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Original Research Article

Type of antihypertensive medications in CKD-stage V patients on hemodialysis and its relationship with demographic variables: an observational study

Kalpana Bharani^{1*}, Rajesh Bharani², Rubina Vohra³, Chhaya Goyal¹, Pooja Reddy¹

¹Department of Pharmacology, ³Department of Nephrology, SAIMS Medical College, Indore, Madhya Pradesh, India
²Department of Nephrology, Bombay Hospital, Indore, Madhya Pradesh, India

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***Correspondence:**

Dr. Kalpana Bharani,

Email: drkalpanabharani@gmail.com

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ABSTRACT

Background: The majority of the patients with chronic kidney disease stage V on hemodialysis have been found to have hypertension and many studies have recommended that hypertension should be essentially controlled in these patients for better clinical outcome. But till now no study analyzing the relationship between antihypertensive medication and the demographics of the patient has been done, so with this objective in mind the present study was carried out. Aim and objectives were to analyse the types of antihypertensive being used in CKD stage V patients on hemodialysis and their relationship with the demographic variables.

Methods: The present observational cross-sectional study was conducted in Sri Aurobindo Institute of Medical Sciences, Indore (M.P.) from 01 January 2018 to 31 March 2018 on patients with chronic kidney disease stage V on hemodialysis. The demographic variables evaluated were age, sex, basic disease and duration of dialysis. The relationship with type of antihypertensive being used and these demographic variables was calculated using Pearson Chi-square test. A p value of <0.05 was taken as statistically significant.

Results: Diabetic nephropathy, CIN-CKD 5d, CGN-CKD 5d and hypertensive nephropathy were the commonest basic diseases in our study. Calcium channel blockers, beta blockers, ATRB, centrally acting antihypertensive, ACE inhibitors were the commonest antihypertensive used. Statistically significant relationship was seen between antihypertensive and basic disease (p<0.05).

Conclusions: The study revealed that all the antihypertensive medications are prescribed on the basis of basic disease while other demographic variables do not play a vital role prescribing antihypertensive in patients with CKD stage V on haemodialysis. And the prescription of antihypertensive medications also matches with the actual clinical practice.

Keywords: Hypertension, Chronic kidney disease, End stage renal disease, Hemodialysis, Antihypertensive use, Association between antihypertensive used and demographic variables

INTRODUCTION

Hypertension is a very common finding in patients with chronic kidney disease, especially end-stage renal disease. The incidence is around 86%. The main pathophysiological etiology of hypertension in these patients is expansion of extra-cellular volume (ECV). The increased risk of left ventricular hypertrophy, coronary

artery disease, congestive heart failure cerebrovascular complications and mortality are associated with hypertension.¹ Hence it becomes imperative that hypertension in these patients should be controlled.² The blood pressure control recommendation for patients on hemodialysis is similar to that recommended for general population.³ With the technological advent, several options of treatment are now available, which includes

angiotensin II receptor antagonists, beta blockers and calcium channel blockers first line drugs. Beta blockers and calcium channel blockers have been found to reduce mortality associated with cardiovascular disease and has also been found to show protection in patients who are at high risk.³ We could not come across any study which showed any relationship between type of antihypertensive used and demographic variables in these patients, so considering this lacunae, we undertook the present study, where we tried to find out the type of antihypertensive being used in CKD stage V patients on hemodialysis and to find out relationship between the type of antihypertensive being used and patients demographic variables.

METHODS

The present observational cross-sectional study was conducted in Sri Aurobindo Institute of Medical Sciences, Indore (M.P.) from 01.01.2018 to 31.03.2018 on patients with chronic kidney disease stage 5 on hemodialysis presenting to institution during the study period. Though we had no calculated the sample, but with the present sample size the power of the study is 80% at a confidence interval of 95%. A study specific proforma was used to collect the information of the patients. Detailed information about the study, its protocol, procedures, details that will be collected from the patient was explained to these patients prior to including them in the study. Those who refused for participation were excluded from the study. Patient's personal details were kept confidential. The data was analyzed using Microsoft Excel software for analysis and online software were used for calculating P values. Association between demographic variables and type of antihypertensive medications was done using Pearson Chi-square test. A p value of <0.05 was taken as statistically significant. We had included 150 patients in the present study.

Selection criteria

All chronic kidney disease stage V patients on hemodialysis of any gender and willing to provide voluntary written informed consent for participation were included in the study, while children, pregnant and lactating women, and those patients with any other comorbidity like kidney stone, tumors or trauma were excluded from the study. And all those patients who were not willing to provide consent for participation were also excluded.

Ethical considerations

Study was initiated after obtaining the approval from Ethics Committee of Sri Aurobindo Institute of Medical Sciences, Indore (M.P.). Also, all study related procedures were initiated after obtaining voluntary written informed consent from the patient and/or his/her legally acceptable representative. All the required information was gathered from the documents available with the patient.

RESULTS

We had included 150 patients of chronic kidney disease Stage V undergoing hemodialysis in the present study. Of these 150 patients, there was a male preponderance 99 (66.0%) in comparison to 51 (34.0%) females. Mostly 83 (55.3%) patients belonged to age group 41-60 years, followed by 36 (24.0%) in the age group 61-80 years.

Table 1: Distribution according to type of antihypertensive used.

Type of antihypertensive medication	Number	Percentage
Calcium channel blockers	131	87.3
Nifedipine	61	40.7
Amlodipin	52	34.7
Cilnidipin	18	12.0
Beta blockers	76	50.7
Metoprolol	40	26.7
Atenolol	13	8.7
Carvedilol	23	15.3
Others	0	0.0
ATRB	18	12.0
Losartan	4	2.7
Telmisartan	11	7.3
Olmесartan	3	2.0
Others	0	0.0
ACE inhibitors	2	1.3
Ramipril	2	1.3
Enalapril	0	0.0
Others	0	0.0
Centrally acting antihypertensives	76	50.7
Clonidine	51	34.0
Moxonidine	25	16.7
Minoxidil	10	6.7
Alpha blockers	59	39.3
Prazocin	56	37.3
Doxazocin	3	2.0
Diuretics	19	12.7
Furosemide	3	2.0
Torsamide	16	10.7
Metalazone	5	3.3

Diabetic nephropathy seen in 65 (43.3%) patients was the most common basic disease, followed by CIN-CKD 5d seen in 28 (18.7%) patients, CGN-CKD 5d seen in 27 (18.0%) patients, hypertensive nephropathy seen in 13 (8.7%) patients, ADPKD seen in 10 (6.7%) patients, SLE seen in 5 (3.3%) patients and obstructive uropathy seen in 2 (1.3%) patients. 41 (27.3%) patients were on hemodialysis since 1-6 month duration, 15 (10.0%) were since 6-12 months, 30 (20.0%) were since 13-24 months, 38 (25.3%) were since 25-60 months and 26 (17.3%) were since more than 60 months.

Total 61 (40.7%) patients were on nifedipine, 52 (34.7%) were on amlodipin, 18 (12.0%) were on cilnidipin. 40 (26.7%) patients were on metoprolol, 13 (8.7%) were on Atenolol, 23 (15.3%) were on Carvedilol. 4 (2.7%) patients were on Losartan, 11 (7.3%) patients were on telmisartan and 3 (2.0%) patients were on olmesartan. 2 (1.3%) patients were on Ramipril. 51 (34.0%) patients were on Clonidine, 25 (16.7%) were on maxonidine, 10 (6.7%) were on minoxidil. 56 (37.3%) patients were on prazosin, 3 (2.0%) were on doxazosin. 3 (2.0%) patients were on Furosemide, 16 (10.7%) were on torsamide and 5 (3.3%) were on metalazone (Table 1).

Calcium channel blockers were used by 131 (87.3%) patients, beta blockers were used by 76 (50.7%) patients, ATRB was used by 18 (12.0%) patients, ACE inhibitors were used by 2 (1.3%) patients, centrally acting antihypertensive were used by 76 (50.7%) patients, alpha blockers were used by 59 (39.3%) patients and diuretics were used by 19 (12.7%) patients (Table 1).

The association was seen between age, sex, basic disease, duration of dialysis and type of antihypertensive prescribed.

There was a statistically significant association seen between calcium channel blocker use and basic disease ($p=0.010$), where in majority of the patients with each basic disease, calcium channel blocker was given; and duration of dialysis ($p=0.033$), where it has been that there is a variation in prescription of calcium channel blockers. While all other associations were found to be statistically not significant ($p>0.05$).

There was a significant association seen between beta blockers and sex ($p=0.044$), showing more prescription in males in comparison to the females. While all other associations were found to be statistically not significant ($p>0.05$).

There was no statistically significant association seen between ATRB and any of the demographic variables ($p>0.05$).

There was a statistically significant association seen between ACE Inhibitor use and basic disease ($p=0.002$), where it was prescribed in a small proportion in patients having hypertensive nephropathy, while in all other basic diseases, it was not prescribed. All other associations were found to be statistically not significant ($p>0.05$).

There was a statistically significant association seen between Centrally Acting antihypertensive use and basic disease ($p=0.013$). In 70.4% patients with CGN-CKD 5d, 55.4% patients with diabetes nephropathy, 61.5% patients with hypertensive nephropathy and 50.0% patients with obstructive uropathy were prescribed this antihypertensive, while in other disease conditions, lesser proportion of patients were prescribed this drug. All other associations were found to be statistically not significant ($p>0.05$).

There was a significant association seen between alpha blockers and sex ($p=0.004$), showing more prescription in females in comparison to the males. There was a significant association seen between basic disease and alpha blockers ($p=0.001$), showing a variation in prescription of alpha blockers according to basic disease. In 55.6% patients with CGN-CKD 5d, in 69.2% patients with hypertensive nephropathy and 50% patients with obstructive uropathy it was prescribed, while it was not prescribed in ADPKD and only 7.1% patients with CIN-CKD 5d were prescribed. While all other associations were found to be statistically not significant ($p>0.05$).

There was a significant association seen between duration of dialysis and diuretics use ($p=0.003$), showing that as the duration of dialysis increases, the use of diuretics was reduced significantly. While all other associations were found to be statistically not significant ($p>0.05$).

DISCUSSION

There was a male preponderance in our study with majority of the patients belonging to the age group 41-60 years with a mean age of 51.84 ± 13.65 years. Joseph et al in their study also reported a male preponderance reported higher incidence of hypertension in males, which is comparable with our study results. Lee et al reported an overall mean age of 61.5 years, which is quite consistent with our findings.^{4,5}

Majority of the patients were having diabetic nephropathy, followed by CIN-CKD 5d and CGN-CKD 5d. Majority of the patients i.e. 27.3% were on hemodialysis for duration of 1-6 months, followed by 25.3% who were since 35-60 months and 20% were since 13-24 months.

Total 87.3% patients were on calcium channel blockers, 50.7% were on beta blockers, 12% on ATRB, 1.3% were on ACE inhibitors, 50.7% on centrally acting antihypertensives, 39.9% on alpha blockers and 12.7% on diuretics. Majority of the patients are on calcium channel blockers, followed by centrally acting antihypertensives and beta blockers. Our results have been confirmed by the studies done by Bhanu et al and Sajju et al who also reported that calcium channel blockers are the most commonly given prescription for hypertension.^{6,7}

Statistically significant association was seen between basic disease ($p=0.010$); duration of dialysis ($p=0.033$) and calcium channel blocker; sex and beta blockers ($p=0.044$); between basic disease and ACE inhibitors ($p=0.002$); basic disease and centrally acting antihypertensive ($p=0.013$); basic disease ($p=0.001$) and sex ($p=0.004$) with alpha blockers; duration of dialysis and diuretics ($p=0.003$).

Calcium channel blockers are prescription is based on the basic disease with a large distinction; beta blockers were more commonly prescribed in males. ACE inhibitor was prescribed in patients with hypertensive nephropathy, while it was not prescribed in other basic diseases.

Centrally acting antihypertensives were given majorly in patients with CGN-CKD 5d, diabetes nephropathy, hypertensive nephropathy and obstructive uropathy. Alpha blocker prescription also varied according to the basic disease, it was prescribed in CGN-CKD 5d, hypertensive nephropathy and obstructive uropathy patients, which is having a similar pattern of prescription as that of centrally acting antihypertensives. Diuretic use was gradually reduced as the duration of dialysis was increasing. ATRB prescription was independent of the demographics of the patients.

None of the studies perused have undertaken the study to find out the relationship between antihypertensive medication and the demographics of the patients, so we could not perform any comparison of this parameter.

The foremost limitation of our study was that it was a single center study, so the data obtained and results generated represent only our study center, which might differ when a large study population covering many centers is done.

So, to conclude, we found a significant relationship of antihypertensive use with the basic disease with is well consistent with the real-life clinical practice.

CONCLUSION

In this study, we demonstrated that the antihypertensive use or prescription was based primarily on the basic disease and duration of dialysis of the patient, and it has little relationship with other demographic variables, except in some instances association was seen with gender. Calcium channel blockers, beta blockers, centrally acting antihypertensives and alpha blockers were most commonly prescribed medications in patients with CKD stage V on hemodialysis with hypertension.

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