

Prescribing Patterns of Antihypertensive Drugs in Tertiary Care Hospital

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Abstract :

Background: Hypertension is globally considered to be the greatest mortality risk factor for both men and women and is regarded as a modifiable risk factor of the non-communicable diseases (NCDs) of lifestyle. The goal of the present study was to describe the antihypertensive medication prescribing patterns for inpatients with hypertension at a University teaching hospital in order to better understand the patterns of care for inpatients and

Objectives: Primary objective: To evaluate the Prescribing Pattern in Hypertension. potential opportunities for improvement in hypertension management. Secondary objective: To find the Association of Hypertension with Type 2 DM. To Associate the Age with Hypertension.

Methodology: This study was conducted at Mallige hospital. Mallige hospital is a multispecialty tertiary care hospital with over 126 beds conveniently located in the Bengaluru, Karnataka state of India. Mallige hospital consist of inpatient department with consist of General ward, Male ward , Female ward , Intensive care unit , Surgical ward, etc. The study involves both Prospective and Retrospective Observational Study. Study was conducted for 6 months in which data collection period for 3 months. Inclusion criteria: Patient having the age of 18 years and above. Patient known to be on antihypertensive medication one or more. Exclusion criteria: Patient not willing to sign the consent form. Patient data not available completely. Pregnant and lactating women. The study was conducted by randomly collecting the prescriptions containing antihypertensive drugs of patients who are visiting the department. Prescriptions containing antihypertensive drugs were evaluated for the category of antihypertensive prescribed and indication for use.

Results: A total number of 110 patients were enrolled in the study of which 68 (61.81%) were male patients and 42 (38.18%) were female patients. The incidence of hypertension was more common in male compared to female. The maximum percentage of male and females with hypertension was found at the age group of 61-80 years (51.81%). This result showed most of the patients were diagnosed with pre-hypertension 58 (52.72%), stage 1 hypertension 24 (21.81%) and stage 2 hypertension 18 (16.36%). Various co-morbid conditions like diabetes mellitus, cardiovascular disease, Arthritis, dyslipidemia was seen among patients and many of these were found to be risk factors of Hypertension. Diabetes mellitus (34.54%) and cardiovascular disease (17.27%) were the two most common co-morbid conditions found in most of the patients which increase the risk of Hypertension. The family history of the patients revealed that majority of the patients (74.54%) does have family history of hypertension, followed by (25.45%) in whom there was no family history of Hypertension. In the study of 110 hypertension patients I observed that Amlodipine utilization was high as monotherapy (25.5%). Telmisartan + Hydrochlorothiazide was used most widely (19.46%) as a combination therapy. Total number of drugs prescribed were 512. Average number of drugs per prescription were 4.65. Number of appropriate prescriptions were 102 (92.72%) and Number of inappropriate prescriptions were 8 (7.27%).

Conclusion: The present study represents the current prescribing trend for antihypertensive agents. It implies that in hypertensive patients using the monotherapy is more common than combination therapy. Each of the antihypertensive therapy classes is roughly equally effective in lowering the blood pressure, producing a good antihypertensive response in 30 to 50 percent of patients. There is, however, wide interpatient variability as many patients will respond well to one drug but not to another. In developing countries like India, more systematic studies are required on the evaluation of prescribing patterns and guideline based antihypertensive medications' use, which can be tailored to suit the patients' requirements.

Keywords: hypertensive, anti-hypertensive, HTN, Monotherapy; Prescribing Pattern.

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I. Introduction

Hypertension is globally considered to be the greatest mortality risk factor for both men and women and is regarded as a modifiable risk factor of the non-communicable diseases (NCDs) of lifestyle. ^[1] Hypertension is also called as silent killer. The strong reason behind this name given to hypertension as silent killer is that the patient externally looks like fit and fine and in most cases, physician could not find any signs and patient also don't have any symptoms until disease gets established. Hypertension internally affects various target organs. If it affects brain then it is called neuropathy. Whenever hypertension affects kidneys it is called nephropathy. When hypertension affects eyes, it is called retinopathy. High blood pressure (BP) was the foremost cause of death worldwide in 2008, responsible for 13 - 14% of global mortality or about 7.5 million deaths. ^[4] Hypertension is a major risk factor for cardiovascular disease, and has been associated with two-thirds of strokes and almost half of ischemic heart disease cases globally. ^[2] The World Health Organization (WHO) mentions that the percentage of adherence to treatment of patients with chronic diseases reaches 50% in developed countries, and that approximately 20% of the world population suffers from HT while only between 3 and 34% of this group control their blood pressure with antihypertensive treatment. ^[3] The risk for its development increases with age, lifestyles and associated comorbidities. ^{[4],[5]} Different preventive strategies for HT have been established, specifically related to lifestyles, especially diet and exercise. Once the diagnosis has been established, it is sought to limit the damage in target organs by means of medications; however, lack of control and poor adherence to drug treatment has also been evidenced. ^[3] Prevalence of hypertension in India in 2000 was 60.4 million males and 57.8 million females and projected to increase to 107.3 million and 106.2 million respectively in 2025. Epidemiological studies demonstrated that prevalence of hypertension is increasing rapidly in India, varying from 4 to 15 % in urban and 2-8 % in rural population. It generally begins in adulthood between the ages of 35 and 50, although it also occurs to a lesser extent among children and younger adults. ^[6] A positive family history is a frequent feature in hypertensive patients, with the heritability estimated to vary between 35 and 50% in most studies. ^[7] However, hypertension is a highly heterogeneous disorder with a multifactorial aetiology. Several genome wide association studies and their meta-analyses have identified 120 loci that are associated with BP regulation, but together these only explain about 3.5% of the trait variance ^[8] Epidemiologic data from the NHANES studies indicate that younger hypertensive patients less than 40 years old and Hispanics are less likely to be treated for their hypertension. Epidemiologic data from the NHANES studies indicate that younger hypertensive patients less than 40 years old and Hispanics are less likely to be treated for their hypertension. ^[11] Hypertensive patients with diabetes have low rates of blood pressure (BP) control and often required combination therapy. Approximately 2/3rd of people with diabetes do not reach recommended target blood pressure value of 130/80 mmHg, a much higher proportion than patients without diabetes mellitus. ^[9] To achieve the goal of normal blood pressure (BP), practice guidelines serve as useful tools for clinical decision making. ^[10] Most patients will require drug therapy in addition to lifestyle measures to achieve optimal BP control. In the previous Guidelines, five major drug classes were recommended for the treatment of hypertension: ACE inhibitors, ARBs, beta-blockers, CCBs, and diuretics (thiazides and thiazide-like diuretics such as chlortalidone and indapamide), based on:

- (i) Proven ability to reduce BP;
- (ii) Evidence from placebo-controlled studies that they reduce CV events; and
- (iii) Evidence of broad equivalence on overall CV morbidity and mortality, with the conclusion that benefit from their use predominantly derives from BP lowering. These conclusions have since been confirmed by recent meta-analyses. ^[11] These Guidelines thus recommend that the same five major classes of drugs should form the basis of antihypertensive therapy. There are compelling or possible contraindications for each class of drug and preferential use of some drugs for some conditions. There is also evidence that there are differences in the persistence and discontinuation rates of the major drug classes. ^[12] Several guidelines have been developed worldwide for the management of hypertension, and these serve as reference standards for clinical practitioners. However, many clinicians practice their own prescribing pattern in treating hypertensive patients according to their clinical experience. Primary care physicians need to be empowered in appropriate and evidence-based management of hypertension. A review of these prescribing patterns and guideline-based use of antihypertensive medications can give better insights into the concept of personalised, yet cost-effective pharmacological management of hypertension. The goal of the present study was to describe the antihypertensive medication prescribing patterns for inpatients with hypertension at a University teaching hospital in order to better understand the patterns of care for inpatients and potential opportunities for improvement in hypertension management.

II. Materials And Methods

DURATION OF STUDY

Study was conducted for 6 months in which data collection period for 3 months.

SITE OF STUDY

This study was conducted at Mallige hospital. Mallige hospital is a multispecialty tertiary care hospital with over 126 beds conveniently located in the Bengaluru, Karnataka state of India. Mallige hospital consist of inpatient department with consist of General ward, Male ward , Female ward , Intensive care unit , Surgical ward, etc.

STUDY DESIGN

The study involves both Prospective and Retrospective Observational Study.

SOURCES OF DATA AND MATERIALS

Prescription of patient / medication chart.

Blood pressure chart.

Nursing notes and doctor notes.

Patient data collection from.

Patient inform consent form.

STUDY CRITERIA

INCLUSION CRITERIA

Patient having the age of 18 years and above.

Patient known to be on antihypertensive medication one or more.

EXCLUSION CRITERIA

Patient not willing to sign the consent form.

Patient data not available completely.

Pregnant and lactating women.

METHOD OF DATA COLLECTION

The study was conducted by randomly collecting the prescriptions containing antihypertensive drugs of patients who are visiting the department. Prescriptions containing antihypertensive drugs were evaluated for the category of antihypertensive prescribed and indication for use. Even the prescription was evaluated for commonly used antihypertensive and their combinations. Rationality and irrationality of prescription was assessed based on drug interactions and number of antihypertensive prescribed in each prescription. The prescriptions were also evaluated for any significant interactions which caused by the antihypertensive drugs. If interaction is significant the intervention was done. Appropriateness of the prescriptions was evaluated by considering various parameters like dose, dosage form, and duration of treatment, route and frequency of administration. The data was collected, documented and analyzed by using suitable statistical method.

III. Results

The prospective observational study was conducted for 6 months in Mallige hospital Medical Science & Research Center. A total of 110 CAD patient were included in the study.

PATIENT DISTRIBUTIONS BASED ON DEMOGRAPHIC DATA

A total number of 110 patients were enrolled in the study of which 68 (61.81%) were male patients and 42 (38.18%) were female patients. The incidence of hypertension was more common in male compared to female which is represented in Table 1 and Fig. 1.

Total No. of patients (%)	No. of Male patients (%)	No. of Female patients (%)
110 (100%)	68 (61.81%)	42 (38.18%)

Table 1: Percentage distribution of the sample according to sex (N=110)

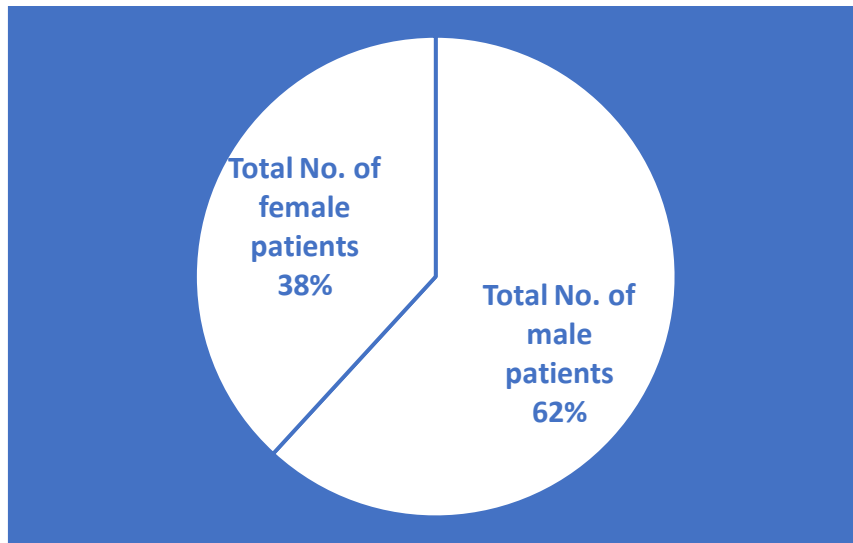


Fig 1: Percentage distribution of the sample according to sex

PATIENT DISTRIBUTION WITH RESPECT TO THEIR AGE GROUPS

The maximum percentage of male and females with hypertension was found at the age group of 61-80 years (51.81%), which is given in the Table 2 and Fig. 2.

Age group in years	No. of patient (n =120)	Percentage (%)
21-40	15	13.63
41-60	38	34.54
61-80	57	51.81

Table2: Patient Distribution with Respect to their Age Groups (N=110)

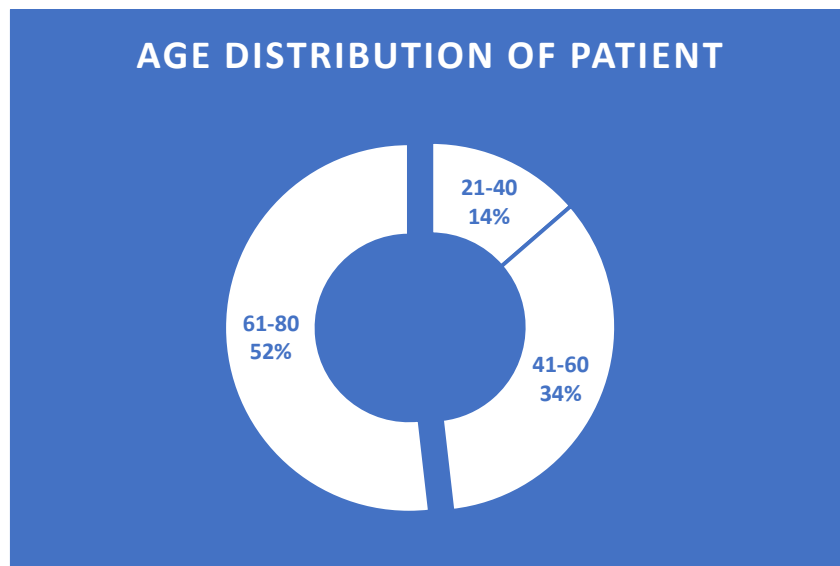


Fig 2: Pie Chart of Patient Distribution with Respect to their Age Groups (Total No. of Patients)

DISTRIBUTION OF CLASSIFICATION OF BLOOD PRESSURE CATEGORY IN STUDY POPULATION

This result showed most of the patients were diagnosed with pre-hypertension 58 (52.72%), stage 1 hypertension 24 (21.81%) and stage 2 hypertension 18 (16.36%) which is given in table 3 and fig. 3-1 and 3-2.

Classification	Systolic BP (mm Hg)	Diastolic BP (mm Hg)	No. of patients (n=110)	Percentage (%)
Normal	< 120	And <80	10	9.09
Prehypertension	120-139	Or 80-89	58	52.72
Stage 1 hypertension	140-159	Or 90-99	24	21.81
Stage 2 hypertension	>160	Or >100	18	16.36

Table 3: Classification of Blood Pressure Category in Study Population

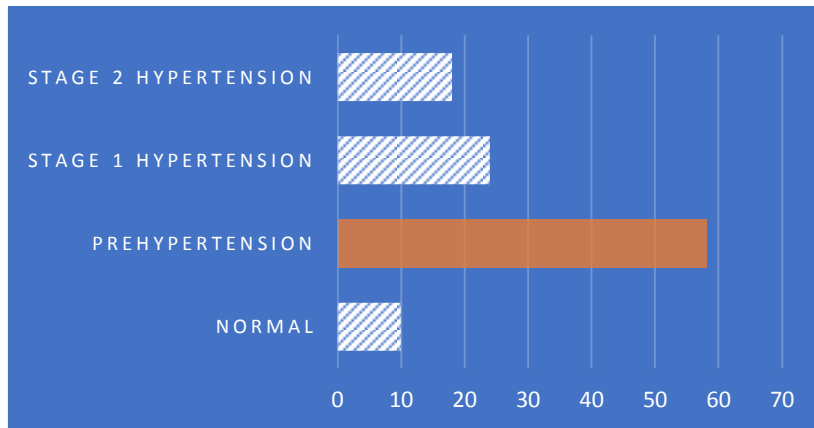


Fig. 3-1: Graphical Representation of Classification of Blood Pressure Category

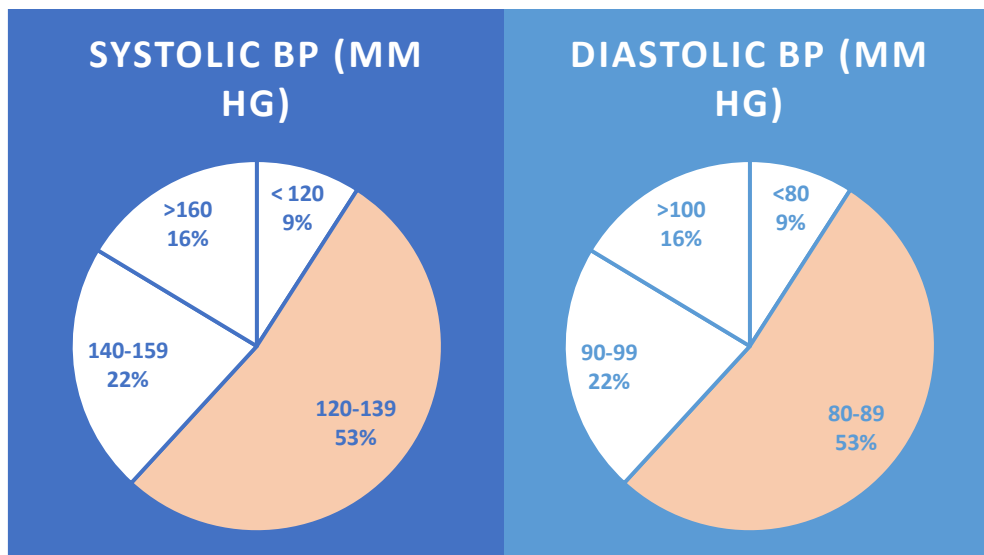


Fig. 3-2: Pie chart of Classification of Blood Pressure Category

DISTRIBUTION OF THE PATIENTS BASED ON CO-MORBID CONDITIONS

Various co-morbid conditions like diabetes mellitus, cardiovascular disease, Arthritis, dyslipidemia was seen among patients and many of these were found to be risk factors of Hypertension. Diabetes mellitus (34.54%) and Cardiovascular disease (17.27%) were the two most common co-morbid conditions found in most of the patients which increase the risk of Hypertension which is given in table 4 and fig. 4-1 and 4-2.

Co-morbid condition	No. of Male Patients	No. of Female Patients	Total No. of Patients (n=120)
DM	21	17	38 (34.54%)
Cardiovascular	16	3	19 (17.27%)
Arthritis	8	6	14 (12.72%)
Dyslipidemia	6	4	10 (9.09%)
PUD	5	3	8 (7.27%)
Asthma	10	7	17 (15.45%)
Others	3	2	5 (4.54%)

Table 4: Details of the Patients based on Co-morbid Conditions

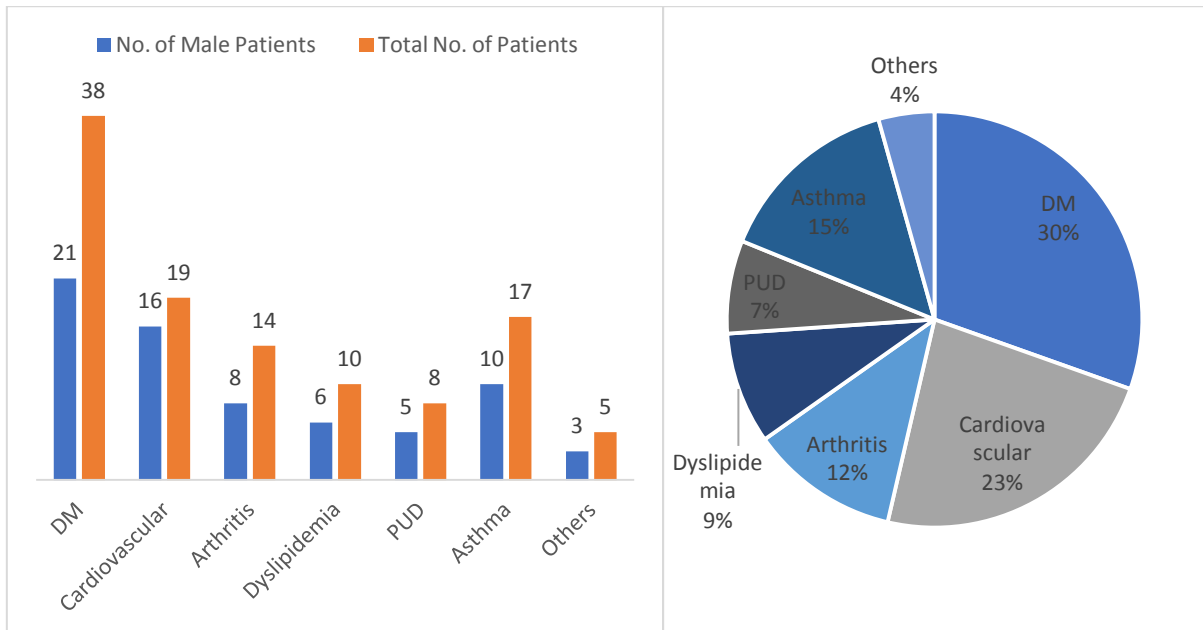


Fig. 4-1: Details of the Male Patients based on Co-morbid Conditions

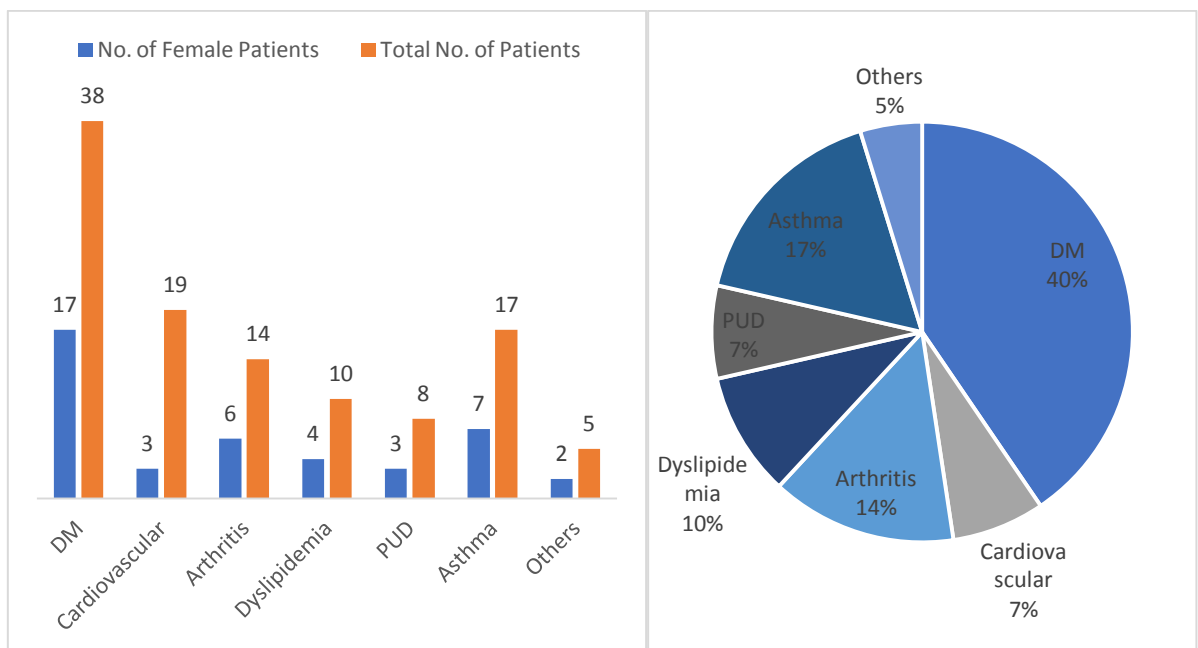


Fig. 4-2: Details of the Female Patients based on Co-morbid Conditions

DISTRIBUTION OF PATIENTS BASED ON THEIR FAMILY HISTORY

The family history of the patients revealed that majority of the patients (74.54%) does have family history of hypertension, followed by (25.45%) in whom there was no family history of Hypertension which is given in the Table 5.

Category	No. of patients (n=120)	Percentage (%)
Family history	82	74.54
No family history	28	25.45

Table 5: Patients Based on Their Family History

DISTRIBUTION OF CLASSIFICATION OF ANTI-HYPERTENSIVE THERAPY

In the study of 110 hypertension patients I observed that Amlodipine utilization was high as monotherapy (25.5%). Telmisartan + Hydrochlorothiazide was used most widely (19.46%) as a combination therapy which is given in table 6 and fig. 6.

Drugs (Monotherapy)	Dose (mg)	Frequency	No. of patients (n=146)	Percentage (%)
Amlodipine	2.5,5	OD	38	25.5
Telmisartan	20,40	OD	26	17.44
Olmesartan	20	OD	15	10.06
Furosemide	10	OD	9	6.04
Drugs (Combination Therapy)				
Telmisartan+ Hydrochlorothiazide	40/5 or 40/12.5	OD	29	19.46
Olmesartan+ Hydrochlorothiazide	20/12.5 or 40/12.5	OD	22	14.76
Amlodipine+ Atenolol	5/25	OD	7	4.69

Table 6: Monotherapy and Combination Therapy of Anti-hypertensive Drugs

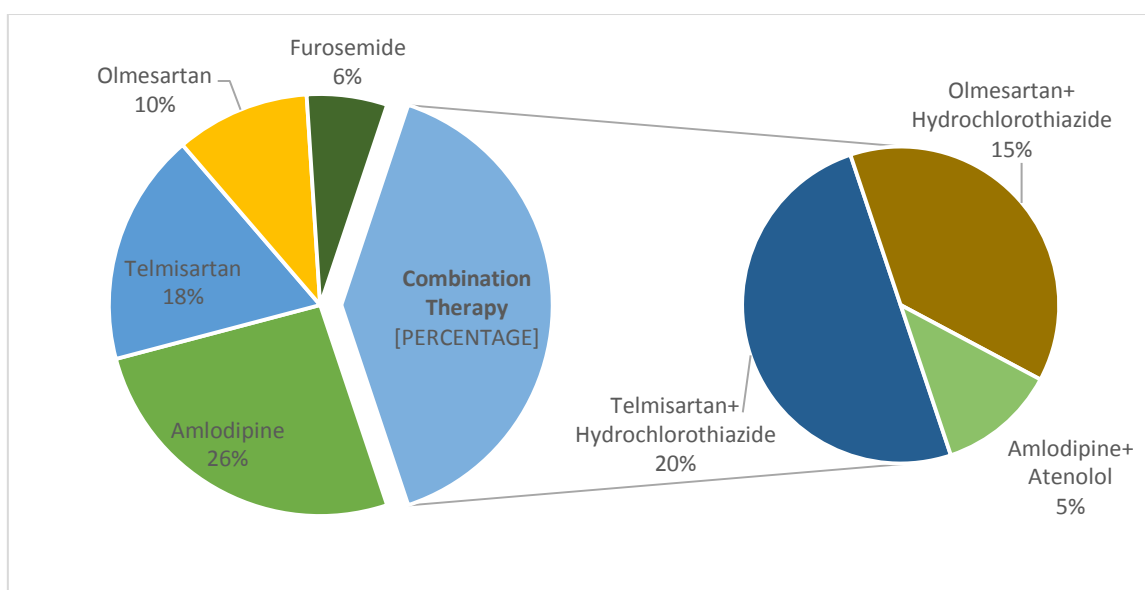


Fig. 6: Monotherapy and Combination Therapy of Anti-hypertensive Drugs

NUMBER OF MEDICATIONS PRESCRIBED IN STUDY POPULATION

Out of 110 prescriptions, the total number of drugs prescribed were 512. Average number of drugs per prescription were 4.65. Number of appropriate prescriptions were 102 (92.72%) and Number of inappropriate prescriptions were 8 (7.27%) which is given in table 7 and fig. 7.

Total no of prescriptions	110
Total no of drugs prescribed	512
Average no of drugs per prescription	4.65
No. of appropriate prescriptions	102 (92.72%)
No. of inappropriate prescriptions	8 (7.27%)

Table 7: Number of medications prescribed in study population

IV. Discussion

With increasing economic growth rate, India is not only facing the epidemic of hypertension but also of obesity, diabetes mellitus, and coronary artery disease. Prevalence of hypertension has remained stable or has decreased in developed countries during the past decade; it has dramatically increased in developing countries like India.^[35]

As per the study criteria total 110 cases of hypertensive patients (Both sex) of different age group ranges from 21-80+ years were collected. After the analysis of age distribution pattern, it was observed that higher no. of hypertensive patients (57) which is the 51.8% of all collected cases were falling under age group of 61-80. Plasma renin falls by 17% each decade which may be the possible reason of hypertension in older population. Similar findings were seen in other studies done by Arijit Dutta, et al.^[13]

In the present study, it was found that the prevalence of hypertension was more in male patients (61.81%) as compared to females (38.18%), so males are affected more than females, which correlates with the previous study done by Rajeev Mishra, et al.^[14]

Patients was categorised by classification of blood pressure category in study population. This result showed most of the patients were diagnosed with pre-hypertension (52.72%) followed by stage 1 hypertension (21.81%) and stage 2 hypertension (16.36%). In a study conducted by Pyakurel P, et al. in which most of the patients were diagnosed with Stage-IHTN.^[15]

After distribution of the patients based on co-morbid conditions it was observed that Diabetes mellitus (34.54%) and Cardiovascular disease (17.27%) were the two most common co-morbid conditions found in most of the patients which increase the risk of Hypertension. This result conducted with the study done by Mohammad arief, harika b, et al.^[16] which is supporting this study.

Various observational studies of hypertension in families explore the genetic nature of hypertension by correlating the relation of elevated blood pressure also between children and parents. In this study; after family history distribution analysis, it was found that higher no. of hypertensive patients (74.54%) were having family history and only (25.45%) patients were not having family history which most of the cases were maybe due to carelessness of physician while writing files or patients were not interested to discuss their family history.

Previous studies revealed that hypertension is better controlled by combination therapy and is most commonly prescribed.^{[17],[18]} However, in contrast to these studies, it was observed in the present study that the monotherapy is more common than combination therapy. This was in accordance with the previous study done by Mohammad Arief, et al.^[16]

Out of 110 prescriptions, the total number of drugs prescribed were 512. Average number of drugs per prescription were 4.65. The risk of drug interaction may increase with increase in number of drugs per prescription which ultimately lead to prescribing errors and in hazardous to the health of patient. Number of inappropriate prescriptions were 8 (7.27%). A major reason for inappropriate prescriptions is the drug interactions which underestimation of potential adverse consequences.

V. Conclusion

The present study represents the current prescribing trend for antihypertensive agents. It implies that in hypertensive patients using the monotherapy is more common than combination therapy. Each of the antihypertensive therapy classes is roughly equally effective in lowering the blood pressure, producing a good antihypertensive response in 30 to 50 percent of patients. There is, however, wide interpatient variability as many patients will respond well to one drug but not to another. In this study, most of the patients were diagnosed with pre-hypertension. The prevalence of prehypertension remained constant across age groups among men but increased with age among women. In other hand the number of male patients were comparatively high. This study reveals that most of the drugs were dosed appropriately. Amlodipine were the most common monotherapy antihypertension drug given to patients and Telmisartan with Hydrochlorothiazide were the most common prescribed combination therapy. This shows that in hypertensive patients ARBs are the leading group of antihypertensive agents as monotherapy and ARBs with diuretics as a combination therapy. In developing countries like India, more systematic studies are required on the evaluation of prescribing patterns and guideline based antihypertensive medications' use, which can be tailored to suit the patients' requirements.

VI. Limitation And Future Plan

The study was carried out for a short duration and limited data were available on entire treatment course in majority of cases.

Less number of samples and single study site.

It was conducted only among the inpatients.

Long duration of study and large number of patients involved in the study can give more accurate result.

To study the compliance of patient about treatment, questionnaire-based interview regarding awareness, adherence can be planned in second phase of this study.

To achieve therapeutic goal, compliance of patients about pharmacological and non-pharmacological treatment is necessary.

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