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Prescription Pattern And Patient Counselling Of Hypertention Patients In A Tertiary Care Hospital

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***Abstract: Objective:** Hypertension is a leading contributor to the global burden of cardiovascular morbidity and mortality. The main objective of the present study was to assess the prescription pattern for the hypertension Patients and counsel them and to find out most prescribed drug in each class of hypertensive drug category.*

***Materials and Methods:** A prospective study was carried out for the period of six months in an out patients of general medicine department. Patients who has been diagnosed with hypertension as per JNC-7 guidelines and patients receiving or prescribed with antihypertensive drugs were included. Patient with organ defect and pregnant women were excluded.*

***Result:** A total of 600 prescription were analyzed during the six month study period.63.5% of female and 36.5% of male and only 23% of patients were responded positively towards counselling. The most common drug class involved in the study was ARB(33.8%) followed by CCB(24.2%),BB (3.3%),ACE-I(3%),Diuretic(1.3%) etc.65.7% patients of them found to be monotherapy and 34.3% of them found to be combination therapy. Most commonly prescribed drug in this study population were Telmisartan (67.5%).The most common fixed drug combination in present study was found to be Clinidipine+ Telmisartan (15.5%).*

***Conclusion:** The Present study shows that most commonly prescribed drug classes involved were Angiotensin Receptor blocker followed by Calcium channel blockers. The most commonly Prescribed individual drug was found to be Telmisartan followed by Amlodipine. Patient counselling can be positively impacted on blood pressure control.*

***Keywords:** BB - Beta Blocker, ARB – Angiotensin Receptor Blocker, CCB - Calcium Channel Blocker, ACE – I – Angiotensine Converting Enzyme Inhibitors*

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I. INTRODUCTION

Blood pressure is defined as pressure of blood in the circulatory system often measured for diagnosis since it is closely related to the force and rate of heart beat and diameter and elasticity of the arterial wall. High blood pressure puts strain on heart, increase risk of angina, peripheral artery disease, coronary artery disease, heart attack and heart failure. So lowering blood pressure is most benefit for internal organs such as kidney, heart, brain etc.

Hypertension is the term used to describe high blood pressure, it is a chronic medical condition in which the blood pressure is elevated. Hypertension is one of the most common health problem both in developing and developed countries. It is a chronic illness associated with high morbidity and mortality. According to Med lexicons medical dictionary, hypertension means "Transitory or sustained elevation of systemic arterial blood pressure to a level likely induce cardiovascular damage or other adverse consequences". Study reveal that lowering of blood pressure effectively prevents the adverse outcomes.

The recent World health organization –international society of hypertension (WHO-ISH)recommendation for the treatment of hypertension are consistent with the guidelines established by 7th Join National Committee on Prevention, Detection, Evaluation and treatment of high blood pressure. According to JNC classification SBP<120 & DBP<80mmHg is considered as normal BP, SBP 120-139 or DBP 80-

89mmHg is considered a Prehypertens,SBP 140-159 or 90-99 mmHg is considered as stage1 hypertension and SBP>160 or DBP >100 is considered as Stage 2 Hypertension.

A large number of antihypertensive drugs along or a various combinations are available and physician need to choose the most appropriate drug for a particular patient. Therefore the selection of antihypertensive agents should be primarily based on their comparative ability to prevent these complications. Raised blood pressure increase the risk for cardiovascular disease. Therefore once hypertension is diagnosed, starting rational antihypertensive therapy on long-term basis along with regular followup, lifestyle modification and exercise is immensely important.

Commonly used drugs categories for the treatment of hypertension are Diuretics, ACE inhibitors, Beta blocker, ARB, CCB, alpha blocker etc. According to JNC guideline thiazide type diuretic, ACE inhibitors, ARB, BB, CCB or in combination considered for the initial drug therapy of stage 1 hypertension. In the case of stage 2 hypertension two drug combination (usually thiazide type) diuretic and ACE inhibitors or ARB or BB or CCB are recommended.

This study focus that adherence to antihypertensive medication has control of hypertension & it can be understand by simplifying the number of daily doses of hypertensive drugs. This study represents the current prescribing pattern for anti-hypertensive agents and it highlights certain shortcomings in the existing prescribing practice. This study also focus effect of patient counseling in the case of BP control. This study represents the current prescribing pattern for anti-hypertensive agents and it highlights certain shortcomings in the existing prescribing practice. This study also focus effect of patient counseling in the case of BP control. Patient counselling is defined as providing medication information orally or in written form to the patients or their representatives on directions of use, advice on side effects, precautions, storage, diet and life style modifications. Patient counseling help to improve medication adherence.

Hypertension is a leading contributor to the global burden of cardiovascular morbidity and mortality. Apart from unhealthy lifestyles, lack of awareness about hypertension and distorted public health system contributes to the increased prevalence of hypertension in our country.

AIM AND OBJECTIVES

- ✓ To study the prescribing pattern of Antihypertensive drugs.
- ✓ To study the most common pharmacological class of antihypertensive drug prescribed.
- ✓ To study the most common individual hypertensive drug in each class
- ✓ To study the prescription pattern of antihypertensive drugs against the variable age & sex.
- ✓ To counsel hypertension patients.

II. BACKGROUND AND REVIEW OF LITERATURE

Hypertension is a common disease that is simply defined as persistently elevated arterial blood pressure (BP). The Seventh Report of the Joint National Committee on the Detection, Evaluation, and Treatment of High Blood Pressure (JNC7) is the most prominent evidence-based clinical guideline in the United States for the management of hypertension.

CLASSIFICATION OF HYPERTENSION

RANGES	SYSTOLIC BP	DIASTOLIC BP
NORMAL	< 120mmHg	<80mmHg
PREHYPERTENS	120-139 mmHg	80-89mmHg
STAGE 1 HYPERTENSION	140-159 mmHg	90-99 mmHg
STAGE 2 HYPERTENSION	>160mmHg	>100mmHg

Table 1: Classification of hypertension

ETIOLOGY

In most patients, hypertension results from an unknown pathophysiologic etiology (essential or primary hypertension). This form of hypertension cannot be cured, but it can be controlled. A small percentage of patients have a specific cause of their hypertension (secondary hypertension). There are many potential secondary causes that are either concurrent medical conditions or are endogenously induced. If the cause can be identified, hypertension in these patients has the potential to be cured.

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 auto regulation, and disturbances in sodium, calcium, and natriuretic hormones. Many of these factors are cumulatively affected by the multifaceted RAAS, which ultimately regulates arterial BP. It is probable that none of these factors is solely responsible for essential hypertension; however, most anti hypertensive specifically target these mechanisms and components of the RAAS.

CLINICAL PRESENTATION OF HYPERTENSION

GENERAL

- ✓ The patient may appear very healthy, or may have the presence of additional CV risk factors:
- ✓ Age (≥55 years for men and 65 years for women)
- ✓ Diabetes mellitus
- ✓ Dyslipidemia (elevated low-density lipoprotein-cholesterol, total cholesterol, and/or triglycerides; low high density lipoprotein-cholesterol)
- ✓ Micro albuminuria
- ✓ Family history of premature CV disease
- ✓ Obesity (body mass index ≥30 kg/m2)
- ✓ Physical inactivity
- ✓ Tobacco use Symptoms

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- ✓ Most patients are asymptomatic.

SIGNS

- ✓ Previous BP values in the prehypertension or hypertension category.

LABORATORY TESTS

- ✓ Blood urea nitrogen/serum creatinine, fasting lipid panel, fasting blood glucose, serum electrolytes, spot urine albuminto-creatinine ratio. The patient may have normal values and still have hypertension. However, some may have abnormal values consistent with either additional CV risk factors or hypertension-related damage.

OTHER DIAGNOSTIC TESTS

- ✓ 12-lead electrocardiogram (to detect left ventricular hypertrophy), estimated glomerular filtration rate (using Modification of Diet in Renal Disease equation).
- ✓ 10-year risk of fatal coronary heart disease or non-fatal myocardial infarction, based on Framingham scoring. Target-Organ Damage
- ✓ The patient may have a previous medical history or diagnostic findings that indicate the presence of hypertension-related target-organ damage:
- ✓ Brain (stroke, transient ischemic attack)
- ✓ Eyes (retinopathy)
- ✓ Heart (left ventricular hypertrophy, angina or prior MI, prior coronary revascularization, heart failure)
- ✓ Kidney (chronic kidney disease)
- ✓ Peripheral vasculature (peripheral arterial disease)

CLASSIFICATION AND MANAGEMENT OF BLOOD PRESSURE IN ADULTS ACCORDING TO JNC-7 GUIDELINES

classification	Systolic (mmHg)	Diastolic (mmHg)	Lifestyle modification	Initial drug therapy	
				Without compelling indication	With compelling indication
Normal	<120	<80	Encourage	No antihypertensive drug indicated	Drugs for compelling indication
Pre hypertension	120 -139	80-89	yes		
Stage-1 hypertension	140-159	90-99	yes	Thiazides type diuretic for most, ACE-I,ARB,BB, CCB or in combination	Drugs for the compelling indication+ other antihypertensive drugs(ACE-I,ARB,BB,CCB) as needed
Stage-2 hypertension	≥160	≥100	yes	Two drug combination for most (usually Thiazides type diuretic and ACE-I or ARB or BB or CCB	

Table 2: Classification and management of hypertension According to JNC-7

COMPELLING INDICATORS

Compelling indicators	Drug Treatment
Post myocardial Infarction	ACE-I, Beta blocker
Angina pectoris	Beta blocker,CCB
Heart failure	ACE-I, ARB, Betablocker,Diuretic,aldosterone antagonist
Chronic renal disease	ACE-I, ARB
Diabetes	ACE-I,ARB and others
High coronary heart disease risk	ACE-I, ARB,CCB,Beta blocker and Diuretic

Table 3: Compelling Indicators

MANAGEMENT OF HYPERTENSION

- ✓ The overall goal of treating hypertension is to reduce morbidity and mortality by at least intrusive means possible.
- ✓ Goal BP values are <120/80 mmHg for most patients , but <130/80 for patients with diabetes mellitus, significant chronic kidney disease, known coronary artery disease(myocardial infarction or angina), non coronary atherosclerotic vascular disease (ischemic stroke, transient ischemic attack, peripheral arterial disorder, abdominal aortic aneurysm) and < 120/80 for patients with left ventricular dysfunction.
- ✓

NON PHARMACOLOGIC- THERAPY FOR BLOOD PRESSURE CONTROL

Non pharmacologic therapy includes lifestyle and diet modification to control blood pressure.

- ✓ Regular physical activity
- ✓ Smoking cessation
- ✓ Weight reduction
- ✓ Limiting alcohol
- ✓ Dietary modification

Modification	Amount	Reduction in SBP(mmHg)
Dietary sodium restriction	<30 -50 mmol/d	2 - 8
Moderation of daily alcohol intake	150 – 200 ml	2 - 4
Increased physical activity	30 min 3 times per week	4 - 9
Reduction in body weight	10kg or 22 lb	5 - 10
Adoption of DASH eating plan (high potassium)		8 -14

Table 4: Diet modification for blood pressure control

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PHARMACOLOGIC THERAPY

Drug therapy is initiated when:

- Lifestyle modification alone is not sufficient to achieve target blood pressure.
- Rapid control of blood pressure is needed as in urgencies and emergencies.[8,9]

PHARMACOLOGICAL CLASSIFICATION OF ANTIHYPERTENSIVE DRUGS

✓ Diuretics
- Thiazides: Hydrochlorothiazide, Chlorthalidone, Indapamide.
- High Ceiling:Furosemide
- K^+ Sparing:Spiranolactone,Amiloride

✓ ACE inhibitors
- Captoprils,Enaloprils,Lisinopril,Perindopril,Ramipril, Fosinopril etc

✓ Angiotensin Receptor blockers
- Losartan,Candesartan,Irbesartan,Valsartan,Telmisarta n

✓ Calcium channel blockers
- Verapamil,Diltiazem,Nifedipine,Felodipine,Amlodipi ne,Nitrendipine,Lacidipine,etc.

✓ β Adrenergic blockers
- Propranolol,Metoprolol,Atenolol,etc

✓ β + α Adrenergic blockers
- Labetalol,Carvedilol

✓ α Adrenergic blockers
- Prazosin,Terazosin,Doxazosin,Phentolamine,phenox ybenzamine.
- Central Sympatholitics
- Clonidine,Methyldopa

✓ Vasodilators
- Arteriolar:Hydralazine,Minoxidil,Diazoxide
- Arteriolar+venous: Sodium nitroprusside

DIURETICS

Low dose Thiazides diuretics often are used as first line agents alone or in combination with other antihypertensive drugs. Thiazides inhibit the Na^+/Cl^- pump in the distal convoluted tubule and hence increase sodium excretion. In the long term, they also may act as vasodilators. Thiazides are safe, efficacious, inexpensive, and reduce clinical events. They provide additive blood pressure lowering effects when combined with beta blockers, ACE-I, ARB. In contrast, addition of a diuretic to CCB is less effective. Owing to an increased incidence of metabolic side effects (hyperkalemia, insulin resistance, increased cholesterol) higher doses generally are not recommended. Two potassium sparing diuretics, amiloride and triamterene, act by inhibiting epithelial sodium channel in the distal nephrone. These agents are weak antihypertensive agents but may be used in combination with a Thiazides to protect against Hypokalemia.

ANGIOTENSIN CONVERTING ENZYME INHIBITORS

ACE-I are effective class of antihypertensive, and they may be used as first line antihypertensive agent. ACE-I decrease the production of angiotensin 2, increase bradykinin levels, and reduce sympathetic nervous system activity. Most ACE-I can be dosed once daily for hypertension. They decrease aldosterone and can increase serum potassium concentrations. Acute renal failure is a rare but serious side effects of ACE-I, angioedema is a serious potential complication that occurs in less than 1% of patients. A persistant dry cough occurs in up to 20% of patients due to the inhibition of bradykinin breakdown. ACE-I are absolutely contra indicated in pregnancy.

ANGIOTENSIN RECEPTOR BLOCKERS

ARB's antagonize the angiotensin 2and they directly block the angiotensin type 1 receptor that mediates the known effects of angiotensin 2 (vasoconstriction, aldosterone release, sympathetic activation, ant diuretic hormone release and constriction of the efferent arterioles of the glomerulus). Unlike ACE inhibitors ARB's do not blocks the breakdown of bradykinin. Although this accounts for the lack of cough as side effects. All ARB's have similar antihypertensive efficacy and fairly flat dose- response curves. The addition of low doses of Thiazides diuretics or CCB significantly increases the antihypertensive efficacy. ARB's have the lowest incidence of side effects compared with other antihypertensive agents. Like ACE-I, they may cause renal insufficiency, hyperkalemia, and orthostatic hypotension. ARB's should not be used in pregnancy.

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CALCIUM CHANNEL BLOCKERS

CCB's cause relaxation of cardiac and smooth muscle by blocking voltage sensitive calcium channels, thereby reducing the entry of extracellular calcium into cells. Vascular smooth muscle relaxation leads to vasodilatation and a corresponding reduction in BP. This is a heterogeneous group of agents that includes drugs in the following three classes: phenylalkylamine (verapamil), benzodiazepines (diltiazem), and 1,4 dihydropyridines (nifedipine). Used alone or in combination with other agents. Side effects of flushing, headache, and edema with dihydropyridines use are related to their potencies as arteriolar dilators, oedema is due to an increase in the transcapillary pressure gradients, not to net salt and water retention.

BETA BLOCKERS

Beta adrenergic receptor blockers lower blood pressure by decreasing cardiac output, due to a reduction of heart rate and contractility. Other proposed mechanism by which beta blockers lowers blood pressure include a central nervous system effect and inhibition of rennin release. Beta blockers are particularly effective in hypertensive patients with tachycardia, and their hypertensive potency is enhanced by co-administration with a diuretic. In patients with CHF, beta blockers have been shown to reduce the risk of hospitalization

and mortality. Side effects of beta blockade in the myocardium include bradycardia, AV conduction abnormalities and acute heart failure (cones). Abrupt cessation of beta blocker therapy may produce unstable angina, myocardial infarction, or even death in patient with coronary disease. In patients without heart disease, abrupt discontinuation of beta blocker may be associated with tachycardia, sweating, and generalized malaise in addition to increased BP. For this reasons, it is always prudent to taper the dose gradually over 1-2 weeks before discontinuation.

Alpha adrenergic blocker

Alpha adrenergic blocker lowers blood pressure by decreasing peripheral vascular resistance. They inhibit catecholamine uptake in smooth muscle cells of the peripheral vasculature, resulting in vasodilatation. They are effective antihypertensive agents used either as monotherapy or in combination with other agents. A potentially severe side effect is a first dose phenomenon characterized by orthostatic hypotension accompanied by transient dizziness or faintness, palpitation and even syncope within 1-3 hours of the first dose or after later dosage increases. Sodium and water retention can occur with chronic administration. These agents are most effective when given with a diuretic to maintain antihypertensive efficacy and minimize potential edema.

CENTRALLY ACTING DRUGS

They lowers BP primarily by stimulating alpha -2 adrenergic receptor in the brain, which reduces sympathetic outflow from the vasomotor centre and increases vagal tone, which results decrease in cardiac output, total peripheral resistance, plasma rennin activity and baroreceptors reflexes. Chronic use results in sodium and fluid retention. Other side effects may include depression, orthostatic hypotension, dizziness, and ant cholinergic effects. Abrupt cessation may lead to rebound hypertension.

Class	Example with dose range	Indicated in	contraindication	Adverse effects
ACE-I	Captopril:25-200mg(2) Enelapril:5-40mg(1-2) Lisinopril:10-40mg(1) Ramipril:2.5-20mg(1-2)	Young individuals, Diabetes, post MI	Renal failure,hyperkalemia ,renal artery stenosis, pregnancy and lactation	Dry cough, Hyperkalemia
ARB	Losartan:25-100mg(1-2) Telmisartan:20-80mg(1)	Young individuals, Diabetes, Post MI, ACE induced cough	Renal failure, Hyperemia,Rrenal artery stenosis, Pregnancy and Lactation	
Beta blockers	Atenolol:25-100mg(1) Metoprolol:25-100mg(1-2) Nebivilol:5-20mg(1)	Young individuals, Associated coronary artery disease	Asthma, Conduction blocks, Peripheral vascular disease	Impotence
CCB	Amlodipine:2.5-10mg(1) Nifedipine:30-60mg(1) Diltiazem:180-420mg(1)	Elderly, isolated systolic hypertension	Conduction blocks for diltiazem and verapamil	Pedal oedema Flushing
Diuretics	Hydrochlorthiazide:6.25mg(1-2) Furosemide:40-80mg(2-3)	Heart failure, Isolated systolic hypertension	Gout and Dyslipidemia	Gout
Alpha blocker	Prazosin:2-20mg(2-3) Terazosin:1-10mg(1-2)	Elderly with BPH		Postural hypotension
Centrally acting drugs	Alpha-methyl dopa:250-1000mg(2) Clonidine:0.1-0.6mg(2)	Resistant hypertension, Pregnancy		Postural hypotension, Rebound hypertension

Table 5: Therapeutic classes of antihypertensive drugs

Patient counselling is defined as providing medication information orally or in written form to the patients or their representatives on directions of use, advice on side effects, precautions, storage, diet and life style modifications.

BARRIERS TO PATIENT COUNSELING

Patient counselling may not take place in community pharmacies due to various reasons, known as barriers. These barriers are classified as patient-based, provider based and system based barriers

PATIENT BASED BARRIERS: In India, many patients are unaware that pharmacists may provide counselling and generally ask their prescriber about medication use. Gender and language differences may also inhibit patients from asking the pharmacist about medication.

PROVIDER BASED BARRIERS: Many pharmacists lack the confidence to counsel patients due to lack of knowledge and counselling skills. A heavy patient load for prescription filling is also an important barrier in many practice situation

SYSTEM BASED BARRIERS: In India, counselling is not a mandatory legal requirement and officially pharmacists are not entitled to charge for dispensing or for the information provided to patients. These factors act as regulatory and financial disincentives to providing

A counseling service. Lack of privacy in many busy community and hospital pharmacies can also be a problem[1].

III. SKILLS AND TECHNIQUES

The counseling process uses verbal and non-verbal communication skills.

Verbal communication skills include language and paralinguistic features such as tone, volume, pitch and rate of speech. Paralinguistic, or the way we say words, accounts for 40% of how a message is received, so the way in which we speak has an impact on patient understanding.

Language: When speaking to patients, use simple language and avoid unnecessary medical terminology. If possible speak the patient's own language.

Tone: During counseling, the tone of our voice has a great impact on patient understanding. Changes in the level and range of pitch convey information about the feelings and attitudes of the person speaking. When counseling, the tone of the voice should be caring and reassuring.

Volume: Many people speak with wide variations in volume, depending on the situation, and where and to whom they are speaking. Ideally, counseling should be conducted in a quiet, private setting where it is unnecessary to raise one's voice. Although it may be necessary to speak more loudly to patients with a hearing problem, most deaf patient gain more benefit if the speaker moves closer, and directs their voice towards the patient's ear.

Speed: The clarity of our communication depends on our rate of speech. Patients may be reluctant to interact with a pharmacist who speaks quickly because they may feel the pharmacist is too busy. Those may happen if the pharmacist is nervous or is uncertain about the information being given. In contrast, a person who speaks too slowly may lose the interest

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of the listener. For good verbal communication, the pharmacist should present clear, relevant messages in a logical sequence, and at a speed which gives the patient time to think about what is being said. This will help the patient understand and remember the concepts more easily.

NON-VERBAL COMMUNICATION

This includes body language such as the movement and position of the head, limbs and body, and other aspects such as whether the pharmacist is dressed in a professional manner. During any interaction, approximately 50% of the way a message is conveyed comes from body language. Aspects of non verbal communication include proximity, touch, eye contact, facial expression, head movements, gestures with hands and arms and body postures.

Proximity: This refers to the distance that people maintain between themselves during the counseling process. This space has been classified in to four zone: intimate (945 cm or less), personal (45 cm to 1.2 m), social (1.2-3.6m) and public (>3.6m). Generally, counselors and healthcare professionals use intimate or personal proximities.

Eye contact: The amount that people look at one another during conversation varies depending on whether they are speaking or listening. Listeners look at the speaker more often and for longer periods of time. For cultural or personal reasons such as timidity, sadness or depression, some people may avoid looking into the counselor's eyes.

Facial expression: These can be used during counseling to demonstrate empathy towards the patient.

Head movements such as nodding, hand gestures and body postures also can be used to advantage

- ✓ Deepali P Leman *et al* (2016) conducted study on An Overview of rational prescribing pattern in hypertensive patients in a tertiary care hospital at medicine dep. Of Bharathi hospital & Research Centre Pune. This study reveal that in hypertensive patients ARBS are the leading group of anti hypertensive agent as monotherapy & ARBs with Diuretics as a combination therapy according to JNC - 7.[13]
- ✓ Rakesh Romdy *et al* (2016) conducted study on an assessment of antihypertensive drug prescription pattern and adherence to joint national committee &hypertensive treatment guide lines among hypertensive parents attending a tertiary care teaching hospital, In this study art of 500 patients 299 (59.8%) were male & 201 (40.2%) were female, as per this study most of the physicians prescribed single drug (monotherapy) to control BP followed by combination therapy and ARB + DU combination was mostly used in two drug combination therapy. This study can conclude that physician not completely adhering to standard guidelines while treating hypertensive with co morbid condition.
- ✓ Pyarelal *et al* (2015) conducted observational, prospective, cross sectional study on prescribing pattern of antihypertensive,60% patients are presented with associated co-morbidities, among them Diabetes mellitus is the most frequent one . It was found that ARB s are the most commonly prescribed drug class, followed by CCBs, ACE-Is and be concluded that the therapeutic regimen depends on age and co-morbidities.
- ✓ Johan Pandyan J *et al* (2015) conduct a descriptive observational study of pattern of antihypertensive drug utilization in a tertiary care hospital ; In this study CCBs are the most commonly prescribed antihypertensive medication followed by ACE-Is ,ARBs ,Beta blockers and lastly Diuretics
- ✓ Sunitha Pawar *et al* (2014) conduct study on effect of pharmacist mediated patient counselling in hypertensive patients in terms of knowledge, compliance, and life style modification at Bharati Hospital, Pune. This study confirmed that the pharmacist provide patient counselling in effective in improving patient knowledge towards the decease management
- ✓ Jassim *et al* (2014) conducted a study on Antihypertensive Drug Prescription Trends at the Primary Health Care Centres at Bahrain Pharmacoepidemiol Drug Safe, 10(3), 219-227 (2014) and this study concluded that pattern of prescription follows WHO and JNC guidelines, Newer classes of antihypertensive drugs have minimal impact on the prescribing profile. Almost two thirds of the patients were treated with monotherapy.
- ✓ Mirza Atif Beg *et al* (2014) conducted a prospective study on prescribing pattern in hypertensive patients in a tertiary care teaching hospital; In this study the most commonly prescribed drug were ARBs(33.5%) and ACE-I(16.7%),followed by beta blocker(13.63%)and CCBs(11.91%).32.28% antihypertensive were prescribed from essential drug list. The study concluded that rational prescribing requires consideration to dose duration and interaction with other medicines.
- ✓ Arif *et al* (2013) Conducted a study on Evaluation of prescribing pattern of antihypertensive drugs in a tertiary care hospital,Dep.of Cardiology at Krishna institute of medical science ,Hyderabad and researcher observed that physicians had preferred monotherapy more oftenly than the combinations and the most frequently prescribed agent among monotherapy was ACE Inhibitor class of Hypertensive
- ✓ Arshad H. Mohd *et al* (2012) conducted study on prescribing pattern of antihypertensive in Geriatric patients, it conclude that most commonly prescribed drug classes involved were Ca Channel blockers followed by angiotensin II receptor antagonist and also found that age was one of the co-factor of hypertension.
- ✓ Windak *et al* (2010) studied Competence of Polish Primary-care Doctors in the Pharmacological Treatment of Hypertension, J. Eval. Clin. Pract., 16(1), 25-30 (2010). In this study poor compliance with treatment guidelines noted; As per this study ACE inhibitors were the most frequently prescribed medication.
- ✓ Etuk *et al* (2008) studied Prescription Pattern of Anti-Hypertensive Drugs in a Tertiary Health Institution in Nigeria. Annals of African Medicine, 7(3), 128-132 (2008).In this study 145 patients are studied and 20% of them on monotherapy and 80% on combination therapy. Diuretic are the most frequently prescribed drug as antihypertensive.[10]

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IV. MATERIALS AND METHODOLOGY

MATERIALS

- ✓ Informed consent form

To enroll patients into the study, an informed consent in the local language (Malayalam) was prepared.

- ✓ Patient data entry form

For recording the necessary data from sources, a data entry form was designed by including socio-demographic data of patients, educational qualification, Diagnosis etc.

- ✓ Patient counselling leaflet

This include a concise details regarding hypertension.

METHODOLOGY

STUDY SITE

The study was conducted in Iqraa international Hospital and Research Centre. Iqraa Hospital is a tertiary care referral hospital set up with capacity of 350 beds. The various specialties in the hospital are; 24 hours accident and trauma care unit, General medicine, pediatric and neonatal, Obstetrics and Gynaecology, Orthopaedics, Pulmonology, Cardiology and Cardiothoracic surgery, General surgery, laparoscopic surgery, Neuroscience, Nephrology, Anaesthesiology, Ophthalmology, Neurology, psychiatry, urology, radiology, CT scan, Dialysis Unit, Physiotherapy unit, Dental and Maxilla Facial surgery, Diabetology etc.

STUDY POPULATION

Hypertensive patients receiving at least one antihypertensive drugs, in general medicine department.

SAMPLE SIZE

600 Hypertensive patient with co-morbidities from out patients of general medicine department at Iqraa international hospital and research Centre.

STUDY DURATION

6 months (2017 January to June)

STUDY DESIGN

A single Centre prospective observational study

STUDY PROCEDURE

A hospital based observational study was carried out for a period of 6 months (2017 January to 2017 June) at Iqraa international hospital and research Centre. Ethical approval of study was obtained from the Ethical committee of Iqraa hospital.600 patients receiving at least one antihypertensive drugs, with or without co-morbidities were included. Subjects were selected on the bases of inclusion and exclusion criteria, Data were collected from the case records of the patients and by interviewing the patient or bystanders. The data were entered into a predesigned data form and the filled data form is analyzed to various parameters like age distribution,genderdistribution,duration of hypertension, therapeutic category of drug, Social habits of patients, co-morbid condition etc.

STUDY CRITERIA

INCLUSION CRITERIA

- ✓ Patient receiving at least one hypertension medication.
- ✓ Patients of both sex.
- ✓ Out patients of general medicine department
- ✓ Patients of age more than 18 years

EXCLUSION CRITERIA

- ✓ Patient with organ defect
- ✓ Pregnant women
- ✓ Children
- ✓ Non-Indian
- ✓ Psychiatric patients with hypertension
- ✓ Intensive care patients in hospital settings.

DATA COLLECTION

- ✓ From patient medical history
- ✓ By direct interview with patient or bystanders.

PARAMETERS FOR EVALUATION

- ✓ Most commonly prescribed drug class and individual drug prescribed
- ✓ Drug suitable for all age
- ✓ Prescribed drug in co morbidities
- ✓ Most common multidrug combination

STATISTICAL ANALYSIS

The collected data from the study was tabulated in Microsoft Excel 2010 were analyzed using statistical package for Social Science (SPSS, SPSS Inc, Instat, Chicago, IL, USA). t-test and Chi-square test were used for data analysis .$P<0.05$ was considered significant.

V. RESULTS

A total of 600 patients who are using one antihypertensive drug in Iqraa international Hospital and Research Centre, are enrolled in the study. Patient data sheet were collected and all patients were counseled. The collected data was evaluated to understand the prescription pattern of hypertension patients.

PATIENT'S CHARACTERISTICS

CATEGORIZATION OF STUDY POPULATION BASED ON AGE

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AGE	NUMBER OF PATIENTS	PERCENTAGE
30-39	39	6.5
40-49	88	14.7
50-59	151	25.2
60-69	163	27.2
70-79	121	20.2
80-89	36	6.0
90 ABOVE	2	0.3
TOTAL	600	100.0

Table 6

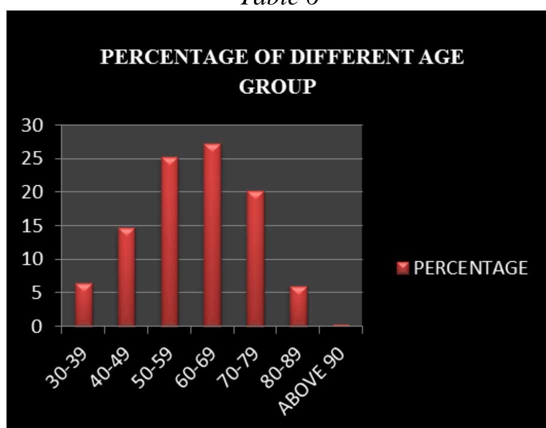

Figure 1: Percentage of different age group

Above figure and table shown that out of 600 patients, majority patients 163(27.0%) were in age group of 60-69 years, followed by 151 patients(25.5%) in 50-59 year,121 patients(20.2%) in 70-79 years,88 patients (14.7%) in 40-49 years,39 patients(6.5%) in 30-39 years , in 36 patients(6%) in 80-89 years and 2 patients(0.3%) in age above 90 years.

CATEGORIZATION OF STUDY POPULATION BASED ON GENDER

SEX	FREQUENCY	PERCENTAGE
FEMALE	381	63.5
MALE	219	36.5
TOTAL	600	100.0

Table 7

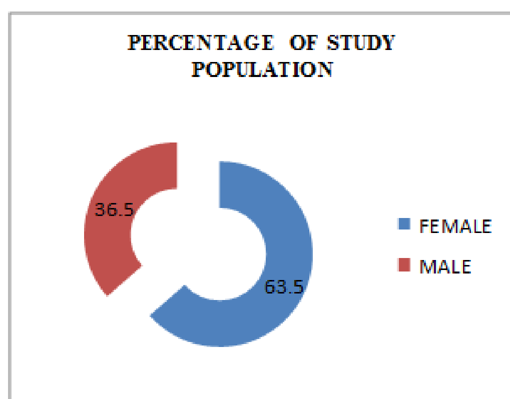

Figure 2: Percentage of Study Population

The above table and figure shows that out of the 600 patients 381(63.5%) were females while 219 (36.5%) were males, which indicates that higher prevalence of hypertension was in female population when compared with male.

FREQUENCY OF DIFFERENT STAGES OF HYPERTENSION

BP	frequency	Percentage
Normal(120/80mmHg)	70	11.67
Pre-hypertension (130/89mmHg)	150	25
Stage-1 hypertension (159/99 mmHg)	230	38.33
Stage-2 hypertension (160/100)	150	25

Table 8

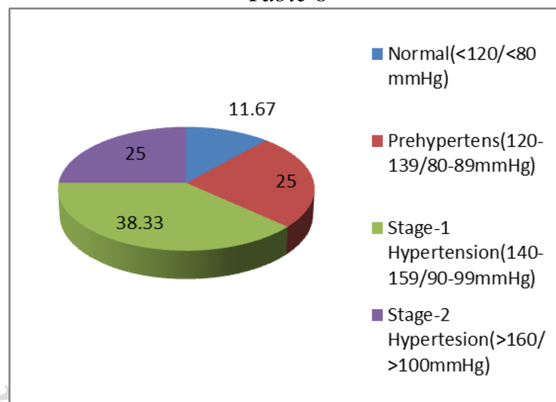

Figure 3: Frequency of Different stages of Hypertension

Above data indicates that ,During study period 38.33%(n 220) had stage -1 hypertension ,25%(n150) of patients were prehypertension ,25% of patients had stage-2 hypertension, and 11.67%(n70) were found to be normal.

DEMOGRAPHIC DATA OF HYPERTENSIVE PATIENTS BASED ON SOCIAL HABIT

Habits		Sex: Male	Sex: Female	Total
Smoking		110	2	112
		50.22%	0.522%	18.6%
Alcoholism		91	3	94
		41.66%	0.78%	15.66%
Food	Vegetarian	19	81	100
		8.6%	21.25%	16.7%
	Non vegetarian	200	300	500
		91.32%	78.8%	83.3%

Table 9

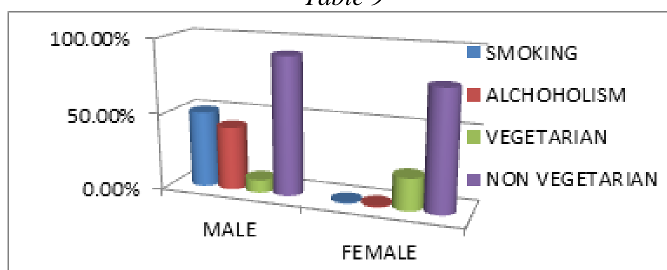

Figure 4: Demographic data of Hypertensive Patients based on Social Habit

From the above data 50.22%(n=110) of male patients were found to be smokers and 41.66% (n=91) of them had

alcohol consumption. In the case of male patients 8.60% patients were found to be vegetarians and 91.32% of them were Non vegetarians. In the case of female patients 21.25% were vegetarians and 78.80%were non-vegetarians.

SOCIO-DEMOGRAPHIC DATA OF PATIENTS

variables		frequency	Percentage
Family history of HTN	No	100	16.66
	Yes	500	83.33
Duration of Treatment for HTN in years	1-3 years	80	13.33
	4-6 years	220	36.67
	7-9 Years	150	25
	10 and above years	50	8.33

Table 10

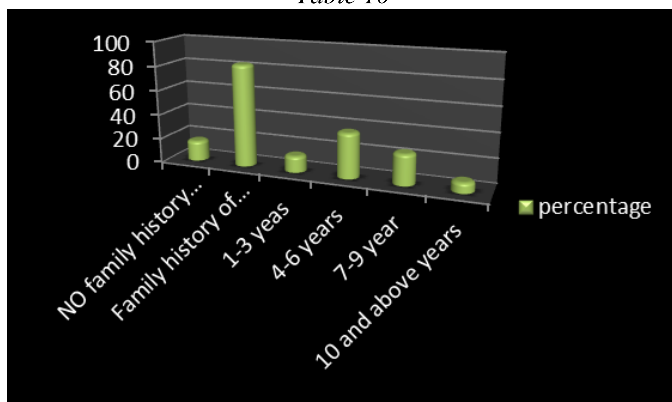

Figure 5: Socio-demographic data of patients

The above data shows that Majority of patients had history of HTN (83.33%n=500). Most of the patients had duration of therapy 4-6 years (36.7%,n=220)

PATIENT COUNSELLING RESPONDS

PATIENT RESPONDS	NO. OF PATIENTS	PERCENTAGE
GOOD RESPOND	138	23
NOT RESPOND	462	77

Table 10

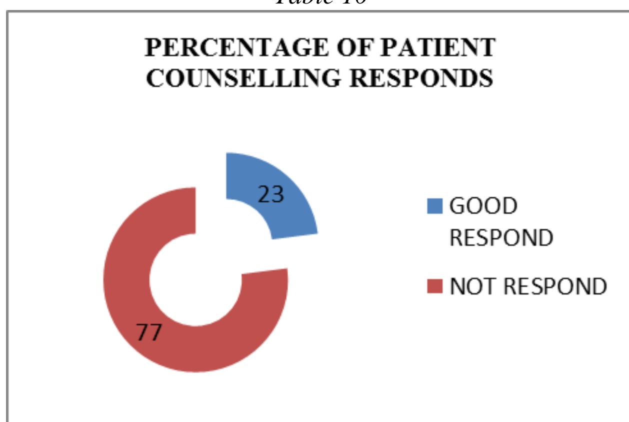

Figure 6: Percentage of Patient counselling responds

The above data shows out of 600 patients only 138 number of patients (23%) were responded well towards counselling. Rest of them were not responded (77%).

PERCENTAGE OF DIFFERENT PHARMACOLOGICAL CLASSES OF ANTIHYPERTENSIVE DRUG PRESCRIBED

Drug Class	Drug	Frequency	Percentage
ARB	**LOSARTAN**	**102**	**17%**
	TELMISARTAN	**299**	**49.83%**
CCB	**AMLODIPINE**	**212**	**35.33%**
	CLINIDIPINE	**97**	**16.16%**
DU	**CHLORTHALIDONE**	**14**	**2.33%**
	HYDROCHLOROTHIAZIDE	**33**	**5.5%**
	FUROSEMIDE	**7**	**1.16%**
BB	**NEBIVOLOL**	**7**	**1.16%**
	CARVEDILOL	**17**	**2.833%**
	PROPRANOLOL	**2**	**0.33%**
ACE-I	**CAPTOPRIL**	**12**	**2%**
	LISINOPRIL	**6**	**1%**

Table 11

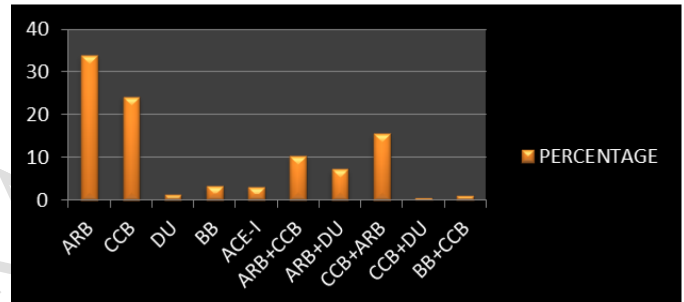

Figure 7: Percentage of different Pharmacological classes of Antihypertensive drug prescribed

The above data shows in the case of monotherapy most prescribed one was ARB(33.8%) followed by CCB 24.2% (n=145),Beta blocker 3.3%(n=20), ACE-I 3%(n=18) and finally Diuretic 1.3% (n=1.3%).In the case of combination therapy most prescribed one was fond to be CCB+ARB 15.5%(n=93). Followed by ARB+CCB 10.2%(n=61), ARB+DU 7.2%(n=43), BB+CCB 1%(n=6) and CCB+DU 0.5%(n=3).

MODE OF THERAPY

MODE OF THERAPY	NO.OF PATIENTS	PERCENTAGE
MONOTHERAPY	394	65.7
COMBINATION THERAPY	206	34.3
TOTAL	600	100

Table 12

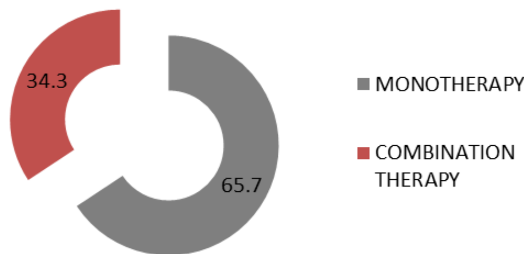

Figure 8: Percentage of mode of therapy

The above data shows 394 number of patients out of 600 (65.7%) under monotherapy and 206 number of patients (34.3%) under combination therapy.

PERCENTAGE PRESCRIBING OF MONOTHERAPY AGENTS FOR TREATMENT

Drug	No. Of patients	Percentage
ARB	203	33.8%
CCB	145	24.2%
DU	8	1.3%
BB	20	3.3%
ACE-I	18	3.0%

Table 13

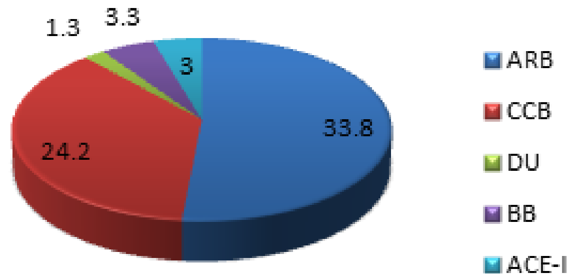

Figure 9: Percentage Pescribing of Monotherapy

The above data shows that ARB s were the most commonly prescribed drug as monotherapy(33.8%), followed by CCB(24.2%), BB(3.3%), ACE-I(3%) and finally Diuretic(1.3%).

PERCENTAGE OF DOUBLE COMBINATION PRESCRIBED

DOUBLE COMBINATION	FREQUENCY	PERCENTAGE
Telmisartan 40mg+Amlodipine 5 mg	**40**	**6.66%**
Clinidipine 10 mg + Telmisartan 40 mg	**93**	**15.5%**
Telmisartan 40 mg +Amlodipine 10 mg	**21**	**3.5%**
Nebivilol 5 mg+Amlodipine 5 mg	**6**	**1%**
Telmisartan 80 mg + Hydrochlor thiazide25mg	**10**	**1.6%**
Amlodipine 5 mg + Furosemide 40 mg	**1**	**0.16%**
Losartan 50mg + Hydrochlor Thiazides 12.5	**20**	**3.33%**
Amlodipine 5 mg +Chorthalidone	**2**	**0.33%**
Telmisartan 40 mg+ Chlorthalidone 12.5mg	**13**	**2.16%**

Table 14

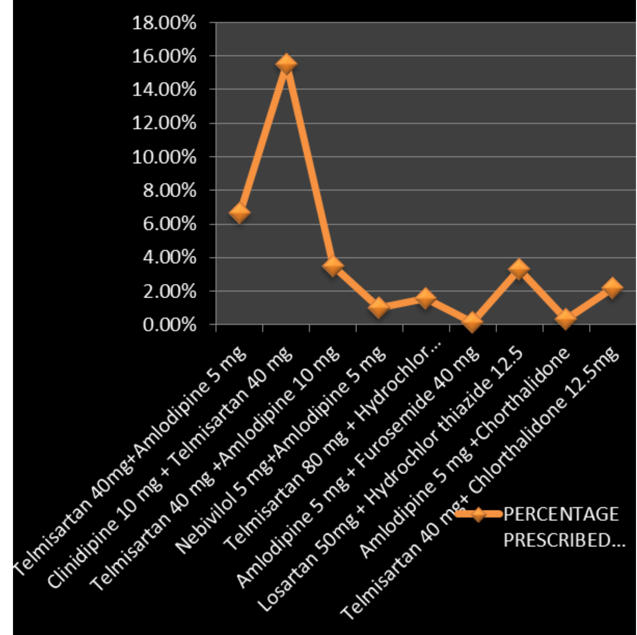

Figure 10: Percentage prescribed combination therapy

The above data shows that most frequently prescribed combination was Clinidipine and Telmisartan(n=93)15.5%, Followed by Telmisartan 40mg+Amlodipine 5mg(6.6%), Telmisartan 40 mg +Amlodipine 10 mg(3.5%) and Losartan 50 mg+Hydrochlorthiazide 12.5mg.

PERCENTAGE PRESCRIBING OF INDIVIDUAL DRUG IN DIFFERENT CLASS OF ANTI HYPERTENSIVE

Drug Class	Drug	Frequency	Percentage
ARB	LOSARTAN	102	17%
	TELMISARTAN	299	49.83%
CCB	AMLODIPINE	212	35.33%
	CLINIDIPINE	97	16.16%
DU	CHLORTHALIDONE	14	2.33%
	HYDROCHLOROTHIAZIDE	33	5.5%
	FUROSEMIDE	7	1.16%
BB	NEBIVOLOL	7	1.16%
	CARVEDILOL	17	2.833%
	PROPRANOLOL	2	0.33%
ACE-I	CAPTOPRIL	12	2%
	LISINOPRIL	6	1%

Table 15

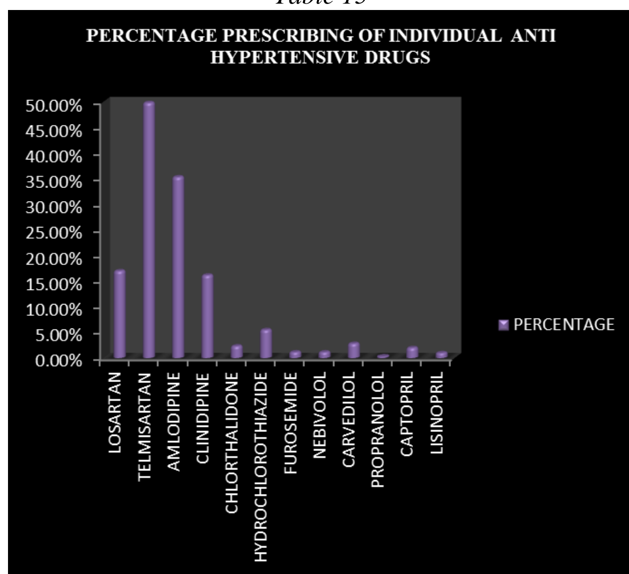

Figure 11: Percentage prescribing of individual antihypertensive drug

From the above data was found to be that Telmisartan was the most commonly prescribed(49.83%) anti hypertensive drugs belongs to the class Angiotensin receptor blockers, Followed by Amlodipine(35.33%) Belongs to the class Calcium Channel Blockers

RELATIONSHIP BETWEEN DRUGS AND BP

CLASS OF DRUGS	NUMBER OF PATIENTS	MEAN SYSTOLIC PRESSURE	MEAN DIASTOLIC PRESSURE
ARB	203	151	83
CCB	145	145	84
DU	8	172	87
BB	20	165	88
ACE-I	18	155	84
ARB+CCB	61	153	86
ARB+DU	43	165	88
CCB+ARB	93	158	86
CCB+DU	3	176	86
BB+CCB	6	171	85

Table 16

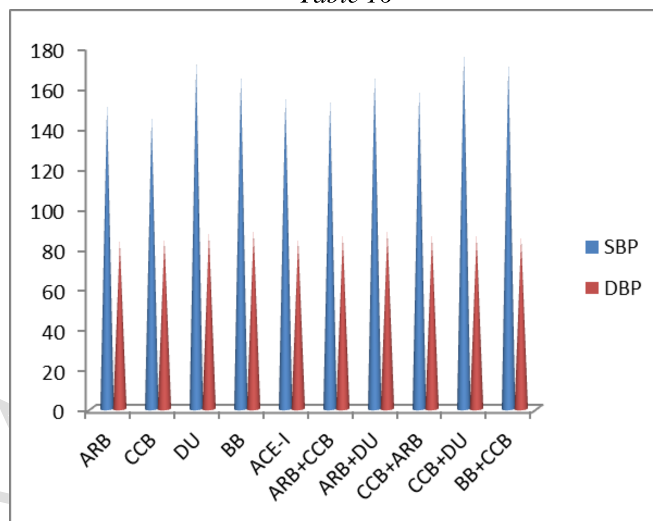

Figure 12: Relationship between drug and BP

From ANOVA test using above data got a significant value (.000) in the case of diastolic blood pressure between groups of drugs. But in the case of systolic blood pressure between groups got value 0.131,it is not significant. This shows during treatment diastolic blood pressure of patients were changed than systolic blood pressure of patients. To understand which combination is more effective done multiple comparison test. From this test shows CCB+ARB have greater effect on DBP.

PERCENTAGE PRESCRIBING ANTI HYPERTENSIVE DRUGS WITH AGE

DRUG	AGE						
	30-39	40-49	50-59	60-69	70-79	80-89	90 ABOVE
ARB	38.5	35.2	44.4	31.9	25.6	19.4	0
CCB	30.8	23.9	18.5	26.4	26.4	22.2	50
DU	1	1.1	0	1.2	3.3	2.8	0
BB	0	5.7	2	1.8	5.8	5.6	0
ACE-I	2.6	1.1	2.6	2.5	3.3	11.1	0
ARB+CCB	10.3	8	7.9	15.3	8.3	5.6	50
ARB+DU	10.3	12.5	7.9	3.1	6.6	8.3	0
CCB+ARB	2.6	9.1	16.6	15.3	20.7	25	0
CCB+DU	0	1.1	0	1.2	0	0	0
CCB+BB	5.1	2.3	0	1.2	0	0	0

Table16

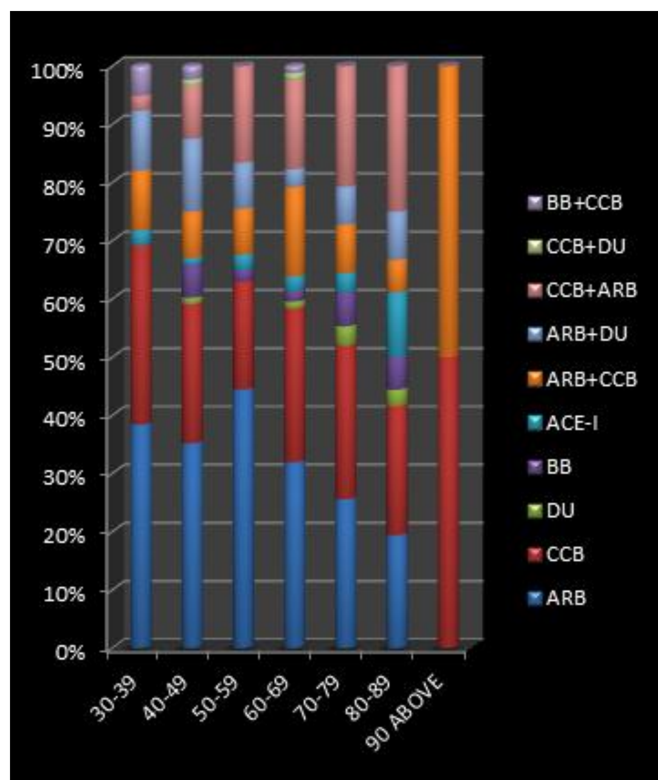

Figure 13: Percentage prescribing anti hypertensive drugs with age

The above data shows in the case of age group 30-39 most prescribed drug was ARB(38.5%),followed by CCB(30.8%),ARB+CCB(10.3%).In the case of age groups 40-49, 50-59 & 60-69 also most prescribed drug is ARB(35.2% , 44.4%and 3.9%) respectively. In the case of age groups 70-79 and 80-89most prescribed drug was found to CCB 26.6%&22.2% respectively. In the case of age group above 90 CCB and ARB+CCB combination was prescribed equally, 50% each one. Chi-square test done for understanding which drug was more prescribed within all age group, Got a statistical significant 0.007, which is less than 0.05 so it is statically significant.

PERCENTAGE PRESCRIBING ANTI-HYPERTENSIVE DRUG WITH GENDER

Gender	Drug									
	ARB	CCB	DU	BB	ACE-I	ARB+CCB	ARB+DU	CCB+ARB	CCB+DU	CCB+BB
Female	124 32.5%	92 24.1%	5 1.3%	13 3.4%	10 2.6%	37 9.7%	27 7.1%	67 17.6%	2 0.5%	4 1.0%
Male	79 36.1%	53 24.2%	3 1.4%	7 3.2%	8 3.7%	24 11%	16 7.3%	26 11.9%	1 0.5%	2 0.9%

Table 17

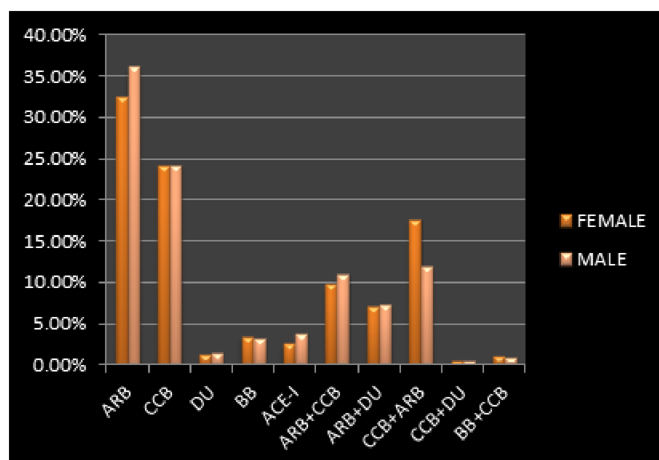

Figure 14: Percentage prescribing anti-Hypertensive drug with gender

From this data found to be that ARBs are most prescribed individual drug for females and males (32.5%,36.1% respectively).In the case of combination therapy also most prescribed one same both females and males(17.6%,11.9%).

VI. DISCUSSION

Hypertension is worldwide problem. Antihypertensive drugs were prescribed to control and prevent the morbidity and mortality associated with hyper tension. Optimal blood pressure control is achieved by adherence to treatment guide lines and to the therapy. Adherence to treatment guidelines can be monitored by several methods prescription pattern studies are once such important method.

This study was conducted in a tertiary care referral hospital in Malabar Region, Kerala, India. A total of 600 cases were recorded and analyzed drug a period of 6 months. The majority of patients were females (63.5%) the prevalence is high lights among obese female and hence obesity is a risk factor for developing hypertension. This result is differ from that observed by Rakesh Rombay *et al* and Mohammed Arif *et al.*

The majority of patients were in age group 60 to 69 (27.2%) hence the rest suggest that age is a risk factor for developing hypertension. Prevalence of hyper tension in a age group 60 to 69 may be due to coexisting illness, hypertensive complication or poor adherence to the hypertensive therapy. This result were similar to the finding of study conducted by Arshad S Mohammed *et al*(2012)

With regard to the patients family history, most of the patients had family history of hypertension. That family history back ground hence a positive trend towards the development of hyper tension. This finding may be due to the fact that genetic factors may play a major roll in the development of hypertension.

Based on treatment modality 65.7% were on monotherapy, with the rest receiving combination therapy (34.3%). The most commonly prescribed drug classes as a monotherapy were ARB followed by CCB and BB. This result consistent with Deepali P Limen *et al* (2016). In presence study diuretics were used as a monotherapy at least

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level. It may be due to adverse effect of diuretics on glucose homeostasis and lipid profile.

From the study population majority of the subjects (91.32%) were non vegetarian, food containing high amount of saturated and total fats and this lead to the development hypertension. Smoking is one of the major risk factor for developing hypertension. In this study 50.53% of male populations were smokers. International guide lines suggest that cessation of smoking is one of the major steps in improving the life style for reducing blood pressure.

Patient Counselling can be improve quality of life of patients, but in present study Only23.00 %(n=138) patients out of 600 had a good responds towards counselling. It is mainly due to the patient based barrier and system based barrier, and also due to Lack of privacy in busy hospital pharmacy.

LIMITATION OF STUDY

Main limitation of study is the lack of detailed patient records, justifying the prescribed drugs based on the grade of hypertension, Presence of complications, previous drug therapy. Those patients whose medical and medication history was not available. Not getting enough time to counselling patients is one of the other limitation of present study.

VII. CONCLUSION

- ✓ Hyper tension is progressive and complex disorder that is difficult to effectively manage in the long term
- ✓ The present study is used to evaluate the prescription pattern of anti-hypertensive drugs and for counselling the patients.
- ✓ In this study enrolled female than male so female were found to be more prone to hypertension than males, with most of the patients belonging to the age group (60 to 69)
- ✓ ARBs are the most commonly prescribed anti-hypertensive drug class for all age group.
- ✓ Telmisartan was the most commonly prescribed individual drug
- ✓ Most of the patients are stable with one anti-hypertensive drug and mono therapy was the preferred mode of therapy
- ✓ In conclusion this study high lights the need for conducting prescription pattern to reduce the expenditure on medication.
- ✓ This study also highlights the need for patient counselling for improving quality of life of patients.
- ✓ Clinical pharmacist can play a role in promoting rational drug use and improving adherence to medication through patient counselling.

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