Prevalence of Chronic Kidney Disease and Associated factors among Patients with Kidney Problems Public Hospitals in Addis Ababa, Ethiopia

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Abstract

Objective: The objective of this study to assess the prevalence and associated factors of chronic kidney disease among kidney problem patients attending public hospitals in Addis Ababa.

Method: This study was a hospital based quantitative cross-sectional study conducted among patients hospitalized in a nephrology clinic and OPD at public hospital Addis Ababa, Ethiopia. The sample was simple randomly selected based on standard sample size formula. The collected data was analyzed by using SPSS software: Versions 20 compute the variables by regression analysis such as bivariate and multivariate analysis was done.

Result: According to CKD EPI equation used to mobile application to calculate eGFR 66 (15.6%) of participants have normal/stage 1, 49 (11.6%) of participants have stage 2, 82(19.4%) of the participants have stage 3, 62 (14.7%) stage 4 and 163 (38.6%) stage 5 CKD respectively. Those patients who were in the age group of >68 were three times more likely (AOR 3.16 (CI 1.36, 7.35); P=0.07) to develop CKD as compared to those who were under 18.

Conclusion and recommendation: This study identified a prevalence of CKD (38.6) by CKD EPI equations among Kidney disease patients that attend the public hospitals of Addis Ababa. Patients in Addis Ababa and out of Addis wait a lot of appointments because of shortage of dialysis service in public hospitals so the people lost their life exposed to high cost in the private dialysis center.

Keywords: Prevalence; CKD; Kidney problem; Public health; Proteinuria

Introduction

Kidney disease is a silent killer [1]. Kidney failure is also called end-stage renal disease (ESRD) or Stage 5 Chronic Kidney Disease. When people have ESRD they need dialysis or a kidney transplant to survive [2]. Chronic Kidney Disease (CKD) is a worldwide public health problem [3]. The endemic occurrence of chronic kidney disease of unknown etiology (CKDu) (sometimes referred to as chronic renal failure [CRF]) was first observed in the 1990s, and over the past 15 years the prevalence of the disease within certain geographical locations has increased dramatically [4]. The unique feature of the disease is that, it has no association with the well-known risk factors such as diabetes, hypertension or chronic glomerulonephritis [4]. The onset of the disease appears to be asymptomatic, and by the time patients seek treatment, the kidneys have reached a stage of irreversible damage (End Stage Renal Disease [ESRD]) [4]. End-stage renal disease, also called established renal failure, is chronic kidney disease which has progressed so far that the patient’s kidneys no longer function sufficiently and dialysis or transplantation become necessary to maintain life.

A retrospective, descriptive hospital cohort study carried out during the period 2001-2002, indicated that the number of persons with health issues seeking treatment at nephrology clinics in Anuradhapura and Kandy were increasing, and the majority was CKDu patients [4]. More recent investigations from community-based studies, report significantly higher rates (12.9%) [5]. The disease appears to mainly affect the proximal tubules and the interstitium giving rise to characteristic, recognizable histopathological and clinical features [6]. Clinically, the disease is characterized by tubular proteinuria, usually β2-microglobulinuria, and the absence of hypertension and edema [6]. The histological appearance of the disease reveals a tubule interstitial pathology that can commonly be observed in toxic nephropathies [6]. To date, there is no unequivocal evidence to recognize the possible environmental causative factors that could lead to nephro toxin being responsible for the disease [7]. Recent personal communications from scientists are pointing to episodic dehydration as a cause that could be a contributing factor for CKDus (farmers undergo episodic dehydration events due to their field activities) and the strong association with lifestyle habits that included smoking and the consumption of illicit liquor and micro albuminuria that is documented [8].

In this respect, the predominant causal factor(s) that have been suggested in the literature that may contribute to the development of the disease, include heavy metals (cadmium [Cd], arsenic [As] and 3 various nucleotides, including uranium [U]), elevated levels of fluoride...
(F) in groundwater, the specific composition of groundwater, aluminum (Al) and aflatoxins [9]. It is worth noting that this issue of chronic kidney disease (CKD) is not confined to Sri Lanka and that there are reports in the literature that describe similar clinical etiologies from India (Rao and Pereira 2007), Nicaragua [9], Costa Rica [10] and other Central American states [9]. The reports from Central America cite an increased risk of the disease among agricultural workers, in general and sugarcane workers in particular [10]. They have also noted that kidney disease decreases at higher altitudes [10]. Heavy workloads in hot climatic conditions often lead to chronic dehydration, which has emerged as a possible hypothesis in Central America [11].

**Materials and Methods**

**Study area**

According to the data obtained from Addis Ababa City Administration Health Bureau there are 11 public and 34 private hospitals in Addis Ababa, providing different services for the public. Three hospitals (Black Lion Specialized Hospital, St. Paul’s Hospital Millennium Medical College and Zewditu Memorial Hospital) among the public hospitals were selected.

**Study period**

This cross-sectional study was conducted for a period of two months from May to July, 2017.

**Population**

**Source of population**

All Patients with kidney disease were seen in and out patients in nephrology department at Black Lion Specialized Hospital, St. Paul’s Hospital Millennium Medical College and Zewditu Memorial Hospitals.

**Study population**

Individuals were selected by the sampling technique in the nephrology department at Black Lion Specialized Hospital, St. Paul’s Hospital Millennium Medical College and Zewditu Memorial Hospital during the study period.

**Ethical consideration**

This research project was approved by “Departmental Ethics and Research committee” of the Department of public Health, Collage of Health Science of Africa Medical College. The purpose of the study was explained to the study participants accordingly. Permission was obtained from each hospitals research center and nephrology clinic. Only subjects who gave informed consent were enrolled. Information was gathered from the study participants were kept confidential. The study results will be disseminated to health care providers to aid in patient care.

**Sample size determination**

The sample size was calculated based on single sample size estimation. The value of p is taken considering 95% confidence interval, 5% margin of error and the value of p was 50% because there is no study conducted related with CKD associated factors. The sample size is calculated using the following standard formula.

The sample size \( n = \frac{2(\alpha^2)p(1-p)}{d^2} \)

Where \( n \) =Sample size

\( Z (\alpha^2) = \) At 95% confidence interval Z value (\( \alpha = 0.05 \)) = 1.96

\( p\) =Proportion of occurrence of the event to be studied

\( d\) =Margin of error at (5%)(0.05)

\( n=(1.96)^20.5(1-0.5)/(0.05)^2 \)

\( n=384 \)

It was none respondents 10%

\( 384 \times 10 \%= 38.4 \)

\( 384+38.4=422.4 \sim 422 \)

**Sampling procedure**

The data was collected from study participants by interview method questionnaire and secondary data.

**Data management and quality control**

Data quality was ensured through use of WHO and CDC standardized questioners [12] to data collection materials, 21(5%) pre-tested on non-selected area which was Korean Hospital of the questionnaire, after doing pre-test the questioner was maintained some problems such as the way question raised lab tests. Data collectors was identified, trained and informed to collect the data as the structured questionnaire before the starts of actual data collection from May 3-4, 2017 and intensive supervision during data collection by the principal investigator.

**Dependent (outcome) variables**

Chronic kidney disease

**Independent variable**: Socio demographic characteristics, history of diabetes, hypertension and cardiovascular disease, smoking habit and alcohol consumption, use of traditional medicine and over the counter medication (NSAID), history of kidney disease and status of kidney failure.

**Data processing and analysis**

Data entry and analysis was done using by SPSS statistical software version 20. The odd ratio was calculated and put the dependent and independent variables in regression analysis to do binary and multivariate. Variables that show association p value <0.2 were selected for further analysis. In all cases P-value less than 0.05 was considered as statistically significant.

**Result**

The data was collected from 422 participants out of these 221 participants from SPHMMC (from OPD, medical wards, dialysis
center and kidney transplant OPD), the rest 121 and 80 of the participants from BLSH and ZMH (OPD, dialysis and medical wards) respectively was collected from May, 2017 up to July, 2017.

The analysis of the demographic data found reveals the following results regarding age, sex, educational and marital status of the respondents: The mean (SD) age of the participants is 43.95 (1.68) years among the participants 210 (49.8%) are between the age of 18 and 39 years, 107 (25.3%) of the participants are between the age of 40 and 49 years. 105 (24.9=%) of the participants are 58 and above years. Two hundred thirty one (54.7%) and one hundred ninety one (45.3%) of the participants were males and females respectively. Concerning the educational background of the participants, 25(5.9%) attended non formal education (illiterate) 119(28.2) attended primary education. 120(28.4%) of the participants attended College/University education. 120(28.4%) of the participants attended secondary education. 120(28.4%) of the participants attended College/University education level.

Regarding marital status of the respondents 90(21.3%) of them are single while two hundred eighty four (67.3%) are married and 48(11.4%) are divorced and widowed/widower. From total population 85(46.2%) of them started from the year one to three years among the participants 210 (49.8%) are between the age of 18 to 49 years. 107 (25.3%) of the participants are between the age of 40 to 48 years. 105 (24.9=%) of the participants are 58 and above years.

Almost all patients complained about long time of schedule to start dialysis before coming complicated of their kidney. 133(31.6%) of participants had three times dialysis schedule per week.


case of comparing the prevalence of CKD is higher for stage 3, 62(14.7%) stage 4 and 163(38.6%) stage 5 CKD respectively. This shows that the prevalence of CKD is higher for stage 5 and lower for stage 3 and stage 4.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Yes N(%)</th>
<th>No N(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ever diagnosed for diabetes</td>
<td>296(71.1%)</td>
<td>126(29.9%)</td>
</tr>
<tr>
<td>Confirmed</td>
<td>77(18.2%)</td>
<td>345(81.8%)</td>
</tr>
<tr>
<td>Diagnosed for hypertension</td>
<td>353(83.6%)</td>
<td>69(16.4%)</td>
</tr>
<tr>
<td>If you say “yes” is that confirmed</td>
<td>253(60%)</td>
<td>169(40%)</td>
</tr>
<tr>
<td>Have you diagnosed to cardiovascular disease</td>
<td>327(77.5%)</td>
<td>95(22.5%)</td>
</tr>
<tr>
<td>If you say “yes” is that confirmed</td>
<td>82(19.4%)</td>
<td>340(80.6%)</td>
</tr>
<tr>
<td>Do you have other chronic diseases</td>
<td>115(27.3%)</td>
<td>303(71.7%)</td>
</tr>
</tbody>
</table>

Table 1: History of diabetes, hypertension and cardiovascular disease of respondents among kidney patients in public hospital, Addis Ababa, 2017 (n=422).

According to CKD EPI equation used to mobile application to calculate eGFR 66(15.6%) of participants have normal/stage 1, 49(11.6%) of participants have stage 2, 82(19.4%) of the participants have stage 3, 62(14.7%) stage 4 and 163(38.6%) stage 5 CKD respectively. This shows that the prevalence of CKD is higher for stage 5 and lower for stage 3 and stage 4.
Discussion

In those hospitals based quantitative cross sectional study, prevalence and associated factors of CKD among renal patients that attend public hospitals of Addis Ababa have been studied. CKD prevalence was greater among older persons and among persons with diabetes, cardiovascular disease and hypertension than among persons without these conditions, supporting previous findings. Mexican Americans and non-Hispanic blacks had greater prevalence of CKD than non-Hispanic whites. The large disparity in prevalence among those with stage 1 CKD might be explained in part by racial/ethnic differences in micro albuminuria and non-Hispanic blacks and Mexican Americans [13-21]. By using CKD EPI equation, prevalence of CKD has been found to be 38.6% by the respective equations. Stage (1-2) prevalence of CKD is 27.2% (15.6%) and (1.16%) respectively. Whereas stage (3-4) prevalence of CKD is 34.1% (19.4%) and 14.7% respectively by CKD EPI equation. Even though the difference is not statistically significant CKD EPI underestimates the prevalence compared to Cockcroft Gault. Among the 15.5% participants with CKD by MDRD equation found in the study conducted in Canada 80% had eGFR 30-60 (Stage 3 CKD) which is comparable with this research finding but over 10% (1.6% of total participants) [22] had eGFR which is 5.4% in this research finding by the same equation. The difference between this study and the Canadian are the population and the methodology. That’s why my study higher than those. The study done in Tanzania shows the prevalence of CKD among adult diabetic patients by Cockcroft Gault equation was 24.7% [23-32]. The Tanzanian researcher focused on only prevalence of diabetic patients from CKD that’s why higher difference between this study and there. The research done in Ethiopia among diabetic patients by using similar equations with this study have found the prevalence of CKD to be 18.8% and 23.8% by MDRD and Cockroft Gault equation respectively [9]. This study also focused in diabetic patient but I need to discuss because the populations are similar with this study: Not too many study done on type 1 diabetics prevalence of CKD is similar to this study. However, the studies found have determined the prevalence by using point prevalence whereas this research uses period prevalence. The CKD prevalence done among type 2 diabetes have found to be 27.9% [21] in Spain, while its prevalence found in this study is 10.79% by the MDRD equation which was the equation used in both studies. Regarding associated factors, different associated factors that have been presented in similar research were assessed to see whether they are 26 associated factors in these study population or not. Due to less number of respondents who smoke currently the result obtained regarding the prevalence of CKD among current smokers (0%) may not be reliable. Older age, type 2 diabetes, family history of CKD, smoking habit, alcohol use, obesity, co-existence of hypertension have been assessed but no significant association was found. As it is the first study done in Addis Ababa, this research has its own limitations. Primarily, due to financial reasons the period prevalence of CKD is done by using the serum creatinine level of patients which is done recently among the tests done in the last five years. This in turn affects the reliability of the prevalence obtained as some patients who have a normal creatinine level before two or three years may have elevated or normal status had the test been done during the data collection [33-43]. The prevalence of CKD would have been much higher than the result obtained by this study, had the research used current level of creatinine. Third, some questions had not been filled by the respondents and that in turn affects the analysis and the result of the study [44-47]. Activities aimed at preventing CKD or its progression can decrease prevalence of the most severe form of CKD, stage 5 (i.e., End-Stage Renal Disease), which is associated with increased morbidity and mortality and diminished health-related quality of life [48]. Treatments such as control of high blood pressure in the early stages of CKD can prevent progression to end-stage renal disease [49].

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Conflict of Interest

The authors have no conflict of interest to declare for this study.

References
