How to Cite:
Abbas, A. O. I., Mohamed, A. N., & Babker, A. M. (2022). The impact of hypertension and Age groups on the severity of chronic kidney disease and their associated with renal function test status. *International Journal of Health Sciences*, *6*(S1), 3489–3496.
https://doi.org/10.53730/ijhs.v6nS1.5538

The Impact of Hypertension and Age Groups on the Severity of Chronic Kidney Disease and their Associated with Renal Function Test Status

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***Abstract*---**Chronic kidney disease is one of the renal disease conditions, slow development may take months and irreversible. Different factors can lead to chronic kidney disease, Hypertension known as one of the main causes of chronic kidney disease, vision loss, coronary artery disease and heart failure. Secondary hypertension is common in chronic kidney disease patients leading to end-stage renal disease (ESRD). This current study was conducted to evaluate the relative impact of HTN on CKD and ESRD risk in women compared with men. In this study, the prevalence of CKD among hypertensive patients was found to be 67. % . Also, current study demonstrated unequal impact of Hypertension on Age, Sex and the severity of chronic kidney disease and renal function test status.

***Keywords*---**Hypertension, Chronic Kidney Disease, Renal Function.

Introduction

Chronic kidney disease (CKD) is defined as the presence of kidney damage or an estimated glomerular filtration rate (eGFR) less than 60 ml/min per 1.73 square meters, persisting for 3 months or more. It is a progressive loss of kidney function that eventually necessitates the use of renal replacement therapy [1] The renal disease has several stages, each of which might affect an individual's health.

International Journal of Health Sciences ISSN 2550-6978 E-ISSN 2550-696X © 2022.
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Manuscript submitted: 18 Jan 2022, Manuscript revised: 09 Feb 2022, Accepted for publication: 27 March 2022

Patients may have a normal or mild decline in glomerular filtration rate (GFR) and albuminuria in the early stages. It worsens over time, eventually leading to end-stage renal disease (ESRD) or kidney failure. The most important contributing risk factor for CKD is hypertension [2]. Hypertension is a powerful risk factor for fatal and nonfatal cardiovascular disease events and major public health issue in developed as well as developing countries [3]. Also, a significant percentage of people with diabetes develop chronic kidney disease (CKD), and diabetes is also a leading cause of end-stage kidney disease [4]. In patients with diabetes, hypertension is a substantial, reversible risk factor for albuminuria, decreased kidney function, end-stage renal disease, and cardiovascular disease [5]. The extent to which women and men with HTN are at a similar risk of developing CKD outcomes has not been extensively examined. Accordingly, several guidelines recommend early detection and treatment of HTN to delay the disease's progression and reduce its complications in both sexes A recent study suggested that CKD's prevalence is higher in women than men, while another study indicated that the lifetime risk of ESRD is higher in men than women [6]. Generally, the impact of HTN can extent to many system into the human body not only renal system Hypertension is recognized as one of the principal risk factors for many disorders like cardiovascular disease, thrombophilia, brain stroke and pregnancy complications , women with chronic hypertension are at risk for a variety of adverse maternal and fetal/neonatal outcomes and suspected to spontaneous abortion [7-10].This current study was conducted to evaluate the relative impact of HTN on CKD, age and ESRD risk in women compared with men.

Materials and Methods

This is a prospective cross-sectional conducted among patients with chronic renal failure in Khartoum state during the period from June 2015 to November 2018.In this study all stages of chronic kidney disease were selected from hospitals and dialysis centers in Khartoum (Soba University Hospital, Princess Nora Pediatric Dialysis Center, Ibn Sina Hospital, Ahmed Gasim Teaching Hospital, Jafer Ibn Auf Pediatric Hospital and The Sudanese Kidney Transplant Association). The self-administered Questionnaire was used to collect the personal data verbal consent was obtained from all patients after informing them about the objective and details of the study. Renal function test such as urea, creatinine, uric acid, sodium, and potassium were tested for all chronic kidney disease patients and donor samples by using Cobas C311. Sodium and potassium were measured by ion selective electrode (ISE) that measure ion in solution with unique properties of certain membrane material to develop an electrical potential (electromotive force EMF). Data management was done using Statistical Package for Social Sciences (SPSS version 12). SPSS was used for analysis and to perform Pearson Chi-square test for statistical significance (P value), Z test for two proportions at 95% confidence level was applied to test significant differences relations that observed in this study and the result revealed statistically significant at P value < 0.05 [11].

Result

The gender-related incidence distributions among the chronic renal disease patients, (n=230) frequent as 136 as male and 94 as female (Figure 1). Among all patients hypertensive with percentage (67%), Diabetes patients also suffer for

hypertension percentage (4%) and rest of the patients were not diabetes or hypertension percentage (29%) represent in (Figure 2).In relation of age group and chronic disease (diabetes, hypertension) in chronic kidney disease according to gender, the age group less than twenty years old male (4%) female (6%), second group from twenty to thirty nine years old male (16%) female (12%), third group from forty to fifty nine years old male (20%) female (24%) and the final group is from sixty and more male (9%) female (9%) (Figure 3),other hand when we survey connection of age gathering and chronic kidney disease without diabetes or hypertension ,the first age group less than twenty years old male (43%) female (16%), second group from twenty to thirty nine years old male (16%) female (6%), third group from forty to fifty nine years old male (8%) female (3%) and the final group is from sixty and more male (8%) female (0%) (Figure 4). The incidence of renal function profile in relation with age groups in chronic kidney disease patients with hypertension or diabetes was selected as every twenty year interval in each group , the first age group is less than twenty years old , second group from twenty to thirty nine years old , third group from forty to fifty nine years old and the final group is from sixty and more respectively ,when assessment the serum urea with age groups shown 142,140,131and 126 mg/dl also serum creatinine shown 9.6,10.4,10.3 and 8 mg/dl , in other hand the serum sodium 131,135,135 and 137 mmol/l finally serum potassium 5.0,4.6,4.5 and 4.3 mmol/l (Table 1).but the incidence of renal function profile that relation with age groups in chronic kidney disease patients without hypertension or diabetes shown serum urea 101,127,100 and 162 mg/dl, serum creatinine 7.3,11,10 and 7 mg/dl , serum sodium 135,137,132 and 135 mmol/l ,serum potassium 4.5,4.1,4.6 and 4.7 mmol/l (Table 2).

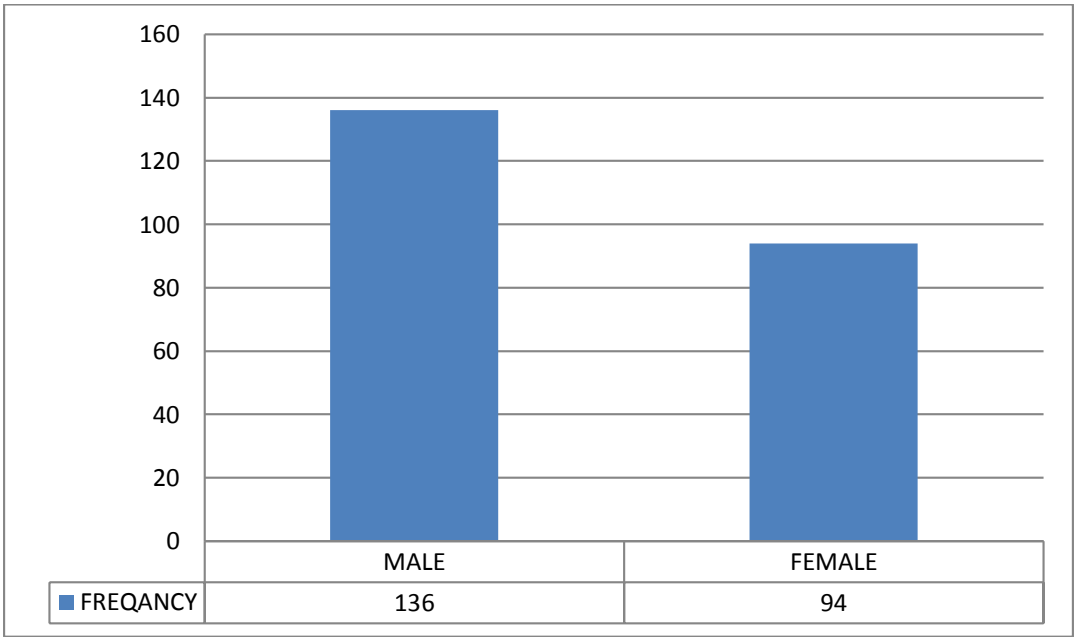

Figure 1: The gender-related incidence distributions among the chronic renal disease patients, (n=230)

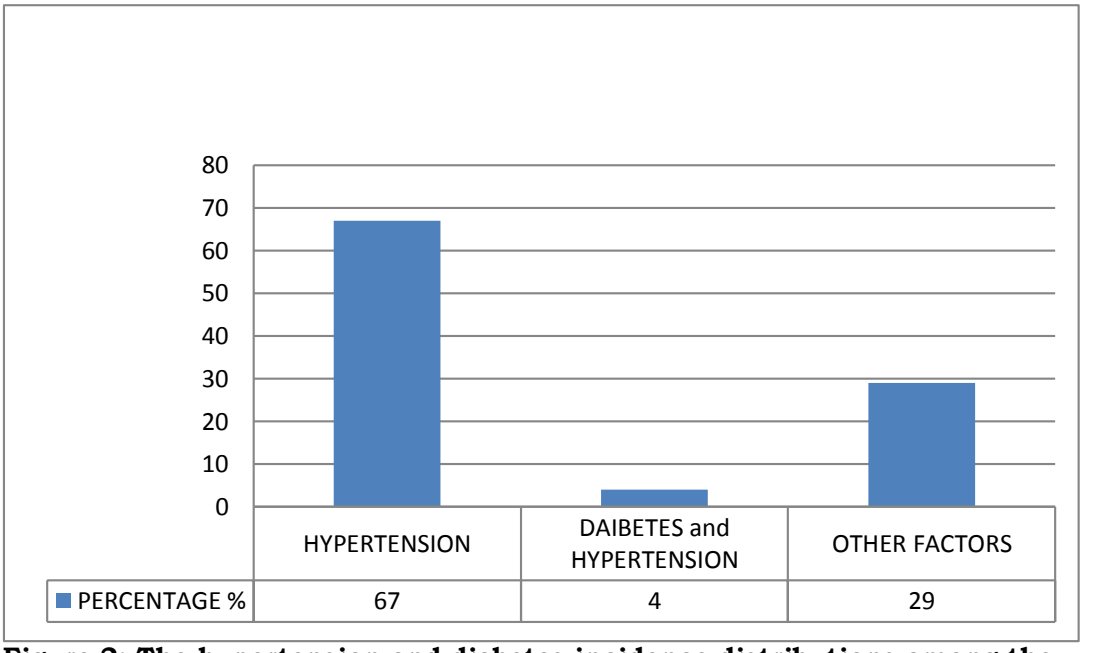

Figure 2: The hypertension and diabetes incidence distributions among the chronic renal disease patients, (n=230)

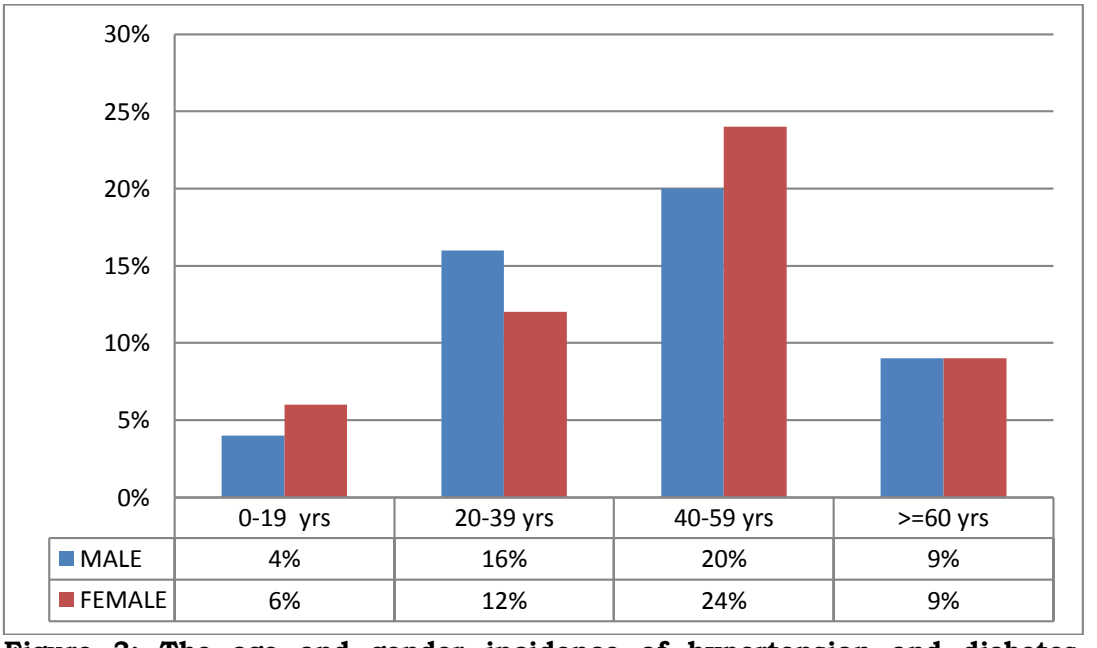

Figure 3: The age and gender incidence of hypertension and diabetes distributions among the chronic renal disease patients, (n=173)

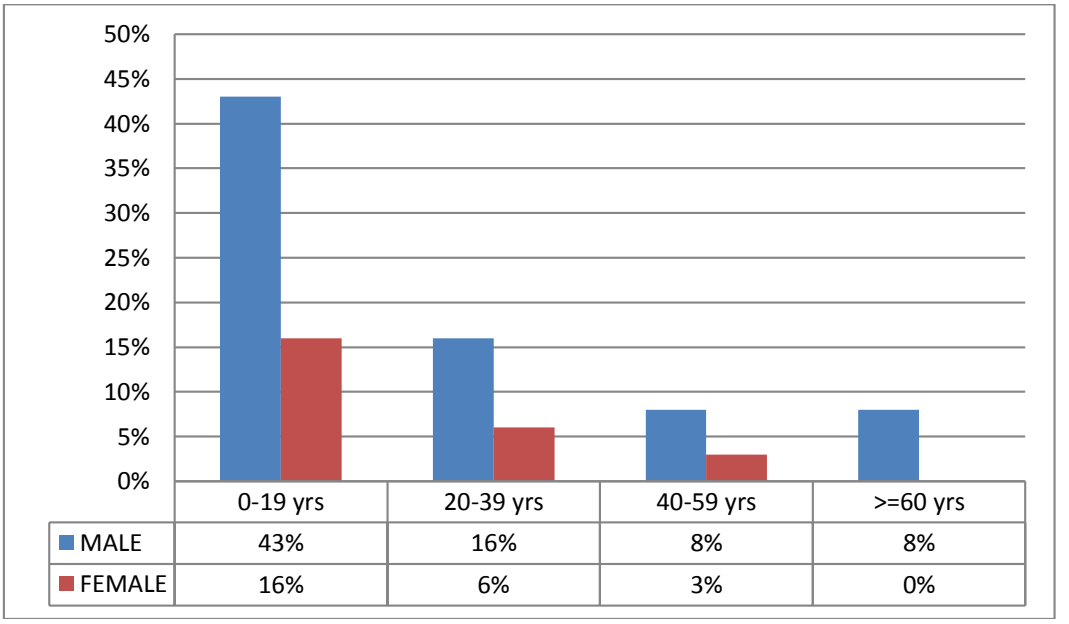

Figure 4: The age and gender incidence of non-hypertension and diabetes distributions among the chronic renal disease patients, (n=57)

(Table 1) The incidence of renal function profile associated to age groups in chronic kidney disease patients with hypertension or diabetes (n=173).

AGE	0-19 years	20-39 years	40-59 years	>= 60 years	P-value
SERUM UREA mg/dl	142±68	140±39	131±45	126±48	0.82
SERUM CREATININE mg/dl	9.6±4.4	10.4±3.6	10.3±3.6	8±4.1	0.87
SERUM SODIUM mmol/l	131±5	135±4	135±4.4	137±4.8	0.95
SERUM POTASSIUM mmol/l	5.0±1.0	4.6±0.7	4.5±0.9	4.3±0.8	0.99

(Table 2) The incidence of renal function profile that relation with age groups in chronic kidney disease patients without hypertension or diabetes (n=57)

AGE	0-19 Years	20-39 years	40-59 years	>=60 years	P-value
SERUM UREA mg/dl	101±39	127±27	100±17	162±88	0.47
SERUM CREATININE mg/dl	7.3±2.8	11±4.6	10±2.5	7±4.0	0.53
SERUM SODIUM mmol/l	135±3.3	137±3.9	132±3.4	137±2.4	0.81
SERUM POTASSIUM mmol/l	4.5±0.8	4.1±0.8	4.6±0.2	4.7±1.0	0.92

Discussion

Generally, hypertension was the most common cause of chronic kidney disease 67%, diabetes lessor factor in this study 4% and all other factors 29% that lead to dialysis [12]. In the current study there was a higher incidence in male more than females in chronic kidney disease patients. which is similar to the findings with a systematic review and meta-analysis conducted by Weldegiorgis and Woodward and they concluded that, HTN confers about a fifth lower excess risk of incident CKD or ESRD in women than men. Sex differences in onset, duration, and severity of some risk factors, such as albuminuria, diabetes, cardiovascular disease, obesity, and socioeconomic status, may explain part of the excess risk in men. Another explanation could be that women might be under-diagnosed and less likely to initiate dialysis [6]. The hypertension among CKD patient is about 67% and diabetes with hypertension about 4% incidence distributions, this finding is agreed with several studied conducted among CKD patients concluded that, the prevalence of hypertension is higher among patients with CKD, progressively increasing with the severity of CKD. National survey of representative sample of noninstitutionalized adults in the USA, it is estimated that hypertension occurs in 23.3% of individuals without CKD, and 35.8% of stage 1, 48.1% of stage 2, 59.9% of stage 3, and 84.1% of stage 4-5 CKD patients [13]. Regarding frequency of diabetes (4%) among CKD this indicate the diabetic has no clear role in pathogenicity of CKD, this finding is supported by study conducted by Erfanpoor et al, in ttheir study, diabetes was an independent risk factor for CKD in males; however, the evidence was not sufficient to prove such an association for females and demonstrated that no synergic effect between diabetes and hypertension on the incidence of CKD [14]. Also, and several other studies conducted that hypertension and diabetes are independent risk factors of CKD, no significant additive or multiplicative interaction was found between these risk factors concerning CKD incidence [15,16]. We also investigated the effect of hypertension on CKD incidence in females and males our finding is consistent with the results of previous studies [17,18]. The lower risk of hypertension for CKD development in females, compared to males, can be attributed to different factors such as female sexual hormones, under-controlled hypertension, and less compliance with treatment in males compared to females [14,19]. In cause of chronic disease (hypertension or diabetes) urea found high in children less than 20 then gradually decrease according to age, primary hypertension affects urea level, on the other hand chronic renal disease in patient without chronic disease (hypertension or diabetes) more than 60 years were highest level of urea. There were statistically insignificant high urea values in hypertension or diabetes patient compare CKD patient without hypertension. Creatinine found highest in 20-39 years age group but also seen high in association with diabetes or hypertension, when compare with chronic kidney disease without hypertension or diabetes. Our finding is consistent with the results of study conducted by Noor et al, and concluded that, CKD patients have higher serum urea and creatinine levels, leading to various other dangerous diseases [20]. CKD is more common in male than in females. People between 40 to 60 years are more affected with CKD. The reason may be attributable to hypertension, diabetes, or some other age-related changes. Creatinine levels in the average age from 20-60 years were higher than the edge years group under 20 and over 60 years of age. Likewise, this study agrees with our work high level of serum creatinine level as 10.48 ± 3.0 in the age

between 21 and 40 years, 10.35 ± 3.23 mg/dl in the age group between 41 and 60 years and 8.27 ± 2.60 mg/dl in the age group between 61 and 80 before dialysis Nisha *et al.* [21].

Conclusion

In this study, the prevalence of CKD among hypertensive patients was found to be 67. % . Also, current study demonstrated unequal impact of Hypertension on Age, Sex and the severity of chronic kidney disease and renal function test status.

Funding: None.
Conflict of interest: The authors declared no conflict of interests.

Acknowledgement
Our special thanks and appreciation to all those who helped us through their assistance and guidance in performing our study. We would like to thank specially; our colleagues in Soba University Hospital, Princess Nora Pediatric Dialysis Center, Ibn Sina Hospital, Ahmed Gasim Teaching Hospital, Jafer Ibn Auf Pediatric Hospital and The Sudanese Kidney Transplant Association.

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