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RESEARCH ARTICLE

COMPARATIVE STUDY ON THE OCCURRENCE OF RENAL FAILURE AMONG SUDANESE PEOPLE

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ABSTRACT

The kidneys are important organs responsible for filtration, reabsorption and excretion of waste from the body. Renal failure (RF) is mainly determined by a decrease in glomerular filtration rate (GFR); the rate at which blood is filtered in the glomeruli of the kidneys. The decrease of filtration rate is detected by a decrease in or absence of urine production or determination of waste products (creatinine or urea) in the blood. Hematuria (blood loss in the urine) and proteinuria (protein loss in the urine) may be noted in relation to this failure. This study was aimed to compare the occurrence of renal failure among Sudanes people. Eighty patients with renal failure (RF) registered at hospitals in Khartoum State agreed to participate in this study between April - May / 2015. Data was collected from each patient using a specific questionnaire designed for this purpose. Results: revealed that the high percentage of RF was among men (62.5%) compared to 37.5% among females. Moreover, 40% of these patients were found to smoke cigarettes. Regarding family history, 35% of those having high percentage of RF had a family history while 65% without family history. Also of these patients 65% were reported suffering from chronic diseases before RF onset and 35% did not show any sign of disease before it. The chronic diseases included hypertension (58%), diabetes mellitus (30.7%) and heart disease (3.7 %%). In the meantime, 5% of those reported with renal failure was observed to be susceptible to other diseases. Conclusion: The study concluded that chronic disease was found to be main causes of RF and the disease was higher among officials and that a high percentage of it was reported among males and most of them without family history and non -smokers

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INTRODUCTION

The kidneys are important organs of the body responsible for filtration, reabsorption and excretion of waste from the body. The kidneys are a pair of organs located in the back of the abdomen and each kidney is about 4 or 5 inches. The kidney's functions are to filter the blood. All the blood in our bodies passes through the kidneys several times a day. The kidneys remove wastes; control the body's function; as controlling blood pressure, electrolyte concentrations, blood plasma osmolarity, and acid-base balance (Anita *et al*., 2011). The renal arteries branch directly from the abdominal aorta and enter the kidneys. Inside the kidney, the renal arteries diverge into the smaller afferent arterioles of the kidneys.

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Each afferent arteriole carries blood into the renal cortex, where it separates into a bundle of capillaries known as a glomerulus. From the glomerulus, the blood recollects into smaller efferent arterioles that descend into the renal medulla. The efferent arterioles separate into the peritubular capillaries that surround the renal tubules. Next, the peritubular capillaries merge to form veins that merge again to form the large renal veins. Finally, the renal vein exits the kidney and joins with the inferior vena cava, which carries blood back to the heart (Moore *et al*., 2012). Each kidney contains around 1 million individual nephrons (Nyengaard and Bendtsen, 1992).

The main cause of kidney problems which requires nephrology consultation is that associated with high mortality rates. However, the primary causes of renal failure include ischemia, hypoxia or nephrotoxicity. An underlying feature of the occurrence of renal failure is a rapid decline in glomerular filtration rate (GFR) usually associated with decreases in renal blood flow. Renal failure is mainly determined by a decrease

in glomerular filtration rate, the rate at which blood is filtered in the glomeruli of the kidney. The decrease in glomerular rate is detected by a decrease in or absence of urine production or determination of waste products (creatinine or urea) in the blood. Whatever the cause of renal failure hematuria (blood loss in the urine) and proteinuria (protein loss in the urine) may be noted associating with this failure. Moreover, renal failure may be manifested in problems such as increased fluid in the body (leading to swelling), increased acid levels, raised levels of potassium, decreased levels of calcium, increased levels of phosphate and anemia in later stages. Bone health may also be affected as a result of kidney dysfunction. However, long-term kidney problems were reported to be associated with an increased risk of cardiovascular disease (Ricci and Ronco, 2012). Inflammation also represents an important additional factor leading to kidney problems (David *et al*., 2012).

The classification of kidney disease can be divided into two main categories: acute kidney injury, which is often reversible with adequate treatment, and chronic kidney disease, which is often not reversible. In both cases, there is usually an underlying causative factor (Konigstein *et al*., 2013). On the other hand, the type of renal failure is determined by the trend in the serum creatinine. Other factors that may help distinguish acute kidney injury from chronic kidney disease include anemia and the kidney size on sonography. Chronic kidney disease generally leads to anemia and small kidney size (Kamyar and George, 2009).

The aim of the present study was to estimate factors that might responsible for renal failure (RF) in Sudanese people.

MATERIALS AND METHODS

For comparison 80 volunteered patients with renal failure registered at three hospitals: Ribat Hospital, Ibn - Sina Hospital and Ahmed Gassim Hospital in Khartoum Sate were studied during April-May 2015. Prior commencement of study written consent was received from each volunteer. Information regarding each one was collected via questionnaire format designed for this purpose. The information included the age, occupation, gender, residence, smoking cigarettes and occurrence of chronic disease before the renal failure as well as the type of chronic disease. Data collected was analyzed and presented following conventional descriptive statistical methods.

RESULTS

The results of percentage of patients with RF among different occupation and age groups are shown in Table 1. The results revealed that high percentage of RF was found to be higher in officials (30%), followed by housewives (22.5%), workers (20%) and then in retired (7.5%). The results revealed that percentage of RF was higher among patients aged between 50 - 60 years (22.5%) followed by 40 – 50 years (20%), 60 – 70 years (17.5%), 70 – 80 years (16.2%), 20 -30 (12.7)and 30 – 40 years (11.3%).

The results regarding percentage of occurrence according to gender, residence, smoking, family history of RF and presence of chronic disease before RF onset are shown in Table 2. The results showed a high percentage of RF (62.5%) was among males compared to 37.5% in female. Also 73.8% of those having RF were living in Khartoum State while the remaining percentage (26.2%) came from other states. Moreover, 40% were found to smoke compared 60% as non smokers. The results also revealed that 35% of RF patients had a family history of RF while 65% did not have it. Concerning chronic disease it was found 65% of RF patients have chronic disease before onset of RF while 35% did not have any chronic before it.

Table 1. distribution of occupation and age among patients with renal failure

			Prevalence				Total
Occupation	Officials	Workers	Unemployed	Housewife	Retired	Others	80 (100%)
	24 (30%)	16 (20%)	13 (16.3%)	18 (22.5%)	6 (7.5%)	3 (3.8%)	
Age (yrs)	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70	70 – 80	80 (100%)
	10 (12.7%)	9 (11.3%)	16 (20%)	18 (22.5%)	14 (17.5%)	13 (16.2%)	

Table 2. distribution of gender, residence and family history in renal failure patients

	Prevalence		Total
Gender	Male 50 (62.5%)	Female 30 (37.5%)	80 (100%)
Living in Khartoum	Yes 59 (73.8%)	No 21 (26.2%)	80 (100%)
Smoking cigarettes	Yes 32 (40%)	No 48 (60%)	80 (100%)
Family history of RF	Yes 28 (35%)	No 52 (65%)	80 (100%)
Chronic disease before RF	Yes 52 (65%)	No 28 (35%)	80 (100%)

Table 3. Prevalence of chronic diseases among patients with renal failure

Disease	Diabetes mellitus	Hypertension	Heart disease	Total
No (%)	16 (30.7%)	30 (58%)	3 (5.7%)	52 (100%)

Similarly, the chronic disease between the patients of RF was found as following diabetes mellitus, hypertension and heart disease as following 30.7%, 58% and 5.7% respectively.

DISCUSSION

The present study revealed the percentage of occurrence of renal failure varied in different age groups, between male and females and more likely to be affected by type of occupation, presence of previous chronic disease and exposure to adverse

environmental conditions such as living cities in prevailing hot climate.

It was evident that the chronic disease and living in the city were more prominent factors leading to renal failure. These probably were combined with the type of occupation particularly office work where long stay for approximately more than 10 hours per day under air condition with low water intake due to lack of thirst in such condition. These together with the prevailing hot climate in a country like Sudan where summer temperature some reaches elevated levels between 40 – 48 C°. In this context, a previous study recommended that the person must take about 1.9 liter per day to remove out toxins in kidneys and prevent kidney problems (McCartney, 2011).

On the other hand, the high percentage of occurrence of RF among males compared to females might be indicative to the fact that males were more susceptible to pressure of daily life than females as they are not restricted specific responsibility during the day. In addition to that smoking might contribute to this disease as smoking was reported to be higher among males compared to females (Munzir *et al*., 2015).

Moreover, the results revealed that considerable proportion of RF patients had family history of the disease and this indicating that RF patients were genetically predisposed to acquire the disease. In the meantime, the chronic disease among the patient of the present study was found highly related presence of previous with hypertension. Because hypertension incurred damage in arterial of kidney, and lead to impaired GFR (Björn *et al*., 2009). In this context, one study done by Anita *et al*. (2011) explained how kidneys can be damaged by arterial hypertension, and also explained how auto regulation of glomerular pressure was impaired in chronic kidney disease (CKD).

So elevations in systemic blood pressure are associated with increased glomerular capillary pressure and glomerular hypertension resulted in increased protein filtration and endothelial damage, causing increased release of cytokines which lead to changing of normal kidney tissue by fibrosis. Also an important factor implicated in progressive of renal disease was activation of the renin-angiotensin system, which triggers increase blood pressure and also promotes cell proliferation, inflammation, and matrix accumulation.

In this context, previous studies confirmed that chronic kidney disease was implicated in sudden cardiac death, ischemic and valvular heart disease, congestive heart failure, atrial fibrillation and infectious complications (particularly related to dialysis catheters) in hemodialysis and peritoneal dialysis patients (Collins *et al*., 2015).

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