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Research Article

**A PROSPECTIVE OBSERVATIONAL STUDY ON DRUG UTILIZATION  
AND EVALUATION OF ANTI HYPERTENSIVE DRUGS AND IT'S  
ADHERENCE TO STANDARD TREATMENT GUIDELINES IN  
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**Article Received:** October 2021**Accepted:** October 2021**Published:** November 2021**Abstract:**

**Aim & objectives:** The principle aim was to study Drug utilization and Evaluation of Anti-Hypertensive Drugs and it's Adherence to standard treatment guidelines and importance of BP control; hypertension is persistent elevation of arterial blood pressure.

**Methodology:** A Prospective and observational study was carried out on 100 subjects in the Department of general medicine in Osmania General Hospital, a tertiary care teaching hospital for a period of 6 months.

**Results:** The data collected was analyzed and presented using simple statistics and presented in counts or percentage. Out of 100 subjects (64 %) were males and (36%) were females. Maximum number of the patients were found in age group >61 with (52%) people in it. There were 70 patients with different comorbid condition among which Diabetes (25%) was the highly prevalent comorbid condition. Monotherapy (59%) was oftenly prescribed in both comorbid and non-comorbid diseased conditions of the study. Diuretics (Furosemide) Calcium Channel Blocker (Amlodipine), Angiotensin Renin Blocker (Telmisartan), Angiotensin converting enzyme (Enalapril), Beta blocker (metoprolol) were frequently prescribed. Anti-hypertensive class of drugs prescribed in monotherapy. The presence of comorbidities makes the situation more complicated in such conditions Dualtherapy (27%), Triple therapy (14%) was used. Among dual combination (27%) Diuretics and Angiotensin renin blocker was primarily selected antihypertensive class. The triple combination therapy (14 %) was rarely prescribed in extreme conditions the class of drug used in triple combination was calcium channel blocker, Diuretic, centrally sympathomimetics. In the study most of the patients were alcoholics (39%), smokers (30%). Participant's adherence status: Prevalance rate on self-care activity among hypertensive patients was conducted there were 67% subjects with hypertension of >2 years, 72% patients were taking medications only 44% patients know about medication, medication adherence was observed in 67% patients, adherence to rationality of prescription was 83%, non-adherence to low salt diet was high with 56% outcome as complication was observed in 75% patients.

**Keywords:** Hypertension, Diabetes, comorbidities, monotherapy, combination drug therapy and Diuretics.

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## INTRODUCTION:

According to the American Heart Association (AHA), approximately 86 million adults (34%) in the United States are affected by hypertension, which is defined as a systolic blood pressure (SBP) of 140 mm Hg or more or a diastolic blood pressure (DBP) of 90 mm Hg or more, taking antihypertensive medication, or having been told by clinicians on at least 2 occasions as having hypertension. Substantial improvements have been made with regard to enhancing awareness and treatment of hypertension. However, a National Health Examination Survey (NHANES) spanning 2011-2014 revealed that 34% of US adults aged 20 years and older are hypertensive and NHANES 2013-2014 data showed that 15.9% of these hypertensive adults are unaware they are hypertensive; these data have increased from NHANES 2005-2006 data that showed 29% of US adults aged 18 years and older were hypertensive and that 7% of these hypertensive adults had never been told that they had hypertension.

Data from the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7), which was released in 2003, were relatively similar to the NHANES data. The JNC 7 noted that approximately 30% of adults were unaware of their hypertension; up to 40% of people with hypertension were not receiving treatment; and, of those treated, up to 67% did not have their BP controlled to less than 140/90 mm Hg. [3]

### Definition and Classification of Hypertension

**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 [2]. High blood pressure typically does not cause symptoms [4]. Long-term high blood pressure, however, is a major risk factor<sup>1</sup>. 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. Known 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

High blood pressure increases a person's risk of stroke and heart attack. It often occurs with diabetes [9]. Based on recommendations of the JNC 7, the classification of BP (expressed in mm Hg) for adults aged 18 years or older is as follows:

**Table 1:** Classification of Blood Pressure in Adults [9]

Classification	Systolic (mm Hg)		Diastolic (mm Hg)
Normal	<120	and	<80
Prehypertension	120-139	or	80-89
Stage 1 hypertension	140-159	or	90-99
Stage 2 hypertension	≥160	or	≥100

## EPIDEMIOLOGY

Between 10% and 25% of the population are expected to benefit from drug treatment of hypertension; the exact figure depending on the cut-off value for blood pressure and the age group considered for active treatment. In 90-95% of cases of hypertension, there is no underlying medical illness to cause high blood pressure. This is termed 'essential' hypertension, so named because at one time it was erroneously believed to be an 'essential' compensation mechanism to maintain adequate circulation.

### Essential 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. Genetic factors may play an important role in the development of essential hypertension. There are monogenic and polygenic forms of BP dysregulation that may be responsible for essential hypertension. Many of these genetic traits feature genes that affect sodium balance, but genetic mutations altering urinary kallikrein excretion, nitric oxide release, and excretion of aldosterone, other adrenal steroids, and angiotensinogen are also documented. In the future, genetic testing for these traits could lead to alternative approaches to preventing or treating hypertension; however, this is not currently recommended. [10]

**Secondary Hypertension:** Fewer than 10% of patients have secondary hypertension where either a comorbiddisease or a drug (or other product) is responsible for elevating BP (see Table 2). 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. The most common agents are listed in

Table 2. 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.<sup>[10]</sup>

### SIGNS AND SYMPTOMS

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

- Age ( $\geq 55$  years for men,  $\geq 65$  years for women)
- Diabetes mellitus
- Dyslipidemia
- Albuminuria
- Family history of premature CV disease
- Obesity (body mass index [BMI]  $\geq 30$  kg/m<sup>2</sup>)

- Physical inactivity

Tobacco use Symptoms: Usually none related to elevated BP.

### PATHOPHYSIOLOGY

Multiple factors that control BP are potential contributing components in the development of essential hypertension. These include malfunctions in either humoral (i.e., the renin-angiotensin-aldosterone system [RAAS] or vasodepressor mechanisms, abnormal neuronal mechanisms, defects in peripheral autoregulation, and disturbances in sodium, calcium, and natriuretic hormone. Many of these factors are cumulatively affected by the multifaceted RAAS, which ultimately regulates arterial BP. It is probable that no one factor is solely responsible for essential hypertension.

**Table 2: Potential Mechanisms of Pathogenesis<sup>[10]</sup>**

<p><b>Blood pressure (BP) is the mathematical product of cardiac output and peripheral resistance. Elevated BP can result from increased cardiac output and/or increased total peripheral resistance.</b></p>	
<p><b>Increased cardiac output</b></p>	<p><b>Increased cardiac preload:</b></p> <ul style="list-style-type: none"> <li>• Increased fluid volume from excess sodium intake or renal sodium retention (from reduced number of nephrons or decreased glomerular filtration)</li> </ul> <p><b>Venous constriction:</b></p> <ul style="list-style-type: none"> <li>• Excess stimulation of the renin-angiotensin-aldosterone system (RAAS)</li> <li>• Sympathetic nervous system overactivity</li> </ul>
<p><b>Increased peripheral resistance</b></p>	<p><b>Functional vascular constriction:</b></p> <ul style="list-style-type: none"> <li>• Excess stimulation of the RAAS</li> <li>• Sympathetic nervous system overactivity</li> <li>• Genetic alterations of cell membranes</li> <li>• Endothelial-derived factors</li> </ul> <p><b>Structural vascular hypertrophy:</b></p> <ul style="list-style-type: none"> <li>• Excess stimulation of the RAAS</li> <li>• Sympathetic nervous system overactivity</li> <li>• Genetic alterations of cell membranes</li> <li>• Endothelial-derived factors</li> <li>• Hyperinsulinemia resulting from the metabolic syndrome</li> </ul>

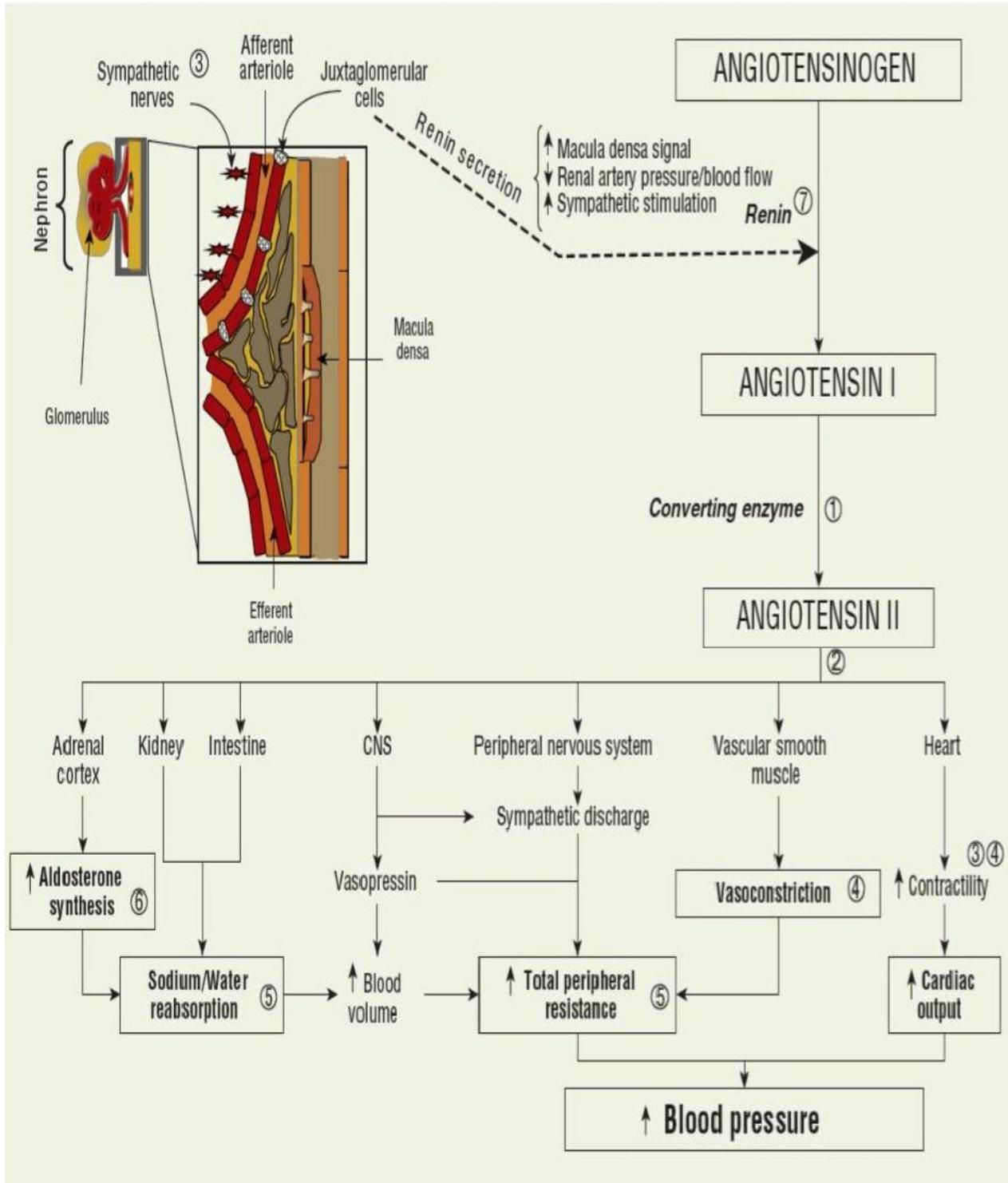


Fig. 1: Diagram representing the renin-angiotensin-aldosterone system<sup>[10]</sup>

**PREVENTION**

The 2004 British Hypertension Society guidelines<sup>[6]</sup> proposed lifestyle changes consistent with those outlined by the US National High BP Education Program in 2002 for the primary prevention of hypertension:

- maintain normal body weight for adults (e.g. body mass index 20–25kg/m<sup>2</sup>)
- reduce dietary sodium intake to <100 mmol/ day (<6 g of sodium chloride or <2.4 g of sodium perday)
- engage in regular aerobic physical activity such as brisk walking (≥30 min per day, most days of theweek)
- limit alcohol consumption to no more than 3 units/day in men and no more than 2 units/day inwomen
- consume a diet rich in fruit and vegetables (e.g. at least five portions perday)<sup>[6]</sup>

**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).<sup>[10]</sup>

**NEED FOR THE STUDY:**

- The goal of a DUE is to promote optimal medication therapy and ensure that drug therapy meets current trends in care.
- The rationality of the prescription and to study the impact of strict guidelines and standard established protocol in relieving the symptoms and subsiding disease progression to improve health related quality of life.
- The study is designed to asses and improve the medication adherence for optimal benefit for patients.
- Importance of lifestyle modifications and controlling blood pressure in prevention of macro vascular complications.
- To improve the outcome of quality of life with patient counselling during post hypertensive care.
- For overall understanding and effectiveness of therapy by using the data from the patients and their caretakers.

**AIM & OBJECTIVES:**

The aim is to perform drug utilization and evaluation of Antihypertensive drugs prescribed in tertiary care hospital.

- To assess the importance of blood pressure control medicines in lowering incidence and retarding the progression of macro vascular complications in decreasing the risk of morbidity and mortality by utilising antihypertensive drugs.
- To find the prescription pattern of Antihypertension drug prescribed.
- To analyze safety profile of hypertension drug prescribed in tertiary care hospital by seeing ADR interaction and medication errors or the drug presented.
- To check rationality of Antihypertension drugs, use in tertiary care hospital.
- To check and improve medication adherence for patient who are receiving Antihypertension drugs.

**METHODOLOGY:****MATERIALS AND METHODS****A. SUBJECTS:**

The study included all the consecutive patients admitted to the hospital and those visited to hospital for follow up on the weekly or monthly basis with the age group more than 18 years of age diagnosed as hypertensives patients associated with or without CO Morbid conditions.

**STUDY DESIGN:** A Hospital based Prospective, Observational Study.

**STUDY SITE:** The study was carried out at the Department of General Medicine, Osmania General Hospital, a Tertiary Care Teaching Hospital.

**STUDY POPULATION:** All the patients satisfying the inclusion criteria were selected. The total 100 numbers of patients with presumed and/or confirmed hypertension were observed and the demographic details of 100 patients were collected for the study.

**STUDY PERIOD:** The study was carried out for a period of Six (6) months.

**SAMPLE SIZE:** The study was carried on a sample of 100 patients

**B.METHODOLOGY:**

A Descriptive (Observational) Prospective study on the “Drug utilization and evaluation of anti-hypertensive and its adherence to standard treatment Guidelines was carried out for a period of 6 months in Osmania General Hospital of the Telangana state (India), which is 1100 bedded, a tertiary care and teaching hospital. This study was approved by

Institutional Ethics Committee.

The study related Vital Data, Physical examination, Clinical and Biochemical findings including Blood Pressure (SBP and DBP, eGFR, Serum electrolytes, Serum Creatinine, Serum urea, and some radiological findings were documented and assessed.

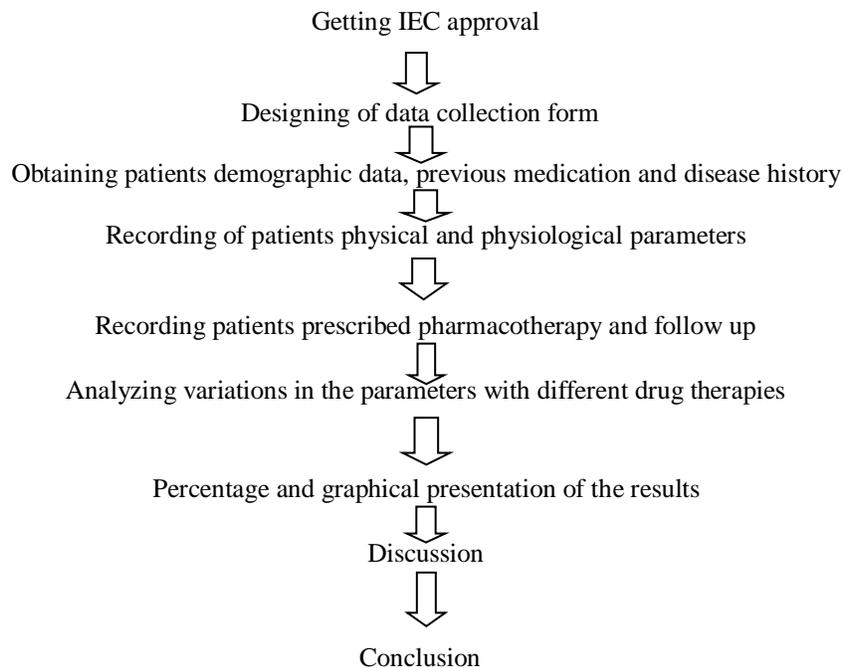
The prescriptions were monitored to know the frequency and extent of antihypertensives used and also the conditions in which the drugs were prescribed. The prescriptions were assessed for the best antihypertensive therapy prescribed.

### C. DATA COLLECTION

Literatures which support the study were collected and were reviewed for study on clinical use of antihypertensives in Drug utilization and evaluation aspect. A predesigned Performa or standard data entry format for collecting patient's details was designed and during the ward rounds the entire patient data with special reference to the antihypertensives prescribed were recorded in the format by the investigators.

The patients who refused to give the informed consent form were excluded from the study.

### E. PLAN OF WORK



The data from the case records of outpatient and inpatient patients containing patient demographics (age, sex), date of admission, date of discharge, past medical and social history, related co-morbidities (Hypertension, Diabetes Mellitus, Coronary Artery Disease, Stroke, Left Ventricular Dysfunction, Hypothyroidism, etc), clinical symptoms, physical examination, biochemical and radiological findings were recorded.

### SOURCES OF DATA:

- ✓ Observing patient's medical or case record.
- ✓ Interviewing patient of patient's attendees.
- ✓ Interviewing the physicians attending the study patients.

### D. DATA ANALYSIS

Descriptive statistics were 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.

**RESULTS:**

**POPULATION DESCRIPTION:** A total of 100 patients with presumed/confirmed Hypertension associated with different co morbidities were selected. Out of which 70 Patients were associated with co morbidities and 30 were with no co morbid conditions.

**Table No 3: AGE AND GENDER DISTRIBUTION**

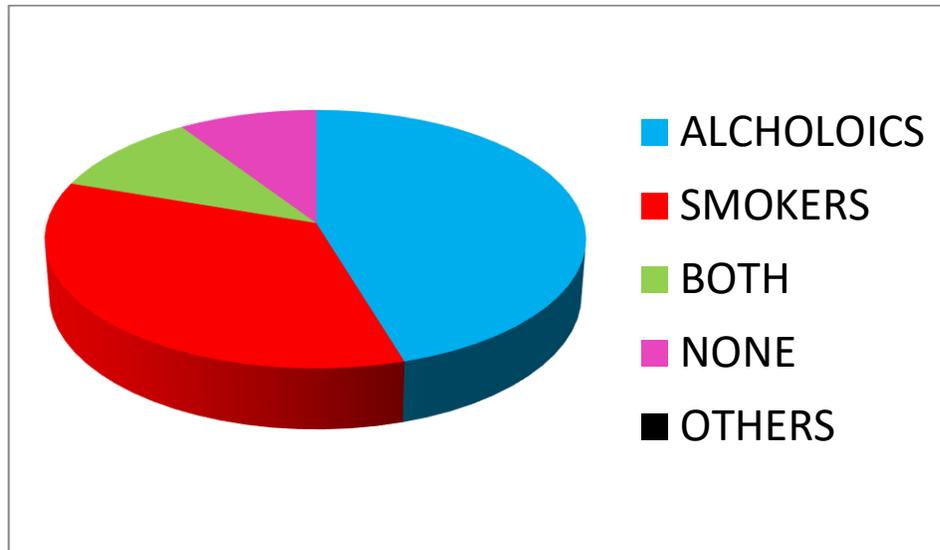
AGE GROUP	No.of MALES	No. OF Females	TOTAL NO. OF PATIENTS EFFECTED	FREQUENCY
18-30	02	01	03	3%
31-43	03	05	08	8%
44-60	21	16	37	37%
> 65	32	20	52	52%

**Table No 4: DISTRIBUTION OF SUBJECTS BASED ON THE SYSTOLIC AND DIASTOLIC BLOOD PRESSURE ASSESMENT**

BLOOD GROUP	NORMAL 120	Pre hypertension 120-139	STAGE1 HTN140-179	STAGE2 HTN>180
SBP VALUES	120	140-159	160-179	>180
DBP VALUES	<85	81-90	91-100	>101
NO.OF PATIENT EFFECTED	n=100	63 (63%)	23(23%)	14(14%)

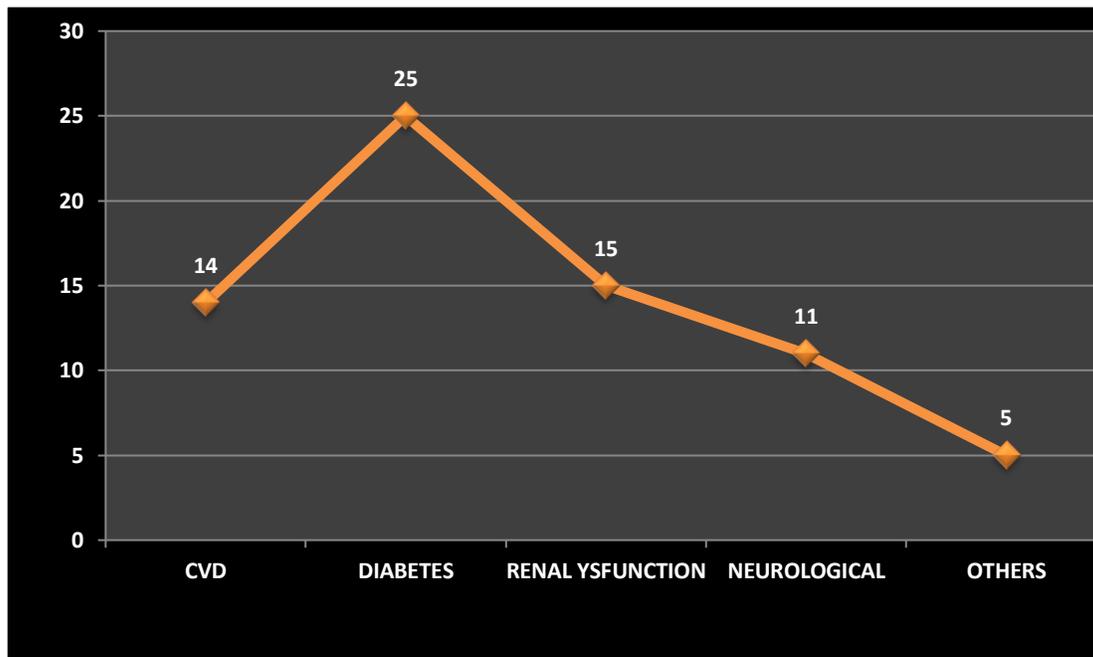
**Table No:5 DISTRIBUTION OF SUBJECTS BASED UPON THE SOCIAL HISTORY.**

ADDICTIONS	NO. OF PATIENTS	PERCENTAGE
ALCOHOLIC	39	39%
SMOKERS	30	30%
BOTH	09	14%
NONE	08	42%
OTHERS	14	14.0%



**Fig. No:2 GRAPHICAL PRESENTATION PATIENT WITH SOCIAL HISTORY**

Of the study population, majority of the subjects were alcoholic (39%) smoker (30%). About 14% were others. So, 9 individuals were both alcoholic and smokers 7% individuals were none.



**Fig. No: 3 PERCENTILE PREVALANCE OF HYPERTENSION IN COMORBID SUBJECTS**

The prevalence of hypertension is high in subjects with Diabetes (25%) followed by Renal dysfunction (15%), CVD (14%), Neurological (11%) and others (5%).

**Table No: 6 PERCENTILE DISTRIBUTION OF ANTI HYPERTENSIVES WITH ASSOCIATED COMORBIDITIES**

COMORBID DISEASE(n=70)	ANTI HYPERTENSIVE DRUG CLASS n(%)
<b>CARDIOVASCULAR DISEASE</b>	CCB=6(30%) DIURETICS=3(15%) ACEIn=2(10%) ARB=2(10%) BETA BLOCKER=1(5%)
<b>DIABETES</b>	CCB=3(8.4%) DIURETICS=6(16.8%) ACEIn=7(22.4%) ARB=8(19.6%) BETA BLOCKERS=1(2.8%)
<b>RENAL DYSFUNCTION</b>	CCB=5(23.3%) DIURETICS=6(28%) ACEIn=3(14%) Beta blocker=1(4.66%)
<b>NEUROLOGICAL</b>	CCB=3(19.09%) Diuretics=5(31.81%) ACEIn=2(12.72%) ArB=1(6.36%)
<b>OTHERs</b>	CCB=1(14%) DIURETICS=2(28%) ACEIn=1(14%) BETA blocker1 (14%)

**Table No:7 PERCENTILE DISTRIBUTION OF ANTI HYPERTENSIVES ASSOCIATED WITH NO COMORBIDITIES**

ANTI HYPERTENSIVE DRUG CLASS n=30	n %
<b>DIURETICS</b>	<b>10(33.3%)</b>
<b>CALCIUMCHANNEL BLOCKERS</b>	<b>09(30%)</b>
<b>ANGIOTENSINRENIN BLOCKERS</b>	<b>03(10%)</b>
<b>ANGIOTENSINRENIN CONVERTING ENZYMES</b>	<b>05(16.6%)</b>
<b>ALPHA BLOCKERS</b>	<b>01(3.33%)</b>
<b>BETAADRENERGIC BLOCKERS</b>	<b>02(6.6%)</b>
<b>CENTRALLYACTING SYMAPATHOMEMITICS</b>	<b>00</b>

In the present study, there were only 30 patients with no comorbid conditions; in which Diuretics were used in (33%) followed by the usage of as CCB's(30%),ARB's(10%),Alpha blockers(3.3%),and Beta blocker(6.6%).NO other class of drugs were prescribed in hypertension with no comorbid conditions

**Table No :8 PARTICIPANTS ADHERENCE STATUS ON SELF-CARE BEHAVIORS (PREVALENCE RATES ON SELF-CARE ACTIVITY) AMONG HYPERTENSIVE PATIENTS**

VARIABLE	CATEGORY	NUMBER	FREQUENCY
Duration with HTN	< 2 years	33	33%
	> 2 years	67	67%
Taking medications for HTN	YES	72	72%
	NO	28	28%
Knows about medicine	YES	44	44%
	NO	56	56%
Presence of comorbidity	YES	67	67%
	NO	33	33%
Outcome complications as	YES	75	75%
	NO	25	16.25%

**Table No: 9 TREATMENTS IN STUDY OF POPULATION WITH MONOTHERAPY**

MONOTHERAPY				59%
CLASS OF DRUG	NO.Males	No. females	TOTAL	PERCENTAGE
DIURETICS: Furosemide,thiazides	17	10	27	45.76%
CCB's: nifedipine,Amlodipine	15	09	25	42.37%
betablocker :metoprolol,Atenolol	2	1	3	5.08%
Alpha Blocker: Prazosin	2	0	2	3.47%
ACEInhibitors: ENALAPRIL	2	0	2	3.47%

**Table No:10 TREATMENT IN STUDY OF POPULATION WITH DUAL THERAPY**

DUAL THERAPY				27%
CLASS OF DRUG	NO.Males	No. females	TOTAL	PERCENTAGE
DIURETICS+ARB Furosemide+Telmisartan	09	06	15	55.5%
CCB's+DiUretics Furosemide+Amlodipine	04	06	10	37.03%
ACE Inh+Betablocker's Enalapril+Atenolol	2	1	3	11.1%

Table No:11 TREATMENT IN STUDY OF POPULATION WITH TRIPLE THERAPY

TRIPLE THERAPY				14%
CLASS OF DRUG	NO.Males	No. females	TOTAL	PERCENTAGE
CCB'S+DiUretics+CentrallyActing symapthomimitics Furosemide+Amlodipine+clonidine	07	02	09	64.28%
CCB's+ Betablocker+DiUretics Amlodipine+Atenlol/metaprolol+Furosemide	04	01	05	35.07%

### DISCUSSIONS:

The present prospective observational study is carried out to assess the current trends in utilization patterns of antihypertensive drugs in the treatment of hypertension.our study identified the Drug Utilisation pattern of hypertension among patients associated with comorbidities and non comorbid in 100 patients admitted in a tertiary care teaching hospital. Among 100 patients that were included in our study, a significantly high number of hypertensive patients were found in the age group of  $\geq 65$  years which accounts for 52% followed by age groups 44-60 years (37%) and 31-43 years (7%).

- When compared to the study of Zahra Eslampanah(2019)<sup>[30]</sup> in our study the 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  $\geq 60$  years with prehypertension having systolic BP as 120-139mmHg and diastolic BP as 80-90mmHg which accounts for 63%.
- In comparison with the study of Hayon Michelle et.al.(2017) our 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%.
- In comparison with study of K.Hussain et.al (2014)<sup>[12]</sup> A.viridis(2010)<sup>[24]</sup> in our study majority of the patients (39%) were found to be alcoholic followed by smokers (30%) and 14% were found to be tobacco chewers and alcohol plays a key role in causing Hypertension which is comparable.
- Impact of smoking is positively associated with the risk of increased hypertension and causes comorbidities with increase in age smoking this was compared according to study by

KaieveGaoet,al.

- In the present study, majority of the patients with both diabetes and hypertension were known cases but the next highest number was that of subjects with known diabetics who were newly diagnosed with hypertension similar to study by Dutta.s.,(2017)<sup>[24]</sup>. We assessed that majority of the subjects had comorbidities like Diabetes (25%) followed by Renal dysfunction (15%), CVD (14%), neurological condition (11%), other with (5%). Hypertension along with diabetes as comorbi condition is high in the stuywhich is comparable to study of Dutta<sup>[7]</sup>
- 67 (67%) patients of our present study had the duration of  $>2$  years of HTN and 72 patients (72%) were taking medications out of which 56 (56%) patients had no knowledge about their medications. Majority of the patients 67 (67%) had comorbid condition, 75patients (75%) had treatment complexity. These results matched with Tesfaye et al.,(2017)<sup>[23]</sup>
- 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 both in monotherapy and combined therapy followed by calcium channel blockers, ACE inhibitors, ARBs  $\beta$  – blockers and  $\alpha + \beta$  blockers (1%).This data was found similar to study by de Beus etal.,(2017).
- More than half of the patients, 60%, were reported as adherent to hypertension medication, 56% were not following low salt diet and non-adherence to physical activity was 52%. More than two third, 64%, of the population were non adherent smokers. Majority, 51% of the patients were not adhered to alcohol abstinence. The adherence observed in the present study is

matches what has been reported in a similar study by Saman et al. and Mweene et al. (2007) <sup>[8]</sup>

- Of the study population, in mono therapy diuretic were the commonly prescribed class of antihypertensive this is comparable to study according to Rachana PR et al,(2014)<sup>[20]</sup>
- In the present study furosemide (33.3%) was widely prescribed followed by Torasemide. The next class of antihypertensive that was most commonly prescribed was Calcium Channel Blockers (CCBs) of which Amlodipine (30%) was widely prescribed Following CCBs, BBs were widely prescribed accounting 6% of which metoprolol ACEIs, Enalapril for 9% in antihypertensives utilization. Various other studies also were in agreement with the present study.
- The drug utilization pattern studies showed that diuretics were used extensively. There were some antihypertensive agents used excessively which includes Diuretics, Calcium channel blockers Angiotensin Receptor Blockers (ARBs), Beta Adrenergic Blockers (BABs), Alpha Adrenergic Blockers (AABs) and Angiotensin Receptor Blockers (CCBs), Converting Enzyme Inhibitors (ACEIs). Diuretics were prescribed more followed by Calcium channel blockers. This is comparable to study according to Zahra Eslampanah (2019)<sup>[30]</sup>.
- According to our study diuretics, calcium channel blockers, Renin–angiotensin system inhibitors, are the mainstay of current antihypertensive therapy. Patients with some comorbid conditions were prescribed and required dual combination therapy and severe patients or patients with intense conditions required triple therapy. This is comparable to our study according to Joel Neuteul treatment algorithm of hypertension <sup>[15]</sup>.
- Of the study population, the triple therapy was not most commonly prescribed. Out of which the most widely used combination was Enalapril + Furosemide + Amlodipine accounting for 10% followed by Metoprolol + Furosemide + Amlodipine and Clonidine + Furosemide + Amlodipine accounting for 4% and 3% respectively. The commonly prescribed polytherapy were Furosemide + Clonidine + Metoprolol + Amlodipine and Furosemide + Clonidine + Metoprolol + Enalapril accounting for 2% each. Furosemide + Amlodipine (37%) <sup>[103]</sup>

were the most commonly prescribed dual therapy among the subjects followed by Metoprolol + Enalapril, Clonidine + Amlodipine and Amlodipine + Metoprolol each accounting for 2%.

- Drug-drug interactions (DDIs) were checked with MedScape multidrug interaction checker and Drugs.com Interaction checker. The present study involved neither significant nor potential drug interactions. Almost all the prescriptions were found to be rational.

### CONCLUSION:

Hypertension is arguably the single most important risk factor for many co-morbid diseases that can be modified by timely directions as well as decisive therapeutic intervention

Hypertension management is crucial to achieve correct protection. Despite the availability of several drug classes optimal BP control still remains an open question.

From the present study we have concluded that MONOTHERAPY is frequently used when compared to combination dual therapy, triple therapy. Diuretics (Furosemide), Calcium Channel Blocker (Amlodipine), Angiotensin converting enzyme (Enalapril), Beta blocker (metoprolol) were frequently prescribed Anti-hypertensive class of drugs with prescribed in monotherapy, Dual therapy, Triple therapy with only hypertension and also in all the patients which have hypertension associated with different co –morbid disease.

Most combinations of antihypertensive agents, whether at fixed doses or free combinations, include a diuretic. These combinations have been shown to produce greater blood pressure reductions than those seen with monotherapies Combinations of a calcium antagonist with a renin–angiotensin system inhibitor (RASI), whether an angiotensin-converting enzyme inhibitor (ACEI) or angiotensin receptor blocker (ARB), have been effective and safe in the management of the hypertensive patient

Use of hypertensives does not deviate from guidelines.

Rational drug use should be prioritized in all hospitals and Essential Drug list should be well publicized to enhance medication adherence. The patient counselling by pharmacist has led to better medication adherence and less adverse events which proved the importance of clinical pharmacist.

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