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MANAGEMENT OF HYPERTENSION AND ANTI-HYPERTENSIVE DRUG PROFILE IN END-STAGE-RENAL-DISEASE PATIENTS UNDERGOING MAINTENANCE HEMODIALYSIS

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ABSTRACT

Background: Hypertension is common in patients of end stage renal disease treated with hemodialysis. Objective: To observe management of hypertension and antihypertensive drug profile in end stage renal disease (ESRD) patients undergoing hemodialysis. **Methods:** An observational study was conducted for 2 months (August 2015) - September 2015) in different hospitals of Lahore. Population of 50 dialysis ward patients was randomlyselected during this period and study was performed by filling data collection forms from patients. Collected data was analyzed and results were presented in the form of graphs and tables. **Results:** Of the total patients, 56% were male and 44% were female. Hypertension (62%) and diabetes (20%) are leading cause of CKD. 76% patients were on low sodium diet and only 40% do exercise to control their blood pressure. 78% patients use calcium channel blockers alone or in combination with alpha or beta blockers as antihypertensive agents. **Conclusion:**Treatment with agents that lower blood pressure should routinely be considered for individuals undergoing dialysis to reduce the very high cardiovascular morbidity and mortality rate in this population. At the same time educating the patients regarding restricting the dietary salt or fluid intake will enable them to control their blood pressure and improve their quality of life.

Keywords: hypertension, ESRD, CKD, antihypertensive drug profile.

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INTRODUCTION

Chronic kidney disease is a term used for heterogeneous disorders affecting the structure and function of the kidney.[1]Chronic kidney disease definition is based on the presence of kidney damage (i.e. albuminuria) or decreased kidney function (i.e. glomerular filtration rate<60 mL/min per 1.73 m²)

for 3 months or more, irrespective of clinical diagnosis. Stage 5 chronic kidney diseasei.e GFR less than 15 mL/min per 1.73 $m^2$is end stage renal disease (ESRD).

Pakistan is the country where more than 180 million people are predisposed to chronic diseases including diabetes and hypertension because of low birth weight possibly which might be associated with reduced renal reserve. [2] Worldwide 2 million people with end-stage renal disease (ESRD) undergo maintenance hemodialysis (MHD). [3]Hypertension is a common clinical problem in these patients. It is estimated that the prevalence of hypertension is about 80% in this population. In HD patients, hypertensive emergency would result in congestive heart failure (CHF) in spite of being on dialysis and using multiple medications. [4]

The pathophysiology of hypertension in dialysis patients is complex, and multiple mechanisms are likely involved in blood pressure dysregulation in these patients. But major cause is sodium and volume overload in body (volume-dependent), and other cause include elevated renin activity (renin dependent), resulting in a rise in renin and blood pressure during hemodialysis as fluid is removed. [5]

While blood pressure control may improve cardiovascular outcomes in hemodialysis patients, its management in these patients is challenging considering extracellular fluid volume is a major determinant of blood pressure in hemodialysis patients. [6] Fluid removal in hemodialysis patients is usually achieved by ultrafiltration to achieve a clinically derived value for "dry weight." Dry weight is the lowest weight a patient can tolerate without the development of symptoms or hypotension. Unfortunately, there is no standard measure of dry weight and as a consequence it is difficult to ascertain adequacy of fluid removal for an individual patient. [7] Gradual fluid removal with longer dialysis allows a greater degree of total fluid loss and attaining the dry weight. Patients with chronic kidney disease should have a target blood pressure goal of <130/80 mmHg. Ultimately, the rationale for lowering blood pressure in all patients with CKD is to reduce both renal and cardiovascular morbidity and mortality. [8]

Management of hypertension can be divided into 2 broad categories: non-pharmacologicand pharmacologic [9].Non-pharmacologic management includesfive lifestyle modifications as recommended by JNC 7 for reducing blood pressure. These are; reducing sodium intake, increasing exercise, moderating alcohol consumption, following the Dietary Approaches to Stop Hypertension (DASH) eating plan and losing weight. [10].

Even while using these interventions, pharmacologic therapy is usually required to control blood pressure in hemodialysis patients. Most classes of agents are appropriate for use in hemodialysis patients. Inhibitors of the renin angiotensin aldosterone system (RAAS) ought to be considered as first line agents for blood pressure control in hemodialysis patients. Angiotensin-converting enzyme (ACE) inhibitors and angiotensin II receptor blockers (ARB) may decrease morbidity and mortality. ?-Blockers remain an important choice in the selection of drugs for hypertension management, including drugs for patients with ESRD.Combined ?- and ?-blockers are becoming increasingly popular for use in hemodialysis patients because of their effectiveness, reduced cost, and demonstrated benefit in patients with dilated cardiomyopathy. [11-13]Among all classes, CCBs are the most commonly prescribed antihypertensive agents and offer the advantage of not being cleared during hemodialysis. Dosing, frequency, and type of medication are influenced by pharmacokinetic profiles of patients. [14]

Current study was planned to identify potential treatment targets for hypertension in patients receiving hemodialysis and to observe pharmacological agents for the treatment of hypertension in the setting of hemodialysis. Further to aware about non-pharmacological methods for reducing blood pressure in patients on hemodialysis.

MATERIALS AND METHODS

A descriptive observational study was conducted at nephrology wards of Sir Ganga Raam Hospital and Services Hospital Lahore, Pakistan. The duration of study was 2 months (August 2015- September 2015) and 50 patients undergoing maintenance hemodialysis in nephrology wards of Chronic Kidney Disease were randomly included as subjects for this study.

A data collection form was designed to collect the information from the hemodialysis patients. Data collection form covered the different aspects regarding patient's demo-graphic information, past medical history, family history, medication history, frequency of hemodialysis, measurement of blood pressure during dialysis, management of hypertension, life style and dietary changes to control hypertension and other complications associated with hypertension. Verbal informed consent was taken and confidentiality was

maintained. Collected data was recorded in data collection form. The descriptive statistics was applied using Microsoft Excel® and the frequency and percentages were calculated and results were expressed in tables and figures.

RESULT

As table 1 indicates, in our study, 56%patients were male and other 44% patients were female. 64% patients in our study were above 40 years. Major reasons of kidney failure were hypertension (62%) and diabetes (20%). More than 90% patients have kidney problem for more than 1 year which ultimately leads to kidney failure or dialysis.92% patients have stage 5 chronic kidney disease and few were of stage 4. All patients have their hemodialysis sessions at hospital. 32% patients do feel cramps during their interdialytic period which unfortunately their health care professional failed to reduce. Anemia is very common in dialysis patients. That's why 92% patients have Hb injection to minify their problem.

All patients have hypertension problem associated with their dialysis. 46% patients have hypertension in their immediate family. Doctor or any other health care provider measure blood pressure of all patients before starting hemodialysis session and after it finishes.76% patients used low sodium diet to control their fluid intake and 40% do light exercises like running, jogging as instructed by doctor to keep their blood pressure in limits as indicated in table 2. All patients of chronic kidney disease have their weight change before or after dialysis. Doctors reduce dry weight of all patients according to their individualized requirements to lower their blood pressure. Only 66% patients measure their blood pressure at home.Others have no blood pressure measuring device at home.

Commonly prescribed antihypertensive class in dialysis patients is calcium channel blocker. In calcium channel blockers nifedipine and amoldipine are mostly in use.

DISCUSSION

Chronic kidney disease includes conditions that damage your kidneys and decrease their ability to function normally. This study demonstrates that male and female are almost equally prone to CKD. Elder people are more susceptible to kidney failure. This is in collaboration with one study showing that CKD is more common in older people.[15]

A study describing the risk factors of CKD showed

TABLE 1:
PATIENTS DEMOGRAPHIC, CAUSES OF CKD, AND THEIR GFR VALUE AND HEMODIALYSIS FREQUENCY

	Variables	Frequency n=50	Percentage
Sex	Male	28	56%
	female	22	44%
Age	>30 years	9	18%
	>40 years	16	32%
	>50 years	16	32%
Causes of CKD	Diabetes	10	20%
	Hypertension	31	62%
	other	9	18%
GFR value	>15ml/min/1.73m^2>10ml/min/1.73m^2	4	8%
		46	92%
Frequency of . hemodialysis	Twice per week	30	60%
	Thrice per week	20	40%
Patients felt cramps during dialysis	Yes	16	32%
	No	34	68%

TABLE 2:
BLOOD PRESSURE ASSOCIATED WITH CHRONIC KIDNEY DISEASE AND ITS NON-PHARMACOLOGIC MANAGEMENT

	Variables	Frequency	Percentage
hypertension associated with hemodialysis	Yes No	50 0	100% 0%
Measurement of blood pressure before dialysis?	Yes No	50 0	100% 0%
Immediate family being diagnosed with hypertension?	Yes No	23 27	46% 54%
Other health problems with hypertension	Heart problem None	6 44	12% 88%
Hb injection after dialysis	Yes No	46 4	92% 8%
Use of low sodium diet	Yes No	38 12	76% 24%
Use of exercise to control hypertension?	Yes No	20 30	40% 60%
Change in weight	Yes No	50 0	100% 0%
Measurement of B.P by patient at home	Yes No	33 17	66% 34%

TABLE 3:
USE OF ANTIHYPERTENSIVE AGENTS (MOST PATIENTS USE ANTIHYPERTENSIVE AGENTS IN COMBINATION)

Parameter	Frequency (n=50)	Percentage
Ca+2 channel blocker	39	78%
α blockers	13	26%
β blockers	19	38%
Angiotensin renin blockers	2	4%
Vasodilators	1	2%

Results are evaluated by considering each group as 100%.

that persons with diabetes or cardiovascular disease had a greater prevalence of CKD than persons without those conditions. This is in agreement with our study in which two main causes of chronic kidney diseaseare diabetes and high blood pressure, which are responsible for up to two-thirds of the cases. Other reasons include some drug interactions, any adverse effect, hepatitis, polycystic kidney disease or neurogenic bladder.[16]

Patients with Stage 5 chronic kidney disease i.e GFR level less than 10ml/min/1.73m^{2}require maintenance hemodialysis so almost all patients in our study are at stage 5 chronic kidney disease. Health care professional determine patient's serum creatinin levels on every dialysis session which is used to calculate

GFR. All patients also have their biopsy performed to diagnose CKD as their doctors instructed to them. Hypertension is cause and consequence of dialysis. It is a common clinical problem in dialysis patients.

Management of blood pressure in hemodialysis population is very challenging because dry weight setting is difficult in dialysis patients. Dry weight setting is very important to keep patients' blood pressure under control. Other studies have confirmed that removing excess salt and water during maintenance hemodialysis normalizes BP in at least 70% of cases. [17]

All patients in our study have their hemodialysis sessions at hospital. The frequency of dialysis session of these patientsdepends upon hospital setting. A hospital can have two or three sessions of hemodialysis of patient. Some patients in this study do feel cramps during their interdialytic period which unfortunately their health care professional failed to reduce or treat. Other studies also proved that muscle cramps are a common complication of hemodialysis treatments, occurring in 33 to 86 percent of patients. [18, 19]

Despite new therapeutic options and treatment strategies, anemia still remains one of the major complications of chronic kidney disease (CKD), especially in patients undergoing chronic hemodialysis for end-stage renal disease. Successful management of anemia is a central part of patient care that may improve clinical outcomes in hemodialysis patients. Anemia was also very commonin patients of our study so almost all patients have hemoglobin injection to minify their anemia problem. [20]

46% patients in our study have hypertension in their immediate family so they are more prone to it. Doctor or any other health care provider measure blood pressure of all patients before starting hemodialysis session. Patients don't seem to have any other problem due to hypertension except few who were having heart problem.Moderate dietary salt restriction and increasing dialysate sodium helped to improve cardiovascular stability and well-being of the patient during the dialysis session, especially with decreasing dialysis time and higher ultrafiltration rates. [21]Patients in our study also use low sodium diet to control their fluid intake. Others are reluctant about their salt restriction or fluid intake in body which cause problems like edema. These problems may interfere with dialysis session of patients. Some patients do light exercises like running, jogging as instructed by doctor to keep their blood pressure in limits. All patients of chronic kidney disease have their weight change before or after dialysis because of fluid removal during dialysis. Doctors determine dry weight of all patients according to their individualized requirements to lower their blood pressure. Only 66% patients measure their blood pressure at home and keep check of their blood pressure value. Others have no blood pressure measuring device at home due to which they are not able to keep track of their blood pressure.According to study done by Peixoto, Ambulatory blood pressure monitoring (ABPM) has generally been considered the most accurate method for studying blood pressure in hemodialysis patients over time.[22]

Commonly prescribed antihypertensive class in dialysis patients is calcium channel blocker in which nifedipine and amoldipine are mostly in use. Because they can effectively lower blood pressure in hemodialysis patients and are often effective in patients with volume overload. Other than this ? receptor blockers, ? receptor blockers, angiotensin receptor blockers and vasodilators were also given. Most of the patients were given combination therapy to control hypertension.

CONCLUSION

Hypertension is a common clinical problem in dialysis patients. Anemia is also very common in these patients. Patients mostly do not restrict their dietary salt or fluid intake which causes edema of body and rise in blood pressure and dry weight determination becomes difficult. DASH diet is seldom followed by patients. Most commonly prescribed antihypertensive drugs to maintain B.P is calcium channel blockers or ? or ? receptor blockers.

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