

Associated risk factors of renal failure among patients attending Hemodialysis center at Al-Thwara Authority Hospital in IBB city, Yemen: A cross sectional study

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Abstract

Background: Chronic renal failure is a major public health problem. Identifying individual's risk factors are important to prevent infection of chronic renal failure.

Objective: this study aimed to highlight the risk factors associated with chronic renal failure for patients attending hemodialysis center at Al-Thwara Authority Hospital in Ibb city, Yemen.

Methods: the study is hospital-based cross sectional study. A total 100 patients collected randomly from hemodialysis centre at Al-Thwara Authority Hospital in Ibb, Yemen. Socio-demographic data, behavioral factors, medical history determined using a standardized questionnaire and analyzed by using IBM SPSS version 22 and Microsoft Excel.

Results: the mean age of patients was 45.75 years, and most of them were in the range of 38-46 years. Males were 60% and 40% were females. Married subjects represented 86% and 38% of patients had primary education. Of the 100 respondents, 83% drink tap water, 86%Khat chewers, 75% consume soft drinks, 51% smokers, 48% had urinary tract infections and 30% urinary stones. Participants who used non-steroidal anti-inflammatory drugs represent 29% of the sample, 18% had heart disease and 14% of patients had pervious malaria infection. About 46% of the patients were hypertensive before their infection with renal failure, and 16% diabetics. There is association between gender of patients and heart diseases and malaria infection. Statistics correlation between age of patients and Khat chewing and smoking was estimated.

Conclusion: this study suggests that, khat chewing, consumption of tap water, soft drinks and smoking increase the risk of chronic renal failure among Yemenis.

Keywords: Chronic renal failure; Hemodialysis; Ibb city; Yemen

1. Introduction

Renal failure indicates the kidney's inability to perform excretory functions, which can lead to the retention of nitrogenous waste products from the blood. Acute and chronic renal failure are two forms of kidney failure (1, 2). Chronic renal failure (CRF) or end-stage renal failure (ESRF) is defined as the progressive loss of kidney function that can occur over a period of time ranging from several months to years resulting in a continuous reduction in the ability of the kidney to process waste in the blood and perform other functions (3, 4). Chronic Kidney Disease (CKD), recognized

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as a worldwide public health problem that affects >10% of the general population worldwide (5). Recent data suggests that 9.1% to 13.4% of the worldwide population (between 700 million and one billion people) has chronic kidney disease (6, 7). According to the Global Burden of Disease (GBD) study, CKD was the 11th leading cause of death in 2019 (8) and it is associated with 35.8 million disability-adjusted life years (9). Chronic kidney disease represents an especially large burden in low-and middle income countries, which are least equipped to deal with its consequences. It is estimated that by 2030, 70% of patients with end stage renal disease (stage 5 CKD), will be in developing countries a growing demand will overtake the financial capabilities of health care systems (2). Prevalence of CKD across Asia is 7.0%–34.3% and it is estimated that up to approximately 434.3 million people have CKD across the eastern, southern and south-eastern regions of Asia, with most of the disease burden observed in China and India (up to 299.9 million) (10). Researches carried out between 2000- 2016 revealed that the prevalence of Chronic renal failure (CRF) stages from 1 to 5 and CRF stages from 3 to 5 in Africa was 15.8% and 4.6% respectively (11) and other studies showed the prevalence of end-stage kidney disease in the countries of Middle East including Tunisia, Egypt, Turkey, Iran and Yemen, ranged between 55 and 818 per million populations (12). The prevalence of CRF stages from 3 to 5 in Abu Dhabi was 4.6% in males and 2.8% in females (13).

In Yemen, renal failure remains a significant cause of mortality (14) and the incidence rate of end-stage renal disease is 120 cases per million per year (15). About 5234 patients registered in renal dialysis centers of the Yemeni Ministry of Public Health and Population (16). The rapid increase of renal failure represents a great socio- economic and public health burden in low income countries (17) such as, Yemen. Ibb Governorate is located in the central part of the Republic of Yemen. It is about (193 km) away from the capital city, Sana'a. The governorate is known as the "green/ fertile province" due to its heavy rainfall and green landscape. It is the most densely populated governorate in Yemen outside of Sana'a city (18). Al-Thawra General Hospital Authority in Ibb city was established in 2010 and is considered the reference hospital for Ibb Governorate and the neighboring governorates. It contains the only governmental dialysis center in the region, which is considered one of the most important dialysis centers spread in Yemen, which number is 32 centers. Because of the war in Yemen since 2015, Ibb governorate received many people fleeing from the war from different regions of Yemen, including patients with kidney failure. To our knowledge, there is a paucity of data regarding to the risk factors of renal failure in Yemen and understanding of risk factors of renal failure especially in Ibb city. Therefore, this study aimed to determine more common risk factors of renal failure in patients attending hemodialysis center in Ibb city, Yemen.

2. Material and methods

This study was a hospital based cross sectional descriptive study carried out to assess the associated risk factors of Chronic renal failure (CRF) among 100 patients who were attending hemodialysis center, Al-Thwara Authority Hospital in Ibb city, Yemen and received regular hemodialysis center in Al-Thwara Authority Hospital. Data were collected randomly by using a designed questionnaire. Health risk factors categorized into socio-demographic, lifestyle, environment and health status of patients. Patients who refuse to participate and those with mental or speech disability were excluded. The obtained data were statistically analyzed using IBM SPSS version 22 and Microsoft Excel. Statistical significance was defined by using the chi-square test at $P < 0.05$ for categorical variables.

3. Results

From table 1, the study sample (n = 100 chronic renal failure patients) consisted of 60% males and 40% females. the average age of chronic renal failure patients was 45.75 years. The highest proportion of chronic renal failure in this study was observed in the age group of 38-46 years, constituting 26% of the cases and decreased to 2% due to increased mortality rate at age 74 years. Of the 100 chronic renal failure patients, 86% were married and 14% were unmarried. Most of the patients had primary education 38%, while 35% of the patients were illiterate and 17% had secondary education and only 2% had undergraduate education. The majority of participants 83% had used tap water as a source of drinking water, however 17% of them had mineral water as a source of drinking water. Most of the respondents 86% were khat chewers and 51% had smoking habits, whereas, percentage of participants who are non- khat chewers and nonsmokers represent 16% and 49% respectively. Out of this study population, majority of the patients 75% consume soft drink during their daily life. Regarding to high blood pressure, 45% of study population were hypertensive. Concerning diabetes, 16% of patients were diabetics. The present study revealed that 48%, 39% and 30% of chronic renal failure patients participants had history of urinary tract infection, sudden fright and renal stones respectively. While 29% had history of using non-steroidal anti-inflammatory drugs (NSAIDs), 18% suffering from heart diseases and 14% of them had previous malaria infection (Figure 1).

Table 1 Description of Socio demographical characteristics of study patients (n = 100)

Variable	No. (%)
Age (years)	
20-28	12 (12)
29-37	18 (18)
38-46	26 (26)
47-55	20 (20)
56-64	14 (14)
65-74	8 (8)
>74	2 (2)
Gender	
Male	60 (60)
Female	40 (40)
Social status	
Married	86 (86)
Unmarried	14 (14)
Educational status	
Illiteracy	35 (35)
Primary	38 (38)
Secondary	17 (17)
Undergraduate	10 (10)
Types of drinking water source	
Tap water	83 (83)
Mineral water	17 (17)
Drinking soft drink	
Yes	75 (75)
No	25 (25)
Khat chewing	
Yes	86 (86)
No	14 (14)
Smoking	
Yes	51 (51)
No	49 (49)
Hypertension	
Yes	45 (45)
No	55 (55)
Diabetes	
Yes	16 (16)
No	84 (84)

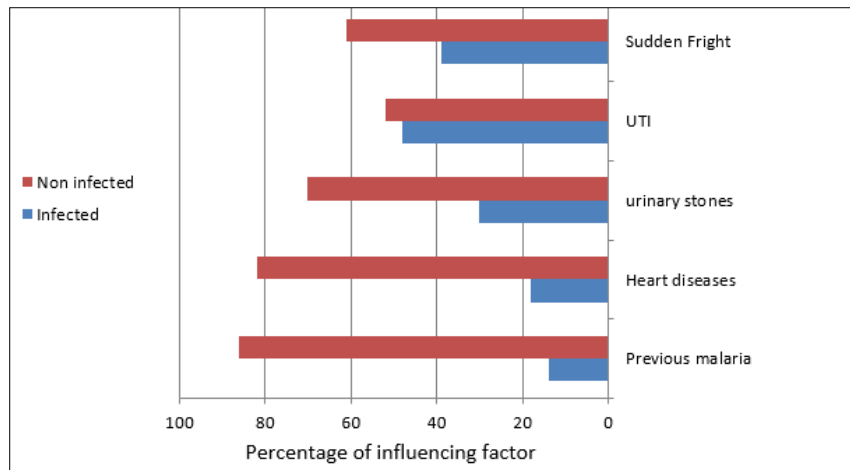


Figure 1 Description of influencing factors of Chronic Kidney Disease

Table 2 shows that, the etiology of CRF was significantly different between male and female patients ($P < 0.043$). The most common causes of CRF in male patients were heart diseases 11.7% and urinary stone 38.3%. However, the majority of cases of CRF in female patients were caused by heart diseases 27.5%, and urinary stones 17.5%. The current study reported that there is no association between male and female related to sudden fright factor, non-steroidal anti-inflammatory drugs (NSAID) using, previous malaria, previous schistosomiasis, urinary tract infection, diabetes, and hypertension.

Table 2 Distribution of risk factors of renal failure according to gender

Variable	Status	Gender		P value
		Male	Female	
Sudden fright	Yes	21 (35)	18 (45)	0.315
	No	39 (65)	22 (55)	
*NSAID using	Yes	17 (28.3)	12 (30)	0.857
	No	43 (71.7)	28 (70)	
Heart disease	Yes	7 (11.7)	11 (27.5)	0.043
	No	53 (88.3)	29 (72.5)	
Previous schistosomiasis	Yes	3 (5)	2 (5)	1.00
	No	57 (95)	38 (95)	
Previous malaria	Yes	8 (13.3)	6 (15)	0.814
	No	52 (86.7)	34 (85)	
Urinary Stone	Yes	23 (38.3)	7 (17.5)	0.026
	No	37 (61.7)	33 (82.5)	
**UTI	Yes	29 (48.3)	19 (47.5)	0.935
	No	31 (51.7)	21 (52.5)	
Diabetes	Yes	8 (13.3)	8 (20)	0.373
	No	52 (86.7)	32 (80)	
Hypertension	Yes	26 (43.3)	19 (47.5)	0.682
	No	34 (43.3)	21 (52.5)	

* NSAID: Non-Steroidal Anti-inflammatory Drugs; ** UTI: Urinary Tract Infection

4. Discussion

Chronic renal failure (CRF) is a growing problem in Yemen (4). According to the national guide for dialysis units and centers in the Republic of Yemen, the number of patients with advanced renal failure and approved dialysis registered in the hemodialysis centers of the Ministry of Public Health and Population in the Republic of Yemen in the year 2019 was 5234 patients, and the average incidence rate of end-stage renal failure (ESRD) in Yemen is 320 patients per million people (4). Identifying individual's risk factors of CRF is very important for a suitable intervention to prevent infection of CRF. The present study reported that the highest proportion of CRF, which is 26%, was in the age group between 38-46 years which is agreed to study result in 2006 conducted in Hadramout city, Yemen (19) which reported that the highest proportion of CRF was in the age group between 31-44 years and another study carried out in Sa'adah Governorate, Yemen which stated that; in univariate analysis of factors associated with ESRD, patients aged ≥ 40 years were 3.7 times more likely to have ESRD than younger patients (4). Another study carried out in Makkah city, Saudi Arabia showed that the highest percentage of the patients was in the age group 40-59 years (20).

The current study showed that the prevalence of CRF in male patients was higher than that in female. Although, increasing males in the taken sample, the finding of this study is similar to other studies conducted in Yemen (19, 4, 14) and studies carried out in Saudi Arabia (20), Iraq (21), Sri Lanka (22) and Libya (23). However, another study that conducted in Nepal showed that the prevalence of CKD was higher among women compared to men (17) and also another study carried out in Erbil city, Iraq revealed that, the prevalence of CRF from 2007 to 2012 was higher among women than in men (2).

There was higher percentage of married patients among the cases in our study, 84%. The findings of studies conducted in Iraq (2), Iran (24) and in Nigeria (3) were similar to the finding of this result. The effects of social responsibilities and economic steers on married people are more than on the unmarried people. This may be contributed to negligence of health status of married patients and lacking of proper treatment and disease prevention. Concerning educational status, in the current study, most of patients had primary education or illiterate. Illiteracy was associated with ESRF in studies carried out in Yemen (4), Taiwan (25), Nigeria (3) and another previous study showed that those with less than high school education had 1.7 times CKD risk in comparison with those with college education (26). In contrast to the finding of this study, another previous study conducted in Taif region, Saudi Arabia (27) revealed that no association between educational level and CRF.

In some previous studies which reported that, types of sources of water drink had statistical significance with CRF infection, in which two studies conducted in Sri- Lanka revealed that there is a strong association between water drinking well, tap drinking water and CRF (28, 22). The finding of the present study was similar to that two studies, where, 83% of patients drink tap water. Tap water source has direct effect on renal function and can lead to impaired in kidneys and become inability to work properly. In this study, 75% of participants consume soft drink during their daily life, which could be considered as risk factor for CRF. Previous studies revealed similar finding, in study conducted in Basrah, Iraq which stated that, consumption of soft drink increases the level of serum urea and creatinine in normal people and kidney patients and there may be a risk of increased symptoms of kidney disease and an increase in chronic kidney diseases (29). Soft drinks include added sugars and related energy, study carried out in Taif region in Saudi Arabia revealed that there is a link between sweets intake and renal damage (27).

Regarding Khat chewing, the current study showed that 86% of subjects were Khat chewers. Study conducted in the Nephrology department at the central military hospital in Sana'a, Yemen from 2004 to 2007; showed that the habit of chewing Khat considered as a risk factor to progression of End-Stage Renal Disease (ESRD) in patients with CRF (30, 31). The WHO contends that chronic Khat-chewing can cause hypertension in young adults, with a spontaneous regression once consumption is stopped (30). From this study, nearly more than half of patients were smokers, however 49% were nonsmokers, previous studies revealed that there was no significant relationship between smoking and the incidence of CRF (32, 33, 22). Whereas other studies reported that there is a correlation between smoking and the incidence of CRF (21, 34). Previous study carried out among Norwegian population showed that, the damage effect of smoking on kidneys functions among individuals aged below 70 years and currently smokers had 4.0 times and former smokers had a 3.3 times higher risk of renal failure when compared with non smokers respectively (2). Another study conducted in Turkey reported that smoking five cigarettes a day was related to increasing in serum creatinine by 31% and smoking more than 20 cigarettes a day increased the risk of CRF (26). Habits in Yemen during social meetings, in these meetings, people are khat chewers, consumers of soft drinks and smokers which could be considered as risk factors for renal failure infection. Regarding to hypertension, the current study revealed that 45% of respondents were hypertensive. Hypertension was the most common cause of CRF in Yemen as reported in studies conducted in Yemen (19, 35, 4, 14). Hypertension is well known to be a risk factor for CRF worldwide (36). Hypertension has long been a defined risk factor for CRF and accounts for 28% hemodialysis patients in Turkey (26) and 22.2% in Libya (23), 19%

in Saudi Arabia (37). In USA, the two most common causes of kidney disease, the risk for CKD is even greater. Nearly 1 in 3 people with diabetes and 1 in 5 people with high blood pressure have kidney disease (38). The present study reported that 16% of hemodialysis patients were diabetics which is higher than study conducted in Sana'a (35), Hudaidha cities, Yemen (14). Diabetes mellitus is the leading cause of CRF and accounts for 50% of ESRD causes in both developed and developing countries (26, 32). Although, CRF as a complication of medications intake as analgesics represents 29% of sample compared to 5% in Tabuk, Saudi Arabia (20) but the result of this study revealed that there was no correlation between NSAID using and gender of CRF patients which is identical to studies conducted in Saudi Arabia and Yemen (4, 20, 39). In contrast, several previous researches suggest that regular use of large compounds of NSAIDs may increase the risk of CKD (40). Patients participated in this study who exposed to sudden fright before renal failure infection represented 39% of the sample. Sudden fright can cause neurological shock leading to many disabilities of body organs to work properly including kidneys. The result of this study found that 48%, 30%, 14%, and 5% of participants had urinary tract infection, urinary stones, previous malaria infection and schistosomiasis respectively. This result is resembling to that reported by Al-Rohani M. (41, 42) in Yemen. Al-Rohani M. in his study stated that, the high prevalence of these infectious diseases and inappropriate treatment can lead to development of chronic infection CRF. This study reported that there was no association between previous malaria infection, previous schistosomiasis and urinary tract infection and gender of patients. The result of the present study is dissimilar to the results of previous studies conducted in Yemen, in Pakistan and Saudi Arabia showed that there was strong association of recurrent kidney or urinary tract infection and ESRF (4). Female patients in this study who suffered from heart diseases represented 27.5%, however male patients was 11.7% and there was association between gender of patients and heart disease ($P < 0.043$). Regarding urinary stones, 38.3% were male patients had urinary stones and 17.5% females. Statistics correlation ($P < 0.026$) was estimated between urinary stones and gender of patients. The finding of this study was similar to that results of studies carried out in Saudi Arabia (20, 39) and Yemen (41, 14), which reported that urinary tract obstruction and urinary retention are considered amongst most common causes of ESRD in male patient and there was statistical significance difference between male and female for calculi and renal failure.

5. Conclusion

This study highlights the most important factors contributing to chronic renal failure. Khat chewing, consumption of tap water, soft drink and smoking in Yemen society in addition to aging, hypertension, sudden fright, diabetes, urinary diseases and communicable diseases infection such as malaria and schistosomiasis could be also risk factors for renal failure. Thus, national campaigns and early diagnosis and treatment of urinary disease should be performed to increase awareness about these factors to possibly reduce the incidence of the disease.

Compliance with ethical standards

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Disclosure of conflict of interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Statement of ethical approval

Written consent from Jiblah University for Medical and Health Sciences and from Al-Thwara Authority Hospital was taken.

Statement of informed consent

Consent of participants was taken before collection of their data and all patient details were kept confidential.

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