

A Study on Assessment of Adherence to JNC 7 Guidelines in Prescribing of Antihypertensive Drugs in a Tertiary Care Hospital during Covid-19 Pandemic

A R Shabaraya¹, M V Prathvi*², M Reshma² and H Mary Sunila³

¹Professor and Head, Department of Pharmacy Practice,

²Student pharm D, Department of Pharmacy Practice,

³Assistant professor, Department of Pharmacy Practice,
Srinivas College of Pharmacy, Mangalore, Karnataka -574143

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ABSTRACT

Hypertension is now considered as one of the major public health concerns worldwide as it is a significant risk factor for cardiovascular, cerebrovascular, and renal complications. It is associated with increased morbidity, mortality, and economic impact on society. Hence effective treatment should be achieved towards controlling BP using recommended guidelines. Antihypertensive drug therapy has improved noticeably, but different complications have arisen due to the rise in the number of drugs for the treatment of hypertension. To counteract the problem, the Joint National Committee (JNC) designed a guideline for the treatment of hypertension.

This study was fabricated to evaluate the prescribing pattern of antihypertensive drugs in accordance with JNC 7 guidelines during the period of COVID-19 pandemic.

This study was conducted in a total of 100 patients at tertiary care teaching hospital Mangalore, for a period of six months. The data from the case files of patients diagnosed with hypertension were collected and evaluated, which includes the demographic details and prescription pattern and the data was analysed using Microsoft Excel Software.

The present study consists of 59% male and 41% female patients. It was found that hypertension is commonly seen in patients above 65 years of age (54%). A total of 152 drugs were prescribed during the study out of which the most frequent antihypertensive class to be prescribed were ARBs (22.4%) significantly higher than CCBs (21.8%) and diuretics (18.4%). Fixed dose combination of two diuretics (44.44%) was prescribed higher than ARBs with diuretics (18.18%) and CCBs with beta

blockers (18.18%). In this study 40% of the patients had received two antihypertensive drugs, 39% of patients received one drug therapy while 14% received three drugs and 7% received four drugs for the treatment of Hypertension.

The present study shows that hospital is abiding to the guidelines of seventh report of JNC and guideline-based use of antihypertensive medications can give better insights into the concept of personalised, yet cost-effective pharmacological management of hypertension.

Keywords: Hypertension, Prescribing pattern, Antihypertensive drug, Joint national committee

I. INTRODUCTION

Hypertension is now considered as one of the major public health concerns worldwide as it is a significant risk factor for cardiovascular, cerebrovascular, and renal complications.¹ These diseases were estimated by the World Health Organization (WHO) to account for 38 million out of an estimated 56 million deaths in 2012; with cardiovascular disease accounting for 46.2% of deaths and by the year of 2030 the number of deaths can increase up to 52 million, with cardiovascular disease being a major contributor.² The increasing prevalence of hypertension has been attributed to population growth, ageing and exposure to persistent stress. It is associated with increased morbidity, mortality, and economic impact on the society. Hence effective treatment of hypertension should be achieved towards controlling the BP using recommended guidelines.

Evidence from large clinical trials suggests that lowering blood pressure (BP) with antihypertensive drugs can improve the quality of life and reduces the risk of developing

complications.³ Antihypertensive drug therapy has improved noticeably, but different complications have arisen due to the use of more number of drugs for the treatment of hypertension. To counteract the problem, the Joint National Committee (JNC) designed a guideline for the treatment of hypertension and provides with updated recommendations to manage the arising health challenges among hypertensive patients.³ Changes over time in terms of recommended guidelines and innovations in drug formulations have resulted in modifications in prescription pattern of antihypertensive drugs in various countries.⁴

The sudden emergence of COVID-19 has increased the concern towards the management of hypertension based on the initial hypothesis of a positive relationship with certain antihypertensive drugs and the speculation of increasing the patient's risk for acquiring the infection and resulting in severe complications with drugs such as ARBs and ACE inhibitors.⁷

The study was aimed at the evaluation of prescribing patterns and guideline-based use of antihypertensive medications can give better insights into the concept of personalized, yet cost-effective pharmacological management of hypertension. Auditing prescription patterns and assessing individuals with hypertension for blood pressure control can help in treating the disease and associated co-morbidities.

II. METHODOLOGY AND OPERATIONAL MODALITY

A study on assessment of adherence to JNC 7 guidelines in prescribing of Antihypertensive drugs in a tertiary care hospital during Covid-19 Pandemic. This study was carried out at a multi-specialty tertiary care teaching hospital in Mangaluru. This was conducted for a duration of 6 months from October 2020 to March 2021 which included a sample of

100 hypertensive patients with or without co-morbidities to meet the selection criteria, based on the time schedule allotted for the project including other circumstances. The study protocol was approved by Institutional Ethics Committee (IEC).

Inclusion criteria

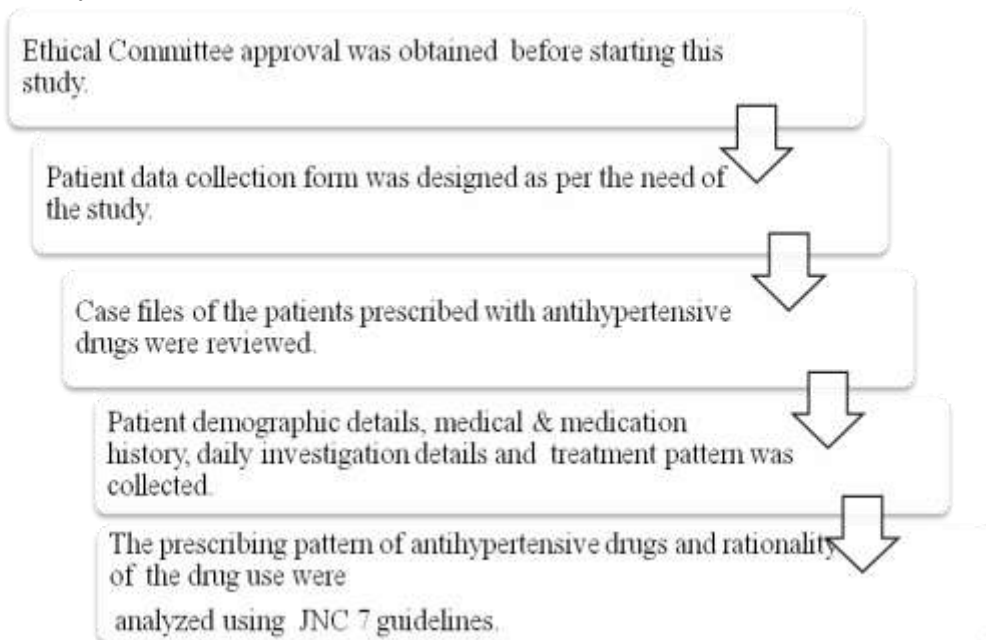
- Patients above 18 years of age.
- Patients admitted to the hospital during the period of Covid-19 pandemic.
- Patients diagnosed with hypertension with other co-morbidities.
- Patients who are prescribed with antihypertensive drugs.

Exclusion criteria

- Patients below 18 years of age
- Out patients
- Patients with gestational hypertension

The data collected for the study was taken from the case files of patients admitted in the general medicine department of a tertiary care teaching hospital, and it included patient demographic details, medical & medication history, daily investigation details, and treatment patterns and all the details were kept confidential. The information was collected using a structured data collection form from the case files of in-patients. The data from the case files of In-patients which were filled by doctors, nurses, pharmacists, and other health care professionals were collected. The collected data were evaluated by using Microsoft Excel 2010. The prescription pattern of antihypertensive drugs and rationality of the drug use was analyzed using JNC 7 guidelines. It has been observed and concluded on the basis of case files of hypertensive patients along with other co-morbidities. Data analysis involved collecting and scrutinizing every data sample in a set of items from which samples can be drawn and analyzed.

Operational Modality



III. RESULTS

3.1 DEMOGRAPHIC PROFILE OF THE STUDY PARTICIPANTS

A total of 100 case data files were assessed during the entire study period, out of which 59 (59%) were male and 41 (41%) were female respectively. From the data which has been collected, maximum patients belonged to age group

of more than 65 years (54%), in which 33 were male and 21 were female, 43% of the patients belonged to the age group of 41-65 years, among which 24 were male and 19 were female and 3% of the study subjects were less than 40 years, out of which 2 were male and one was female. Mean age in study subject was found to be 65.84 years.

Table 1. Number of patients with hypertension based on their age

Age	Number of patients		Total numbers	Percentage (%)
	Male	Female		
<40	2	1	3	3%
41-65	24	19	43	43%
> 65	33	21	54	54%

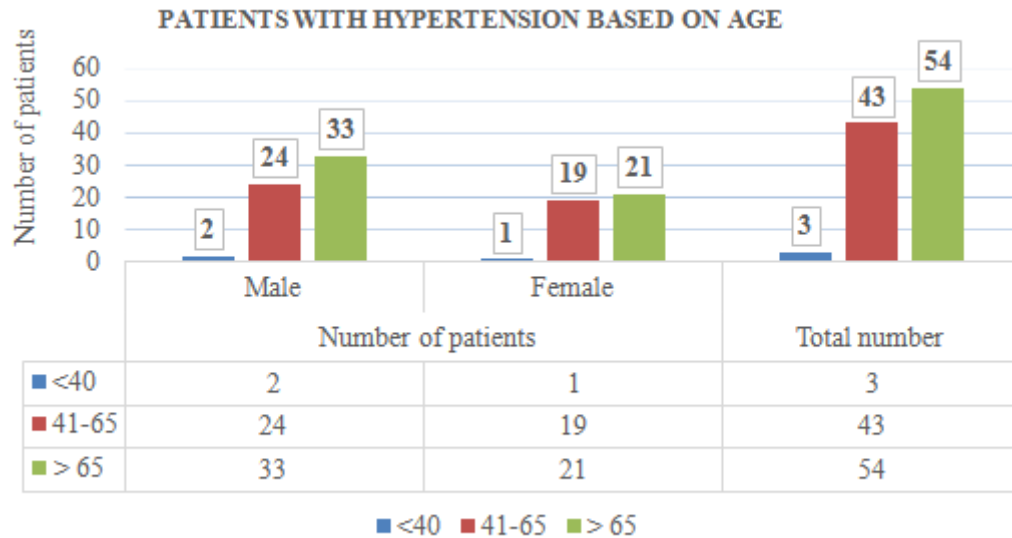


Figure 1. Number of patients with hypertension based on their age

PRESCRIBING PATTERN OF ANTIHYPERTENSIVE DRUGS IN COMPLIANCE TO JNC 7 GUIDELINES

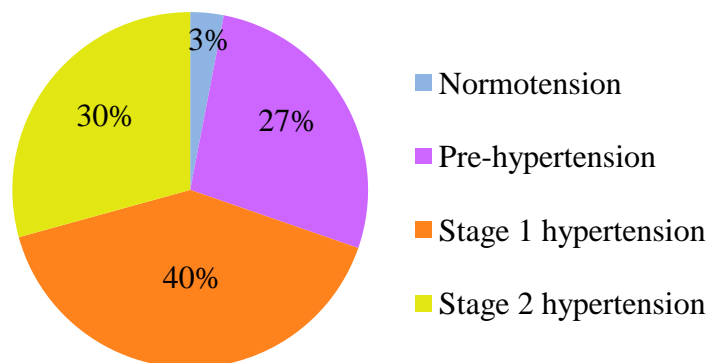
In the present study the prevalence of Stage 1 hypertension is higher than other stages.

Among 100 patients 40% of the patients had stage 1 hypertension, 30% of the patients had stage 2 hypertension, 27% of the patients had pre-hypertension and the proportion of normotensive patients were found to be 3%.

Table 2: Proportion of patients in each stage of Hypertension

Stages of hypertension	Proportion of patients (%)
Normal	3%
Pre-hypertension	27%
Stage 1 hypertension	40%
Stage 2 hypertension	30%

PROPORTIONS OF PATIENTS IN EACH STAGE OF HYPERTENSION



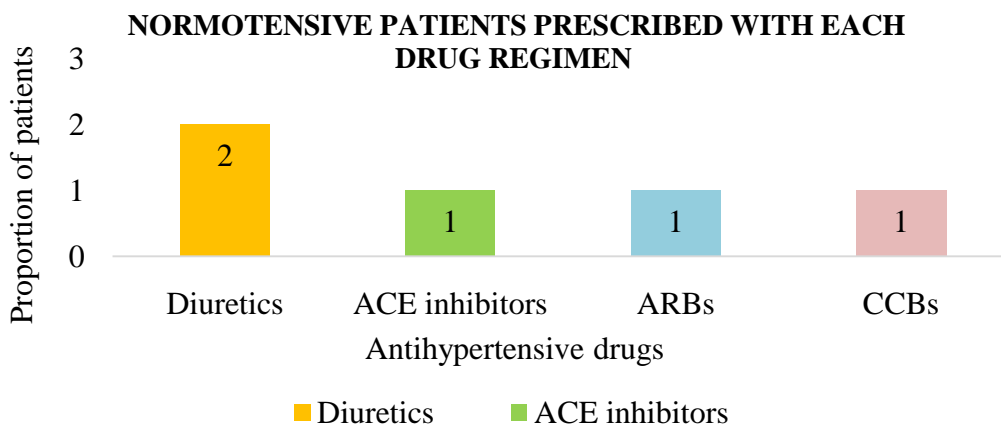


Fig 2. Proportion of patients in each stage of hypertension

Table 3 shows the proportion of normotensive patients prescribed with each drug regimen. Among 3 normotensive patients, 2 were

prescribed with diuretics and the rest were prescribed with ACE inhibitors, ARBs and CCBs as mono therapy.

Table 3: Proportion of normotensive patients prescribed with each drug regimen

Antihypertensive drugs	Proportion of patients
Diuretics	2
ACE inhibitors	1
ARBs	1
CCBs	1

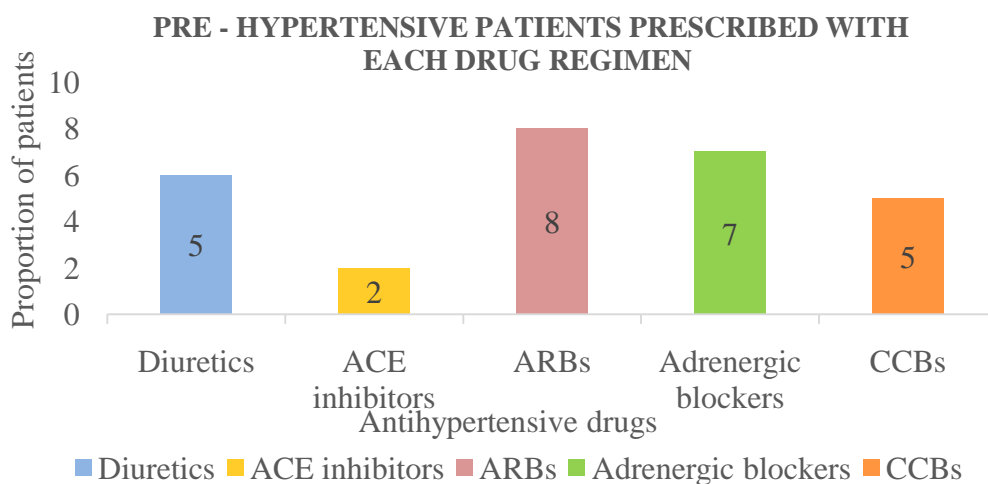


Fig 3. Proportion of normotensive patients prescribed with each drug regimen

Table 4 shows the proportion of pre-hypertensive patients prescribed with each drug regimen. Among 27 pre-hypertensive patients, ARBs were the most commonly prescribed group of antihypertensive drugs given in 8 patients, which

was found to be simultaneously higher than adrenergic blockers that were given among 7 patients, CCBs and diuretics in 5 patients, and ACE inhibitors in 2 patients.

Table 4: Proportion of pre-hypertensive patients prescribed with each drug regimen

Antihypertensive drugs	Proportion of patients
Diuretics	5
ACE inhibitors	2
ARBs	8
Adrenergic blockers	7
CCBs	5

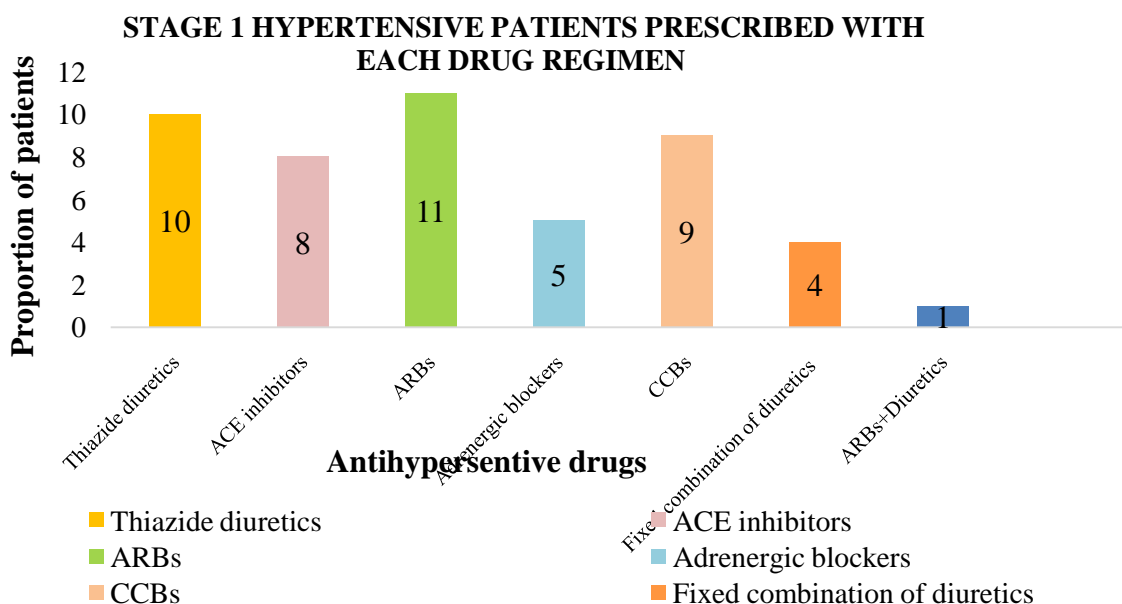


Fig 4. Proportion of pre-hypertensive patients prescribed with each drug regimen

Table 5 shows the proportion of stage 1 hypertensive patients prescribed with each drug regimen; out of 40 Stage 1 hypertensive patients, ARBs were prescribed among 11 patients which is being the most commonly prescribed group of antihypertensive drugs, followed by thiazide

diuretics in 10 patients and CCBs in 9 patients, ACE inhibitors in 8 patients whereas 5 patients received adrenergic blockers. 4 patients received fixed-dose diuretics and 1 received the combination therapy of ARBs+diuretics.

Table 5: Proportion of stage 1 hypertensive patients prescribed with each drug regimen

Antihypertensive drugs	Proportion of patients
Thiazide diuretics	10
ACE inhibitors	8
ARBs	11
Adrenergic blockers	5
CCBs	9
Fixed dose combination of diuretics	4
ARBs+Diuretics	1

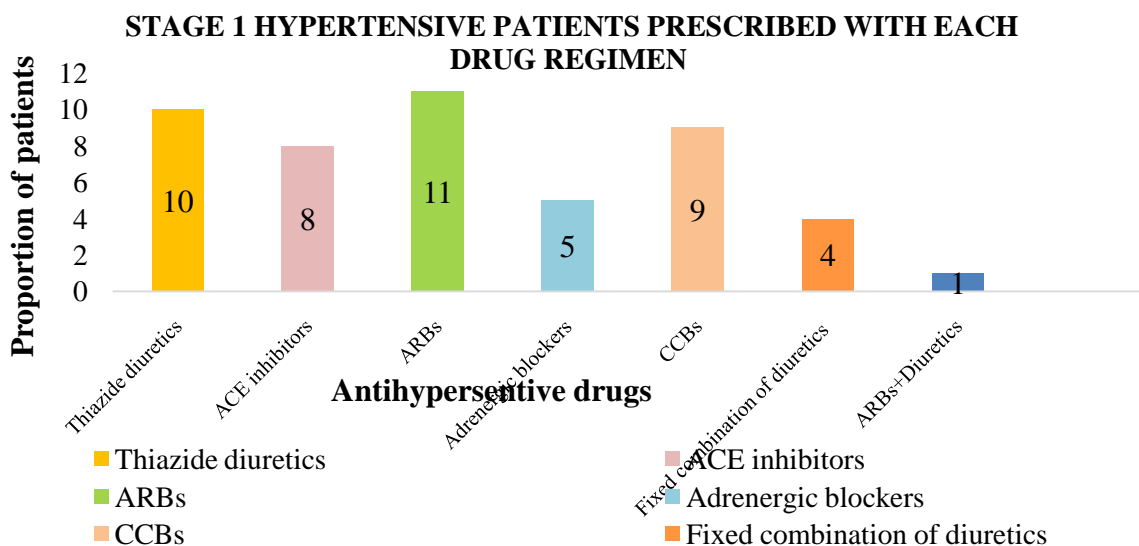


Fig 5. Proportion of stage 1 hypertensive patients prescribed with each drug regimen

Table 6 shows the proportion of stage 2 hypertensive patients prescribed with each drug regimen, among 29 stage 2 hypertensive patients CCBs were the most commonly prescribed group of antihypertensive drugs being prescribed to 13 patients comparatively higher than fixed-dose combination of diuretics given among 10 patients

and ARBs in 7 patients, combination of ACEIs+betablockers among 6 patients, ARBs+diuretics in 5 patients and ARBs+CCBs prescribed to 1 patient. Adrenergic blockers were given to 2 patients whereas thiazide diuretics as monotherapy were given in 1 patient

Table 6: Proportion of stage 2 hypertensive patients prescribed with each drug

Antihypertensive drugs	Proportion of patients
Thiazide diuretics	1
ARBs	7
Adrenergic blockers	2
CCBs	13
CCBs+ Beta blockers	6
Fixed combination of diuretics	10
ACEIs+ Beta blockers	6
ARBs+ Diuretics	5
ARBs+ CCBs	1

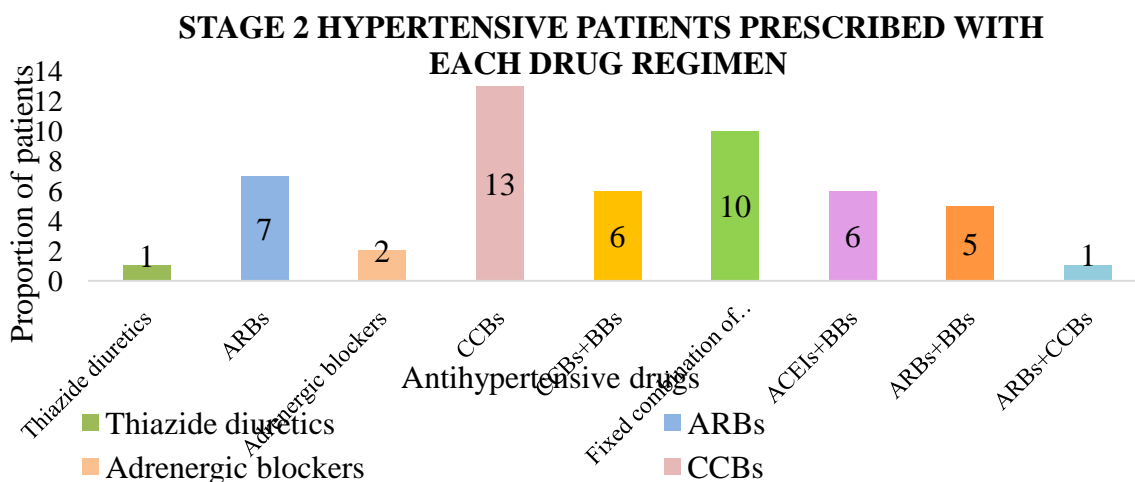


Fig 6. Proportion of stage 2 hypertensive patients prescribed with each drug regimen

EFFECT OF CONCURRENT DISEASES ON TREATMENT OF HYPERTENSION

Table 7 depicts co-morbid conditions associated with hypertension and table 8 depicts the utilization of antihypertensive drugs among patients with co-morbidities. According to the study, majority of the patients were suffering from concurrent diseases, among which diabetes mellitus

was found to be the most common being diagnosed among total of 62 patients. Other commonly associated conditions were coronary artery disease found among 36 patients, chronic kidney disease in 14 patients, respiratory illness in 12 patients and cerebrovascular diseases in 11 patients; thyroid disease and heart failure was found to be among 6 patients each.

Table 7: Proportion of hypertensive patients associated with other co-morbid conditions

Concurrent diseases	Number of patients
Type 2 Diabetes Mellitus	62
Coronary artery disease	36
Cerebro-vascular disease	11
Heart failure	06
Chronic kidney disease	14
Thyroid disease	06
Respiratory illness	12

HYPERTENSIVE PATIENTS ASSOCIATED WITH OTHER CO-MORBID CONDITIONS

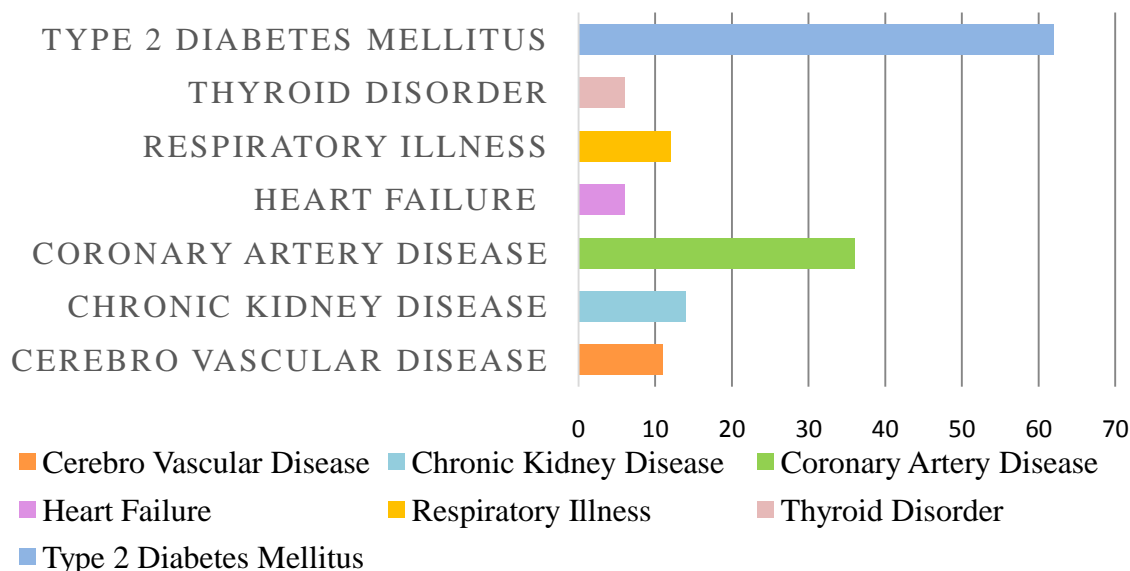


Fig 7. Proportion of hypertensive patients associated with other co-morbid conditions

In patients with type 2 diabetes mellitus associated with hypertension, 62% had received single drug therapy in which the most prescribed drugs were CCBs being given to 22 patients (23.65%), fixed-dose combinations and ARBs were prescribed to 19 patients (20.43%). Other commonly given drugs include adrenergic blockers being prescribed to 11 patients (11.82%) and ACEIs being prescribed to 7 patients (7.52%). Among patients diagnosed with cerebrovascular disease associated with hypertension, the most given drugs were fixed-dose combinations, which were prescribed to 5 patients (29.41%), ARBs given to 4 patients (23.52%); CCBs and ACE inhibitors prescribed to 3 patients each (17.64%) and among coronary artery disease patients,

combination therapy was given to most, making it to 12 patients (21.81%), ACE inhibitors in 11 patients (20%), ARBs given to 10 patients (18.18%) and CCBs to 9 patients (16.36%). These patients were given with diuretics and adrenergic blockers each as monotherapy (12.7% and 10.9% respectively). Patients with heart failure were prescribed with ACE inhibitors and thiazide diuretics among 4 patients (28.57%), ARBs in 3 patients (21.42%); the remaining 14.28% of patients were given with combination therapy. And Patients with CKD were given with ACE inhibitors comprising of 8 patients (44.4%), diuretics (16.66%), whereas CCBs, fixed-dose combinations and adrenergic blockers were given among 2 patients (11.1%).

Table 7: Prescription pattern of antihypertensive drugs among the patients with coexisting diseases

Drug class	No. of antihypertensive drugs prescribed					
	Patients with DM	Patients with CVD	Patients with CAD	Patients with HF	Patients with CKD	

Thiazide diuretics	15 (16.12%)	1 (5.88%)	7 (12.7%)	4 (28.57%)	3 (16.66%)
ACE inhibitors	7 (7.52%)	3 (17.64%)	11 (20%)	4 (28.57%)	8 (44.4%)
ARBs	19 (20.43%)	4 (23.52%)	10(18.18%)	3 (21.42%)	1 (5.5%)
Adrenergic blockers	11 (11.82%)	1 (5.88%)	6 (10.9%)	0	2 (11.1%)
CCBs	22 (23.65%)	3 (17.64%)	9 (16.36%)	1 (7.14%)	2 (11.1%)
Fixed dose combination	19 (20.43%)	5 (29.41%)	12(21.81%)	2 (14.28%)	2 (11.1%)
Total	93	17	55	14	18

ANTIHYPERTENSIVE DRUGS IN PATIENTS WITH CO-EXISTING DISEASES

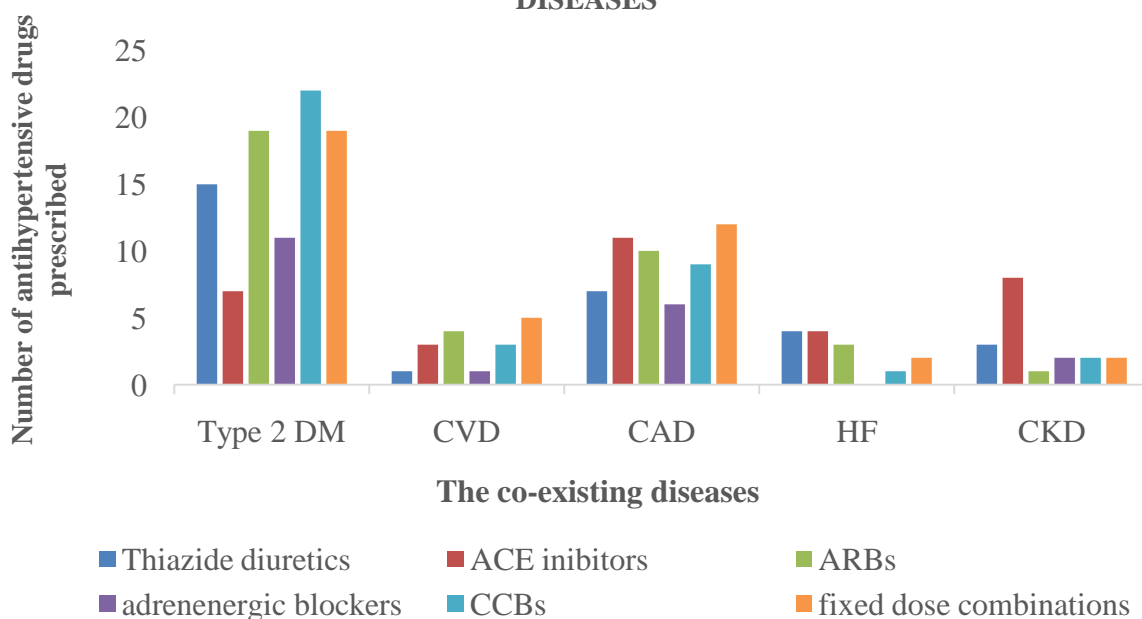


Fig 8. Prescribing pattern of anti-hypertensive drugs in patients with co-existing diseases.

IV. DISCUSSION

The present study showed that the prevalence of hypertension was found higher in male (51%) than in female (49%). It also reveals that the highest number of patients were belonging to the age group of more than 65 years suggesting that elderly patients are at high risk of developing hypertension and related co-morbidities. This was

to the results demonstrated in the study conducted by Naik H G et al.,⁶ Hence at most care is required in management of the disease condition.

Hypertension is placed into different categories as given by the JNC 7 guidelines, and the data analysis results showed that patients with stage 1 hypertension were observed in greater number (40%), followed by stage 2 hypertension

(29%), pre-hypertension (27%) and normotension (3%). This finding was similar to the study conducted by Sapkota et al.,³ where prevalence of stage 1 hypertension over other stages of hypertension was higher. In all stages of hypertension, the most frequently prescribed group of drugs were ARBs in pre-hypertension, which were followed by CCBs, thiazide diuretics, ACE inhibitors and beta blockers. In stage 1 hypertension ARBs followed by Diuretics. CCBs were also highly prescribed in stage 2, which were followed by ARBs, thiazide diuretics, adrenergic blockers and ACE inhibitors.

Patients with chronic diseases like hypertension usually suffer from other associated conditions. Analysed data also revealed that greater proportion of the patients were suffering from concurrent diabetes mellitus (62%) and some other diseases like coronary artery diseases (36%), chronic kidney disease (14%), respiratory illness (12%) and cerebrovascular disease (11%), thyroid disorder and heart failure was found to be in 6% each. This shows similar outcome as that of the study conducted by Sapkota et al.,³ where most of the patients were diagnosed with concurrent diabetes mellitus along with hypertension, which is simultaneously higher than coronary risk diseases. Among the various diseases, cardiovascular diseases pose a major threat which requires multiple drugs for their management. In hypertension along with comorbidities, the most frequently prescribed group of drugs were ACEIs. The treatment pattern was changing according to the patient's comorbid condition.

The article published by Clark CE et al.,²⁴ suggests the continuation of ACE inhibitors and ARBs during COVID-19 pandemic is safe. Simultaneously the current study was reviewed for plausible changes in the prescribing pattern of antihypertensive drugs among the patients followed up during the COVID-19 pandemic and the result was not found to have varied from the studies published before the pandemic. The study showed that the most prescribed drugs were telmisartan (16.8%) and the total ARBs (24.36%) prescribed outnumbered the other classes of antihypertensive drugs, which concluded that the hospital did not switch to an alternative treatment for hypertension during the pandemic.

After analyzing all the prescriptions, it was found that the prescriptions followed the seventh report of the Joint National Committee where our data showed that 99% of the prescriptions followed the JNC 7 guidelines.

V. CONCLUSION

Angiotensin receptor blockers (Telmisartan) were the highly prescribed drug as monotherapy and fixed-dose combination of diuretics were prescribed commonly as a combination therapy.

The comparative study of the treatment pattern based on stages of hypertension and the co-morbid conditions utilized shows that the hospital is abiding (99%) to the guidelines of the seventh report of the Joint National Committee.

A regular monitoring of prescription pattern has to be carried out from time to time and the circulation of standard guidelines among prescribing physicians for the treatment of hypertension are required for the rational utilization of drugs to achieve maximal therapeutic efficacy.

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