

## Chronic kidney disease associated with hypertension

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World Journal of Biology Pharmacy and Health Sciences, 2023, 16(03), 194–199

Publication history: Received on 05 November 2023; revised on 20 December 2023; accepted on 23 December 2023

Article DOI: <https://doi.org/10.30574/wjbphs.2023.16.3.0509>

### Abstract

**Background:** Globally, chronic kidney disease (CKD) is acknowledged as a major public health issue. Both the incidence and prevalence of chronic kidney disease (CKD) are rising with immense pace worldwide. Hypertension and diabetes mellitus is the main risk factor of chronic kidney disease.

**Objective:** To determine chronic Kidney disease associated with hypertension

**Methods:** A cross-sectional study was conducted at district headquarter hospital, Mianwali, Pakistan, which was performed between June 2020 and February 2022, the total number of patients in our study were 120. The number of Male patients were 49 and female were 71. In 120 consecutive patients who underwent for blood tests and Blood pressure monitoring. We also took stages of chronic kidney disease (CKD stage 1,2,3A,3B,4 and 5). We did renal function test for all patients (serum creatinine and serum urea). Data was tabulated and analyzed by SPSS.

**Results:** In a current study total 120 patients were enrolled. The minimum age of patients were 30 and the maximum age of the patients were 84. The mean age were  $50.60 \pm 10.9$  years. The minimum systolic blood pressure were 130 and maximum systolic blood pressure were 200. The mean systolic blood pressure were  $149.55 \pm 13.5$ .

The minimum diastolic blood pressure were 80 and the maximum diastolic blood pressure were 100. The mean diastolic blood pressure were  $89.57 \pm 3.76$

The frequency of male patients were 49 and its percentage were 40.8. The frequency of female patients were 71 and its percentage were 59.2. The frequency of age group 30-50 years were 61 and its percentage were 50.8. The frequency of age group 51-70 years were 52 and its percentage were 43.3. The frequency of age group >70 years were 7 and its percentage were 5.8. The mean of renal functional test Serum creatinine were 7.82 mg/dl and its SD value were 3.59 mg/dl. The mean of renal functional test Serum urea were 109.90 mg/dl and its SD value were 24.30 mg/dl.

- The mean glomerular filtration rate were 20.36 ml/min and its SD value were 13.2 ml/min.
- The mean weight of patients were 56.61 kg and its SD value were 10.19 kg.
- The P-value of stages of Chronic kidney disease (CKD) were 0.133. The P-value of hypertension were 0.074.

**Conclusion:** Hypertension and diabetes mellitus is the main cause of Chronic kidney disease (CKD). Stage 5 Chronic kidney disease (CKD) patients were more in our study as compare to other stages of CKD. We concluded in our study that after age of 30, patients have higher risk of Chronic kidney disease (CKD).

**Keywords:** Chronic kidney disease (CKD); Hypertension; Diabetes Mellitus

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## 1. Introduction

Globally, chronic kidney disease (CKD) is acknowledged as a major public health issue. 13.4% is the valued prevalence of CKD worldwide [1]. Chronic kidney disease (CKD) is becoming more commonplace worldwide and its incidence is also rapidly increasing [2]. South Asia, Eastern Europe, and Latin America's emerging nations bear an exceptionally heavy load [3]. Chronic kidney disease (CKD) is defined as reduced kidney function, with an estimated glomerular filtration rate (eGFR) of less than 60 mL/min/1.73 m<sup>2</sup> [4]. In general, about 30% of persons have hypertension, and up to 90% of those with chronic kidney disease (CKD) have it. A blood pressure (BP) of greater than 140/80 mmHg is what the European Society of Cardiology and the European Society of Hypertension (ESC/ESH) designate as it [5]. Hypertension is a factor in the progression of CKD and is both a cause and a consequence of the condition [6]. The frequency and intensity of hypertension rise when eGFR falls [7]. In Pakistan, diabetes is the primary cause of renal damage [8]. In reality, we discover cardiovascular involvement in every stage of chronic kidney disease (CKD). This is partly because the population is getting older and partly because CKD patients are more likely to be diabetic, dyslipidemia, and hypertensive [9]. Both directly and indirectly—by causing pressure and volume overload that results in left ventricular hypertrophy and aggravating ischemic heart disease—can be caused by chronic renal disease [10]. Due to drastic changes in fluid and electrolyte levels, those receiving hemodialysis three times a week appear to be more at risk for abrupt mortality due to extended dialytic intervals [11]. Features of chronic nephropathy, such as a thin and hyperechogenic cortex with a lowered corticomedullary ratio and a slight dilatation of the urinary system, are shown by an ultrasound examination of the kidneys. Parapelvic and subcortical cysts are frequently identified [12]. Additionally, patients need to be monitored for CKD consequences include anemia, hyperphosphatemia, vitamin D insufficiency, metabolic acidosis, hyperkalemia, and secondary hyperparathyroidism [13]. Serum creatinine (sCr) and blood urea levels are currently used to diagnose chronic kidney disease (CKD); however, studies have revealed that sCr has a low predictive value [14]. Compared to males (12.1%), women had a greater rate of chronic renal failure (15.1%) [15]. A growing worldwide public health issue that impacts around 25% of those 65–74 years of age and over 50% of those 75 years of age or beyond [16]. A worse prognosis for chronic kidney disease (CKD) is linked to lower estimated glomerular filtration rate (eGFR), greater excretion of urine protein and albumin, and higher levels of tubulo-interstitial atrophy and fibrosis [17]. End-stage renal failure often follows significant kidney damage seen in stages 4 and 5 [18]. Those with stages 3 and 4 of CKD (91.2% and 94.1%, respectively) were nearly all hypertensive [19]. The main risk factor for chronic kidney disease is diabetes mellitus [20].

## 2. Materials and methods

A cross-sectional study was conducted at district headquarter hospital, Mianwali, Pakistan, which was performed between June 2020 and February 2022, The total number of patients in our study were 120. The number of Male patients were 49 and female were 71. In 120 consecutive patients who underwent for blood tests and Blood pressure monitoring. We also took stages of Chronic kidney disease (CKD stage 1,2,3A,3B,4 and 5). We did renal function test for all patients (serum creatinine and serum urea). Data was tabulated and analyzed by SPSS.

### 2.1. Clinical and laboratory examination

Weight, sex, and age were noted. For all patients, we did Serum creatinine and serum urea.

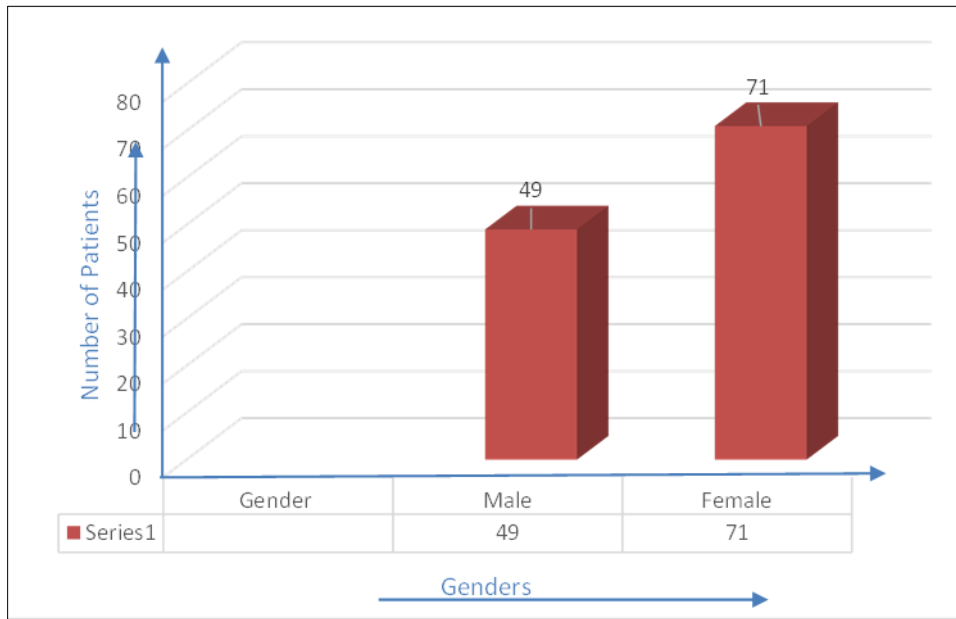
## 3. Results

**Table 1** Mean age and Blood pressure of all the enrolled patients ( $n=120$ )

Variables	Minimum	Maximum	Mean $\pm$ SD
Age (Years)	30	84	50.60 $\pm$ 10.9
Blood pressure			
Systolic BP	130	200	149.55 $\pm$ 13.5
Diastolic BP	80	100	89.57 $\pm$ 3.76

In a current study total 120 patients were enrolled. The minimum age of patients were 30 and the maximum age of the patients were 84. The mean age were 50.60 $\pm$ 10.9 years. The minimum systolic blood pressure were 130 and maximum systolic blood pressure were 200. The mean systolic blood pressure were 149.55 $\pm$ 13.5.

The minimum diastolic blood pressure were 80 and the maximum diastolic blood pressure were 100. The mean diastolic blood pressure were  $89.57 \pm 3.76$



**Figure 1** Bar graph showing gender distribution (n=120)

In Figure 1, Gender distribution, The male patients were 49 and female patients were 71. Vertical arrow represent Y-Axis and Horizontal arrow represent X-Axis.

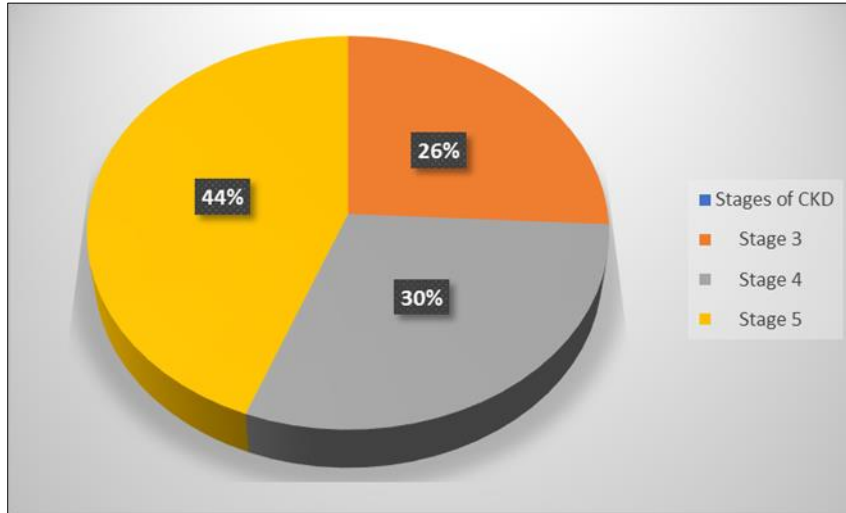
**Table 2** Patient characteristics of enrolled patients (n=120)

Variables	Frequency	Percentage
<b>Gender</b>		
Male	49	40.8
Female	71	59.2
<b>Age groups</b>		
30-50 years	61	50.8
51-70 years	52	43.3
>70 years	7	5.8
<b>Stages of CKD</b>		
Stage 3	31	25.8
Stage 4	36	30.0
Stage 5	53	44.2
<b>DM</b>		
YES	63	52.5
NO	57	47.5

In table 2, The frequency of male patients were 49 and its percentage were 40.8. The frequency of female patients were 71 and its percentage were 59.2. The frequency of age group 30-50 years were 61 and its percentage were 50.8. The frequency of age group 51-70 years were 52 and its percentage were 43.3. The frequency of age group >70 years were 7 and its percentage were 5.8.

The stages of Chronic kidney disease CKD, The frequency of stage 3 were 31 and its percentage were 25.8.

- The frequency of stage 4 were 36 and its percentage were 30.0. The frequency of stage 5 were 53 and its percentage were 44.2.
- The frequency of diabetes mellitus were present in patients 63 and its frequency were 52.5.
- The frequency of diabetes mellitus were absent in patients 57 and its frequency were 47.5.



**Figure 2** pi graph showing stages of CKD

Figure 2, Pi graph showing stages of Chronic kidney disease (CKD). The percentage of stage 3 CKD were 26%. The percentage of stage 4 CKD were 30% and the percentage of stage 5 CKD were 44 %.

**Table 3** Mean and SD of Renal Function Test, GFR and weight of all the enrolled patients (n=190)

	Means	SD
Renal Function Test		
Serum Creatinine mg/dL	7.82	3.59
Serum Urea mg/dL	109.90	24.30
Glomerular Filtration Rate mL/min	20.36	13.2
Weight (kg)	56.61	10.19

**Table 4** Correlation of stages of CKD with hypertension

Correlations			
		stages of CKD	Hypertension
Stages of CKD	Pearson Correlation	1	-0.133
	Sig. (1-tailed)		0.074
	N	120	120
Hypertension	Pearson Correlation	-0.133	1
	Sig. (1-tailed)	0.074	
	N	120	120

The P-value of stages of Chronic kidney disease (CKD) were 0.133; The P-value of hypertension were 0.074.

In Table 3, The mean of renal functional test Serum creatinine were 7.82 mg/dl and its SD value were 3.59 mg/dl. The mean of renal functional test Serum urea were 109.90 mg/dl and its SD value were 24.30 mg/dl.

- The mean glomerular filtration rate were 20.36 ml/min and its SD value were 13.2 ml/min.
- The mean weight of patients were 56.61 kg and its SD value were 10.19 kg.

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#### 4. Discussion

Even while blood pressure management lowers the risk of cardiovascular problems and slows the rate of GFR loss in proteinuria individuals, it is still not optimum for CKD patients, who are at high risk for cardiovascular disease<sup>4</sup>. Of the Americans with CKD in this sample, 37% met the recommended blood pressure target (<130/80 mm Hg) according to national recommendations. These findings are in accordance with other research showing that, in nationally representative samples of non-CKD patients, adherence to hypertension control guidelines ranges from 25% to 45%. In these studies, objectives are higher (<140/90 mm Hg) [21]. One of the main causes of secondary hypertension is CKDs. The individual approach to setting the target blood pressure with respect to age, the degree of albuminuria, and the existence of CV comorbidities is emphasized by new international standards. The antihypertensive therapy protocol is contingent upon the existence or nonexistence of proteinuria. Drugs that inhibit the renin-angiotensin system are used to treat CKD in both non-diabetics and diabetics. Effective preventative interventions that decrease the evolution of chronic kidney disease (CKD) must include controlling hypertension and treating other modifiable risk factors [22]. The complex etiology of hypertension linked to chronic kidney disease (CKD) is influenced by a number of variables. Among these pathogenic pathways are altered activity of the renin, angiotensin, and aldosterone systems; also, there is an increase in sympathetic nervous system activity and salt dysregulation. Standardized blood pressure (BP) measurements are necessary to diagnose and manage hypertension in patients with chronic kidney disease (CKD) [23].

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#### 5. Conclusion

Hypertension and diabetes mellitus is the main cause of Chronic kidney disease (CKD). Stage 5 Chronic kidney disease (CKD) patients were more in our study as compare to other stages of CKD. We concluded that after age of 30 years, patients have higher risk of Chronic kidney disease (CKD). Secondary hypertension is the major cause of Chronic kidney disease (CKD).

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#### Compliance with ethical standards

##### *Acknowledgments*

I am very thankful to my supervisor Liu Zhen and doctor Sadia Hassan.

##### *Disclosure of conflict of interest*

No conflict of interest to be disclosed.

##### *Statement of ethical approval*

This manuscript is in line with the principles of the Declaration of Helsinki. Approval was granted by the Ethics Committee of First Affiliated Hospital of Xinjiang Medical University.

##### *Statement of informed consent*

Informed consent was obtained from all individual participants included in the study.

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