

The Prevalence of Chronic Kidney Disease in Apparently Healthy Retired Subjects in Asaba, Nigeria

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Abstract

Background: The prevalence of chronic kidney disease (CKD) is increasing globally. Studies on this subject, especially in the older age groups are difficult to come by in developing countries like Nigeria. **Aim:** The aim of this study, therefore, is to estimate the prevalence of CKD in retired and elderly Nigerian subjects. **Subjects and Methods:** A total of 170 retired subjects were recruited for the study. Anthropometric measurements were carried out and blood samples taken for serum urea and creatinine estimation. Estimated glomerular filtration rate (eGFR) was determined using software by Kidney Health Australia. The figures obtained thereafter were multiplied by 1.21 to accommodate for the black race. Differences between subjects were tested, using Chi-squared test for categorical data, while two tailed unpaired *t*-test was used for comparison of means. A significant difference was defined as ($P < 0.05$) **Results:** A total of 170 subjects with age ranged between 50 and 86 years, with a mean age of 68.1 (7.7) years (95% confidence interval [CI = 66.9-69.3]) completed this study. Male: Female ratio was 2:1 and 66.5% (113/170) of subjects were elderly (above 65 years). eGFR of subjects ranged from 31 to 114 ml/min/1.73 m², with a mean of 64.5 (16.5) ml/min/1.73 m² (95% CI = 62.0-67.0). The prevalence of CKD in the general population studied was 43.5% (74/170), whereas that in the elderly sub-population was 40.7% (46/113). In the non-elderly subjects, CKD was observed in 49.1% (28/57) of subjects. There was no statistically significant difference between the prevalence of CKD in both groups ($P = 0.53$). The prevalence of CKD was significantly higher in the female subjects than their male counterparts. Subjects with CKD had 33.33% (38/74) males and 64.3% (36/74) females. **Conclusion:** Prevalence of CKD in this studied population is quite high. More aggressive public health measures are required to stem the tide.

Keywords: Chronic kidney disease, Estimated glomerular filtration rate, Retired subjects

Introduction

The prevalence of chronic kidney disease (CKD) is rising globally and causing enormous socio-economic burdens for societies and the health care systems across the globe. Data from the third National Health and Nutrition Examination Survey (NHANES 1999-2004) suggest that about 1 out of 8 adult Americans exhibit evidence of CKD.^[1] Comparable

estimates have been reported in Asia,^[2] Australia,^[3] and across Europe.^[4-6] It is more difficult to get accurate estimates in the developing countries like Nigeria, due to lack of national registries of CKD and limited surveys. However, the risk factors for CKD are known to be just as prevalent in many developing countries as in the developed countries. Therefore, the burden of CKD in those developing countries may be comparable to those of the developed countries. In addition, developing countries exhibit a disproportionate burden of infectious and environmental factors that broaden the spectrum of CKD risk factors and are apt to increase CKD burden.

In both Canada^[7] and the United States^[8] subjects aged 65 and older are the most rapidly growing segment of the population starting dialysis.

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Underlying these numbers in the end-stage renal disease (ESRD) population is a high prevalence of Stages 3 and 4 CKD in the elderly, with rates of 25%^[9] to 55% respectively.^[3] Because CKD in this age group and others is a marker of poor outcome, including cardiovascular disease and decreased survival,^[10] emphasis has been placed on early detection and implementation of strategies to slow the progression of CKD.^[11]

In the United States, approximately one in three adults aged 65 years and older has CKD defined as an estimated glomerular filtration rate (eGFR) <60 ml/min/1.73 m².^[12] The majority of patients with CKD do not progress to advanced stages of CKD because death precedes the progression to ESRD, even among patients with Stage 4 CKD.^[13] The risk of death when compared to the risk of progression to ESRD may be even higher in older patients with established CKD.

Although many CKD risk factors can be managed and modified to optimize clinical outcomes, the prevailing socioeconomic and cultural factors in disadvantaged populations, more often than not, militate against optimum clinical outcomes. In addition, disadvantaged populations exhibit a broader spectrum of CKD risk factors and may be genetically predisposed to an earlier onset and a more rapid progression of CKD.

The incidence of CKD in Nigerian adults has been shown in various studies to range between 1.6% and 12.4% respectively.^[14-18]

Our hypothesis is that a high burden of CKD is likely in elderly Nigerian subjects, because of the extra burden of ignorance and infectious diseases. After a detailed search for studies on the prevalence of CKD on retired or elderly Nigerians, there were no data found.

The aim of this study, therefore, is to estimate the prevalence of CKD in retired and elderly Nigerian subjects.

Subjects and Methods

Study design

This is a cross-sectional, descriptive study on the prevalence of CKD, using eGFR measurement in a retired Nigerian population.

A total of 220 attendees to the quarterly medical lectures of the Ebreime Foundation for the elderly, were screened at, the medical clinics of the Federal Medical Center, Asaba between August and September 2011.

The Ebreime Foundation for the elderly and physically challenged is a non-profit, non-governmental organization, which among other activities, holds quarterly medical lectures for elderly subject in a town hall meeting format. Invitation to meetings was advertised on radio and television and by

telephone text messages to regular attendees. Attendance is voluntary and subjects are expected to transport themselves to the advertised venue.

Ethical clearance was obtained from the ethics committee of Federal Medical Center, Asaba.

Study population

All attendees underwent a detailed history and physical examination, with emphasis on recent ingestion of nephrotoxic agents (drugs and dyes), recent history of significant trauma or fluid loss and recent history of febrile illness. Those who had experienced any of these conditions in the preceding 1 month were excluded. Those with incomplete data and those who denied consent, were also excluded. At the end of the screening, 50 attendees were considered ineligible for the study. The remaining 170 subjects were grouped in batches and screened over 4 weeks. Informed consent was obtained from each participant. A data proforma was used to record biodata, medical history, and regular medications, among other parameters. Anthropometrics measurements were obtained, using standard hospital equipment.

Biochemical analysis

From each participant, 5 cc of blood was collected from a suitable vein after an overnight fast, into plain blood containers and sent to the laboratory. Serum of subjects was analyzed by colorimetry at the chemical pathology laboratory of Federal Medical Center, Asaba for creatinine, the Rehbery-Folin method of Jaffe's reaction, using the Olympus AU600 auto analyzer and the coefficient of variation was <1.9%. This method is traceable by isotope dilution-mass spectrometry. EGFR was calculated by the modification of diet in renal disease (MDRD) equation (MDRD eGFR [ml/min/1.73 m²]) = 175 × ([serum creatinine [μmol/L]/88.4]^{-1.154}) × (age in years)^{-0.203} × (0.742 if female) × (1.210 if African-American) (which has been validated in Nigerian adults),^[19,20] using software by Kidney Health Australia, which utilizes an abbreviated, four variable MDRD equation. Each subject's age, sex, weight and serum creatinine were fed into the provided spaces and the eGFR was generated by the computer. Results were multiplied by 1.21 to accommodate for race (black race).

Statistical analysis

Data was stored in Statistical Package for the Social Sciences, version 17.0 (Chicago II, USA) for statistical analysis. Differences between subjects were tested, using Chi-squared test for categorical data, while two tailed unpaired *t*-test was used for comparison of means. A significant difference was defined as (*P* < 0.05).

Results

A total of 170 subjects were recruited for this study [Table 1]. The ages of the subjects ranged between 50 and 86 years,

with a mean age of 68.1 (7.7) years (95% confidence interval [CI = 66.9-69.3]). Subjects comprised of 67.1% (114/170) males and 32.9% (56/170) females, giving a male: Female ratio of 2:1. 66.5% (113/170) of the studied population were elderly (above 65 years), while 33.5% (57/170) were below 65 years. Among the elderly sub group, 71.7% (81/113) and 28.3% (32/113) were male and female respectively, while in the non-elderly population only 57.9% (33/57) were male and 42.1% (24/57) female.

Table 2 shows the eGFR of subjects. Their eGFR ranged between 31 and 114 ml/min/1.73 m², with a mean of 64.5 (16.5) ml/min/1.73 m² (95% CI = 62.0-67.0). EGFR was used to classify subjects into normal (above 60 ml/min) and CKD (below 60 ml/min). Of the 170 subjects studied, 96 had normal GFR, while 74 had CKD, giving a CKD prevalence rate of 43.5% (74/170) in the general population studied. Of the 113 elderly subjects, 59.3% (67/113) had normal GFR, while 40.7% (46/113) had CKD. While in the non-elderly population, 50.9% (29/57) had normal GFR, while 49.1% (28/57) had CKD. All the subjects with CKD belonged to Kidney Disease: Improving Global Outcomes Stage 3, with the lowest eGFR recorded among the subjects being 31 ml/min/1.73 m²

There was no significant statistical difference in the prevalence of CKD between the elderly and non-elderly groups (*P* = 0.53).

The prevalence of CKD according to gender is presented in Table 3. Among a total of 114 male subjects, 33.33% (38/114) had CKD. The elderly sub population of male subjects had 32.1% (26/81) CKD, whereas the non-elderly male subjects had 36.4% (12/33) CKD.

Prevalence of CKD observed among female subjects was 64.3% (36/56). The elderly sub-population of females showed 62.5% (20/32) CKD while 66.7% (16/24) was found among the non-elderly females subjects.

The prevalence of CKD among the female group was significantly higher than that of their male counterparts (*P* < 0.001).

Table 4 shows comparison of mean eGFR between male and female subjects. The mean eGFR in the male subjects was 68.7 (16.1) ml/min/1.73 m² (95% CI = 65.7-71.7), while that in the female subjects was 55.9 (13.6) ml/min/1.73 m² (95% CI = 52.3-59.5).

The mean values of eGFR between the male and female subjects were significantly different (*P* < 0.001).

Discussion

This study was intended to estimate the prevalence of CKD in a retired Nigerian population. In 2002, Kidney Disease Outcomes Qualitative Initiative of the National Kidney Foundation defined CKD as either kidney damage, exemplified by proteinuria, or

Table 1: Sex and age distribution of the subjects

Age range	Male (%)	Female (%)	Total (%)
≤65 years	33 (28.9)	24 (42.9)	57 (33.5)
>65 years	81 (71.1)	32 (57.1)	113 (66.5)
Total	114 (100)	56 (100)	170 (100)

Table 2: Prevalence of CKD according to age groups of subjects

Age range	Normal (%)	CKD (%)	Total (%)
≤65 years	29 (50.9)	28 (49.1)	57 (100)
>65 years	67 (59.3)	46 (40.7)	113 (100)

Chi-squared test was used (*P*=0.53). CKD: Chronic kidney disease

Table 3: Prevalence of CKD according to gender

Age range	CKD	
	Male (%)	Female (%)
≤65 years	12 (36.4)	16 (66.7)
>65 years	26 (32.1)	20 (62.5)
Total	38 (33.3)	36 (64.3)

Chi-squared test was used with *P*<0.001. CKD: Chronic kidney disease

Table 4: Comparison of mean GFR between male and female subjects

Sex	Male	Female
Mean eGFR (ml/min/1.73 m ²)	68.7 (16.1) (95% CI=65.7-71.7)	55.9 (13.58) (95% CI=52.3-59.5)
Total subject	114	56

t test was used with *P*<0.001. CI: Confidence interval, GFR: Glomerular filtration rate, EGFR: Estimated glomerular filtration rate

a decreased function, i.e., GFR <60 ml/min/1.73 m² for 3 or more months.^[11] Scholars have used either criterion to define CKD in earlier publications.^[21-23] eGFR <60 ml/min/1.73 m² was used in defining CKD in this study.

The key findings in the study are as follows: Prevalence of CKD in the general population was 43.5%. This is in agreement with the 44% reported by Stevens *et al.*^[12] on Kidney Early Evaluation Program and NHANES subjects in the USA. Interestingly, their study recruited subjects aged 65 years and above, making them closely age matched with our participants. From Netherland, Brugts *et al.*^[24] in 2005 reported a prevalence of 44.9% among adult subjects. Furthermore, Takahashi *et al.*^[25] in 2010 reported a prevalence of 26.7% among elderly Japanese. The lower prevalence in these subjects may be due to differences in environmental and cultural factors. In an article in 2009, Afolabi *et al.*^[18] recorded a prevalence of 20.4% among adult subjects on routine visits to a general practice clinic in south west Nigeria. However, their population was significantly younger than ours.

All the subjects with CKD in this study belong to Stage 3. The range of eGFR values in our subjects with CKD, ranged from 31 to 60 ml/min/1.73 m². This is similar to the findings of many previous authors on the same subject, including

Chadban *et al.*^[3] whose Australian subjects with CKD were mostly in Stage 3. The third NHANES also found most American adults with CKD belonged to Stage 3.^[9]

Prevalence of CKD was slightly higher in non-elderly subjects in this present study. This finding is not consistent with the observation of most authors on the subject including a 2009 study by Flessner *et al.*^[26] reporting on prevalence of CKD among African American subjects. Hemmelgarn *et al.*^[27] in 2006 published data from Alberta, Canada, showing an annual decline in GFR in elderly subjects, even in those without obvious CKD risk factors. The same observation was made in 2004 by Garg *et al.*^[28] in seniors requiring long-term care in Ontario, Canada.

However, the reported difference in prevalence between the two groups in this present study was not statistically significant. There was also a very slight difference in age between the two groups studied, making them almost within the same age bracket.

Prevalence of CKD was significantly higher in female subjects than their male counterparts. This finding is consistent with several other studies in different continents; North America,^[9,29] Europe^[30] and Asia.^[2]

Conclusion

Prevalence of CKD among apparently healthy retired Nigerian subjects is quite high. The implications of this are obvious. More aggressive preventive measures, targeting known risk factors, need to be put in place in order to reverse this trend.

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