Epidemiological Characteristics of Chronic Renal Failure Patients of Hodeidah, Yemen in 2023

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Abstract: Chronic renal failure (CRF) is an emergent worldwide public health problem. The increasing incidence of CRF warrants a need for an epidemiological approach to better understand the disease and its prevention. Therefore, the study aims to describe the epidemiological characteristics of chronic renal failure patients in Hodeidah, Yemen. The study included 560 patients with CRF in retrospective study (a case series based on medical files) in Center of Dialysis and Renal Diseases of Hodeidah, Yemen from 1st January 2023 to 31st December 2023. The patients were diagnosed based on evidence – based clinical practice guideline of all stages of CRF that was extracted from the National Kidney Foundation Kidney Disease Outcomes Quality Initiative (NKFKDOQI). Epidemiological data were reported with ethical approval consideration, data obtained were analyzed. 560 cases were diagnosed with renal failure, 555 patients (99.107 %) of them were diagnosed with CRF and 5 patients (0.89 %) were diagnosed with acute renal failure (ARF). CRF patients was founded 61.81 % in the males while 38.11 % in the females. However, this difference was statistically significant (X^2= 30.921; p < 0.00001). The age range of patients was from 5 to 95 years, where 54.64% of cases occurred more than 50 years then 39.28 % between 18 to 49 years and the lower frequency was in children less than 18 years (5.22%) with different significant (X^2= 226.314 ; p < 0.00001). In addition, 81.98 % of patients in rural and 18.02 % in urban. The maximum cases were reported in summer session namely 13.21 % in July and 11.25 % in August. On the other hand , the major causes were chronic diseases 406 case (73.14 %) that diagnosed and recorded , 161 case (29 %) of hypertension ,132 case (23.78 %) of diabetes , 113 (20.36 %) of inflammation nephrolithiasis obstructive uropathy , 8 cases (1.44 %) of genetic polycystic renal disease , and 4 cases (0.72 %) of sedative narcotic addiction and   137 case (24.68%) of unknown causes with different significant (X^2= 119.00 ; p < 0.00001). The chronic diseases namely diabetes and hypertension were the major causes reported to develop the CRF, therefore, to prevent the development of CRF based on center for control diseases and control (CDC), managing risk factors.

Keywords*: Chronic renal failure, epidemiology, risk factors, causes, Hodeida , Yemen

1. INTRODUCTION

Chronic renal disease (CRF) is defined as the presence of renal damage or an estimated glomerular filtration rate (eGFR) less than 60 ml/min/1.73 mt2, persisting for 3 months or more, irrespective of the cause. The 2012 kidney disease: Improving Global Outcomes (KDIGO) – chronic kidney diseases (CKD) classification recommends

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details about the cause of the CKD [1]. Six categories were classified based on glomerular filtration rate (GFR) (Table 1). In addition, the three levels of albuminuria that include albumin-creatinine ratio (ACR) (Table 2) [2,3].

Table (1) : Six categories was classified based on glomerular filtration rate (GFR)

G1	GFR 90 ml/min per 1.73 m2 and above
G2	60 to 89 ml/min per 1.73 m2 , G3a: 45 to 59 ml/min per 1.73 m2 ,
G3	G3b: 30 to 44 ml/min per 1.73 m2
G4	G4: 15 to 29 ml/min per 1.73 m2
G5	G5: GFR less than 15 ml/min per 1.73 m2 or treated by dialysis.

Table (2)_: The three levels of albuminuria that include albumin-creatinine ratio (ACR)

A1	ACR less than 30 mg/gm (less than 3.4 mg/mmol)
A2	ACR 30 to 299 mg/gm (3.4 to 34 mg/mmol)
A3	ACR greater than 300 mg/gm (greater than 34 mg/mmol).

Note : Each stage of CRF being sub-categorized according to the urinary albumin-creatinine ratio in (mg/mmol) in an early morning "spot" urine sample [2,3].

CFR is a progressive disease with no cure and high morbidity and mortality that occurs commonly in the general adult population, especially in people with diabetes and hypertension. Preservation of kidney function can improve outcomes and can be achieved through non-pharmacological strategies (eg, dietary and lifestyle adjustments) and chronic kidney disease-targeted and kidney disease-specific pharmacological interventions [4].

Renal failure remains a serious cause of mortality in Yemen. Our region has 1.25 million population and our hospital is the central hospital, which has a nephrology department and performs dialysis for the region. Between January 1998 and December 2002. 547 patients were admitted; including children, with acute renal failure (ARF) and CRF. On the other mean , the CRF was observed in 400 patients, an incidence of 64 per million per year and a prevalence of 320 per million. ARF occurred in 147 persons with an incidence of 23.5 per million per year and a prevalence of 117.5 patients per million [5]. There were 57.8% patients who had unknown causes of CRF, followed by post-renal causes such as urolithiasis and pyelonephritis. There were 66.3% patients who required dialysis because of symptoms and signs of advanced renal failure; 60.2% of them were hypertensive, 80.3% were anemic [6]. There are no available data about the epidemiological features of CRF in the general population of of Hodeidah, Yemen. The study aimed to estimate the prevalence of CRF and its associated risk factors in the Hodiedah , Yemen.

2. METHDOLOGY

2.1. Study area , setting and design
The study was carried out in Hodeidah governorate , Yemen , Center of Dialysis and Renal Diseases of Hodeidah, Yemen. The study included 555 patients with chronic renal failure in retrospective study (a case series based on medical files) from 1st January 2023 to 31st December 2023 .

2.3 Data source and collection
The patients were diagnosed based on evidence – based clinical practice guideline of for all stage of chronic renal failure that was extracted from the National Kidney Foundation Kidney Disease Outcomes Quality Initiative (NKFKDOQI). Epidemiological data namely age, gender, accommodation , seasons , and risk factors, that were collected with ethical approval consideration .

2.4. Data analysis

Data were checked and entered in Statistical Package for Social Science (SPSS) and Microsoft Excel. The data were subsequently visualized using tables, graphs and text. Data were described through measurements namely numbers and percentages. The comparisons between different variables were analyzed using chi-squared test.

3.RESULTS

1.1. Sex – Age and Chronic Renal Failure

  560 cases were diagnosed with renal failure, 555 patients (99.107 %) of them were diagnosed with CRF and 5 patients (0.89 %) were diagnosed with ARF. CRF patients was represented in the males as 343 patients (61.81%) while in the females it was represented as 212 case (38.19 %) . However, this difference was statistically significant ($X^2 = 30.921$; $p < 0.00001$). The age range of patients was from 5 to 95 years , where 306 (55.31%) of cases occurred more than 50 years then 220 (39.36 %) of cases between 18 to 49 years and the lower frequency was in children less than 18 years 29 case (5.22%) with different significant ($X^2 = 217.308$; $p < 0.00001$) (Table 3;Figure 1 and 2).

Table 3 : Epidemiological Features of Chronic Renal Failure in Hodeidah, Yemen (N : 555)

| Variables	(n)	(%)	X^2	*p*-value
Sex				
- Male	343	61.81	30.921	0.00001*
- Female	212	38.11		
Age				
- <18	29	5.22	217.30	0.0001*
- 18-49	220	39.63		
- ≥ 50	306	55.13		
Accommodation				
- Urban	455	81.98	227.07	0.00001*
- Rural	100	18.02		
Risk Factors				
- Hypertension	161	29.00		
- Diabetes	132	23.78		
- Inflammation nephrolithiasis obstructive uropathy	113	20.36	119.00	0.00001*
- Genetic polycystic renal disease	8	1.44		
- Sedative narcotic addiction	4	0.72		
- Unknown causes	137	24.68		
	555	100		
*: Significant less than 0.05				
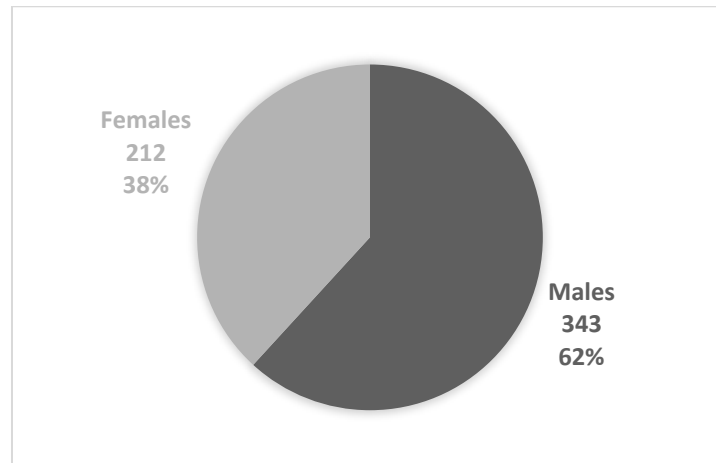
Figure (1) : Chronic renal failure and sex
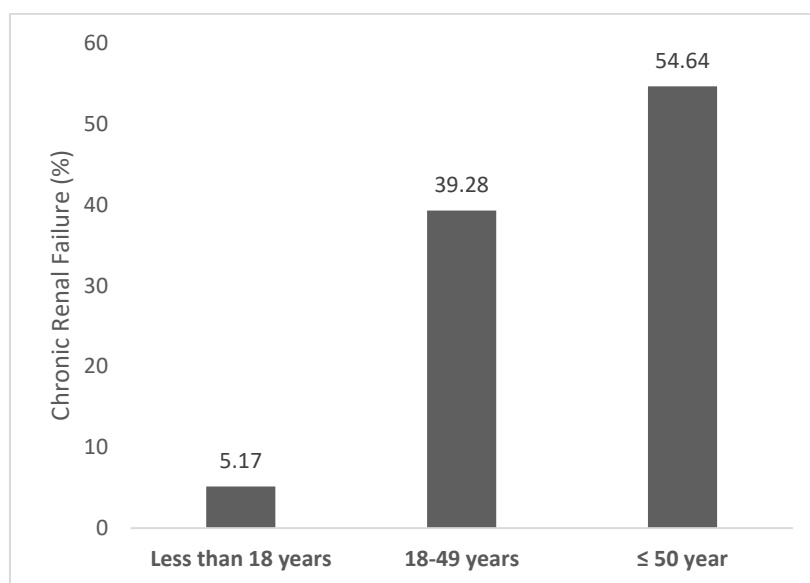
Figure (2) : Chronic renal failure and age

3.2. Accommodation , Sensuality and Chronic Renal Failure

In addition, 455 (81.98 %) of patients in rural and 100 (18.02 %) of patients in urban with different significant (X^2= 227.072; p < 0.00001). . The maximum cases were reported in summer session namely 13.21 % in July and 11.25 % in August (Table 3; Figure3 and 4) .
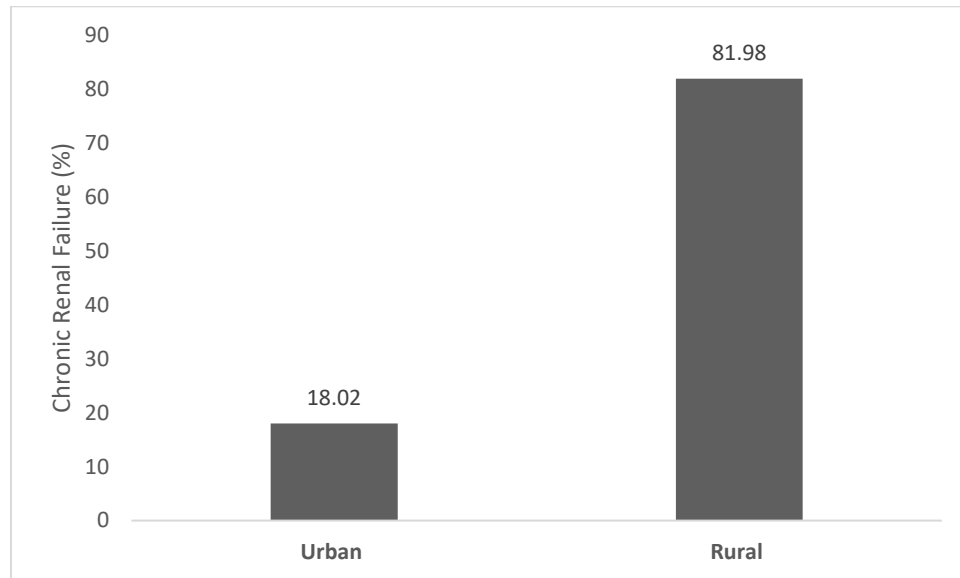
**Figure (3) :** Distribution of chronic renal failure in urban and rural

Figure (4) : Epidemiological curve of incidence for chronic renal failure 2023

3.3. Risk Factors and Chronic Renal Failure

On the other hand , the major causes were chronic diseases 406 case (73.14 %) that diagnosed and recorded , 161 case (29 %) of hypertension ,132 case (23.78 %) of diabetes , 113 (20.36 %) of inflammation nephrolithiasis obstructive uropathy , 8 cases (1.44 %) of genetic polycystic renal disease , and 4 cases (0.72 %) of sedative narcotic addiction and   137 case (24.68%) of unknown causes with different significant (X^2= 119.00; p < 0.00001) (Table 3; Figure 5 and 6).
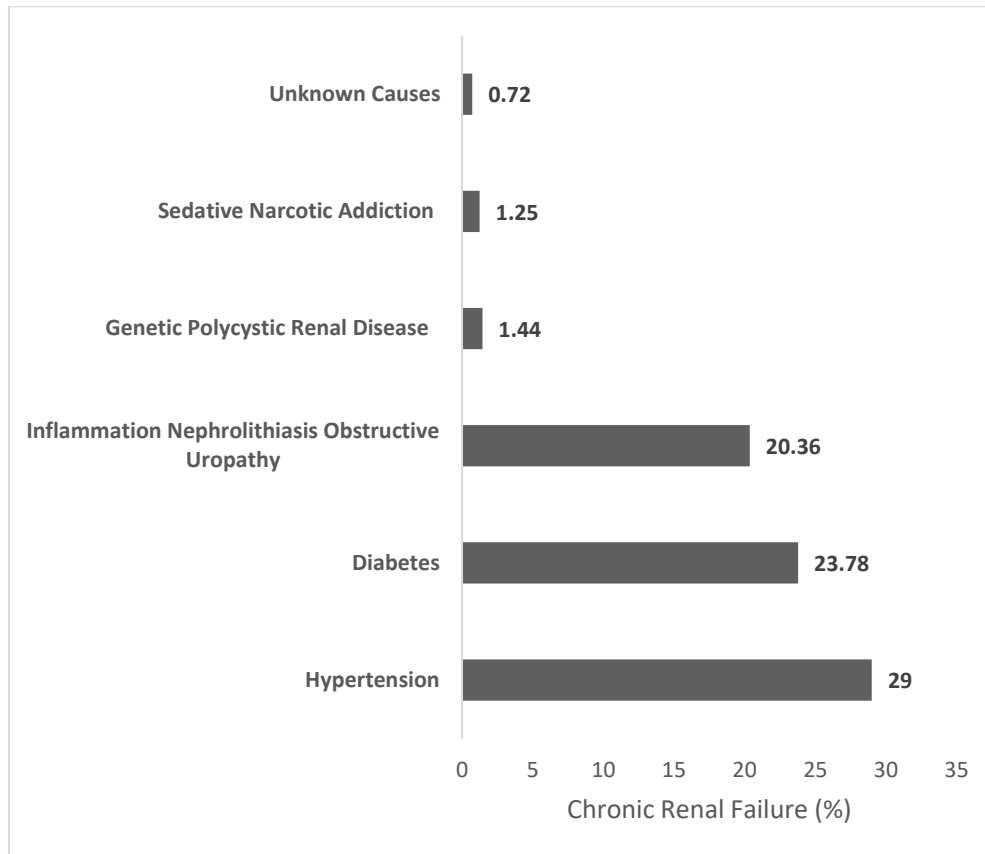
Figure (5) : Causes and risk factors of chronic renal failure
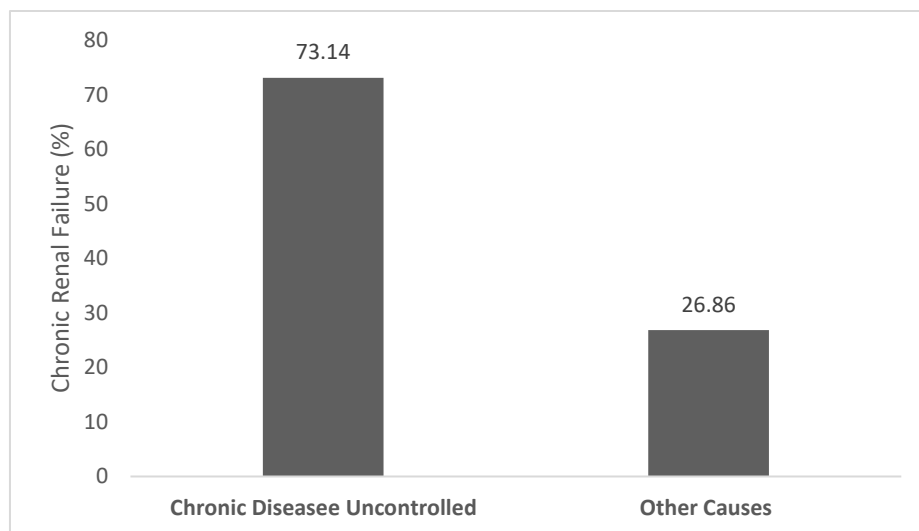
Figure (6) : Percentage of chronic diseases uncontrolled associated with chronic renal failure

4. DISCUSSION

CRF has become a major public health problem and there are currently over 1.4 million patients receiving renal replacement therapy worldwide [7]. Our study showed that chronic diseases   was the most common cause of CKD (71.53%) in Hodeiadh, Yemen . The comparing with other studies were carried out in different countries in the world, this study results agreed with a study done by Mousa et al. in Saudi Arabia, which reported that chronic diseases was 70.7 % (45.3 % of diabetes , 20.7 % of hypertension and 4.7 of glomerulonephritis [8], while the risk factors in CKD patients was recorded by Awad et al. in Iraq (100 %) namely diabetes mellitus (33%) and hypertension (22.6%) were the most common causes of chronic renal failure, followed in order by

obstructive uropathy in 17.3%, undetermined causes in 14%, pyelonephritis in 4.7%, glomerulonephritis in 4.3%, and polycystic kidney disease in 3.9% [9]. On the other hand, the percentages of risk factors associated with CKD were reported in developed countries. The chronic diseases of CKD was 96% (63 % of hypertension and 33 % of diabetes) in USA [10]. The patients number with renal failure treated by dialysis and transplantation (the end stage of CKD) has increased dramatically in the United States (USA) from 209000 in 1991 to 472000 in 2004. The prevalence of earlier stages of CRF in the US population and ascertainment of trends over time is central to disease management and prevention planning, particularly given the increase in the prevalence of chronic diseases namely obesity, diabetes, and hypertension as risk factors for CRF [11].

Diabetes and hypertension are the main causes of CRF in all high-income and middle-income countries, and also in many low-income countries. Incidence, prevalence, and progression of CRF also vary within countries by ethnicity and social determinants of health, possibly through epigenetic influence [12]. In addition, the main causes of CRF were recorded in Yemen namely glomerulonephritis (25.4%), obstructive nephropathy (13.7%), hypertension (11.8%), pyelonephrits (11.8%), diabetic nephropathy(7.8%), arthritis, malaria, vasculitis and postpartum hemorrhage(5.9% each) and Alport's syndrome (3.9% [6]. Previous study in Yemen by Al-Rohani reported that 72% of CRF were adults with a male preponderance. Hodeidah is a tropical area , 27.9 % of malaria ,13.6% of diarrhea and other infectious diseases were the main causes. The following most common were obstructive diseases that caused CRF and ARF (26.8% and 12.9%, respectively), urolithiasis, schistosomiasis, prostatic enlargement and 57.5% of unknown causes [5]. Previous study was carried in Hodeidah ,Yemen that reported ARF induced by cholera with case fatality rate (18.4 %) [14].

Other previous study was carried out in Yemen by Al-Mohani et al reported the average age of patients was 45.75 years, with range of 38-46 years. 60 % of males and 40% of females. Married subjects represented 86% and 38% of patients had primary education. , drink tap water was 83%, khat chewing was 86%, consume soft drinks was 75% , smoking behavior was 51% , 48% had urinary tract infections (UTI) and 30% of urinary stones. 29% of used non-steroidal anti-inflammatory drugs , 18% of heart disease and 14% of patients had pervious malaria infection in their history . 46% of the patients were hypertensive before their infection with renal failure, and 16% had diabetics. Previous study was reported in Al Kamarany et al. that showed that renal stones were 27.31 % of Hodeidah population , renal salts were 39.65 %, and healthy subjects were 33.0 %.The common risk factor were recorded for renal stones and salts patients were dehydration and nutrient that develop to renal failure in the future [15] .

5. CONCLUSION

The chronic diseases namely diabetes and hypertension were the major causes reported to develop the CRF renal failure , therefore to prevent the development of CRF based on center for control diseases and control (CDC), management of risk factors among people that have diabetes and hypertension. The control for blood glucose level and blood pressure level have been shown to lower the risk of developing kidney disease. Finally , early detection and treatment of kidney disease is important for people with diabetes to kidney failure.
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