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A PROSPECTIVE STUDY ON THE MANAGEMENT OF HYPERTENSION IN PATIENTS WITH END STAGE RENAL DISEASE IN A TERTIARY CARE HOSPITAL, BANGALORE.

Remya Bhaskaran S, G. Saranya, P.Vaishnavi Reddy, Dr. Ritty Sara Cherian, Dr. B.A Vishwanath
Aditya Bangalore Institute for Pharmacy Education & Research (ABIPER).

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ABSTRACT

Elevated blood pressure is the major cause of increase in death rate in patients with end stage renal disease. The management of hypertension in end stage renal disease is a major challenge, inorder to reduce the risk of morbidity and mortality. Antihypertensive agents plays an important role in ESRD patients by reducing the risk factors. In India the incidence rate of CKD is increasing from 2006, where as the age adjusted incidence rate of ESRD is 229/million population. A recent study from Western India demonstrated that the occurrence of hypertension is 85%-95% in ESRD patients. This study aims to evaluate the most appropriate non pharmacological and pharmacological treatments in the control of elevated blood pressure in patients with end stage renal disease. Our study shows that Clonidine and Nifedipine was the antihypertensive drug preferred in majority of the ESRD patients.The result of our study suggest that the control of blood pressure is essential, which can be achieved through strict medication adherence and lifestyle modification in the end stage renal disease patients.

Corresponding author
Remya Bhaskaran S
Doctor of pharmacy,
Student,
Aditya Bangalore Institute for Pharmacy Education & Research (ABIPER).

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INTRODUCTION

The final stage[stage5] of chronic kidney disease(CKD) is known as End stage renal disease or end stage kidney disease. If CKD, left untreated, may lead to ESRD. ESRD is the condition in which, the GFR is less than 15ml/min, and life can only be sustained with help of transplantation or dialysis such as haemodialysis or peritoneal dialysis.[2]

Symptoms of ESRD includes weight gain from the accumulation of fluids, cold intolerance, peripheral neuropathy, uremic symptoms such as fatigue, weakness, shortness of breath, mental confusion, nausea, vomiting, bleeding and loss of appetite.
Signs of ESRD include oedema, changes in urine output, foaming of urine as a result of proteinuria and abdominal distension.

Laboratory investigation of ESRD includes the following:
Increased: serum creatinine, BUN, potassium, phosphorus, PTH, cystatin C, blood pressure, glucose, LDL, triglycerides and calcium.
Decreased: GFR, Hb or Hct, iron deficiencies, vitamin D levels, albumin, glucose.

Urine sediment abnormalities, Structural abnormalities such as pyelonephritis, renal masses, polycystic kidney, renal artery stenosis, small kidneys detected by imaging studies, pathologic abnormalities such as glomerular, vascular, cystic, tubulointerstitial, congenital disease are the other diagnostic test for ESRD.

Non pharmacological treatment of ESRD includes 30 minutes 5 times/week excersice, smoking and alcohol cessation, weight loss if BMI >25kg/m^2 , low dietary sodium intake <2g/day in case of HTN.[3]

Vaccines: influenza yearly, pneumococcal vaccines if GFR is <30ml/min/1.73m^2, nephrotic syndrome, diabetes, immunosuppression receiving patients. Single booster dose at year5, hepatitis B vaccine if GFR is <30ml/min/1.73m^2 and risk of progression of CKD.[3]

Pharmacological treatment in ESRD patients include kidney transplantation, haemodialysis and peritoneal dialysis are the major treatment options. Haemodialysis is done by perusing blood and dialysate on the other side of a semi permeable membrane in which substance can be removed from the blood through ultrafiltration and diffusion. The main advantages of the haemodialysis are longer survival rate and fewer complications due to the selection of arterio venous fistula. Fewer complications include infection and thrombosis which can lead to poor blood flow rate. In peritoneal dialysis, dialysate is disseminated through a permanent peritoneal catheter in the peritoneal cavity. Due to the presence of highly vascularised abdominal viscera, the peritoneal membrane is the semi permeable membrane, along which ultrafiltration and diffusion occurs. Continuous ambulatory peritoneal dialysis (CAPD) is the most preferred type of peritoneal dialysis, in which the patient is disseminated with 2 to 3 litres of dialysate 4 times a day.

MECHANISM OF HYPERTENSION IN ESRD:

Microalbuminuria is the major cause of Hypertension and it may also increase the risk of renal failure in type1 and type2 DM patients, thereby endanger the chance of cardiovascular disorders. Underlying diabetic nephropathy, and increased plasma volume or increased peripheral resistance can leads to hypertension. Systemic or intraglomerular hypertension is interrelated with reduction in estimated GFR. Increased systemic vascular resistance and elevated vasoconstriction results in glomerular damage characteristics of nephropathy from angiotensin II in patients with uncontrolled blood pressure and blood sugar levels.[2]

Factors affecting the pathogenesis of hypertension in dialysis patients:
Sodium and volume excess.
Erythropoietin use
Increased vasoconstrictor activity:
Decreased vasodilator activity
Structural changes of arteries.
Pre-existence of essential hypertension
Reno vascular disease.
Parathyroid hormone.
Miscellaneous: anaemia, AV fistula, vasopressin, serotonin.

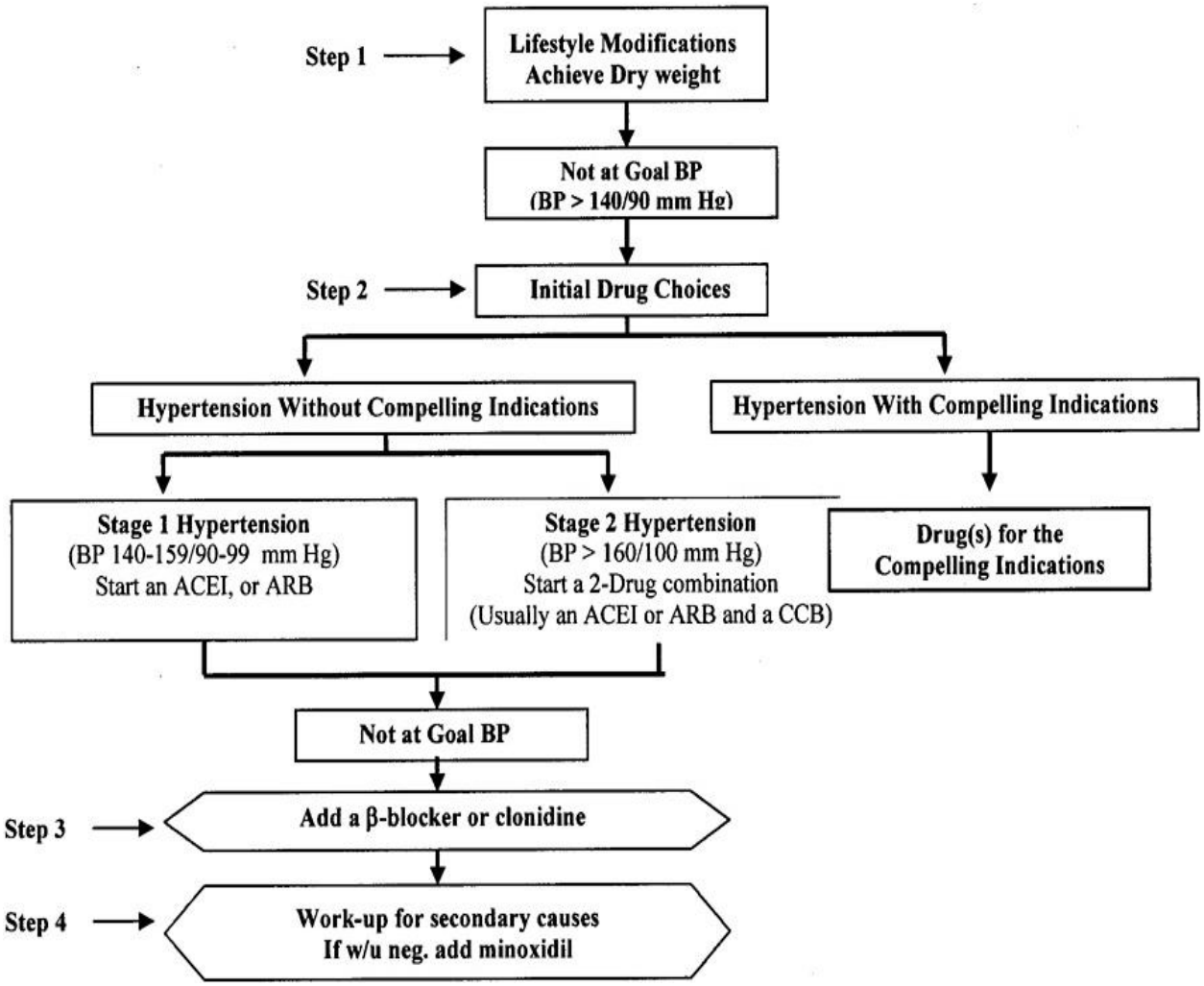
NON PHARMACOLOGICAL TREATMENT

For the control of elevated blood pressure in end stage renal disease includes dietary sodium restriction of 2 to 3g/day, restriction of fluid intake is recommended in patients with volume over load and mainly in patients undergoing haemodialysis who are under the risk for the fluid accumulation during dialysis sessions. Other life style modifications such as weight loss, smoking cessation, regular exercise can also be recommended. In patients undergoing haemodialysis achievement of patients individual dry weight and control of total body sodium through the dialytic process may help to reduce the blood pressure.

PHARMACOLOGICAL TREATMENT

For the management of increase in blood pressure level involves the control of blood pressure that decrease the rate of decline in GFR and albuminuria in non-diabetic patients. According to KDIGO guidelines, target blood pressure should be 140/90mmHg, if the excretion of albumin in urine is less than 30mg per 24hrs whereas in case of urine albumin excretion greater than 30mg per 24hrs, target blood pressure should be 130/80mmHg.

Figure 4 - Hypertension Treatment Algorithm in Dialysis Patients



[4]

MATERIALS& METHODS

A hospital based prospective observational study on the management of hypertension in end stage renal disease. The study was conducted in nephrology department and dialysis unit in a tertiary care teaching hospital, Bangalore. The study was organized for a period of 6 months. This study was approved by Institutional Ethical Committee, Tertiary care Hospital, Bangalore.

STUDY CRITERIA

Inclusion criteria:

End stage renal disease patients diagnosed with HTN in nephrology department and dialysis unit of study site.
Patients who are willing and able to give written informed consent.

Exclusion criteria:

Active uncontrollable malignancy.
Patients with GI disorder that may be associated with impaired absorption or orally administered medication.
Patients who are having difficulty to swallow medications.
Patients who were pregnant.

Method of data collection:

Data collection form

RESULT & DISCUSSION

TABLE 1: GENDER WISE DISTRIBUTION OF PATIENTS.

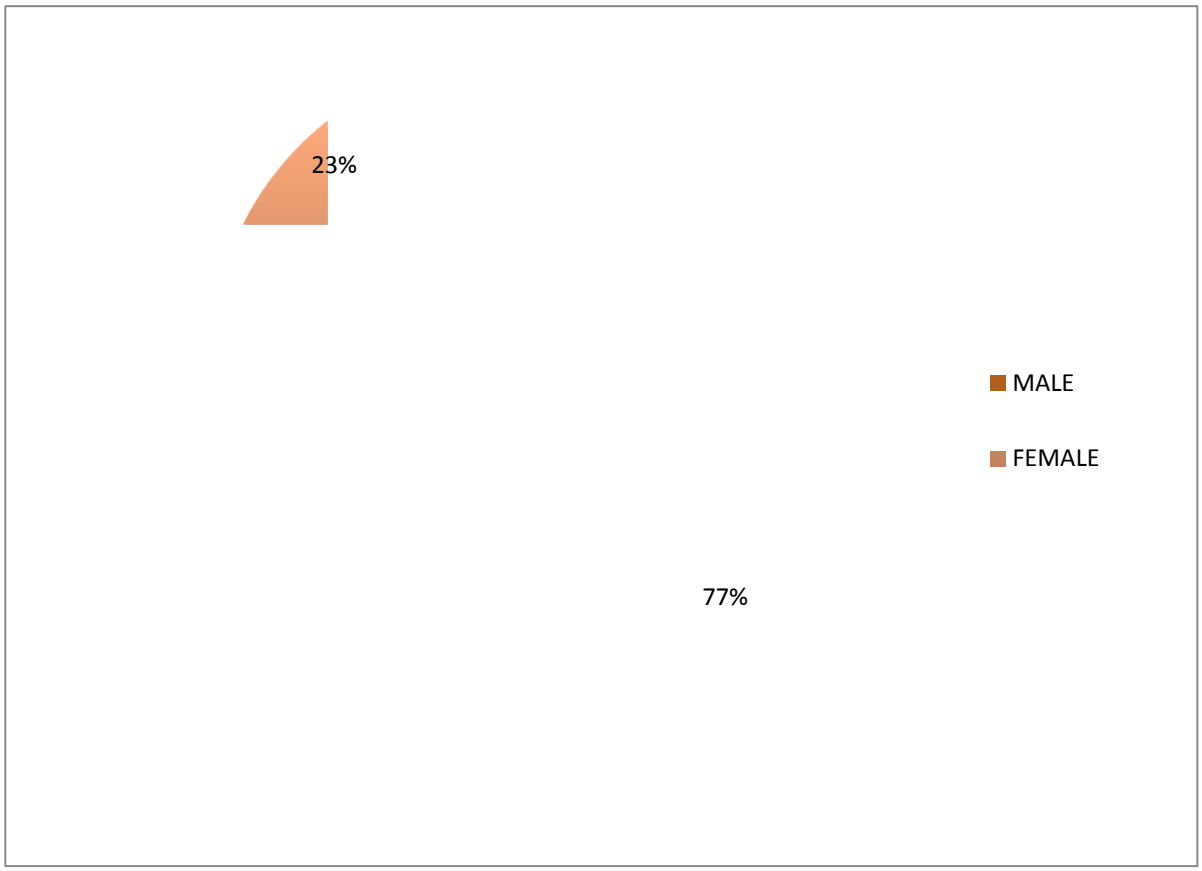


Fig 1:Distribution of patients on the basis of gender.

Among 150 cases 77% males and 23% females were found.

TABLE 2: AGE WISE DISTRIBUTION OF PATIENTS.

SL.NO	AGE	NUMBER OF PATIENTS	PERCENTAGE
1	20-29	3	2%
2	30-39	12	8%
3	40-49	20	13.3%
4	50-59	52	34.6%
5	60-69	40	26.7%
6	70-79	19	12.7%
7	80-89	4	2.7%
TOTAL			100

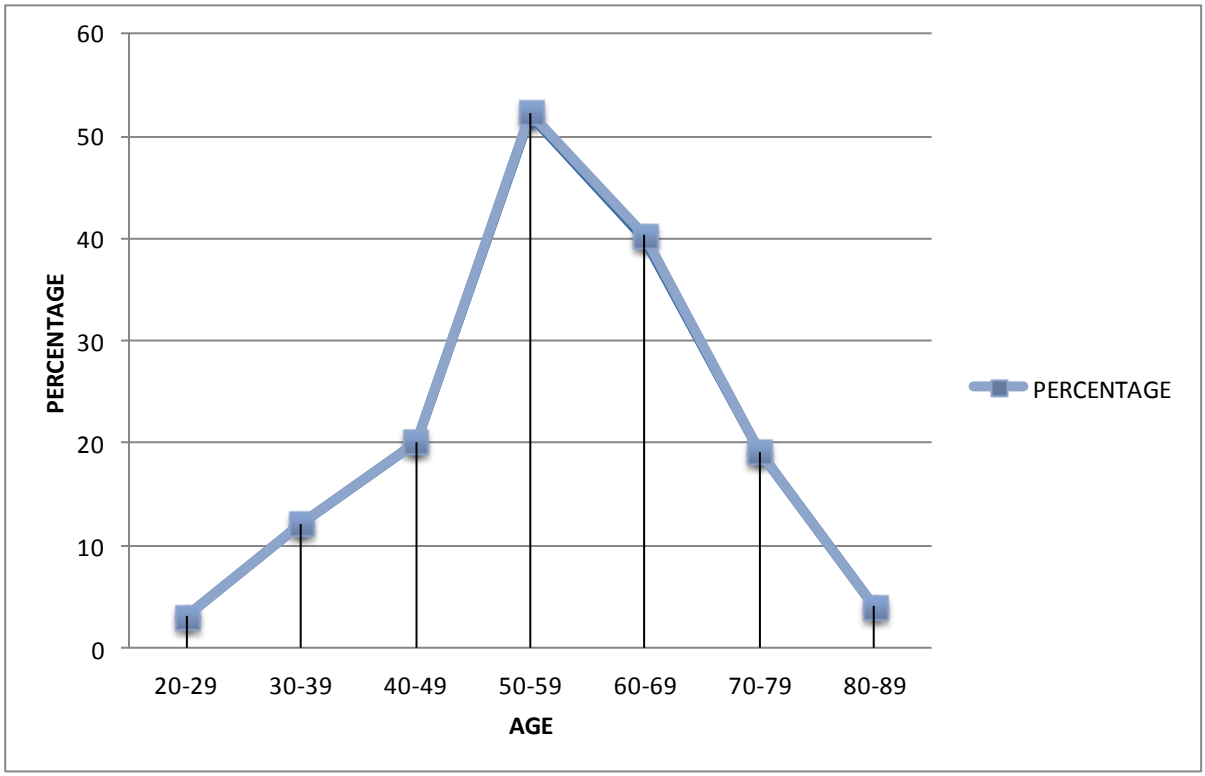


FIG 2: DISTRIBUTION OF PATIENTS, BASED ON AGE.

The major age group in which ESRD reported was 50-59 (34.6%)

TABLE 3: NAME OF ANTIHYPERTENSIVE DRUGS USED.

SL.NO	ANTI HYPERTENSIVE DRUGS	NUMBER OF PATIENTS	PERCENTAGE
1	CLONIDINE	89	25.14%
2	NIFEDIPINE	71	20.06%
3	PRAZOSIN	43	12.15%
4	METOPROLOL	34	9.61%
5	AMLODIPINE	23	6.5%
6	NEBIVILOL	20	5.65%
7	CLINIDIPINE	18	5.08%
8	CARVEDILOL	17	4.80%
9	FUROSEMIDE	14	3.95%
10	BISOPROLOL	12	3.4%
11	TORSEMIDE	8	2.26%
12	TELMISARTAN	2	0.56%
13	VERAPAMIL	2	0.56%
14	HYDRALAZINE	1	0.28%
TOTAL		354	100%

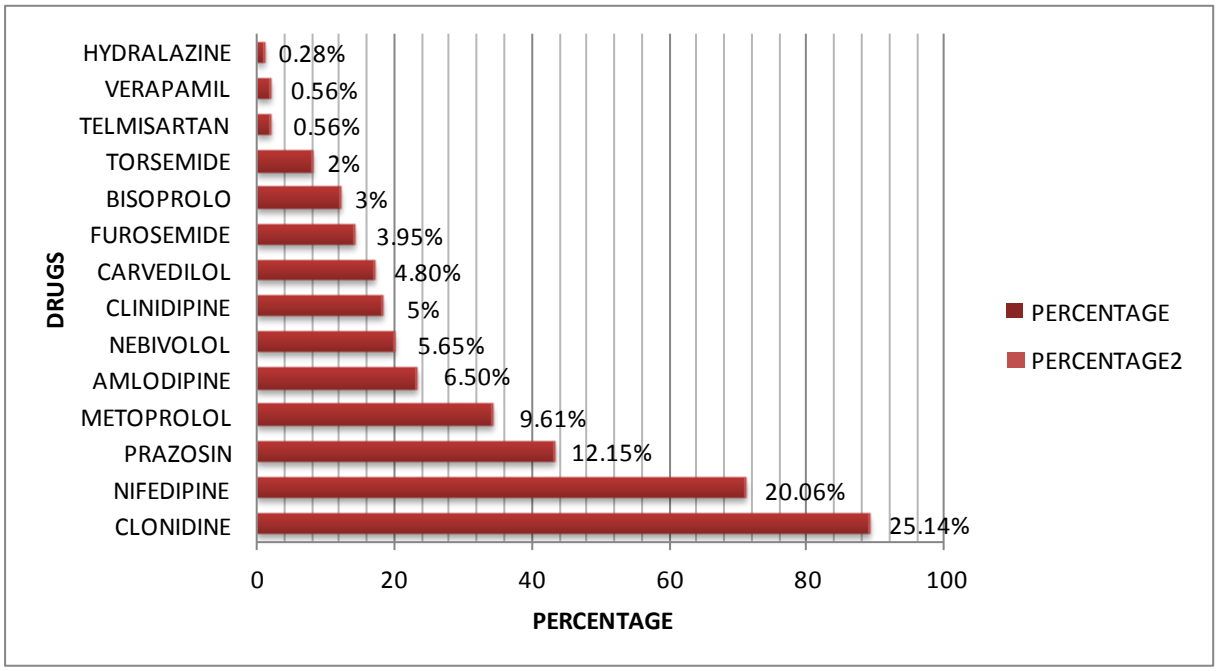


FIG 3 : NAME OF ANTIHYPERTENSIVE DRUGS USED.

The major antihypertensive used during the treatment are clonidine (25.14%), nefidipine (20.06%), prazosin (12.15%), metoprolol (9.61%), amlodipine (6.5%), nebivilol (5.65%), clinidipine (5.08%), carvedilol (4.80%), furosemide (3.95%), bisoprolol (3.4%), torsemide (2.26%), telmisartan (0.56%), verapamil (0.56%), Hydralazine (0.28%).

TABLE 4: CATEGORY OF ANTIHYPERTENSIVEDRUGS.

SL.NO	CATEGORY OF DRUGS	NUMBER OF PATIENTS	PERCENTAGE
1	ALPHA AGONIST	89	31.45%
2	BETA BLOCKERS	66	23.32%
3	ALPHA BLOCKERS	43	15.19%
4	CALCIUM CHANNEL BLOCKERS	43	15.19%
5	DIURETICS	22	7.8%
6	ALPHA+BETA BLOCKERS	17	6%
7	ARB	2	0.70%
8	VASODILATOR	1	0.35%
TOTAL		283	100%

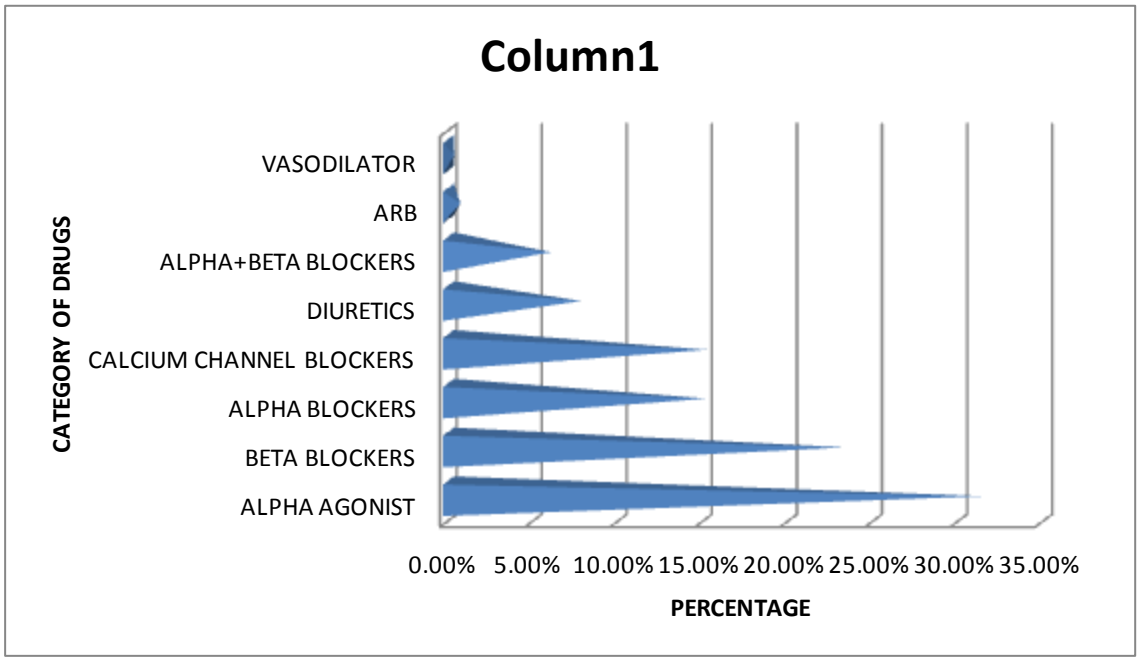


FIG 4: CATEGORY OF DRUGS.

The most preferred category of antihypertensive drugs are alpha agonist 31.45%, beta blockers 23.32%, alpha blockers 15.19%, calcium channel antagonist 15.19% and the least preferred antihypertensive categories are arb 0.70% and vasodilators 0.35%.

TABLE 5: STAGES OF HYPERTENSION.

SL.NO	STAGE OF HTN	NUMBER OF PATIENTS	PERCENTAGE
1	NORMAL	6	4%
2	PRE HTN	25	16.6%
3	STAGE 1	82	54.7%
4	STAGE 2	37	24.7%
TOTAL			100%

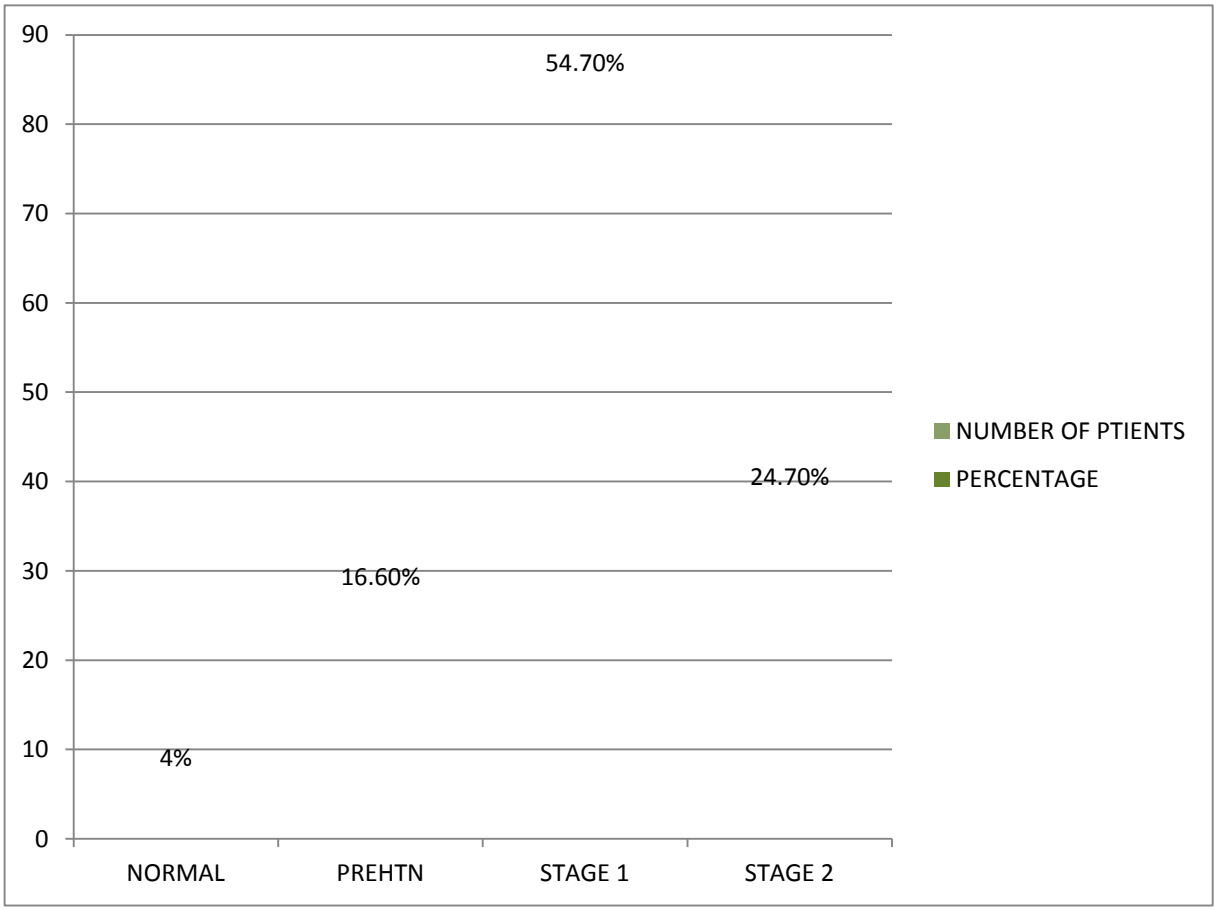


FIG 5: STAGES OF HYPERTENSION.

54.7% of the patients with stage 1 HTN, 24.7% of the patients had stage 2 HTN, 16.6% of the patients were found to be pre HTN, and 4% of the patients had normal HTN.

TABLE 6 :PRESCRIBING PATTERN OF ANTI-HYPERTENSIVE DRUGS IN TERITIARY CARE HOSPITAL, BANGALORE.

SL NO:	DRUG THERAPY	NUMBER OF PATIENTS	PERCENTAGE
1	SINGLE DRUG	47	31.3%
2	DOUBLE DRUG	48	32%
3	TRIPLE DRUG	39	26%
4	MORE THAN THREE	16	10.7%
TOTAL		150	100%

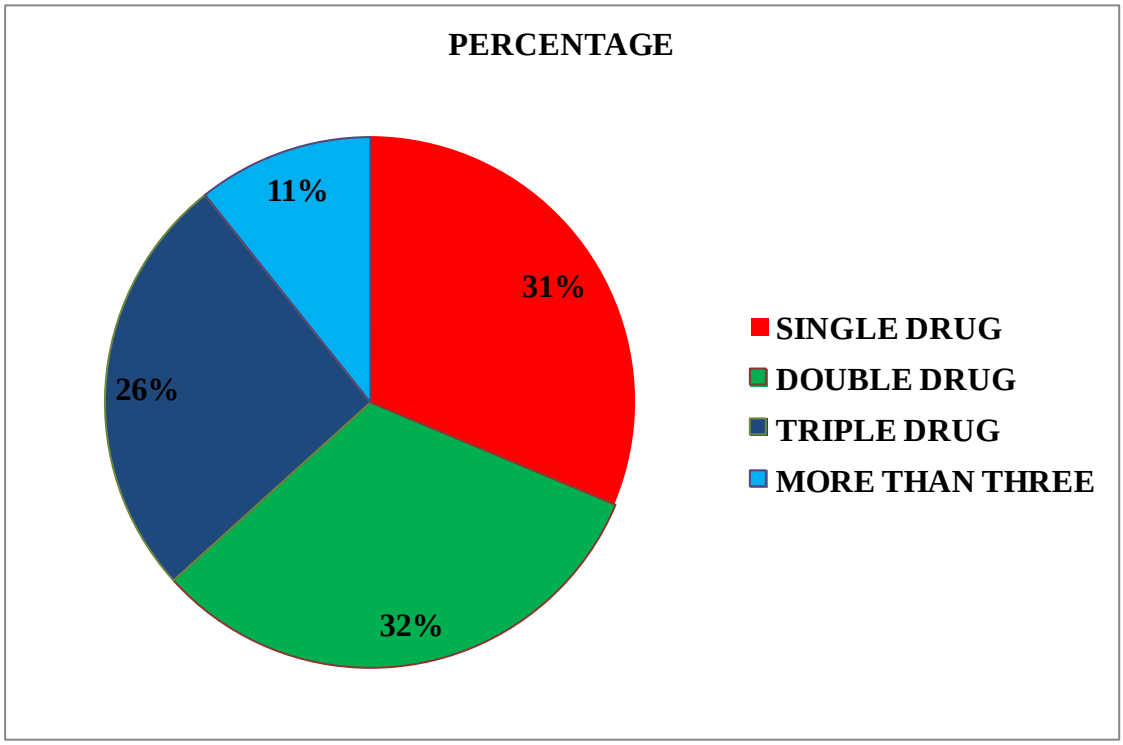


Fig 6 : PATTERN OF ANTI-HYPERTENSIVE DRUGS PRESCRIBED IN TERITIARY CARE HOSPITAL.

31.3% of drug therapy were based on single drug therapy, 32% of the double drug therapy, 26% of the triple therapy and 10.7% of more than three anti-hypertensive drugs therapy were used in the control of hypertension in end stage renal disease.

TABLE 7: SOCIAL HISTORY OF PATIENTS.

SL NO:	NATURE OF PATIENTS	NUMBER OF PATIENTS	PERCENTAGE
1	ALCOHOLIC	38	25.3%
2	SMOKER	21	14%
3	NON ALCOHOLIC & NON SMOKER	91	60.7%
TOTAL		150	100%

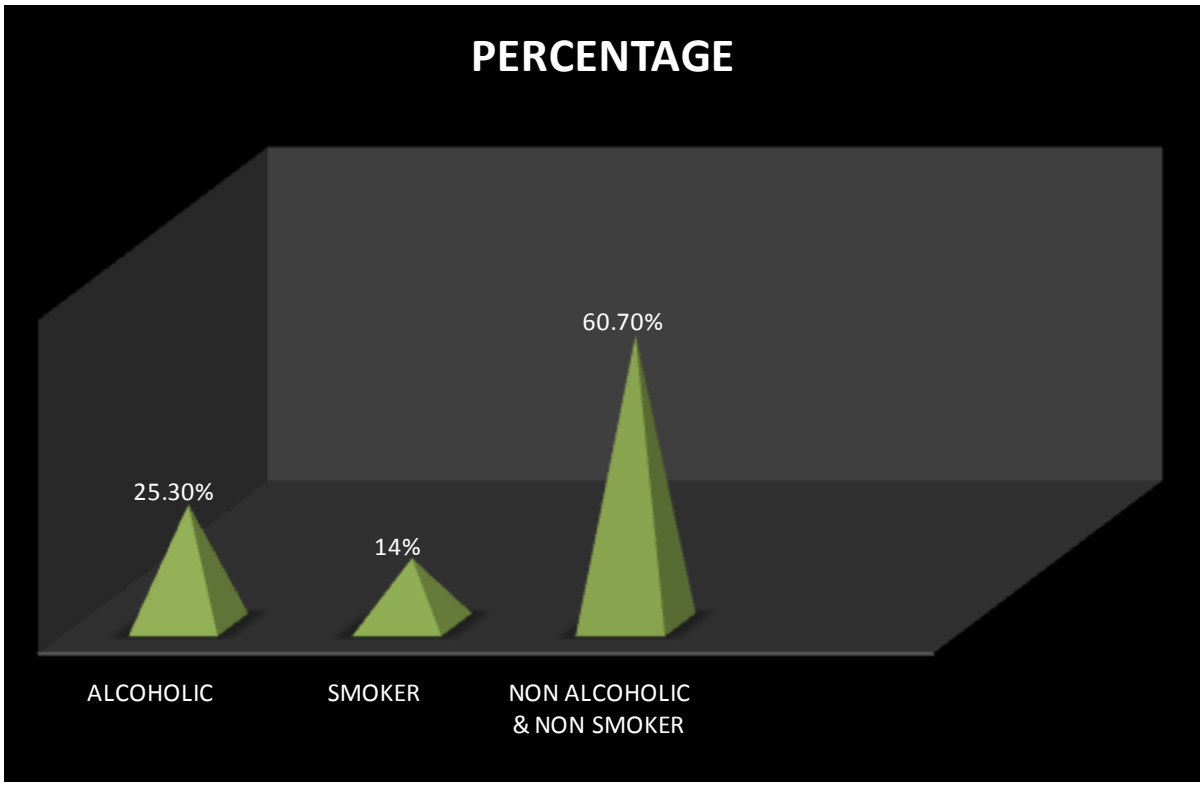


Fig 7:SOCIAL HISTORY OF THE PATIENTS.

25.30% of alcoholic patients, 14% of smokers and 60.70% of non alcoholic & non smoker patients were identified among 150 patients.

TABLE 8 : MAJOR RISK FACTORS.

SL NO:	MAJOR RISK FACTORS	NUMBER OF PATIENTS	PERCENTAGE
1	DIABETES	104	24.07%
2	GLOMERULONEPHRITIS	22	5.09%
3	DIABETIC NEPHROPATHY	74	17.13%
3	IgA NEPHROPATHY	18	4.16%
4	TUBULO INTERSTITIAL NEPHRITIS	9	2.08%
5	POLYCYSTIC KIDNEY DISEASE	8	1.85%
6	CARDIO VASCULAR DISEASE	76	17.62%
7	SEPTICEMIA	5	1.15%
8	INFECTIONS	54	12.5%
9	UROLOGIC	16	3.70%
10	OTHER	46	10.65%
TOTAL		432	100%

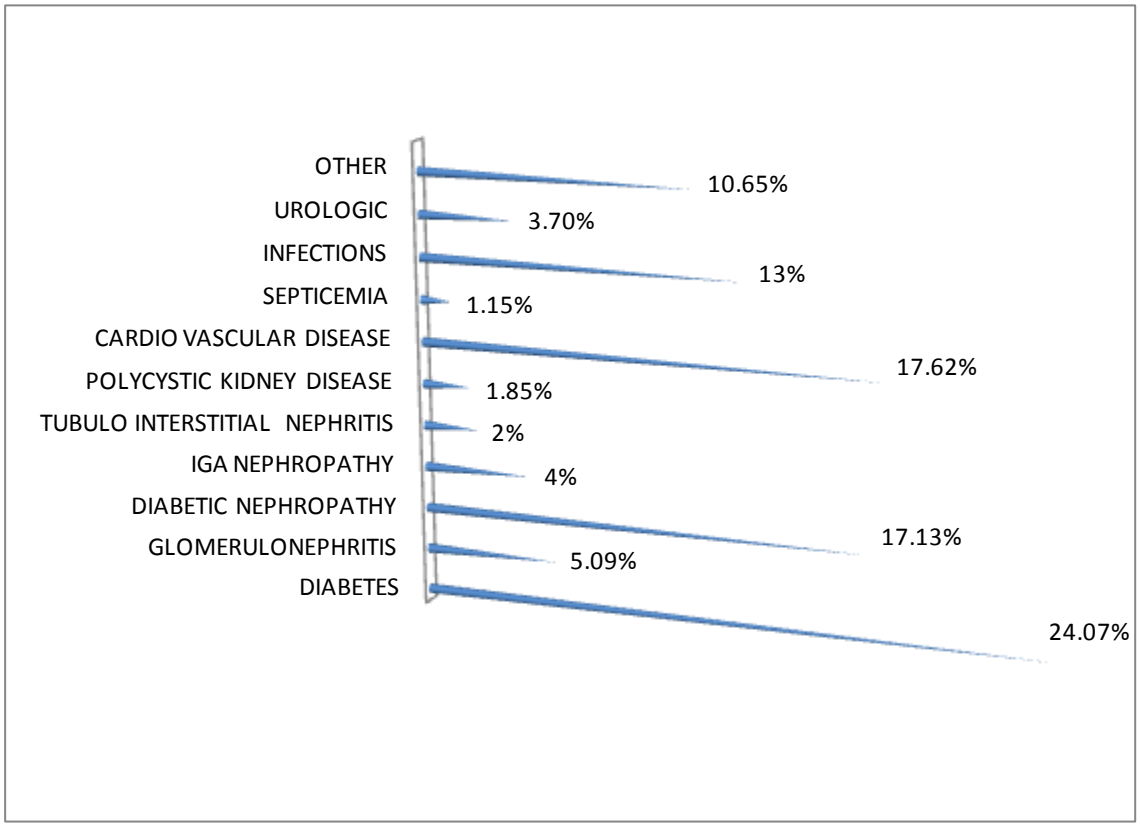


Fig 8 : MAJOR RISK FACTORS.

Major risk factors found were diabetes 24.07%, cvd 17.62% and diabetic nephropathy 17.13%.

TABLE 9:

SL NO:	TYPE OF DIALYSIS	NUMBER OF PATIENTS	PERCENTAGE
1	HEMODIALYSIS	144	96%
2	PERITONEAL DIALYSIS	6	4%
Total		150	100%

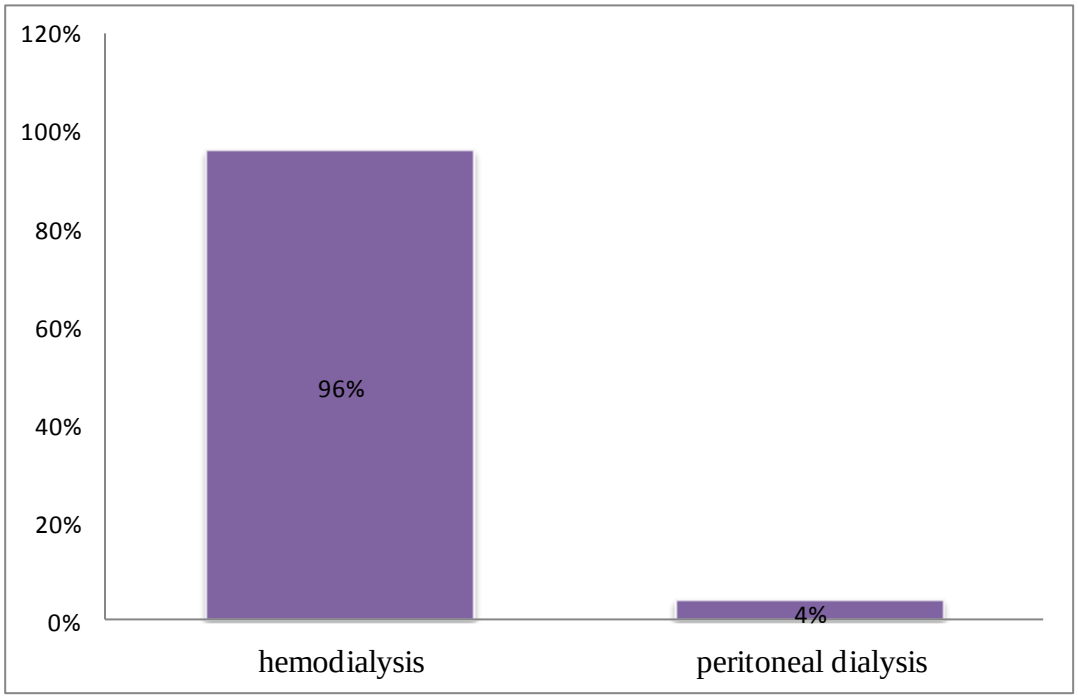


Fig 9: TYPE OF DIALYSIS.

96% of patients underwent hemodialysis whereas 6% of the patient was managed through peritoneal dialysis.

TABLE 10: CO- MORBIDITY.

SL NO:	ASSOCIATED DISEASE	NUMBER OF PATIENTS	PERCENTAGE
1	ANEMIA	112	35.11%
2	BONE DISORDER	48	15.04%
3	DYSLIPIDEMIA	32	10.03%
4	CV RISK	76	23.82%
5	ACUTE PULMONARY EDEMA	29	9.1%
6	FLUID OVERLOAD	22	6.9%
TOTAL		319	100%

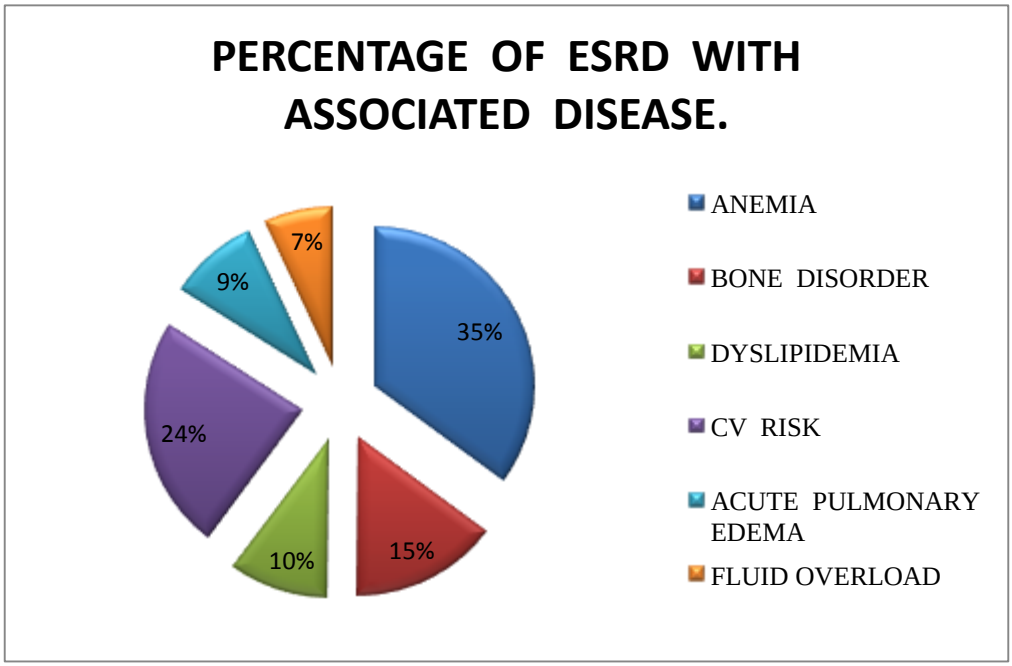


FIG 10:CO- MORBIDITY.

35% of esrd is associated with anemia, 15% with bone disorder, 10% with dyslipidemia, 24% of cv risk, 9% of acute pulmonary edema, and 7% of fluid overload.

TABLE 11: TYPE OF MANAGEMENT.

MANAGEMENT	NUMBER OF PATIENTS	PERCENTAGE
DIALYSIS	145	96.7%
RENAL TRANSPLANTATION	5	3.3%
TOTAL	150	100%

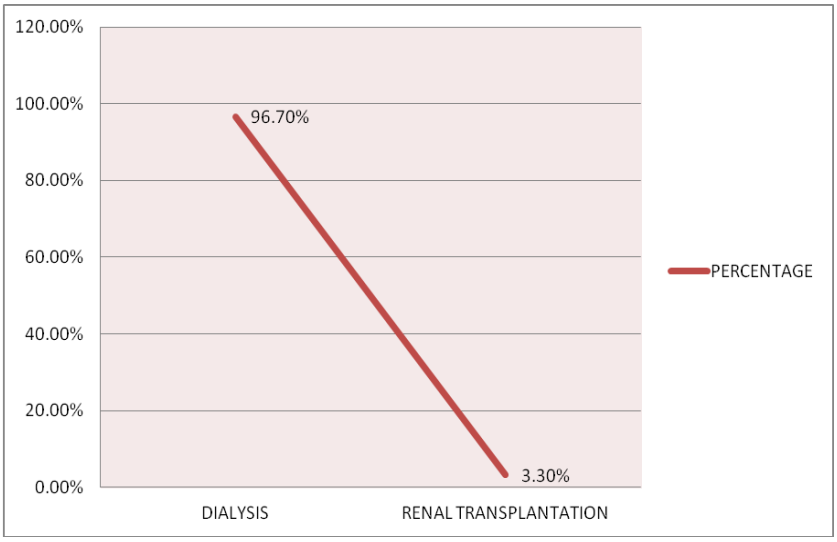


FIG 11 : TYPE OF MANAGEMENT.

96.7% of patients underwent dialysis and 3.7% of patients underwent renal transplantation surgery.

TABLE 12: MAJOR DRUG-DRUG INTERACTIONS.

SL. NO	DRUG	INTERACTING DRUG	EFFECT	NUMBER OF PATIENTS	PERCENTAGE
1.	CLONIDINE	METOPROLOL	Concurrent use may result in increased risk of sinus bradycardia, exaggerated coniine withdrawl response.	13	28.26%
2.	NIFEDIPINE	CLOPIDOGREL	Simultaneous administration may result in decreased antiplatelet effect and increased risk of thrombic events.	8	17.4%
3.	FUROSEMIDE	ASPIRIN	Concurrent use may result in decreased effectiveness of diuretic and possible nephron toxicity	5	10.9%
4.	AMLODIPINE	CLOPIDOGREL	Concurrent use may result in decreased antiplatelet effect and increased risk of thrombic events	3	6.52%
5.	CLONIDINE	BISOPROLOL	Concurrent use may result in increased risk of sinus bradycardia exaggerated coniine withdrawal response.	3	6.52%
6.	METOPROLOL	ASPIRIN	Concurrent use may result in increased blood pressure.	1	2.17%
7.	FUROSEMIDE	AMIODARONE	Concurrent use may result in increased risk of heart rhythm.	2	4.34%
8.	CLONIDINE	NEBIVOLOL	Concurrent use may result in increased risk of sinus bradycardia exaggerated coniine withdrawal response.	6	13.04%
9.	NIFEDIPINE	RIFAMPICIN	Concurrent use may result in decreased nifedipine exposure.	1	2.17%
10.	PRAZOSIN	TADALAFIL	Concurrent use may result in potentiation of hypotensive effect.	1	2.17%
11.	AMLODIPINE	ASPIRIN	Concurrent use may result in decreased antiplatelet effect and increased risk of thrombolic events.	1	2.17%
12.	CLONIDINE	CARVEDILOL	Concurrent use may result in decreased blood pressure and heart rate.	1	2.17%
13.	VERAPAMIL	NEBIVOLOL	Concurrent use may lower blood pressure.	1	2.17%
TOTAL				46	100%

FIG 12: MAJOR DRUG INTERACTIONS

TABLE 13: MODERATE DRUG INTERACTIONS.

SL.NO	DRUG	INTERACTING DRUG	EFFECT	NUMBER OF PATIENTS	PERCENTAGE
1.	CLONIDINE	NIFEDIPINE	Concurrent use may result in decreased blood pressure.	9	16%
2.	METOPROLOL	PRAZOSIN	Concurrent use may result in exaggerated hypotensive response to first dose of alpha blocker.	8	14%
3.	CLONIDINE	INSULIN	Concurrent use may result in hypoglycaemia or hyperglycaemia.	7	12%
4.	CLONIDINE	CARVEDILOL	Concurrent use may result in sinus bradycardia, exaggerated coniine withdrawal response.	6	10%
5.	NIFEDIPINE	PRAZOSIN	Concurrent use may result in lowering blood pressure.	5	9%
6.	METOPROLOL	ASPIRIN	Concurrent use may result in increases blood pressure.	4	7%
7.	NIFEDIPINE	METOPROLOL	Concurrent use may result in increased risk of lowering blood pressure.	2	4%
8.	INSULIN	NEBIVOLOL	Concurrent use may result in hypoglycaemia.	2	4%
9.	BISOPROLOL	PRAZOSIN	Concurrent use may result in hypotensive response to first dose of alpha blocker.	2	4%
10.	PRAZOSIN	CARVEDILOL	Concurrent use may result in hypotensive response to first dose of alpha blocker.	2	4%
11.	NEBIVOLOL	ASPIRIN	Concurrent use may result in increased blood pressure.	2	4%
12.	LINAGLIPTIN	CARVEDILOL	Concurrent use may result in hypoglycaemia or hyperglycaemia.	1	2%
13.	METOPROLOL	ALFUZOSIN	Concurrent use may result in exaggerated hypotensive response to first dose of alpha blocker.	1	2%
14.	CLONIDINE	METOPROLOL	Concurrent use may result in increased risk of sinus bradycardia exaggerated coniine withdrawal response.	1	2%
15.	FUROSEMIDE	DIGOXIN	Concurrent use may result in increased risk of digoxin toxicity.	1	2%
16.	ASPIRIN	METOPROLOL	Concurrent use may result in increased risk of antiplatelet activity and reduced bloodpressure.	1	2%
17.	NIFEDIPINE	NEBIVOLOL	Concurrent use may result in lowering bloodpressure and heart rate.	1	2%
18.	CARVEDILOL	ASPIRIN	Concurrent use may result in reduced effectiveness of carvedilol.	1	2%
TOTAL				56	100%

FIG 13: MODERATE DRUG-DRUG INTERACTIONS.

TABLE 14 :PERCENTAGE DISTRIBUTION OF CLINICAL PHARMACY SERVICES.

SL NO:	CLINICAL PHARMACY SERVICES	NUMBER OF PATIENTS	PERCENTAGE
1	DRUG INTERACTIONS	100	35.2%
2	PATIENT COUNSELLING	109	38.3%
3	MEDICATION HISTORY INTERVIEW	62	21.8%
4	MEDICTAION ERRORS	13	4.7%
TOTAL		284	100%

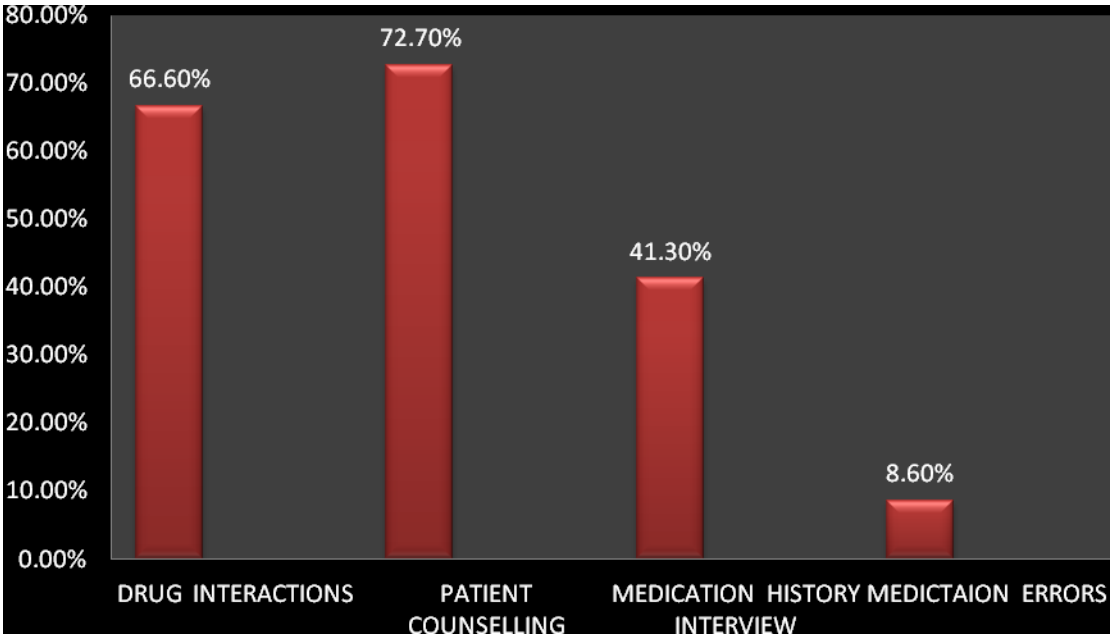


FIG 14: PERCENTAGE DISTRIBUTION OF CLINICAL PHARMACY SERVICES.

DISCUSSION

End stage renal disease or end stage kidney disease is the final stage[stage5] of chronic kidney disease. ESRD is a condition in which GFR is less than 15ml/min in which life can only be sustained with help of transplantation or dialysis such as haemodialysis or peritoneal dialysis.[2]ESRD as well as hypertension are strongly interrelated and both are the major public health challenge worldwide. In this study an attempt has been made to assess the management of hypertension in ESRD. Our study is based on the NKF KDOQI guidelines. This study was a prospective cross sectional study using the data collection form as well as the hospital information system.

Our study confirms several other previous studies and demonstrated that the blood pressure is poorly controlled in ESRD patients. 96% of patients in our study population were undergoing hemodialysis because of its high drug clearance rate. It is possible that patients may forget to take some medications which can result in poor medication adherence that confirms other studies. There are many factors that influence medication adherence in haemodialysis patients which mainly include the prescribing pattern of antihypertensive drugs. Large number of drugs are prescribed mostly in male patients and presence of diabetes this can leads to early mortality.

The IMPERIAL study conducted by S. Kalra*et.al.* also confirms our study which demonstrated that the non-pharmacological management of hypertension includes life style modification, weight reduction, DASH diet and limitation of alcohol.

GENDER WISE DISTRIBUTION OF PATIENTS

In our study, we included 150 number of ESRD patients with high blood pressure. Among them 115 number of male patients (77%) and thirty five number of female patients (23%) were identified where asDasgupta*et.al.* included 145 patients in which male to female ratio was found to be 2:1.

AGE WISE DISTRIBUTION OF PATIENTS

We included 150 ESRD patients with hypertension of different age groups, among them 2% were of 20-29 years of age, 8% were of 30-39 years of age, 13.3% were of 40-49 years of age, 34.6% were of 50-59 years of age, 26.7% were of 60-69 years of age, 12.7% were of 70-79 years of age, 2.7% were of 80-89 years of age but only 60years of age patients were covered in the study conducted by Dasgupta *et.al.*.

NAME OF ANTIHYPERTENSIVE DRUGS USED.

In our study we found that eighty nine number of patients (25.14%) were prescribed with clonidine in the managemen of hypertension in ESRD patients. Seventy one number of patients were prescribed with nifedipine (20.06%), forty three number of patients were prescribed with prazosin (12.15%), thirty four number of patients were prescribed with metoprolol (9.61%), twenty three number of patients were prescribed with amlodipine (6.5%) followed by twenty patients with nebivolol (5.65%), eighteen patients with clinidipine (5.08%), seventeen patients with carvedilol (4.80%), fourteen patients with furosemide (3.95%), twelve patients with bisoprolol (3.4%), eight patients with torsemide (2.26%). Telmisartan (0.56%), verapamil (0.56%), hydralazine (0.28%) was the antihypertensive drugs prescribed less commonly. Clonidine which is an alpha agonist was the most used drug in hypertensive patients who are undergoing hemodialysis and those patients who are difficult to control hypertension. In our study clonidine[25.14%] is the antihypertensive agent which is used most commonly as an add - on - drug for the control of hypertension that is not properly controlled by drugs like calcium channel blockers, ACE inhibitors and ARB.

Carvedilol was used to reduce the risk of mortality and it doesn't require additional dosing as it is not significantly not removed by dialysis. Cardio selective beta blockers such as metoprolol doesn't produce any significant reduction in GFR and renal blood flow but effectively reduces the blood pressure in patients with essential hypertension in the study organized by Malliara M *et.al.* in patients with essential hypertension, normal renal function, hypertension along with diabetic nephropathy and ESRD with dialysis. Our study confirms that metoprolol[9.61%] was also used as an antihypertensive agent as it does not produce any ADR on haemodialysis. Furosemide is effective in reducing the risk of pulmonary edema and there by controlling the intra dialytic weight gain by increasing the urine output in patients with residual renal function which confirms our study that includes furosemide [3.95%].

CATEGORY OF ANTIHYPERTENSIVE DRUGS

Among 150 number of ESRD patients alpha agonist (31.45%) were the most preferred category of antihypertensive drugs, whereas 23.32% of beta blockers, 15.19% of alpha blockers, 15.19% of calcium channel antagonist, 7.8% of diuretics, 6% of alpha+ beta blockers, 0.70% of ARB, and 0.35% of vasodilators were used in the management of hypertension.

Beta blockers [62.03%] and calcium channel blockers [52.90%] were the most preferred antihypertensive agents in the IMPERIAL study conducted by S. Kalra *et.al*. Calcium channel blockers [amlodipine 15.3%, nifedipine 47.3%] are the preferred antihypertensive agents in the study conducted by Malliara M *et.al.* which confirms our study. Calcium channel blockers were most commonly used to reduce the CVD than hypertension alone. The study conducted by Malliara M *et.al.* demonstrates that alpha 1 adrenergic blockers are the most effective anti-hypertensive agents used in patients undergoing haemodialysis which confirms our study that included prazosin[12.15%].

STAGES OF HYPERTENSION

The ESRD patients who are admitted in the hospital with elevated blood pressure were administered with the antihypertensive drugs to reduce the blood pressure. In our study population 4% of patients had normal range of blood pressure, 16.6% of patients were pre hypertensive, 54.7% of patients were stage 1 hypertension and 24.7% of patients were stage 2 hypertensive.

PRESCRIBING PATTERN OF ANTI-HYPERTENSIVE DRUGS IN TERITIARY CARE HOSPITAL

Prescriptions of 150 ESRD patients with hypertension were checked. The double drug therapy (32%) were mostly used. The drug therapy also included 31% of single drug therapy, 26% of triple therapy and 10.7% of more than three drug therapy were identified.

Multiple drug therapy was the most commonly preferred drug therapy in a study conducted by MahboobRahman*et.al.*which confirms our study.

SOCIAL HISTORY OF PATIENTS

In our study 25.3% of patients were alcoholic, 14% of patients were smokers and 60.7% of patients were non-alcoholic as well as nonsmokers.

Limitation of alcohol is the preferred non pharmacological management of hypertension in the study conducted by S. Kalra *et.al.* which confirms our study which shows more alcoholic patients.

The study conducted by Thomas V. Perneger *et.al* stated that consumption of alcohol is associated with an increased risk of kidney failure which confirms our study.

MAJOR RISK FACTORS

Most of the ESRD patients admitted in the hospital were associated with risk factors such as 24.07% of diabetic patients, 17.62% of cv disease, 17.13% of diabetic nephropathy, 12.5% of infections, 10.65% of other factors, 5.09% of glomerulonephritis, 4.16% IgA nephropathy, 3.70% urologic diseases, 2.08% of tubulo-interstitial nephritis, 1.85% of polycystic kidney disease, 1.15% of septicaemia.

Diabetes[25%] were the most common cause in the study conducted by Dasgupta*et.al.*

Melissa S.Y. Thong *et.al.* conducted a study which demonstrate that diabetes mellitus and Glomerular nephritis is the major risk factor for ESRD which confirms our study.

TYPE OF DIALYSIS

Among 150 ESRD patients 96% of patients were undergoing haemodialysis whereas 4% of patients were on peritoneal dialysis.

In the study conducted by Haijiao Jin *et.al.* demonstrated that peritoneal dialysis patients are at higher risk of CVD when compared to haemodialysis patients and patient survival rate were less for peritoneal dialysis patients when compared to haemodialysis. Peritoneal dialysis result in high incidence of leakage, peritonitis and improper position when compared to haemodialysis which supports our study which demonstrated that haemodialysis is most preferred type of dialysis when compared to peritoneal dialysis.

CO- MORBIDITY

Most of the ESRD patients with hypertension who presented to the hospital were associated with other diseases also, such situation is called as co-morbidity.

35.11% of patients were anaemic, 23.82% of patients have cv risk, 15.04% of bone disorder, 10.03% of dyslipidemia, 9.1% of acute pulmonary edema, 6.9% of fluid overload were identified.

The study conducted by Eiam-Ong S *et.al*. demonstrate that CVD is the most common co-morbidity that leads to mortality in ESRD patients. The study conducted by G R Lakshmi narayana *et.al.* shows that hypertension (96.8%), followed by CAD (52.3%), CVD and anaemia are very common which is similar to our study.

TYPE OF MANAGEMENT

In our study 96.7% of patients were under dialysis and 3.3% of patients underwent renal transplantation for the management of end stage renal disease.

According to the study conducted by Roman *et.al.* in July 24th 2017, the survival rate for patients under haemodialysis is significantly higher in comparison with conservative management. Maria Jose Perez *et.al.* conducted a study which suggests that dialysis is the alternative type of management when renal transplantation is contraindicated. The study conducted by Hussain *et.al.* demonstrated that the survival benefit of renal transplantation was lost in patients above 80years of age and patients with high co morbidities which supports our study.

SUMMARY

The current study is a prospective observational study organized for a period of 6 months in a tertiary care hospital.

150 patients were enrolled in the study for the regulation of hypertension in end stage renal disease patients. Among which male patients were 115(77%), and female patients were 35 (23%). The most highest group of population who got admitted to the hospital were of 50-59 years of age (34.6%). Among 150 patients 38 (25.3%) were alcoholic, 21 (14%) were smokers, and 91 (60.7%) were non-alcoholic and non smokers. Among the ESRD patients, 54.7% of stage 1 hypertension patients were observed. The most preferred category of antihypertensive drug is alpha agonist (31.45%), second most preferred category was beta blockers (23.32%), and the least preferred category was vasodilators (0.35%). From our study we indentified that Clonidine (25.14%)was the most commonly prescribed antihypertensive drug, and the second most prescribed drug was Nifedipine (20.06%). Hydralazine (0.28%) was preferred as the least common drug. The most commonly used therapy was double therapy (32%). Single, triple and more than three drug therapy were also used. Most of the ESRD patients who reported to the hospital were associated with risk factors such as 24.07% of diabetic patients, followed by 17.62% of cardiovascular diseases, 17.13% of diabetic nephropathy and 12.5% of infections. Among 150 ESRD patients, 96% of patients underwent Haemodialysis, and 4% of patients underwent Peritoneal dialysis. The highest percentage of the co morbidity associated with ESRD patients was reported to be anaemic (35.11%). Anemia was then followed by Cardiovascular risk (23.82%), Bone disorder (15.04%), dyslipidaemic (10.03%), Acute pulmonary edema (9.1%) and fluid overload (6.9%).The major interaction found among the prescribed drug was between clonidine and metoprolol (13 patients).

CONCLUSION

Our study shows that Clonidine and Nifedipine was the antihypertensive drug preferred in majority of the ESRD patients. Double therapy in the prescribing pattern of antihypertensives were used for the better control of blood pressure. Management of ESRD were achieved through hemodialysis in most of the patients. Implementation of clinical pharmacy services played an important role in educating the patient regarding the dietary restriction and lifestyle modifications in the non pharmacological management of hypertension in ESRD patients. Around % of drug interaction were found and reported to the study department.

The result of our study suggest that the control of blood pressure is essential, which can be achieved through strict medication adherence and lifestyle modification in the ESRD patients.

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ABBREVIATION

ESRD : End Stage Renal Disease,
CKD : Chronic Kidney Disease.

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