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Research Article

Community Based screening for Susceptibility to Renal Failure (RF) among Relatives of diagnosed patients with RF in Hail region

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Abstract: The aim of the current study was to evaluate the susceptibility for renal failure among relatives of those with renal failure in Hail region, Kingdom of Saudi Arabia (KSA). This study included first degree relatives of 100 Saudi patients with renal failure who has regular dialysis in dialysis center at King Khalid Hospital in Hail city, KSA. About 466 participants were selected for this study. In results of the 400 individuals, CKD was indicated in 40/400 (10%) patients. Of the 40 patients with CKD, 36/40 (90%) were with GFR levels 60 to 31 ml/min/1.73m^2 and the remaining 4/40 (10%) were with GFR levels 30 to 20 ml/min/1.73m^2**.** In conclusion the susceptibility for CKD and subsequent renal failure is high among relatives of patients with kidney failure in Hail Region, KSA.
Keywords: CKD, Renal Failure, Hail, Saudi Arabia

INTRODUCTION

RF is a condition characterized by the inability of kidneys to filter wastes products from the blood. It may be acute (occurring suddenly and commonlyreversable) or chronic (developing slowly ov er time as a consequence of long-lasting damage) and this is frequently termed chronic kidney disease [1, 2].

CKD results from renal damage with persistent progressive decline of ultra-filtration, is a global public health problem [3]. CKD is a common disorder that irrespective of etiology results in a variety of complications including hypertension, diabetes, hyperparathyroidism, anemia, vascular calcification and accelerated cardiovascular disease [3-6]. In most instances, CKD reside clinically silent and consequently undetected until an advanced stage is reached.

CKD is defined by Glomerular filtration rate (GFR) less than 60 ml/min per 1.73 m2 and/or kidney damage for three or more months. The presence of albuminuria is utmost usually used to describe kidney damage, while GFR is frequently assessed using equations that include a filtration marker, such as serum creatinine, in combination with demographic characteristics that account for factors that affect creatinine generation. The most mutual creatinine based equation currently in use is the 4-variable MDRD Study equation, although a newer equation, the CKD-EPI equation, is more accurate, particularly at higher levels of eGFR [7].

However, a recent study Hail region, Kingdom of Saudi Arabia (KSA) has showed a high prevalence of CKD. In the study GFR estimation was available for 2,946 individuals, among whom, 278/2946 (9.4%) were found with impaired kidney function). Of the 278 persons with CKD, 11/2946(0.4%), 16/2946(0.5%), 229/2946(7.8%) and 22/2946 (0.6%) were estimated for GFR rates of stage V, Stage IV, stage III and stage IV, respectively [2].

As with other causes of CKD, environmental, social, hereditary and economic factors [8-10] has been shown to influence the development and progression of CKD, we therefore, in the present study aiming at evaluating the susceptibility for renal failure among relatives of those with renal failure in Hail region, KSA.

MATERIALS AND METHODS

This study included first degree relatives of 100 Saudi patients with renal failure who has regular dialysis in dialysis center at King Khalid Hospital in Hail city, KSA. About 466 participants were selected for this study. A questionnaire including information, such as, gender, age, occupation, hypertension, diabetes mellitus (DM), family history of hypertension, family history of DM, Heart attack, stroke, congestive heart failure (CHF), urinary tract infection (UTI), renal stone, analgesic abuse, and herbal usage was used.

Diagnosis of hypertension was based on the observation of blood pressure levels superior to 140/90 mmHg. Diagnosis of diabetes was based on the information provided by the participant of being under treatment for diabetes due to a previous well-established diagnosis. CKD was evaluated depending on GFR calculation using Serum Creatinine and Cystatin C equations, using the standardized definition from the Kidney Disease Outcomes Quality Initiative of the National Kidney Foundation (K/DOQI) practice guideline, and particularly focus on performance of serum-creatinine based equations for GFR estimation.

All individuals with a GFR <60 ml/min/1.73 m2, were regarded as having CKD and further classified into the following stages: stage I: mild reduction in GFR (30 to 59 ml/min/1.73 m2); stage II: moderate reduction in GFR (16 to 29 ml/min/1.73m^2), and stage III: severe reduction in GFR (30 to 59 ml/min/1.73 m2).

Statistical analysis

For all statistical analyses, the SPSS statistical software version 16 was used. Pearson chi square test was used and P. values of 0.05 or less were regarded as statistically significant.

Ethical consent

The study was approved by the College of Medicine, Research Board of Hail University. Each candidate was asked to sign a written ethical consent during the interview before the taking of the sample.

RESULTS

This study investigated 466 apparently healthy volunteers their ages ranging from15 to 99 years with a mean age of 42.5 years. The males' females' ratio was 0.85: 1.00. Of the 466 volunteers, GFR estimation was available in 400 participants. Of the 400 individuals, CKD was indicated in 40/400 (10%) patients. Of the 40 patients with CKD, 36/40 (90%) were with GFR levels 60 to 31 ml/min/1.73m^2 and the remaining 4/40 (10%) were with GFR levels 30 to 20 ml/min/1.73m^2, as indicated in Fig1.

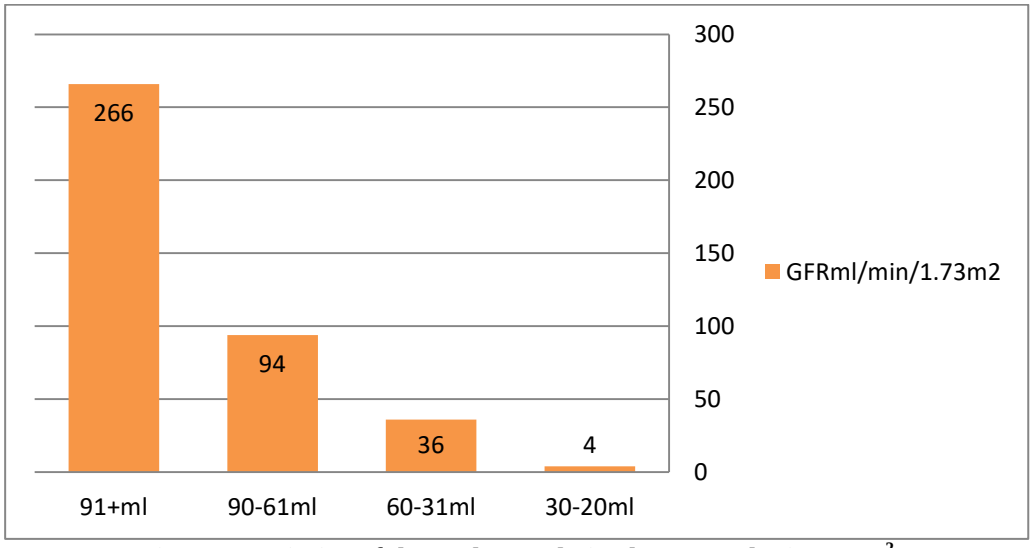

Fig- 1: Description of the study population by GFR ml/min/1.73m^2

Of the 40 patients, 25/40 (62.5%) were males and the remaining 15 (37.5%) were females giving males' females' ration of 1.66: 1.00. Regarding the risk factors for CKD; Diabetes mellitus, Hypertension, recurrent urinary tract infection (UTI), Renal stones, Use of Non-steroidal anti-inflammatory analgesics, Herbal, heart disease and Smoking were identified in 131, 115, 108, 23, 89, 88, 5 and 112 individuals, respectively as indicated in Fig2.

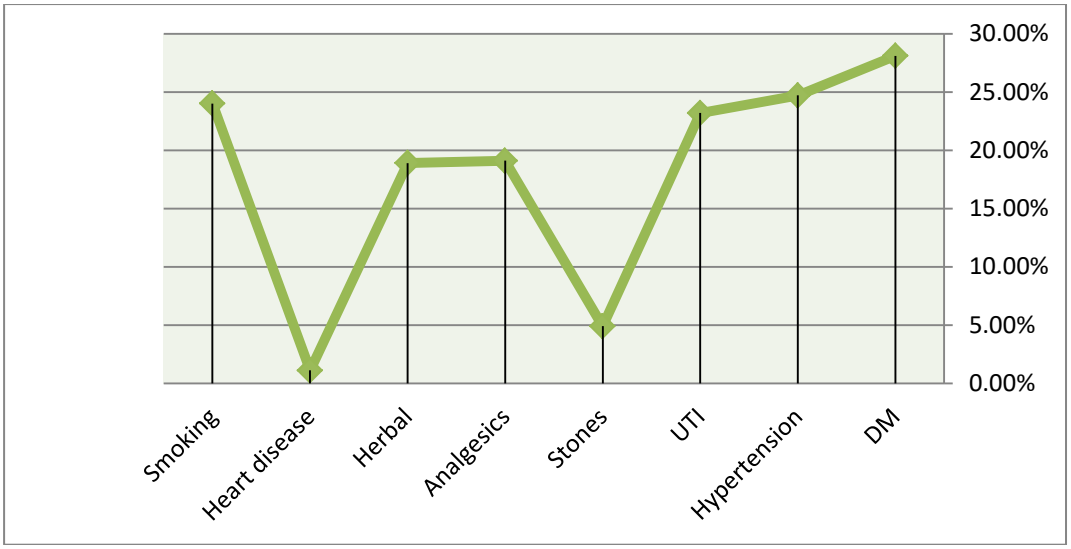

Fig-2: Description of the study subjects by the risk factors for CKD.

As indicated in Table 1, Fig 3, the great majority of cases with CKD were among those with risk factors for CKD. Increased number of cases of CKD were seen among those with hypertension representing 12 patients followed by DM, analgesics users, Smokers, and both heart disease and herbal medication users, constituting 8, 5,4, and 3 patients in this order. Notably, all of cases of CKD were found with risk factors.

In regard to the relationship between age and CKD, most of the cases of CKD were found among age range 56-70 years constituting 17 patients followed by age ranges 41-55, 70+ and 26-40 years representing 10,9 and 4 patients in this order, as indicated in Table 1.However, when calculating the percentage of CKD in each age group, the highest percentage was found in age range 70+ years followed by 56-70, 41-55 and 26-40 years constituting 25.9%, 20.7%, 9% and 3.4% respectively, as shown in Fig 4.

Table 1: Distribution of the study population by CKD and Risk Factors

Variable	**CKD**		**Total**
	Present	Absent	
DM	8	123	131
Hypertension	12	103	115
UTI	3	105	108
Stones	2	21	23
Analgesics	5	84	89
Herbal	3	85	88
Heart disease	3	2	5
Smoking	4	108	112
Age			
<25 years	0	73	73
26-40	4	112	116
41-55	10	102	112
56-70	17	65	82
70+	9	8	17
Total	40	360	400

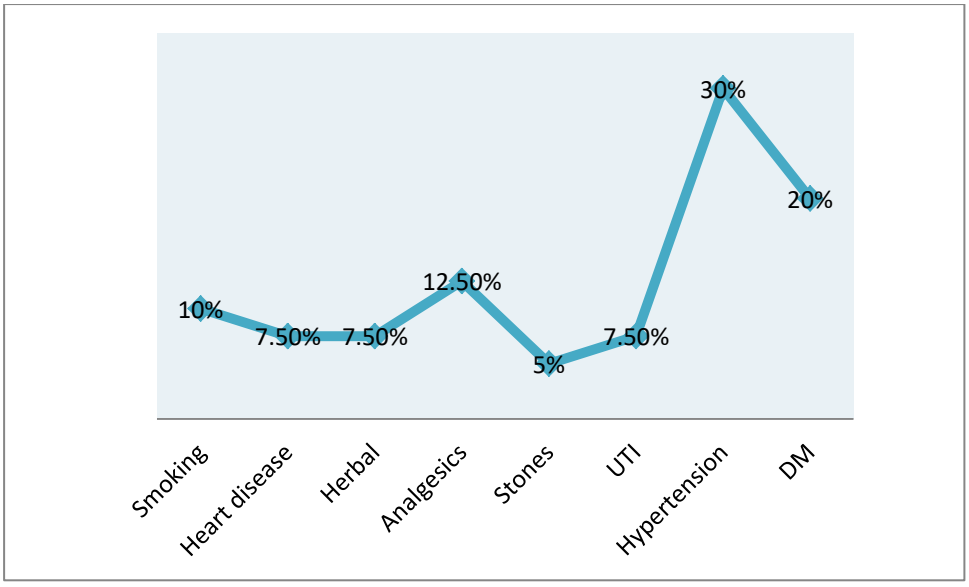

Fig-3: Description of the CKD by percentages of risk factors

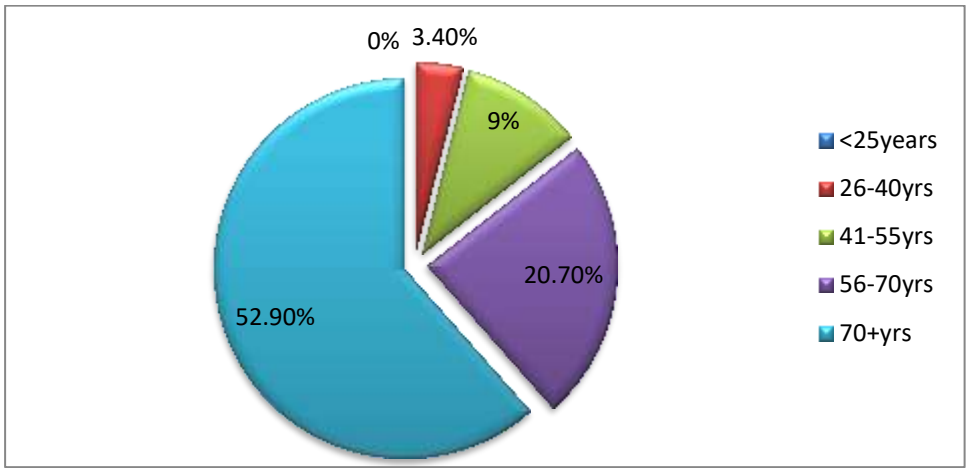

Fig-4: Description of the patients by percentages of CKD in each age group

DISCUSSION

Early diagnosis of CKD offers valuable opportunities for effective interventions that lessen the risk and subsequent hazardous outcomes such as kidney failure and cardiovascular diseases. Thereafter the aims of the present study were to screen the relatives of patients with renal failure for susceptibility to CKD and to identify potential risk factors that may exist within those populations.

However, the prevalence of CKD (24%) in the studied population which is very high compared to other previous reports from Saudi, as well as, reports from many other countries. A recent study from KSA has reported that the prevalence of CKD was 9.4% [2]. A review of 44 studies, have described the epidemiology of ESRD in the countries of the Gulf Cooperation Council (GCC; which consist of Saudi Arabia, the United Arab Emirates, Kuwait, Qatar, Bahrain, and Oman), indicated that the incidence of ESRD has elevated while the prevalence and mortality rate of ESRD in the GCC were poorly reported [11]). In a study from Norway, the overall prevalence of CKD was 10.2%, which is comparable to that reported in the United States [12].

However, there are modifiable and non-modifiable factors that contribute to deterioration of GFR, which indicate CKD. These factors have been found to be substantial irrespective of the underlying etiology of the CKD. In overall, the non-modifiable risk factors were found to be accompanying with more rapid decline in kidney disease includes increased age, African-American race, and male sex. The modifiable risk factors are the focus of treatment to pause disease development and include higher levels of proteinuria, a lower serum albumin level, higher blood pressure, poor glycemic control, and smoking [13].CKD is one of the major complications of DM and hypertension and

carries a risk of cardiovascular morbidity and mortality and development to end-stage kidney disease [14].

In the present study a reasonable number of patients with CKD were found with CKD. The relationship between hypertension and CKD is well known. Sodium retention and stimulation of the rennin angiotensin system is the key for the mechanisms involved in the escalating of blood pressure in patients with CKD [15].Prehypertension and hypertension, as BP levels, are independent predictors of decreased GFR in the general population, with the effect being more pronounced in the elderly. These findings are important for improving risk stratification in the general population [16].

DM is one frequent cause of CKD, accounting for 33% of adult CKD cases [13]. Conversely, 20 to 40% of diabetics are expected develop diabetic nephropathy through the course of their disease [17]; therefore, as the number of diabetic patients increases, the incidence of CKD can be expected to follow. The main complication of DM is diabetic nephropathy (DM-CKD), which progresses in about one-third of diabetics. Attaining optimal glycemic control is the first therapeutic aim in the management of DM-CKD [18].

In the present study, Non-steroidal Anti-Inflammatory Drugs (NSAIDs) were found to be involved in some cases with CKD. NSAID, aspirin and paracetamol use for two years were not found to affecte GFR decline significantly. However, the long-term effects of analgesia usage on eGFR decline continue to be determined [19].NSAID use is prevalent and severely compromises effective renal perfusion in high-risk patients [20]. The community pharmacist can play an essential part in NSAID avoidance education to prevent potential episodes of Kidney injury that have long-term consequences for patients. Most cases of NSAID-induced acute kidney injury can be avoided by identifying high-risk patients and counseling them on appropriate use of NSAID.

Smoking was also found to have some relationship with CKD in the present study. Some studies have assessed the relationship between smoking and CKD in the general population and reported that smoking was associated with CKD as a cause of death in both men and women [21]. However, this effect was mostly existent after the age of 60 [22]. In a study investigated more than 300,000 individuals from the background population, found that smoking was significantly associated with CKD [23].

Furthermore, age was found to be important factor in the existent of CKD in this study, since, the percentages of patients with CKD increase with increase of age. In a study investigated 3173 older Icelandic adults [42% men; mean (standard deviation, SD) age of 80 (5) years] was made to study the distribution of estimated glomerular filtration rate (eGFR) from creatinine and cystatin C, the albumin-to-creatinine ratio (ACR), and CKD-related metabolic complications. It found that the burden of CKD and CKD-related complications is high among elderly adults. The varied range of eGFR and ACR proposes heterogeneity in processes leading to CKD and that factors beyond aging contribute to the progress of CKD in the aging [24].

The findings of the present study indicate that prevalence of renal failure in Hail Region is strongly associated with socioeconomic, demographic, environmental and genetic risk factors. However, high prevalence rates of hypertension, DM, obesity and others were previously reported from this area [5, 6, 8, 25].

The limitation of this study was its lack in genetic investigation of the patients and their relative for passible genetic mutations, since there close ethnicity of the study population.

In conclusion the susceptibility for CKD and subsequent renal failure is high among relatives of patients with kidney failure in Hail Region, KSA. This is due to the presence of large number of individuals with existent risk factors for development of CKD such as hypertension, Diabetes mellitus, smoking and other factors.

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