

Effective Control of Hypertension in Adults with Chronic Kidney Disease

Adhikary L,¹ Koirala A,¹ Gautam B,¹ Gurung A¹

¹Department of Medicine, Kathmandu Medical College Teaching Hospital, Sinamangal, Kathmandu, Nepal.

ABSTRACT

Introduction: Adequate control of hypertension in Chronic Kidney Disease patients is difficult to achieve. This study was designed to analyze the adequacy of Hypertension control in adults with CKD using different classes of antihypertensive drugs.

Methods: A cross-sectional observational study was done that included 85 patients with CKD admitted to our Medicine Department over a period of two years (2006-2008 A.D.). Presence of CKD was defined as glomerular filtration rate <60 ml/min per 1.73 m² for more than three months or presence of albuminuria (albumin:creatinine ratio >30ug/mg). Adequate blood pressure control was defined as systolic blood pressure less than or equals to 130 and diastolic blood pressure less than or equals to 80 mm Hg. Data and Statistical analysis was done using SPSS Version 12 for Windows.

Results: Of all the CKD patients, 51.4% required three Anti-Hypertensive drugs combination for the effective control of Hypertension, while only 21% of CKD patients with hypertension was controlled on two drugs.

Conclusion: Adequate control of blood pressure in CKD patient was shown to be most effective on combination of three antihypertensive drugs. A poor control was seen on patients taking less than three antihypertensive drugs.

Keywords: antihypertensive drugs, chronic kidney disease, glomerular filtration rate, hypertension

INTRODUCTION

Although strict and effective control of hypertension is known to attenuate the progression of Chronic Kidney Disease (CKD), little is known about the number and adequacy of hypertensive drugs in treatment of adults with CKD.¹⁻³

Progression of CKD to End-Stage Renal Disease (ESRD) is a major public health problem. Prevalence of CKD is high, and rates of ESRD have nearly doubled in the last two decades. This accelerated incidence of ESRD exceeds the rate of increase in the prevalence of CKD which has also been associated with increased risk of

cardiovascular outcomes and mortality.¹ Hypertension is associated with more rapid progression of CKD.² Several studies have demonstrated that treating hypertension in patients with CKD and proteinuria may slow down the decline in glomerular filtration rate (GFR).³

In this study we assessed the number of antihypertensive drugs used to control blood pressure in CKD patients and we evaluated the number and class of different antihypertensive drugs for adequate blood pressure control.

Correspondence:

Dr. Laxman Adhikary
Department of Medicine, Kathmandu Medical College
Sinamangal, Kathmandu, Nepal.
Email: adhikarylaxu@hotmail.com
Phone: 9851087470

METHODS

It was a cross-sectional observational study conducted in the department of Medicine, Kathmandu Medical College from January, 2006 to December, 2008. Presence of CKD was defined as glomerular filtration rate <60 ml/min per 1.73 m² for more than three months or presence of albuminuria (albumin:creatinine ratio >30 ug/mg). The patients were excluded if they did not fulfill the above criteria. All the patients who presented with Acute Renal Failure, Septicaemia, and transient increase in serum creatinine levels were also excluded. We studied the effective blood pressure control in patients with CKD using different classes of antihypertensive drugs. Adequate blood pressure control was defined as systolic blood pressure less than or equals to 130 mm Hg and diastolic blood pressure less than or equals to 80 mm Hg. We also calculated the estimated GFR (eGFR) for all patients using serum

creatinine as a marker and cockroft gault equation. Data and Statistical analysis was done using SPSS Version 12 for Windows.

RESULTS

Among patients with CKD, only 51.4% had blood pressure controlled to $<130/80$ mm Hg using three antihypertensive drugs. Of those with poor control ($>130/80$ mm Hg), 27% were on two drugs, 14.6% on single drug and 6.7% on four antihypertensive drugs. Systolic hypertension was the cause for inadequate control. Most of the patients were from the age group of 20 to 50 years and approximately 80% were on maintenance haemodialysis (Table 1-3).

Total 73% of the patients with CKD had blood pressure more than 140 mmHg while 60% had blood pressure more than 90 mmHg (Figure 1-2).

Table 1. Types and Number of Antihypertensive drugs used in CKD patients.

Characteristic of drugs	Number of patients receiving the drug (Percentage)	95% confidence Interval	
		Lower	Upper
Number of patients receiving antihypertensive drugs	74(87.05%)	0.83	0.96
Types of antihypertensive agent used:			
Loop diuretics	56(65.88%)	0.78	0.93
Calcium Channel Blockers	67(78.82%)	0.55	0.76
β -Blockers	27(31.76%)	0.69	0.87
α -Blockers	12(14.11%)	0.22	0.43
Angiotension – converting enzyme inhibitors (ACE I)	7 (8.23%)	0.75	0.24
Angiotension receptor blockers (ARBs)	7 (8.23%)	0.04	0.16
Number of antihypertensives used			
One	11(14.8%)	0.04	0.16
Two	20 (27.2%)	0.07	0.22
Three	38(51.4%)	0.15	0.34
Four	5 (6.7%)	0.34	0.56

Table 2. Characteristics of CKD patients in total patient 85.

Age (years)	No (%)
<20 yrs	5 (5.89%)
20-50 yrs	49 (57.65%)
51-80 yrs	29 (34.11%)
>80 yrs	2 (2.35%)
Sex	
Male	55(64.70%)
Female	30(35.30%)
Other Characteristics: With associated Diabetes Mellitus	13 (15.30%)
Those on Maintenance Haemodialysis	67(78.9%)

Table 3. Difference in SBP and DBP of CKD patients after different Antihypertensive drug used.

No. of Antihypertensive drug used	No. of patients	Post SBP difference mm of Hg	Post DBP difference mm of Hg	P value
1	11	12	12	<0.01
2	20	17	17	<0.01
3	38	37	37	<0.01
4	5	4	4	<0.05

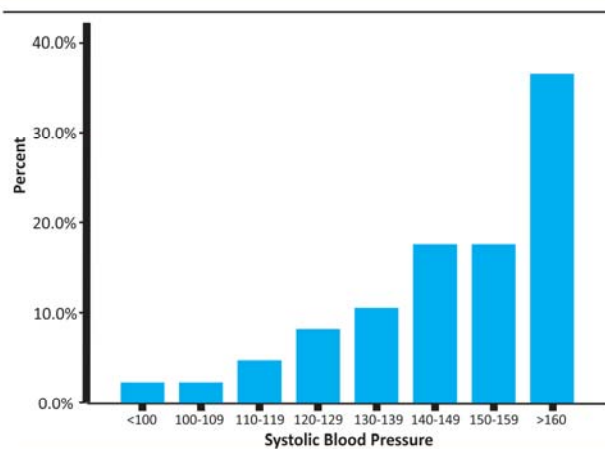


Figure 1. Distribution of Systolic Blood Pressure (mmHg) among CKD patients.

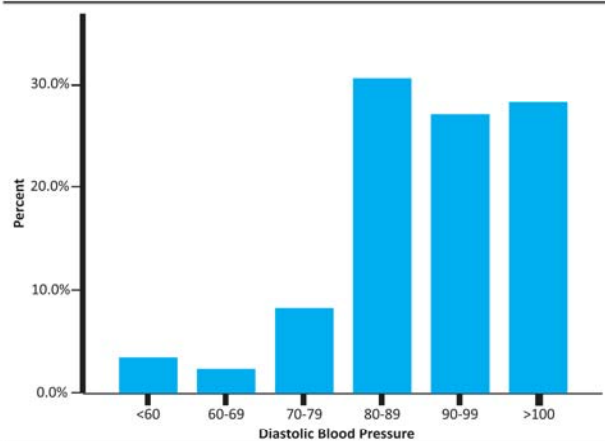


Figure 2. Distribution of Diastolic Blood Pressure (mmHg) among CKD patients.

DISCUSSION

CKD patients are at high risk for cardiovascular disease¹ and adequate blood pressure control has been shown to reduce cardiovascular complications and rate of decline in GFR.^{2,3} National guidelines recommend that pharmacological therapy and lifestyle modification is needed to achieve a blood pressure goal of <130/80 mm Hg for patients with CKD.^{4,5} The role of inadequate blood pressure control have not been well explained in adults with CKD.

Guidelines for hypertension control in patients with CKD have focused both on control of both systolic (SBP) and diastolic blood pressure (DBP). However, isolated systolic hypertension (ISH) is quite high, especially among the elderly.^{6,7}

Adherence to established blood pressure control is low for patients with CKD, although control of hypertension can slow the decline of GFR, reduce proteinuria, and reduce the incidence of cardiovascular complications

in CKD.^{2,3} Because most of the CKD patients have wide pulse pressure and isolated systolic hypertension, more aggressive treatment on systolic hypertension control is beneficial and the role of vascular stiffness in treatment of hypertension in CKD should be explained. As patients with CKD are at increased risk for various complications and have particularly inadequate blood pressure control, efforts should be aimed at adequate hypertension control. Hypertension in CKD patients should be treated with an appropriate regime requiring multiple medications.

Isolated systolic hypertension was the primary cause of inadequate control. Previous studies have documented a high prevalence of systolic hypertension (systolic pressure >140 mm Hg, with diastolic <90 mm Hg) in the general population,^{6,7} and data from clinical trials have documented beneficial effects from treating isolated systolic hypertension in the elderly. Because high systolic pressure is so prevalent in CKD and is important for CKD progression,⁸ systolic blood pressure control should be the focus of antihypertensive therapy in CKD.

The association of CKD with isolated systolic hypertension may be explained by increased vascular stiffness. Wide pulse pressure appears to be a marker of vascular stiffness and cardiovascular calcification, a predictor of cardiovascular risk in the elderly, and it is associated with increased mortality in patients with renal disease.^{9,10} It is not known clearly whether narrowing the pulse pressure in patients with CKD would be helpful in decreasing the cardiovascular mortality in CKD patients.

Although older age is associated with increased rates of complications from CKD,¹¹ age >60 years was an independent predictor of inadequate blood pressure control in CKD. The mechanism for this association may be increased arterial stiffness in older age group. Many physicians do not treat aggressively for systolic blood pressure in older age group because they think increased SBP is a normal phenomenon associated with aging.

Our study suggests that new guidelines should focus on reducing systolic blood pressure (SBP) in adults with CKD. Treating systolic hypertension is beneficial in the elderly, and according to JNC VII thiazide diuretics are the first choice for the treatment of systolic hypertension.⁴ Adequate blood pressure control in CKD is possible, but it requires close follow-up, a good physician team, and, on average, three to four antihypertensive medications. JNC VII recommends adding additional agents depending on the CKD diagnosis

and other comorbidities (especially angiotensin-converting enzyme (ACE) inhibitors and angiotensin receptor blockers) to achieve targets,⁴ but the data for treatment of isolated systolic hypertension in CKD are few, with some studies showing beneficial effects of losartan and candesartan.¹²⁻¹⁴ Despite evidence of the benefit of ACE inhibitors and ARBs in patients with CKD, their use remains comparatively low.

CONCLUSIONS

The adequate control of blood pressure in CKD patient was shown to be most effective on combination of three antihypertensive drugs. A poor control was seen on patients taking less than three antihypertensive drugs. The control of hypertension which is poor in patients with CKD is primarily attributable to number of antihypertensive drugs used. One should also be cautious for rise in Isolated Systolic Hypertension especially in elderly. Future guidelines and antihypertensive therapies for patients with CKD should target on using different class of drugs in combination.

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