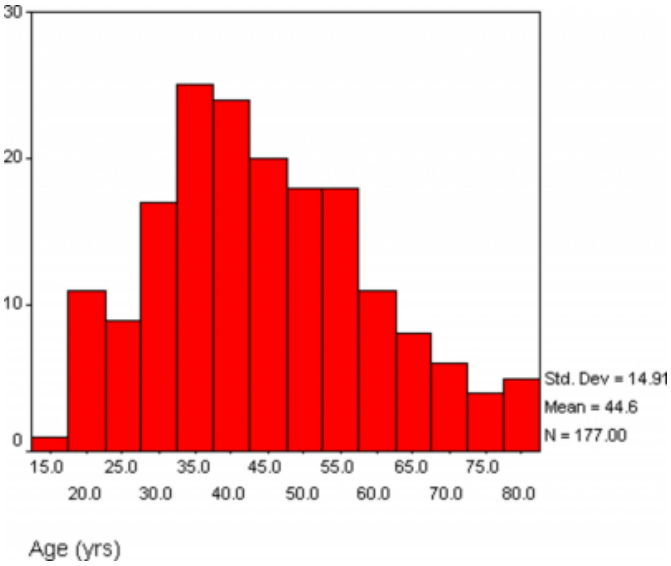

Figure 3

Figure 3: Serum creatinine levels by gender

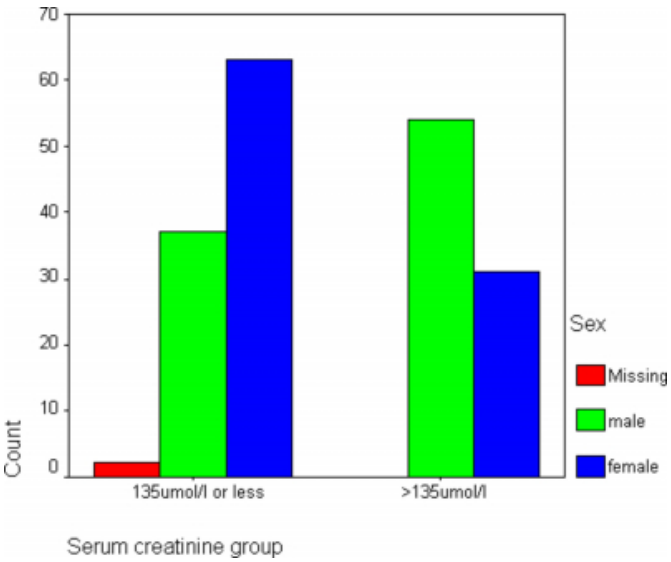

Figure 4

Figure 4: Age group frequencies of normal vs elevated serum creatinine

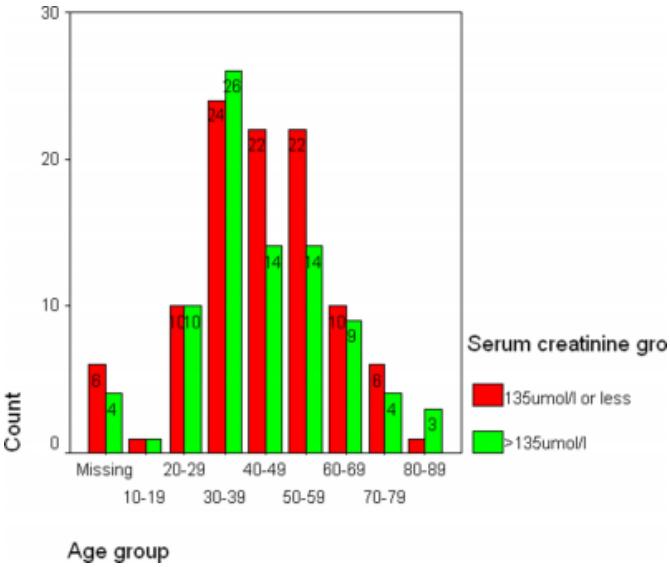

Figure 5

Figure 5: Mean Serum Urea for the Serum Creatinine groups

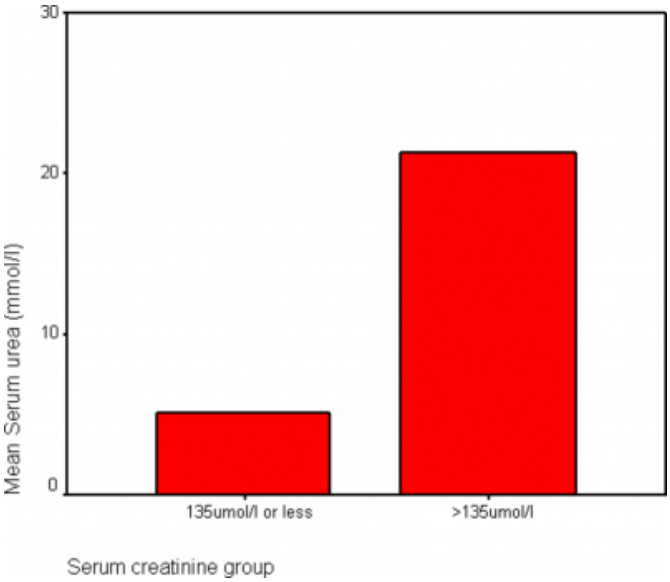

Figure 6

Table 1: Characteristics of Study Population

Characteristic	Creatinine (<135mmol/L)	Creatinine >135mmol/L
Mean Age(yrs)	44.9	44.2
Age Group (yrs)		
<20	1	1
20-29	10	10
30-39	24	26
40-49	22	14
50-59	22	14
60-69	10	9
70-79	6	4
>80	1	3
Sex		
• Male	37	54
• Female	63	31

Figure 7

Table 2: Serum Creatinine groups

Creatinine (µmol/l)	Frequency	Percent
< 135	102	54.5
> 135	85	45.5
Total	187	100

OTHER BIOCHEMICAL DERANGEMENTS

Hyponatramia (Na < 135 mmol/l) was recorded in 33 (15.4 %) of the 165 hypertensive patients investigated for sodium abnormalities. Deranged potassium levels were recorded in 22 of 162 with 7 (4.3 %) having hypokalaemia and 15 (9.3%) having hyperkalaemia . Hypochloremia (Cl < 95 mmol/l) was seen in 8.8 % of the 158 whose results were recorded while 0.6 % had hyperchloraemia (Cl > 110 mmol/l)

DISCUSSION

In this study we report very high prevalence rates of abnormal electrolytes such as sodium potassium and chloride and disturbingly high rates of impaired kidney function in the hospitalized hypertensive in Maiduguri. A persistently elevated serum creatinine is a risk factor for chronic kidney disease (CKD) and an independent factor for progression of CKD to kidney failure ([9]).

Our finding of elevated serum creatinine in 45 % of our study population is higher than the 11.8 % reported by McCellan et al among hypertensive patients in six hospitals in Georgia USA though they considered 1.5 mg/dl that is equivalent to 133 ? mol/l ([10]). Kissmeyer et al reported from the UK a prevalence rate of 11 % for elevated serum creatinine which in their study was defined as125 ?mol/l ([11]).

Their study population was made up of high risk patient with hypertension and / or diabetes in general practice. In the Hypertension Detection and Follow – up program (HDFP) the prevalence rate was even lower at 5.7 % ([12]). The Framinghan Heart study in the US which is a population based study reported elevated serum creatinine in 8.0 % of men and 8.9 % of women ([13]). The possible explanations for the higher rate of elevated serum creatinine in our study than has been reported in the UK and US appear to depend on many factors. The predisposition of the Black race especially in US to kidney disease has been reported by several authors. The third National Health and Nutrition Examination Survey (NHANES III) results indicated that elevated creatinine was present in 9.7 % of men and 1.8 % of women and that the hypertensive African American had a substantially higher risk of chronic kidney disease than his White American counterpart ([14,15]). The KEEP study which is a closely related study to the NHANES III reported a prevalence rate of 5.4 % for elevated serum creatinine in population of non hospitalized individuals considered to be at increased risk of kidney disease ([6]). The NHANES III population was made up of untargeted and non hospitalized patients with the prevalence rate for elevated serum creatinine of 3.5 % being even lower than that of KEEP. This trend leads us to speculate that our higher prevalence rate for elevated prevalence rate was related to study population being entirely hospitalized hypertensive who presented for care as a result end organ damage. Like was reported of South Africa it appears that a high percentage of black sub –saharan African hypertensive have malignant hypertension at diagnosis ([16]). In an autopsy series in Nigeria Ojo et al reported an approximately 25 % occurrence of hypertensive nephrosclerosis made up of 16 % prevalence of malignant and 7 % benign hypertensive nephrosclerosis among 66 renal failure deaths ([17]).

Our study population was made up of entirely black indigenous people from Nigeria and neighbouring Niger, Chad and Cameroun and that composition by virtue of the genetic relatedness to African American may contribute to the high rate of impaired kidney function. Contributory factors to the racial / ethnic disparity in the prevalence of CKD can be best understood as a complex interaction between sociocultural, genetic and environmental factors ([18]). Socioeconomic factors such as poverty, low income with the consequent limited access to healthcare and poor urban housing have been reported to contribute to the incidence and prevalence of hypertension and chronic kidney disease. Poverty for example has several pathways through which it can be associated kidney disease. Poverty is associated with poor nutrition which in turn predisposes to

low birth weight of newborns and reduced nephron mass both of which have been hypothesised to be among the pathogenetic mechanisms of hypertension and kidney disease in adulthood ([19,20]). Residence in poor housing facilities employing the use of leaded paints and exposure to environmental lead from other sources have been linked to the development of hypertension and kidney disease ([21]). Inadequacy of health care in our area of study can contribute to the high prevalence of renal impairment among our hypertensive population who only present for treatment at the onset of complications of hypertension. The awareness of individuals about their blood pressures is low at about 8 % in Nigeria when compared to the about 70 % in the US population. As a consequence of late detection and referral for treatment damage to the end organs in the form of renal impairment and stroke are expectedly higher in our study population than in places with better healthcare systems exist and hypertension is detected and treated optimally ([22]). While there was a correlation between the age and the serum creatinine in the study population there was no difference in age between the hypertensives with normal versus impaired renal function. It is well known that renal functions decline with age and as such increasing age is a risk factor for CKD ([23]) and that may explain the positive correlation between age and serum creatinine in our study. The finding in our study of that the mean age of the group with impaired renal function was similar to that of those with normal creatinine corroborates earlier hypothesis that suggesting that hypertension related kidney damage occurs early in the black populations and is a result of a disease process and not a consequence of the ageing process ([24]). Expectedly the blood urea nitrogen and serum creatinine level correlated well in our study going on to corroborate the serum creatinine as a justifiable means of assessing renal functions. The factors that seem to contribute to the high prevalence of impaired kidney function among our hospitalized hypertensive population in our study include the early development of end organ damage in black people, late presentation for medical care, some bias in the study as a result of self selection of the population that required hopitalization.

CONCLUSION

Impairment of kidney function occurs frequently on hospitalization among patients with hypertension in the Northeast of Nigeria. The need for early detection of kidney disease and the risk factors for cardiovascular disease such as hypertension and diabetes is further highlighted by this study. It is expected that the institution of preventive measures against hypertension and kidney disease will greatly reduce the already unbearable burden of kidney disease in the developing countries like Nigeria.

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