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A retrospective investigation on risk factors of chronic kidney disease in Al-Qunfudah populations, Saudi Arabia

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ABSTRACT

Background: Chronic renal impairment is a major health problem in Saudi Arabia the risk of this health problem as diagnosed in advanced stages, especially during the screening examination. *Objective:* The aim of our work is to clarify the major CKD risk factors among patients attending the nephrology clinic at Qunfudah general hospital. *Method:* Data were collected from the patients' files using a data collection form in addition to using medical records during the period from 2020 to 2021. *Result:* According to our work we found that 80% of chronic renal impairment patients are hypertensive while 40% of them are diabetic, on the other hand, 29% of them obese, and 3% of them are smokers, receiving NSAIDs. *Discussion:* The risk factors were found to be leading and were similar to other research done in countries such as the United States, Japan, and Kuwait. *Conclusion:* These results may be used as a database which may result in the establishment of solid primary preventive programs.

Keywords: Chronic kidney disease, Hypertension, Diabetes, Obesity, Smoking

1. INTRODUCTION

Chronic renal impairment can be proved when the GFR decreased by less than 60 mL/min per 1.73 m2 for three months' time at least (Webster et al., 2017). Chronic renal impairment is a widespread health insult in Saudi Arabia and around the world, and it often goes unnoticed until it is in advanced stages or discovered by coincidence after screening tests (urinary dipstick or blood tests) (Duan et al., 2019). The chronic renal impairment prevalence in the Saudi Arabia population was calculated to be 5.7 percent in 2010, indicating the severity of the problem. Furthermore, renal transplantation is considered a heavy load on the health system especially in poor countries (Stengel et al., 2003; Alsuwaida et al., 2010). Most common risk factors like diabetes, hypertension, and nephrotoxic drugs like analgesics frequently used for extended periods of time which results in analgesic nephropathy and

kidney damage. A hereditary cause of CKD is polycystic kidney disease (PCKD) (Snyder and Pendergraph, 2005). It was founded that 30-40% of chronic renal impairment patients are diabetic in the United Kingdom (Alicic et al., 2017).

HIV and exposure to toxins or heavy metals, medications with herbals, and the unregulated use of additives to the food were also probable causes in developing countries (Jha et al., 2013; Ekrikpo et al., 2018). In countries of Asia and sub-Saharan Africa, unknown causes and glomerulonephritis which is caused by infections and infestations were more common (Ulasi et al., 2006; Engelgau et al., 2011). CKD Complications include Anemia, Cardiovascular disease, Salt and water retention, Cognitive decline, Bone disorders, Metabolic acidosis and electrolyte disorders, Uremic symptoms (Jha et al., 2013; Bello et al., 2017). All of these complications, in addition to the numerous chronic conditions that CKD patients may already be suffering from, pose a significant burden.

Chronic renal impairment global prevalence was 13.4% (Lv and Zhang, 2019) with different distribution between countries according to the presence of risk factors in the population. 15% of US adults are estimated to have CKD (CDC, 2021). While the prevalence was 5.7 % in Saudi Arabia, 18.9% in Iran which proves the effect of the presence of different factors and their impact on the prevalence of the disease between countries (Hosseinpanah et al., 2009, Alsuwaida et al., 2010).

2. MATERIAL AND METHODS

A retrospective study on epidemiology of CKD was conducted in Qunfudah General Hospital South Al-Qunfudah General Hospital and from January 2020 to December 2021. Our study was done on 57 known CKD patients (30 males and 27 females); chronic renal impairment patients less than 16 years were excluded from the study as they are receiving their treatment in the pediatric unit of nephrology. The study discussed three major points. The first one was demographic distribution of the patients, the second point was CKD risk factor including DM, Hypertension, obesity and smoking, and the last point discussed the biochemical investigations of CKD patients including HB level, GFR and serum creatinine levels.

Instrumentation

The data of our study were derived from the patients' files in General Al Qunfuda hospital nephrology unit in addition to medical records.

Statistical analysis

Our statistical analysis was done by Graph bad prism (8) USA. All data were expressed in the form of frequency, percentage.

3. RESULTS

The demographic distribution of our study for the high-risk patients for chronic renal impairment in Al Qunfudah general hospital reveals total patients 57 with 52% male patients and 47% female patients. 87% of them married and 13% of them single, age of 51-70 considered the most vulnerable age exposed to the chronic renal impairment 52% (Table 1).

Table 1 Demographic distribution of the patients with CKD

Total number=57	
Gender	
Male	30(52%)
Female	27(47%)
Marital status	
Married	50(87%)
Single	7(12%)
Age Group	
<21	1(1.7%)
21-30	1(1.7%)
31-40	9(15%)
41-50	7(12%)
51-60	15(26%)
61-70	15(26%)

71-80	8(14%)
>80	1(1.7%)

The main risk factors among patients were hypertension and diabetes mellitus. 80% of patients were hypertensive, 40% had diabetes. Obese patients were 29%. Smoker patients were 3%. 3% regularly use NSAID and 3% had positive family history of renal problem (Table 2). The lowest hemoglobin level ranged from 6 to 7 mg/dl. This was in 6% of patients, 8% of patients had hemoglobin level 7-8 mg/dl, 11% had hemoglobin level 8-9 mg/dl. The highest hemoglobin level was 9-10 mg/dl. It appears in 32% of patients (Table 3). Of all patients 27% had eGFR less than 15 ml/min, 17 % had eGFR 15-29 ml/min, 6% had eGFR 33-44 ml/min and 7% had eGFR less than 45-95 ml/min (Table 3). Chronic renal impairment patients with creatinine level more than 5 mg/dL were in 15% of the total number of patients. While, 4% of them with creatinine level 4-5 mg/dL, 7% with creatinine level 3-4 mg/dL, and 37% of them with creatinine level 2-3 mg/dL (Table 3).

Table 2 Risk factors in relation to chronic renal disease

HTN	46 (80%)
DM	40(70%)
Obesity	17(29%)
Smoking	3(5.2%)
NSAIDs	3(5.2%)
Family Hx	3(5.2%)

Table 3 Biochemical investigations

Hemoglobin level	
6—7	6(10%)
7—8	8(14%)
8—9	11(19)
9—10	32(56%)
GFR	
<15	27(47%)
15-29	17(29%)
30-44	6(10%)
45-59	7(12%)
Serum creatinine	
2-3	37(64%)
3-4	7(12%)
4-5	4(7%)
>5	9(15%)

The correlation between risk factors and biochemical investigations rivaled that lowest hemoglobin level (8.14±0.8 mg/dl) were in hypertensive CKD patents. The CKD diabetic patients had the lowest eGFR level (27.1±8.5 ml/min). Creatinine highest level (5.2±8.3 mg/dl) were also in the same diabetic patients (Table 4 and Figure 1-3).

Table 4 correlation between biochemical investigation and common risk factors (DM, HTN, Obesity)

	Hemoglobin	GFR	Creatinine
DM	8.14±0.8	27.1±8.5	5.2±8.3
HTN	9.6±0.5	29±8.2	3.6±2.5
Obesity	10.4±0.5	41±8.2	1.6±0.3

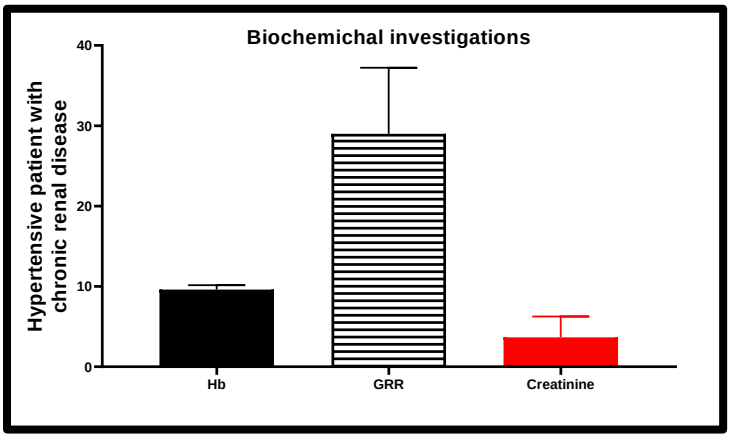

Figure 1 The correlation between risk factors and biochemical investigations in hypertensive patents

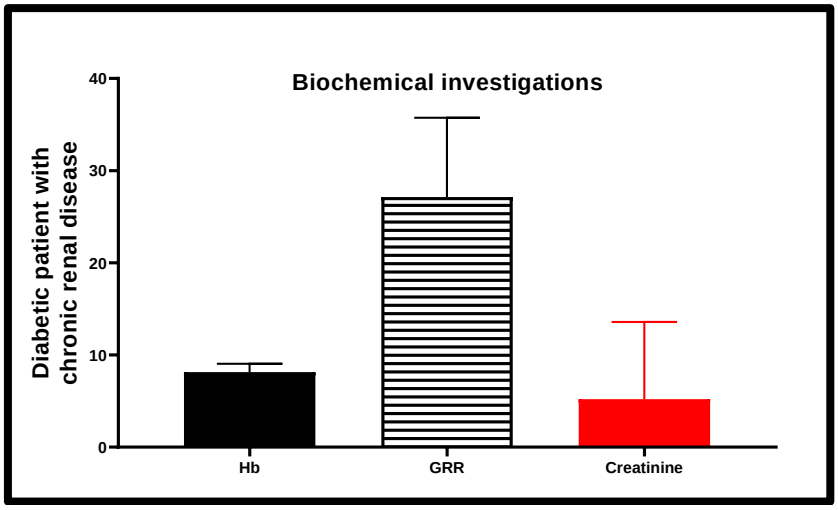

Figure 2 The correlation between risk factors and biochemical investigations in diabetic patents

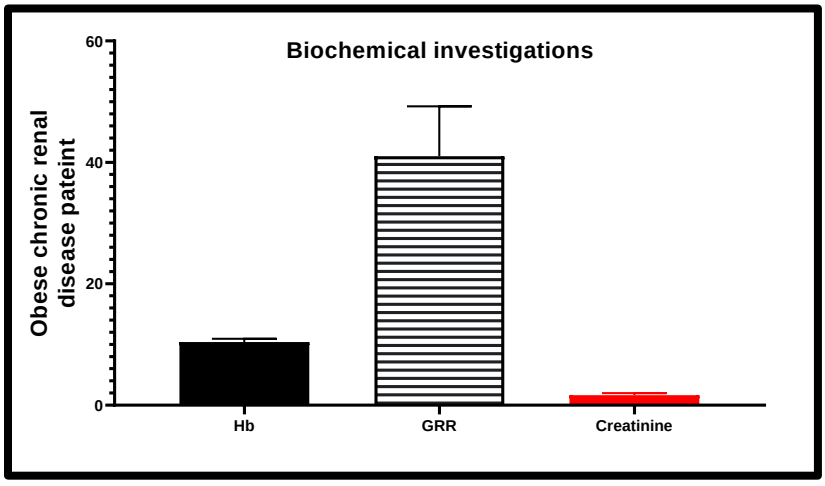

Figure 3 The correlation between risk factors and biochemical investigations in obese patients.

4. DISCUSSION

Our research work elucidate that CKD risk factors upregulated with ageing, particularly after 50 Among the 50 individuals recruited, 47% were female, while males were 52%. The main age groups were 61-70 years and 51-60 years with the same percentage 15% then 31-40 and 71-80 years with percentage 9% and 8% respectively. This agrees with study conducted in Japan which state that renal function decreases with age in both men and women, as also with a cross-sectional survey conducted in Chinese rural area (Kazancioglu, 2013; Duan et al., 2019). Older age of the chronic renal impairment patients indicating that KSA

offers good quality of health care. Our findings is closely related to the age of 61.1 years of the patients of chronic renal impairment in the United State (USRDS, 2019).

In our findings, the distributions of CKD risk factors were as following: hypertension = 46%, diabetes mellitus = 40%, obesity = 8.8%, smoking = 3%, NSAID users = 3% and family history of renal problem = 3%. According to a Saudi study, hypertension accounts for 30.4 % of CKD causes, followed by diabetes mellitus 25.2 % (Shaheen and Al-Khader, 2005). Other Kuwaiti study, showed strong association between hypertension and ESRD (El-Reshaid and Al-Owaish, 1999). Obesity was contributed to approximately 8.8 % of CKD risk factors. Obesity has been linked to CKD in a study conducted in Saudi Arabia. As well another study showed that Obesity is leading risk factors for the chronic renal impairment (Alsuwaida et al., 2010; Assadi, 2019).

Smoking represents 3% of risk factor in our study. A study done on 198 patients suffering from chronic renal impairment revealed that heavy cigarette smoking exhibits a high risk factor for development chronic kidney disease especially in diabetic and hypertensive nephropathy patients (Yacoub et al., 2010). Another multiple studies documented that smoker's chronic renal impairment patients exposed to late stage of renal disease more than nonsmokers patients (Chase et al., 1991; Brancati et al., 1997). In our study chronic NSAID users were 3% of CKD cases. Data from a cohort study on newly diagnosed CKD patients found that chronic renal impairment patients with high risk of ESRD taking NSAIDs (Kuo et al., 2010). A 3% of patient in our study was having renal problem family history. A research of diverse ethnic American individuals revealed that a renal problem family history is one of the most prominent risk factors related with the development of nephropathy and CKD (Satko et al., 2005).

We aimed to evaluate the relationship between risk factors of chronic renal impairment and changes in biochemical markers. More knowledge gives new insight about nonspecific risk factors such as albuminuria, hypoalbuminemia, upregulated creatinine level, down regulated hemoglobin as another important risk factors for chronic renal impairment patients (Dabla, 2010). Another study carried by two years shows that variation in glomerular filtration rat, glucose level, lipid profile; uric acid and hemoglobin levels were minimal and within expected the normal variations (Ohno et al., 2014). Although hypertensive cases were the most predominant cases in our study, diabetic patients showed the lowest eGFR 27.1±8.5 ml/min, hemoglobin levels 8.14±0.8 mg/dl and highest creatinine level 5.2±8.3mg/dl. A Chinese cross-sectional study showed a high prevalence of anemia in patients with non-dialysis CKD, which is more frequent at higher stages of CKD (Li et al., 2016) .

5. CONCLUSION

Our work revealed that the major risk factors in adults attending Al-Qunfudhah General Hospital and those with chronic kidney disease were hypertensive, diabetes, and obese. Diabetes and hypertension are two of the most common chronic illnesses in the Kingdom of Saudi Arabia, putting a significant strain on the health-care system. Raising awareness of the hazards and consequences, among of which chronic renal disease is one of the most significant elements that may affect the spread, as prevention is the first step in limiting the spread. These results may be used as a database of the influencing factors that lead to kidney disease at the level of the Kingdom, which may result in the establishment of solid primary preventive programs that serve to stop reaching these final stages of complications.

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Ethical approval

The study was approved by the Medical Ethics Committee of Um-AlQura University, Saudi Arabia (approval code K-012-2021-10-804).

Author Contributions

All the authors contributed evenly with regards to data collecting, analysis, drafting and proofreading the final draft.

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Conflicts of interest

The authors declare that there are no conflicts of interests.

Data and materials availability

All data associated with this study are present in the paper.

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