Medication usage of antihypertensives in a tertiary care hospital

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Abstract

Objective: The principle aim of our study was to evaluate the drug utilization pattern of antihypertensive drugs among patients. To observe the demographic data, economic status and other associated conditions and correlate with hypertensive patients for better therapeutic approach. Importance of controlling BP and lifestyle modifications in macro vascular complications.

Methodology: A Prospective and observational study was carried out for a period of 6 months at the Department of general medicine in Shadan Institute of Medical Science and Research Center, a tertiary care teaching hospital. The study included all patients with established hypertension, regardless of gender or co-morbidities, who visited the general medicine department. In-patients who have been diagnosed with hypertension are receiving treatment. Patients above the age of 25 were included in this study. Patients who refused to participate in the trial and those under the age of 25 were excluded.

Results: During the study period, a total 150 Patients were enrolled. Out of which 65% were males and 35% were females and common age group was ≥60 years. The results showed that 97% were married, 86% have mixed diet, 65% were employed and 59% have stress. Up to 39% were alcoholic and 30% were smokers. Prevalence of macro vascular complications was found to be more in diabetic patients which is 62%. It was found that majority of the subjects developed comorbidities like CNS disorders which is 57%. It was found that 63% have HTN for a duration of >2 years, 66% were taking medications for HTN, 56% had no knowledge about their medications, 61% have treatment complexity and 96% have macro vascular complications as their outcome. Diuretics were the most commonly prescribed class of drugs both in mono therapy and combined therapy. It was reported that 55% were

adherent to HTN medication, 34% were not following low salt diet, non-adherence to physical activity was 46%, adherence to non- smoking was 61% and 53% of the patients were not adhered to alcohol abstinence.

Conclusion

Our study showed that majority of the patients had duration of >2 years of HTN. The reasons for the uncontrolled BP were poor knowledge of hypertension related complications, medications, non-adherence to alcohol abstinence, non-adherence to low salt diet, more stress, less physical activity and older age. Clinical pharmacist at an early stage can monitor the BP and its related risk factors, thereby enhancing the quality life span of the patient and can help in reducing the burden of costly drugs.

Keywords: Hypertension, Stroke, Coronary heart disease, Diuretics and Clinical Pharmcist

Introduction

Hypertension (**HTN**) also known as high blood pressure, is a long-term medical condition in which the blood pressure in the arteries is persistently elevated. High blood pressure typically does not cause symptoms [4]. Long-term high blood pressure, however, is a major risk factor for coronary artery disease, stroke, heart failure, atrial fibrillation, peripheral vascular disease, vision loss, chronic kidney disease, and dementia[5]. HTN is known as the "silent killer," hypertension usually has no signs or symptoms and many people are not aware they have it. A blood pressure that is higher than 140/90 needs to be monitored, especially if it occurs with diabetes. Hypertension can be further divided into two categories: Essential Hypertension and Secondary Hypertension. Over 90% of individuals with high BP have essential hypertension. Numerous mechanisms have been identified that may contribute to the pathogenesis of this form of hypertension, so identifying the exact underlying abnormality is not possible. Fewer than 10% of patients have secondary hypertension where either a comorbid disease or a drug (or other product) is responsible for elevating BP. In most of these cases, renal dysfunction resulting from severe chronic kidney disease (CKD) or renovascular disease is the most common secondary cause. Certain drugs (or other products), either directly or indirectly, can cause hypertension or exacerbate hypertension by increasing BP. When a secondary cause is identified, removing the offending agent (when feasible) or treating/correcting the underlying comorbid condition should be the first step in management.

Signs And Symptoms

General: The patient may appear healthy or may have the presence of additional CV risk factors:

- Age (≥55 years for men, ≥65 years for women)
- Diabetes mellitus
- Dyslipidemia
- Albuminuria
- Family history of premature CV disease
- Obesity (body mass index [BMI] ≥30kg/m2

2) Tobacco use Symptoms: Usually none related to elevated BP.

Physical in activity

Cardiovascular Risk and Blood Pressure

Epidemiologic data demonstrate a strong correlation between BP and CV morbidity and mortality. Risk of stroke, myocardial infarction (MI), angina, heart failure, kidney failure, or early death from a CV cause is directly correlated with BP. Starting at a BP of 115/75 mm Hg, risk of CV disease doubles with every 20/10 mm Hg Increase.

Even patients with pre-hypertension have an increased risk of CV disease.

Treating patients with hypertension with antihypertensive drug therapy provides significant clinical benefits. Evidence has shown that the increased risks of CV events and death from large-scale placebo-controlled clinical trials associated with elevated BP are reduced substantially by antihypertensive therapy.

SBP is a stronger predictor of CV disease than DBP in adults aged 50 years and older; it is the most important clinical BP parameter for most patients.1 Patients are considered to have isolated systolic hypertension when their SBP values are elevated (i.e., ≥140 mm Hg) and DBP values are not (i.e., <90 mm Hg, but commonly <80 mm Hg). Isolated systolic hypertension is believed to result from pathophysiologic changes in the arterial vasculature consistent with aging. These changes decrease the compliance of the arterial wall and portend an increased risk of CV morbidity and mortality. The elevated pulse pressure (SBP minus DBP) is believed to reflect extent of atherosclerotic disease in the elderly and is a measure of increased arterial stiffness. Higher pulse pressure values seen in those with isolated systolic hypertension are directly correlated with risk of CV mortality. [9]
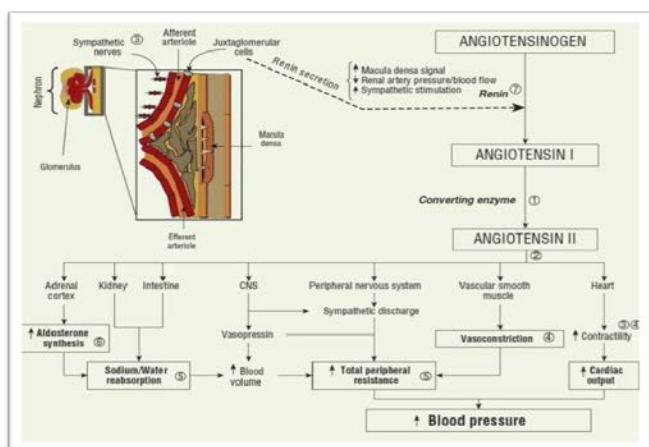

Fig. 1: Diagram representing the renin-angiotensin-aldosterone

Treatment: The JNC 7 guidelines recommend BP goals for the management of hypertension. A goal BP of <140/90 mm Hg is recommended for most patients for general prevention of CV events or CV disease (e.g., coronary artery disease)[9]

Pharmacologic therapy

Pharmacologic therapy for hypertension is used to reduce morbidity and mortality
By the least intrusive means possible.

Antihypertensive Drug Classes

β-Adrenoreceptor antagonists

The mode of action of β-adrenoreceptor antagonists in hypertension is uncertain. β- Adrenoreceptor blockade reduces cardiac output in the short term and during exercise. They also reduce renin secretion by antagonising β-receptors in the juxtaglomerular apparatus. Central actions may also be important for some agents. Non-selective β-blockers may give rise to adverse effects as a result of antagonism of β2-adrenoceptors, that is, asthma and worsened intermittent claudication. However, the so-called ardioselective" (β1-selective) β- blockers are not entirely free of these adverse effects. Patients who develop very marked bradycardia and tiredness may tolerate a drug with partial agonist activity such as pindolol.[9]

Diuretics

There is substantial clinical trial evidence that benefit is obtained from the use of thiazide, for example, bendroflumethiazide, hydrochlorothiazide, or thiazide-like, for example, chlortalidone, indapamide, diuretics in hypertension; these drugs are both inexpensive and well tolerated by most patients. Their diuretic action is achieved by blockade of distal renal tubular sodium reabsorption. Initially, they reduce blood pressure by reducing circulating blood volume but in the longer term they reduce total peripheral resistance, suggesting

a direct vasodilatory action. Although generally well tolerated, thiazide and thiazide like diuretics may cause hypokalemia, small increases in LDL-cholesterol and triglyceride, and gout associated with impaired urate excretion. Erectile dysfunction is also common. Loop diuretics are no more effective at lowering blood pressure than thiazides unless renal function is significantly impaired or the patient is receiving agents that inhibit the renin– angiotensin system. They are also a suitable choice if heart failure is present. Spironolactone, an aldosterone antagonist, is not suitable for first-line therapy but is an increasingly important treatment option for patients with resistant hypertension. Where hyperaldosteronism is suspected, spironolactone may prove to be effective. Spironolactone is a potassium sparing diuretic and should be used with caution especially if used in combination with ACE inhibitors or angiotensin receptor blockers (ARBs), and should almost always be avoided with other potassium sparing diuretics, for example, amiloride. [9]

Renin-Angiotensin-Aldosterone Antagonists

ACE inhibitors block the conversion of angiotensin I to angiotensin II, while ARBs block the action of angiotensin II at the angiotensin II type 21 receptor. Since angiotensin II is a vasoconstrictor and stimulates the release of aldosterone, antagonism results in vasodilation and potassium retention as well as inhibition of salt and water retention. ACE inhibitors also block kinase production and, thus, prevent the breakdown of bradykinin. This appears to be important in the aetiology of ACE inhibitor induced cough, which is a troublesome side effect in 10–20% of users. ARBs do not inhibit kinase and are an appropriate choice for patients who are intolerant of ACE inhibitors because of

cough. ACE inhibitors are also associated with a significant incidence of angioedema, which can in severe cases cause dangerous swelling of the pharyngolargyngeal area leading to stridor, threatening the patient's airway. This adverse reaction is commoner in black subjects.[9]

Calcium Channel Blockers

These agents block slow calcium channels in the peripheral blood vessels and/or the heart. The dihydropyridine group work almost exclusively on l-type calcium channels in the peripheral arterioles and reduce blood pressure by reducing total peripheral resistance. In contrast, the effect of verapamil and diltiazem are primarily on the heart, reducing heart rate and cardiac output. Long-acting dihydropyridines are preferred because they are more convenient for patients and avoid the large fluctuations in plasma drug concentrations that may be associated with adverse effects. [9]

α-Adrenoreceptor Blockers

Drugs of this class antagonize α-adrenoceptors in the blood vessel wall and, thus, prevent noradrenaline (norepinephrine) induced vasoconstriction. As a result, they reduce total peripheral resistance and blood pressure. Prazosin was originally used but had the disadvantage of being short-acting and causing first-dose hypotension. Newer agents such as doxazosin and terazosin have a longer duration of action. They are an appropriate choice as add-in therapy for patients inadequately controlled using other agents. They can frequently cause postural hypotension but may alleviate symptoms in men with prostatic hypertrophy.

Centrally acting agents

Methyldopa and moxonidine inhibit sympathetic outflow from the brain, resulting in a reduction in total

peripheral resistance. Methyldopa is not widely used because it has pronounced central adverse effects, including tiredness and depression. It continues to be used in pregnancy, since it does not cause fetal abnormalities. It is also occasionally used in patients with resistant hypertension. Moxonidine is a newer agent that blocks central imidazoline and α2-adrenoceptors found within the medulla oblongata of the brain. It can cause side effects of dry mouth, headache, fatigue and dizziness, although it appears to have fewer central adverse effects the methyldopa. Other centrally acting agents such as clonidine and reserpine are almost never used in modern practice because of their pronounced adverse effects.[9]

Other agents

Several other drugs such as Minoxidil, Hydralazine and Sodium Nitroprusside are available for use for people with more resistant hypertension.

Materials and Methods

1. Study Design: A Prospective and Observational study.
2. Location of the Study: Department of General Medicine, SHADAN Medical Hospital, a Tertiary care Teaching Hospital, Hyderabad
3. Sample size: 150 Patients
4. Study Population: Patients above 25 years of age
5. Study Period: 6months
6. Study Criteria:

Exclusion Criteria

1. Patients below 25 years of age.
2. Patients who are not willing to participate in the study Patients who are unable to respond to verbal questions

Inclusion Criteria

1. Patients above 25years of age. Either gender attending inpatient or outpatient.
2. Pregnancy and lactating women Patients who are willing to participate in the study.

Study Procedure: All the patients admitted at SHADAN Medical Hospital are screened for hypertension. Each subject's detailed history regarding age, sex, weight, education, employment status, family income, marital status, religion, socioeconomic status, rural or urban, date of admission, date of discharge, sleep pattern, physical activity, dietary intake, salt consumption, laboratory investigations, history of hypertension, and its treatment given, social habits and any co morbid conditions to be collected.

Statistical Analysis: Descriptive statistics was used for Data analysis. Graphs and tables were generated using Microsoft Word and Microsoft Excel. We have used simple percentage calculations to arrive at a conclusion of our study**.**

Study Approval: Study was approved by Institutional Ethics Committee.

Results

A total of 150 patients were enrolled over the course of the study period. Out of the 150 people participants, 65 percent were males and 35 percent were females, with a median age of 60 years. The findings revealed that 97 percent of respondents were married, 86 percent eat a diverse diet, 65 percent work, and 59 percent are stressed. Up to 39% of the participants were alcoholics, and 30% were smokers. Furthermore, diabetic patients were shown to have a higher prevalence of macrovascular problems (62%) than non-diabetic patients. It was discovered that the majority of the participants (57%) had comorbidities such as CNS diseases. 63 percent had HTN for more than two years,

66 percent were taking HTN drugs, 56 percent had no awareness of their prescriptions, 61 percent had treatment complexity, and 96 percent experienced macro vascular problems as a result. Diuretic monotherapy and combined therapy, were the most generally prescribed medication class. According to the study, 55 percent of the patients took their HTN medicine as prescribed, 34 percent did not follow a low-salt diet, 46 percent did not engage in physical exercise, 61 percent did not smoke, and 53 percent did not abstain from alcohol.

Table 1: Age - Wise Distribution of Patients

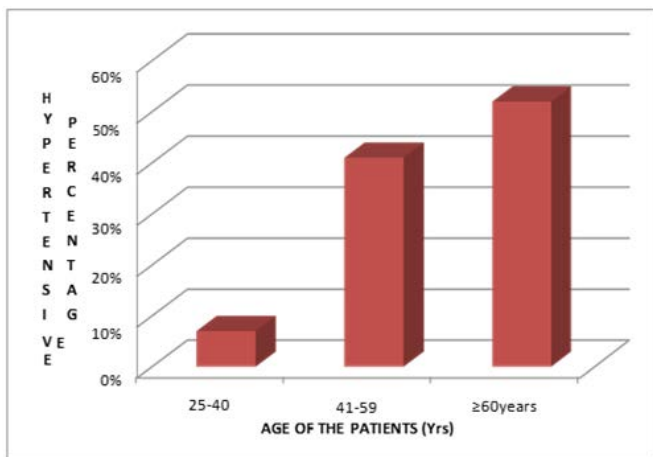| Age (in years)	Number of Patients	Percentage %
25-40 years	10	7%
41-59 years	61	41%
≥60 years	79	52%

Fig. 1: Age – Wise Distribution Of Patients

A significantly high number of hypertensive patients were found in the age group of ≥60 years which accounts for 52%.

Table 2 : AGE – Wise Distribution Of Patients Based On Their Systolic And Diastolic Pressure

Category	Normal	Prehypertension	Stage I Htn	Stage II Htn
SBP Values	<120	120-139	140-159	≥160
DBP Values	<80	80-89	90-99	≥100
Age group(in years)				
25-40	3 (2%)	3 (2%)	1 (1%)	3 (2%)
41-59	18 (12%)	22 (15%)	11 (7%)	10 (7%)
≥60	17 (11%)	38 (25%)	16 (11%)	8 (5%)

Fig. 2: AGE – Wise Distribution of Patients Based On Their Systolic And Diastolic Pressure

Majority of the patients were found in the age group of ≥60 years with prehypertension having systolic BP as 120-139mmHg and diastolic BP as 80- 90mmHg which accounts for 25%.

Table 3: Gender - Wise Distribution of Patients

Category	Number of Patients	Percentage
MALE	98	65%
FEMALE	52	35%

It was found that majority of the subjects were males accounting for 65% of the total participants

Table 4: Gender - Wise Distribution of Patients Based On Their Systolic And Diastolic Pressure

Category	Normal	Prehypertension	Stage I HTN	Stage II HTN
SBP Values	<120	120-139	140-159	≥160
DBP Values	<80	80-89	90-99	≥100
Gender				
Males	22 (15%)	42 (28%)	17 (11%)	17 (11%)
Females	16 (11%)	21 (14%)	11 (7%)	4 (3%)

Fig. 3: Gender - Wise Distribution Of Patients Based On Their Systolic And Diastolic Pressure

It was found that majority of the patients were males having prehypertension with systolic BP as 120-139mmHg and diastolic BP as 80-90mmHg which accounts for 28%

Table 5: Distribution Based on Sociodemographic Characteristics Of Hypertensive Patients

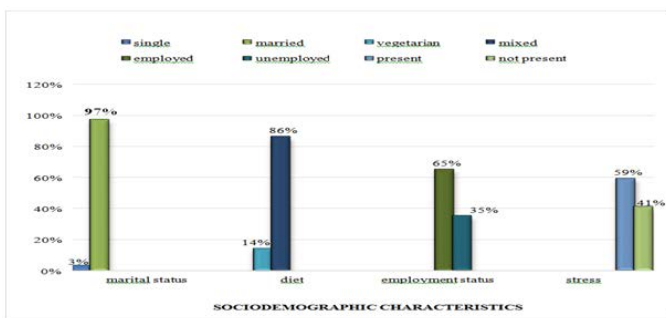| Variables	Category	Frequency	Percentage
Marital status	Single	5	3%
	Married	145	97%
Diet	Vegetarian	21	14%
	Mixed	129	86%
Employment status	Employed	98	65%
	Unemployed	52	35%
Stress	Present	88	59%
	Not Present	62	41%

Fig. 4: Distribution Based on Sociodemographic Characteristics of Hypertensive Patients

The results showed that 97% were married, 86% have mixed diet, 65% were employed and 59% have stress.

Table 6: Distribution of Patients Based on Addictions

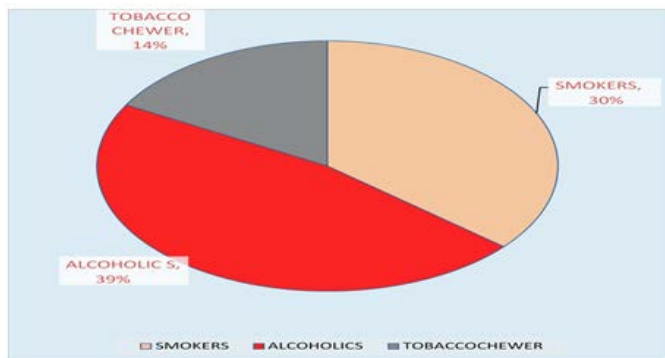| Addictions	Number of Patients	Percentage
Smokers	45	30%
Alcoholic	59	39%
Tobacco Chewer	21	14%

Fig. 5: Distribution of Patients Based On Addictions

The majority of patients were found to be alcoholic who accounts for 39% of the total population.

Table 7: Prevalence of Complication In Hypertensive Patients

Category	Presence of Complication (Frequency)	Prevalence of Complication (Percentage)
Non-Hypertensive Patients	57	38%
Hypertensive Patients	93	62%

Table 8: Risk Stratification Based On Blood - Pressure Values

Category	Normal	Prehypertension	Stage I	Stage II
BLOOD PRESSURE (mmHg)	SBP <120 or DBP <80	SBP 120-139 or DBP 80-89	SBP 140-159 or DBP 90-99	SBP ≥160 or DBP ≥100
Percentage	38 (25%)	63 (42%)	28 (19%)	21 (14%)
Risk strata*	Low risk	Medium risk	High risk	Very High risk

*Risk strata (typical 10-year risk of stroke and myocardial infarction):

Low risk = Less than 15%, Medium risk = About 15-20%, High risk = About

It was found that 14% of the patients show a very high risk of macrovascular complications

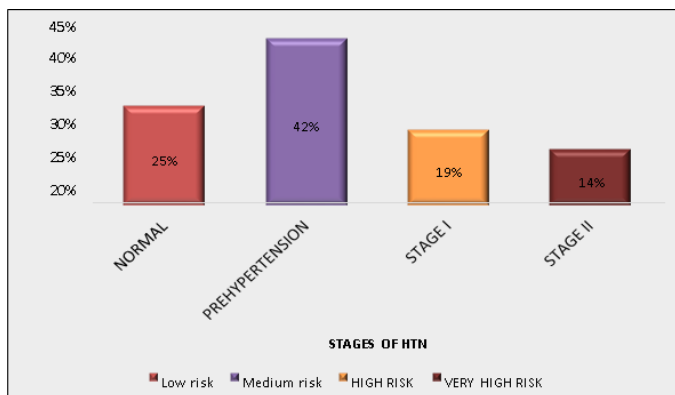Fig. 6: Risk Stratification Based On Blood Pressure Values

Table 9: Distribution Of Data Based On Comorbidity

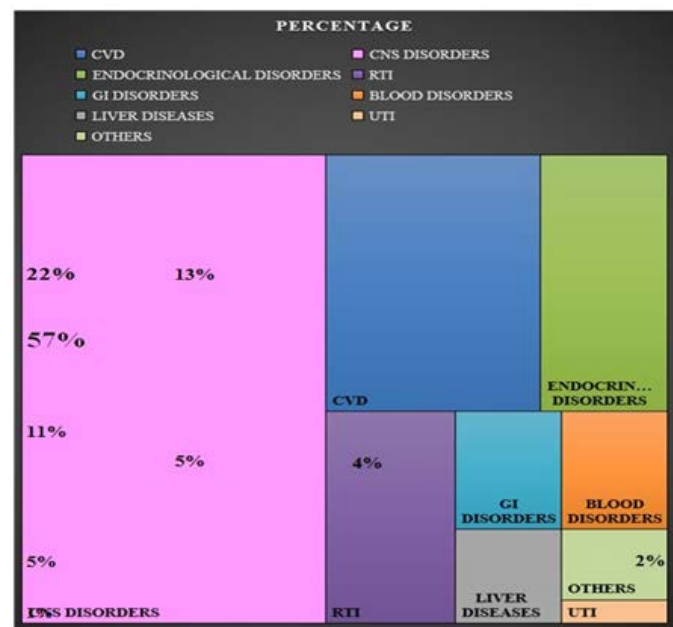| Co morbidity	Patients	Percentage
CV Disorders	33	22%
CNS Disorders	85	57%
Endocrinology Disorders	20	13%
Respiratory Tract Infections	16	11%
GI Disorders	7	5%
Blood Disorders	7	5%
Liver Diseases	6	4%
UTI	2	1%
Other Infections	3	2%

Fig. 7: Distribution of Data Based on Comorbidity

It was found that majority of the subjects had comorbidities like CNS disorders which is 57

Table 10: Distribution Based on Information, Medication And Clinical Characteristics of Respondents

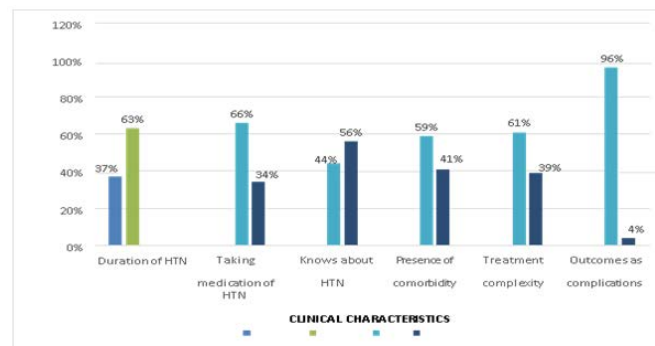| Variable	Category	Frequency	Percentage (%)
Duration with HTN	< 2 years	56	37%
	> 2 years	94	63%
Medications for HTN	YES	99	66%
	NO	51	34%
News about medicine	YES	66	44%
	NO	84	56%
Presence of comorbidity	YES	89	59%
	NO	61	41%
Treatment complexity	YES	91	61%
	NO	59	39%
Outcome as complications	YES	144	96%
	NO	6	4%

Fig. 8: Distribution based on information, medication and clinical characteristics of adherence

It was found that 63% have HTN for a duration of >2 years, 66% were taking medications for HTN, 56% had no knowledge about their medications, 59% have comorbid condition, 61% have treatment complexity and 96% have macrovascular complications as their outcome.

Table 11: Distribution of Anti-Hypertensive Drugs Based on Route of Administration

Route of Administration	Percentage
Oral Route	53%
Intravenous Route	47%

Table 12: Distribution of Class of Drugs Based on Monotherapy And Combined Therapy

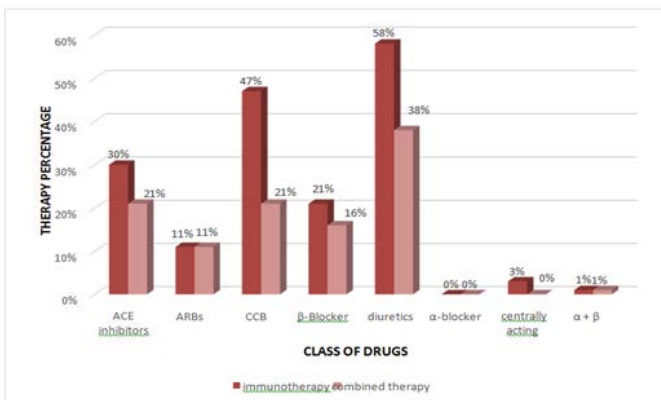| Class of Drugs	Mono therapy (Percentage)	M binned Therapy (Percentage)
ACE I	30%	21%
ARBs	11%	11%
CCB	47%	21%
β-Blocker	21%	16%
Diuretics	58%	38%
α-Blocker	0%	0%
Centrally Acting	3%	0%
α+β Blocker	1%	1%

Fig. 9: Distribution of Class of Drugs Based On Monotherapy And Combined Therapy

It was found that diuretics were the most commonly prescribed class of drugs both in mono therapy and combined therapy

Table 13: Distribution based on prescribing pattern of combination of class of drugs in hypertensive patients

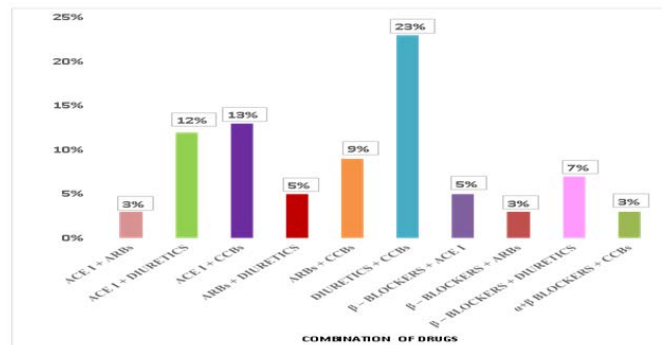| Combination of Class	Frequency	Percentage
ACE I + ARBs	2	3%
ACE I + Diuretics	9	12%
ACE I + CCBs	10	13%
ARBs + Diuretics	4	5%
ARBs + CCBs	7	9%
Diuretics + CCBs	17	23%
β – Blockers + ACE I	4	5%
β – Blockers + ARBs	2	3%
β – Blockers + Diuretics	5	7%
α+ β Blockers + CCBs	2	3%

Fig. 10: Distribution based on prescribing pattern of combination of class of drugs in hypertensive patients

From the data obtained, it was found that combination of diuretics and calcium channel blockers were most commonly prescribed in hypertensive non diabetic patients accounting for 23%.
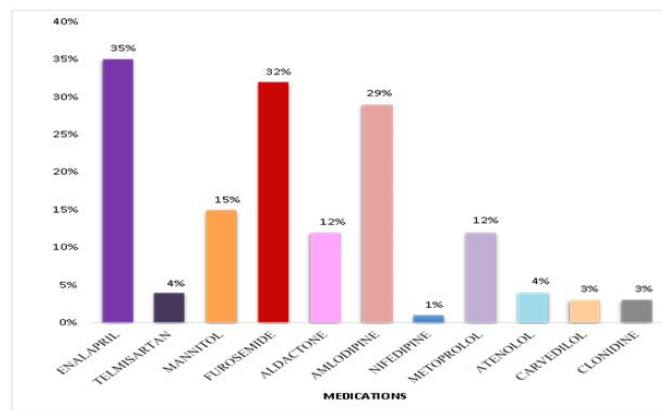

Fig. 11: Distribution based on prescribing pattern of drugs in hypertensive patients

From the data obtained, it was found that enalapril was the most commonly prescribed drug in hypertensive patients accounting for 35%.

Table 14: participants adherence status on self-care behaviors (prevalence rates on self-care activity) among adult patients

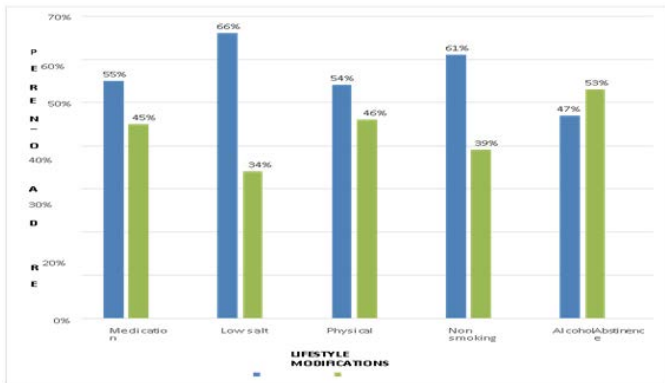| Variables	Category	Frequency	Percentage (%)
Medication Adherence	Adherence	83	55%
	Non-Adherence	67	45%
Low salt diet	Adherence	99	66%
	Non-Adherence	51	34%
Physical activity	Adherence	81	54%
	Non-Adherence	69	46%
Non-Smoking adherence	Adherence	91	61%
	Non-Adherence	59	39%
Alcohol Abstinence Adherence	Adherence	71	47%
	Non-Adherence	79	53%

Fig. 20: Participants adherence status on self-care behaviors (prevalence rates on self-care activity) among adult patients

It was reported that 55% were adherent to HTN medication, 34% were not following low salt diet, non-adherence to physical activity was 46%, adherence to non-smoking was 61% and 53% of the patients were not adhered to alcohol abstinence.

Discussion

Among 150 patients that were included in our study, a significantly high number of hypertensive patients were found in the age group of≥60 years which accounts for 52% followed by age groups 41-59 years (41%) and 25-40 years (7%). When a study on age-wise distribution of patients based on systolic and diastolic blood pressure was conducted, majority of the patients were found in the age group of ≥60 years with prehypertension having systolic BP as 120-139mmHg and diastolic BP as 80-

90mmHg which accounts for 25%. This is comparable to a study by Accord (2010)[16].

The prevalence of HTN is found more in males (65%). This was found similar to study by Madhu et al.,2011[3]. When a study on gender-wise distribution of patients based on systolic and diastolic blood pressure was conducted, it was found that majority of the patients were males having prehypertension having systolic BP as 120-139mmHg and diastolic BP as 80- 90mmHg which accounts for 28%. This is comparable to a study by Accord(2010)[16].

In our study, majority of the patients, 145 patients (97%) were married and 129 patients (86%) have mixed diet. About 98 (65%) of patients were employed and 88 (59%) patients have stress. These results were found similar with study by Habtamu A.H. et al., (2014)[19]. Majority of the patients (39%) were alcoholic followed by smokers (30%) and 14% were found to be tobacco chewers which is similar to a study by Oladele V.A. et.al., (2016)[9]. The assessment among 150 hypertensive patients was found that 93 hypertensive patients (62%) with diabetes developed macrovascular complications. The study is comparable to a study conducted by Youssef et al.,(2002). 57 hypertensive patients (38%) without diabetes developed macrovascular complications. These results matched with another report by Dhobi etal.,(2008)[3] In our study, we found 25% of the patients have low risk, 42% shows a medium risk, 19% of the patients show high risk and 14% of the patients show a very high risk of macrovascular complications. The prognosis of patient and the choice and need for urgency of therapy are dependent on the overall risk stratification. The risk stratification revealed that all diabetics with SBP of ≥140 have a typical 10

year high risk of Stroke or MI. This trend was similar to study by Madhu et al.,(2014)[3].

We assessed that majority of the subjects had comorbidities like CNS disorders like stroke (57%)followedbyCVDs(22%),endocrinologicaldisorders (13%),RTI(11%),GIdisorders (5%), blood disorders (5%), liver disorders (4%), UTI (1%) and others (2%). This results were similar to a report published to AHA by Benjamin E.J. et al., (2017)[5]. 94 (63%) patients of our present study had the duration of >2 years of HTN and 99 patients (66%) were taking medications out of which 84 (56%) patients had no knowledge about their medications. Majority of the patients 89 (59%) had comorbid condition, 91 patients (61%) had treatment complexity and 144 patients (96%) had macrovascular complications as their outcomes. These results matched with Tesfaye et al.,(2017)[8].

The most common prescribed route was found to be oral route. In our study various classes of drugs were prescribed and the most commonly prescribed class of drug was found to be diuretics (58%) both in monotherapy and combined therapy followed by calcium channel blockers (47%), ACE inhibitors (30%), ARBs (11%), β - blockers (21%), centrally acting vasodialtors (3%) and α + β blockers (1%).This data was found similar to study by de Beus etal.,(2017).

We assessed the prescribing pattern in hypertensive patients, combination of diuretics and calcium channel blockers was commonly prescribed (23%) and amlodipine was the most commonly prescribed drug (52%). These results were found to be similar to the study done by S.N. Arya (2003)[38] and Willaims B. (2004). More than half of the patients, 55%, were reported as adherent to hypertension medication, 34% were not following low salt diet and non-adherence to

physical activity was 46%. More than two third, 61%, of the population were non smokers. Majority, 53% of the patients were not adhered to alcohol abstinence. The adherence observed in the present study is lower than what has been reported in a similar study by Saman et al. and Mweene et al. (2007)[8]

Conclusion

When a study on age-wise and gender-wise distribution of patients based on systolic and diastolic blood pressure was conducted, majority of the patients were found in the age group of ≥60 years and were males with prehypertension having systolic BP as 120-139mmHg and diastolic BP as 80- 90mmHg. We assessed the patients among various sociodemographic characters and found that most of the patients were married, have mixed diet, were employed and have stress. Apart from majority of the patients being alcoholic, the prevalence of macro vascular complications was high in hypertensive patients.

Our study showed that majority of the patients had duration of >2 years of HTN. Most of the patients were taking medications but majority had no knowledge about medications and had treatment complexity. The most commonly prescribed anti- hypertensives were found to be diuretics, CCBs, ACE inhibitors followed by β-blockers. In diabetic patients, combination of ACE inhibitors and diuretics was commonly prescribed and enalapril was the most commonly prescribed drug. In non- diabetic patients, combination of diuretics and calcium channel blockers was commonly prescribed and amlodipine was the most commonly prescribed drug.

The reasons for the uncontrolled BP were poor knowledge of hypertension related complications, medications, non-adherence to alcohol abstinence, non-adherence to low salt diet, more stress, less physical

activity and older age. Clinical pharmacist at an early stage can monitor the BP and diabetic related risk factors, thereby enhancing the quality life span of the patient and can help in reducing the burden of costly drugs. Continuous health education, patient counseling and information regarding adherence and satisfaction of the patients in each follow up is very essential to avert the problem.

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