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BLOOD PRESSURE & ANTI-HYPERTENSIVE DRUG USE FOR HEMODIALYSIS PATIENTS AT A TERTIARY HOSPITAL

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ABSTRACT

Hypertension is a major risk factor for cardiovascular disease which is the main cause of morbidity and mortality in the dialysis population. Adequate control of blood pressure is difficult with conventional hemodialysis alone but is important to improve cardiovascular outcomes. Different models have been developed to describe variations in BP in Hemodialysis patients. Antihypertensive drugs like Angiotensin II receptor antagonists, beta blockers and calcium channel blockers are being used effectively to reduce blood pressure in hemodialysis patients. A cross-sectional study was performed in Fortis Hospital with 60 chronic hemodialysis patients for period of 6 months. The patient's details like patients sample no, age, sex, date of starting dialysis were recorded. Patient's blood pressure profile and antihypertensive drugs were also included. 42 Patients used one Antihypertensive Drug, 14 Patients used Two Antihypertensive Drugs, 4 Patients used Three Antihypertensive Drugs.It also showed that 23 Calcium Channel Blocker drugs , 14 Beta Blocker drugs, 14 Adrenergic α Blocker drugs ,7 Diuretic drugs , 10 central sympatholytic drugs,13 Angiotensin receptor blocker drugs were used to treat hypertension for patients under hemodialysis. The relationship of hypertension with adverse outcomes is uncertain in the hemodialysis population. If hypertension is an etiologically significant cardiovascular risk factor in hemodialysis patients, the first step would be to assess the level of BP accurately. To manage hypertension, limiting dietary intake, and individualizing dialysate sodium delivery would be the important step along with antihypertensive drugs. Newer antihypertensive agents, such as direct renin inhibitors, may provide alternative options to improve blood pressure but require testing for efficacy and safety in hemodialysis patients.

Key Words: Hypertension, Hemodialysis, Antihypertensive, Cardiovascular risk.

INTRODUCTION

To describe circadian blood pressure (BP) patterns and linear interdialytic changes, a model was developed to describe simultaneously both the straight line change and oscillatory variation in BP and heart rate over an interdialytic interval in hemodialysis patients [1-2]. Using this trended cosinor model, we simultaneously compared the impact of mean level of BP, linear changes over the interdialytic interval, and oscillatory changes in BP and its relationship with antihypertensive drug use.

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Neither a straight-line change model nor the cosinor model adequately described the BP variability in BP measurements from 60 chronic stable hemodialysis patients. A combination of the 2 models that allowed for the oscillatory rhythmic pattern in BP variation to have an upward trend in the interdialytic period most accurately described the data [3]. Time elapsed since the end of dialysis demonstrated a better model fit compared with the less meaningful clock time. More antihypertensive medication use was associated with increasing mean systolic, diastolic, and pulse pressure [4-5]. Although the rate of change was blunted with increasing antihypertensive drug use, the impact on oscillatory change was U-shaped for systolic BP, direct for diastolic BP, and

inverse for pulse pressure. A trended cosinor model better describes the change in BP in the interdialytic interval in hemodialysis patients, especially when time elapsed is measured from the end of dialysis. Antihypertensive drugs, though associated with higher average BP, are associated with blunted rate of change in BP over time [6-7]. The aim and objective of the study was to evaluate the Antihypertensive drug therapies carried out in hemodialysis patients with continuous blood pressure measurement.

MATERIALS & METHOD

This is a cross-sectional study performed at different dialysis units of Fortis Hospital. BPs were recorded every 30 minutes during the day (6:00 AM to 10:00 PM) using a unit. Patients with BP recordings were excluded, because pattern recognition was not possible with a limited number of recordings. The remaining 60 patients had a combined BP measurement. These data were exported to a relational database to allow for data management, as well as centering the time to that elapsed after dialysis using standard programming tools.

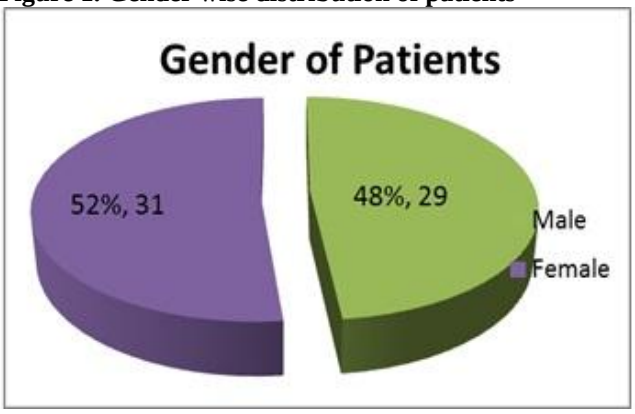
Antihypertensive medications actually taken by the patients were recorded. Pre and post –dialysis blood pressure values of < 140/90 mmHg are recommended as the optimal blood pressure. The extra-cellular volume (ECV) expansion is the main pathophysiological determinant of hypertension in dialysis patients. The efforts should be made to correctly estimate and achieve the patients dry body weight and to limit dietary sodium intake.

Patients 18 years of age who had been on chronic hemodialysis for 3 months and were free of vascular, infectious, or bleeding complication within 1 month were enrolled in the study. Those who missed 2 hemodialysis treatments over 1 month, used illicit drugs, and had chronic atrial fibrillation or body mass index of 40 kg/m^2 were excluded. Patients who had a change in dry weight or change in antihypertensive drugs within 2 weeks were also excluded. Presence or absence of hypertension was not a selection criterion. All of the patients underwent standard dialysis 3 times a week.

RESULTS

It was an observational study. Data were collected from 60 patients from different dialysis units of Fortis Hospital between September 2014 and February 2015. Adequate ambulatory BP record was obtained in 60 hemodialysis patients. Data obtained are subject to further analysis.

Figure 1. Gender wise distribution of patients



From figure 1 it can be seen that the ratio of male and female patients were almost same with the percentage of 52% female and 48% male.

Figure 2. Age wise distribution of patients

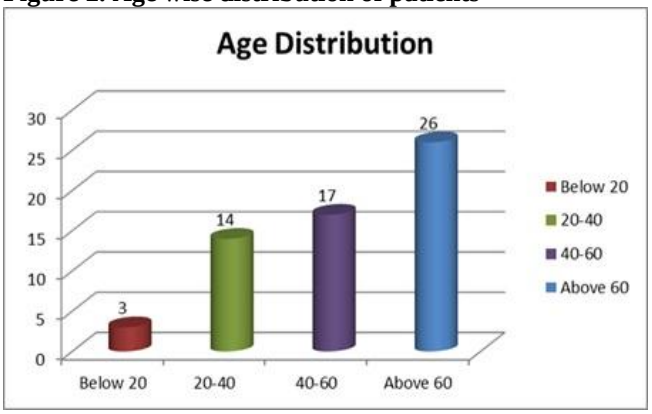


Figure 2 shows the age wise distribution of patients. It represents that most of the patient were above the age of 60

Table 1. Blood pressure profile & Use of Anti-hypertensive drugs

SL No.	Blood Pressure Profile			Anti-hypertensive Drugs
	PRE	MEDL	POST	
1	180/140	170/130	150/110	Amlodipine
2	160/130	160/130	150/120	Metoprolol& Amlodipine
3	190/140	180/120	160/100	Amlodipine
4	150/120	150/120	140/90	Amlodipine
5	170/110	170/110	160/100	Clonidine &Torsemide
6	140/110	140/100	130/90	Amlodipine &Telmisartan
7	170/130	160/110	150/90	Carvedilol
8	160/120	150/110	150/100	Torsemide

9	170/130	170/120	150/100	Nifedipine&Telmisartan
10	180/120	170/110	150/90	Prazosin
11	170/130	160/120	140/110	Metoprolol
12	150/120	160/120	140/110	Telmisartan
13	180/140	170/130	150/110	Metoprolol
14	160/120	170/120	140/100	Clonidine & Amlodipine
15	170/130	150/120	140/90	Prazosin
16	200/140	180/130	160/110	Nifedipine
17	150/130	150/120	140/90	Amlodipine & Furosemide
18	170/130	160/120	150/110	Nifedipine
19	180/120	170/120	160/90	Clonidine & Amlodipine
20	190/130	180/130	160/110	Prazosin&Telmisartan
21	160/120	160/120	150/90	Carvedilol
22	170/120	150/120	140/100	Torsemide
23	140/100	140/90	130/80	Clonidine
24	150/120	150/110	140/80	Prazosin, Amlodipine&Telmisartan
25	160/120	140/110	150/90	Nifedipine
26	180/130	160/120	150/100	Telmisartan
27	190/130	160/120	140/90	Prazosin
28	180/120	160/120	150/100	Metoprolol, Telmisartan
29	170/130	150/130	150/90	Telmisartan
30	150/110	160/110	140/80	Metoprolol
31	170/120	170/110	150/90	Clonidine
32	180/110	150/100	160/120	Prazosin
33	160/120	150/120	140/80	Nifedipine
34	170/120	160/110	150/100	Amlodipine & Furosemide
35	190/140	150/120	160/110	Nifedipine
36	150/100	160/110	150/90	Clonidine
37	170/120	170/100	160/90	Prazosin
38	180/110	160/90	170/100	Carvedilol
39	170/120	160/110	150/110	Prazosin& Amlodipine
40	140/90	140/90	130/80	Telmisartan
41	180/120	160/100	150/100	Metoprolol
42	170/110	150/100	150/90	Clonidine
43	180/130	160/120	150/100	Prazosin
44	170/120	170/110	160/110	Nifedipine
45	170/110	160/100	160/90	Amlodipine &Carvedilol
46	180/100	180/90	150/90	Nifedipine
47	170/110	160/100	140/80	Clonidine
48	150/100	160/110	150/90	Prazosin
49	160/110	160/100	140/90	Carvedilol
50	170/100	150/90	130/80	Torsemide
51	160/100	160/100	150/90	Clonidine, Nifedipine&Prazosin
52	180/120	180/110	150/100	Prazosin
53	170/110	150/100	130/80	Nifedipine, Torsemide&Metoprolo
54	170/100	160/100	150/100	Telmisartan
55	150/100	150/100	140/90	Prazosin
56	170/110	160/100	130/90	Metoprolol, Clonidine&Telmisartan
57	160/100	160/100	150/90	Telmisartan
58	200/120	180/110	170/100	Metoprolol
59	160/100	170/110	150/100	Telmisartan& Amlodipine
60	170/110	180/100	160/90	Prazosin

Table-1 shows 42 Patients used one Antihypertensive Drug, 14 Patients used Two Antihypertensive Drugs, 4 Patients used Three Antihypertensive Drugs. It also represents that 23 Calcium Channel Blocker drugs , 14 Beta Blocker drugs, 14 Adrenergic α Blocker drugs ,7 Diuretic drugs, 10 central sympatholytic drugs,13 Angiotensin receptor blocker drugs were used to treat hypertension for patients.(Calcium Channel Blocker- Nifedipine, amlodipine; β Blocker- Metoprolol, Carvedilol; Adrenergic α Blocker- Prazosin; Central Sympatholytics- Clonodine; Angiotensin receptor blocker- Telmisartan; Diuretics- Torsemide, Furosemide).

DISCUSSION

The majority of patients with end stage renal disease on chronic dialysis need antihypertensive drug therapy. Several classes of antihypertensive drugs are available and all except diuretics are effective in controlling hypertension in hemodialysis patients. In patients with left ventricular hypertrophy, angiotensin converting enzyme (ACE) inhibitors may be effective in causing regression, although the trial sizes have been limited. Calcium channel blockers (CCBs) are the most widely prescribed class of drugs in patients on hemodialysis. Calcium channel blockers appear to be more effective when the plasma volume is expanded. They do not need additive doses after hemodialysis. Because hypertension in hemodialysis patients is thought to be largely a result of volume expansion, these agents may have a unique advantage in ESRD. Both dihydropyridine and non dihydropyridine calcium channel blockers have unaltered pharmacokinetics in patients with ESRD on hemodialysis and have little dialyzability. Preliminary studies with verapamil have even suggested a reduction in intradialytic hypotension. Angiotensin converting enzyme inhibitors and beta blockers appear to be attractive agents due to their independent cardiovascular benefits. Several other options are available to control hypertension. Transdermal clonidine applied at weekly intervals can improve hypertension control. Minoxidil, a potent vasodilator, is effective for hypertension control. It should be used with beta blockers to maintain efficacy. The side effects of hirsuitism, pericardial effusion, and edema should be carefully monitored.

To what level BP should be lowered and how is not known. Studies suggest a mean arterial pressure of < 99 mmHg to be associated with best survival. These patients have long hours of hemodialysis. Lowering BP too much may render fluid removal during dialysis difficult and may increase the discomfort associated with dialysis. On the other hand, by reducing BP to a lower level some cardiovascular benefits may be realized. An ideal BP in a hemodialysis patient would be associated with: hemodynamic stability during dialysis, orthostatic tolerance after dialysis, the best cardiovascular survival, and optimal health related quality of life. Some of these goals can be achieved by dietary and dialysate sodium restriction. This reduces the amplitude of BP fluctuations but additional factors must be considered. A patient with diastolic dysfunction and left ventricular hypertrophy can experience arterial stiffness and intredialytic hypertension. It is likely that tolerance to BP goals will vary by cardiovascular comorbidities. If there is a true association between hypertension and cardiovascular disease in hemodialysis patients, then the lowest possible home BP with the least symptoms on dialysis and best quality of life may be a prudent goal. This BP goal would need to be individualized. Because a home BP of > 150/90 mmHg correlates with hypertension detected by BP targeted to < 150/90 mmHg would be a prudent goal.

CONCLUSION

It is important to recognize accurately the hypertensive patients in hemodialysis.If hypertension is an etiologically significant cardiovascular risk factor in hemodialysis patients, the first step would be to assess the level of BP accurately. To manage hypertension, limiting dietary intake, and individualizing dialysate sodium delivery would be the first steps. Antihypertensive drug therapies can effectively reduce BP and are needed by the vast majority of hemodialysis patients[34]. Whether control of hypertension translates into better outcomes is not known, but collective evidence suggests that hypertension should be controlled in hemodialysis patients.Further studies are required to confirm the most effective antihypertensive therapy in hemodialysis patient.

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CONFLICT OF INTEREST:
The authors declare that they have no conflict of interest.

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