

**PRESCRIPTION PATTERN OF ANTI-HYPERTENSIVE MEDICATIONS IN PATIENTS WITH HYPERTENSION AT A TERTIARY CARE HOSPITAL, ASSAM**ARITRA GUPTA\*<sup>ORCID</sup>, SARAJITA BARMAN<sup>ORCID</sup>, DOLLY ROY<sup>ORCID</sup>

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**ABSTRACT**

**Objective:** The aim of our study is to analyze the pattern of prescription of medications used for managing hypertension (HTN) at a tertiary care hospital and assess the comorbidities associated with HTN.

**Methods:** This prospective study has been conducted for duration of 6 months in the Department of Medicine of Silchar Medical College and Hospital. Prescriptions of both genders diagnosed with primary essential HTN and patients receiving or advised to start antihypertensive medications were included in the study.

**Results:** One hundred and fifty prescriptions have been evaluated in the study duration, 42% are female and 58% male. Monotherapy (69%) followed by dual therapy (26%) and multidrug therapy (5%) have been prescribed to the patients. Calcium channel blockers (CCBs) (48%) are the most widely used drugs, along with angiotensin receptor blockers (ARBs) (29%), beta-blockers (BBs) (11%), diuretics (6%), and angiotensin-converting enzyme inhibitors (6%) in single drug therapy. ARB+CCB followed by ARB+diuretic and ARB+BB were used in dual therapy. In triple therapy, the most preferred therapy was ARB+CCB+diuretic, and then ARB+CCB+BB. Dyslipidemia (38%), followed by Type 2 diabetes mellitus (DM) (34%), and chronic kidney disease (CKD) (19%) were the most common associated comorbidities.

**Conclusion:** Monotherapy was frequently prescribed regimen followed by dual therapy and multidrug therapy. In single-drug therapy, CCB was mostly used, and then ARB. In dual therapy CCB+ARB was the most preferred treatment. Dyslipidemia was most frequently associated with HTN, followed by DM and CKD. Prescription patterns of anti-hypertensive moderately followed the World Health Organization recommendations for HTN.

**Keywords:** Antihypertensive, Hypertension, blood pressure, Pattern of prescription.

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**INTRODUCTION**

Hypertension (HTN) is considered as the easiest modifiable cause of cardiac morbidity, mortality and other health issue worldwide. HTN is a major health burden. Around 97 crore people, 33 crore in financially advanced nations and 64 crore in financially growing nations in 2000 had HTN. It is believed that 156 crore people will have HTN by 2025 [1]. In India, 4–15% urban people and 2–8% rural people are suffering from HTN [2,3]. HTN is related to an increase in age, weight, food habits, tobacco, and alcohol abuse. The prevalence of essential HTN was associated with these related factors [4]. If HTN is poorly controlled, it leads to the development of coronary artery disease (50%), cerebrovascular stroke (33%), chronic renal failure (10–15%), and other complications. Therefore, it is important to control HTN [5]. This prospective study is done for 180 days duration. This is the first study about the pattern of prescription of drugs for HTN in both indoor and outdoor patients of the Department of Medicine at Silchar Medical College and Hospital (SMCH) in Southern Assam. The study sample has been chosen with the help of convenience sampling. HTN is widely prevalent in the world and is increasing in both the rural and urban population of India. Hence, it becomes essential to follow a uniform way of treatment and to ascertain whether recent the World Health Organization (WHO) guidelines of prescribing antihypertensive medications have been followed or not. The Joint National Committee 7<sup>th</sup> report on HTN prevention, diagnosis, and management (Joint National Committee [JNC-7]) was given by the Committee on National High Blood Pressure (BP) education program in 2003 [6]. This guidelines preferred angiotensin-converting enzyme inhibitors (ACEI), angiotensin receptor blockers (ARB), beta-blockers (BB), calcium channel blockers (CCB), or thiazide-type diuretics as

first-line treatment for most persons with no other indication for other classes, and usage of  $\geq 2$  medications from different drug to decrease BP (BP of  $<130/80$  mmHg for persons with chronic kidney disease [CKD], congestive cardiac failure [CCF] and Type 2 diabetes mellitus [Type 2 DM]; and a BP  $<140/90$  mmHg for other persons with HTN). JNC-8 came in 2014 [7]. They have set the recommendation to all the above drugs, except BB. The target BP has been increased to  $<150/90$  mmHg for people from 60 years age and above, and  $140/90$  mmHg for people with HTN and Type 2 DM or non-diabetic CKD and along with other persons with HTN and  $<60$  years of age. According to European Society of Cardiology/European Society of HTN 2018 guidelines recommends the major five classes of drugs to form the basis of antihypertensive therapy. WHO essential medicines list (EML) includes all groups of antihypertensive medications – thiazide diuretics, ARB, CCB, ACEI, CCB – as essential. Single-tablet, fixed-dose combination antihypertensive medications were included in the EML in 2019. This supports the analysis of all groups of drugs used for managing HTN, along with single-pill antihypertensive combinations in the current guideline. The most relevant and current evidence-based public health guidance worldwide on the starting of treatment with pharmacotherapy for HTN in adults is given by the 2021 WHO HTN guidelines. The guidelines are for the normal adult, non-pregnant, hypertensive people. The recommendations gave new guidelines on when to start pharmacological management of HTN, guidelines on when to follow-up, threshold BP to be achieved for control, and the category of health workers who can initiate treatment. It helps to decide when to start therapy with a single drug, two drugs, or fixed drug combination. It also helps nations to select drugs for controlling HTN in their national guidelines for the treatment of HTN.

- A. Guidelines for target to start management:
1. WHO suggests starting management of HTN in hypertensive persons when systolic BP (SBP) is  $\geq 140$  mmHg or diastolic BP (DBP) is  $\geq 90$  mmHg.
  2. WHO strongly suggests management with antihypertensive of persons suffering from cardiac disease and SBP of 130–139 mmHg.
  3. WHO strongly recommends management with antihypertensive of persons with no cardiac disease but with increased cardiac risk, CKD, or DM and SBP of 130–139 mmHg.
  4. WHO conditionally recommends starting pharmacological management of HTN no later than 28 days after diagnosis. If the level of BP is very increased (e.g., SBP  $\geq 160$  mmHg or DBP  $\geq 100$  mmHg) or if existing signs of end-organ failure, management must be initiated as early as possible.
- B. Recommendation about drug groups to be used as initial treatment: WHO suggests usage of medications from the following three groups of drugs as first-line antihypertensive for hypertensive adults who need pharmacological management:
1. CCB,
  2. Thiazides and thiazides-like drug,
  3. ACEI/ARBs.

With high-certainty evidence, WHO strongly suggests that preference is given to long-acting drugs. For example, indications to recommend specific drugs are – CCBs or diuretics in population above 65 years age and in people from Africa, BB for coronary artery disease, ARB/ACEI in people suffering from CCF, CKD, Type 2 DM, and severe proteinuria [6].

**Aims and objectives**

The aims of this study were as follows:

- Primary objective: To analyze the pattern of prescriptions of medications to control HTN in people with HTN at Silchar Medical College and Hospital.
- Secondary objective: To evaluate the comorbidities found in association with HTN.

**METHODS**

**Study area and time**

This study was carried out in SMCH from May 2023 to October 2023.

**Study pattern**

The study is observational and prospective.

**Sample volume**

A total 150 persons have participated in the study.

**Study material**

A specially made case record form has been used to collect patient’s details such as name, sex, age, medication dose and schedule.

**Ethical consideration**

Study has been conducted after getting due approval from the Institutional Ethics Committee (IEC). The reference number for this study is IEC No. SMC/8850 of 2023.

**Informed consent**

Informed consent has been taken from all the study participants. Data have been evaluated with the help of Microsoft Excel and the findings are presented in percentage.

**Inclusion criteria**

All known patients with HTN of both gender and age between 18 and 60 years attending the medicine department, both outdoor and indoor.

**Exclusion criteria**

1. Age <18 years and more than 60 years
2. Pregnancy

3. Lactation
4. Acute myocardial infarction
5. Acute left ventricular failure
6. Acute stroke
7. End-stage renal and hepatic disease.

**RESULTS**

In the study duration, in total, 150 prescriptions have been evaluated. Among them 87 (58%) were man and 63 (42%) were woman. Most of the participants are in 50–59 years age (54%), 78 (52%) participants gave a positive history of HTN in their family and 84 (56%) patients were of normal body mass index (BMI). Out of 150 patients, 66 (44%) patients have a single comorbidity, and 26 (17%) patients have multiple comorbidities whereas 58 (39%) patients have no comorbidity. The findings of demography are presented in Fig. 1. Maximum patients were managed with monotherapy (69%) in the study. The most frequently used single drug therapy was CCBs (48%), followed by ARB (29%), BBs (11%), diuretics (6%), and ACEI (6%). In dual therapy, CCB+ARB (42%) was the most preferred treatment followed by ARB+diuretics (31%), CCB+diuretic (21%), and ARB+BB (6%). In multi-drug therapy,

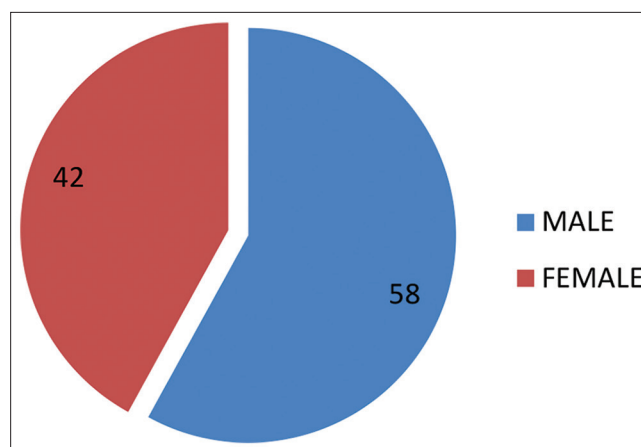


Fig. 1: Pattern of sex distribution in hypertensive patients

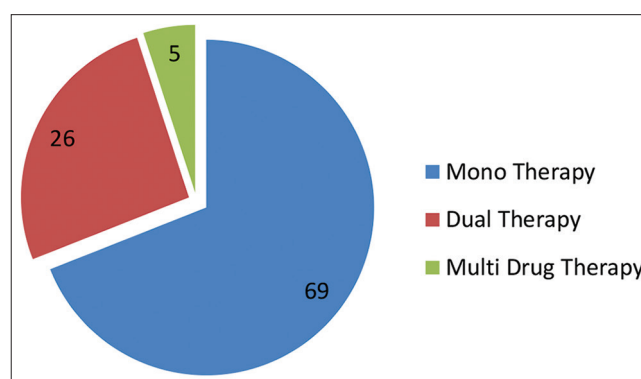


Fig. 2: Patterns of drug therapy prescribed in hypertensive patients

Table 1: Evaluation as per WHO core drug indicators

Prescribing indicators	Study findings	WHO standard
Total no. of prescriptions analyzed	150	
Total no. of medications prescribed	419	
No. of medications at each meet	2.8	1.6–1.8
% of encounters to injection	14	13.4–24.1
% of medications written in generic name	100	100

WHO: World Health Organization

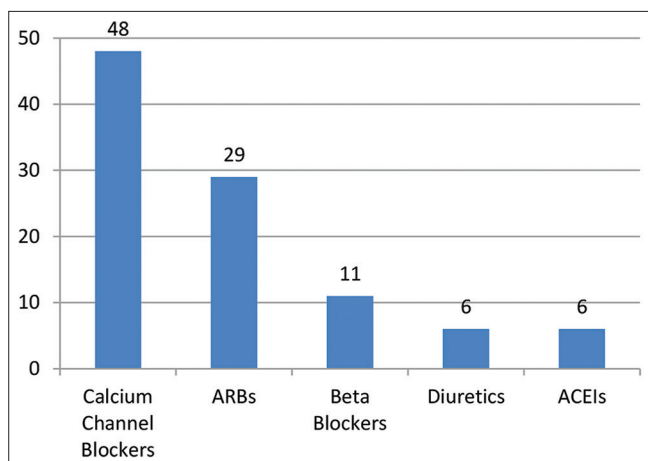


Fig. 3: Patterns of antihypertensive drugs prescribed in monotherapy

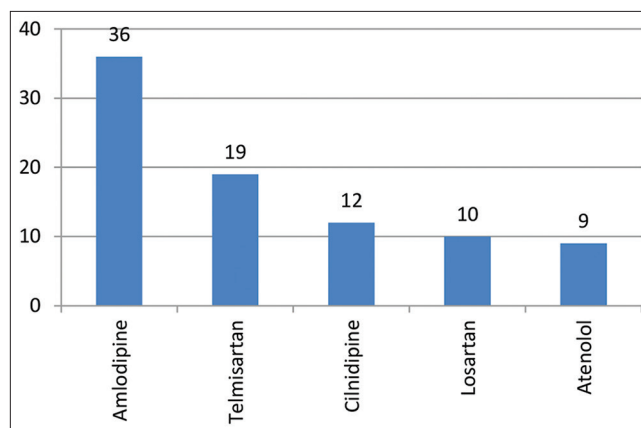


Fig. 6: Pattern of individual anti-hypertensive drugs prescribed in patients

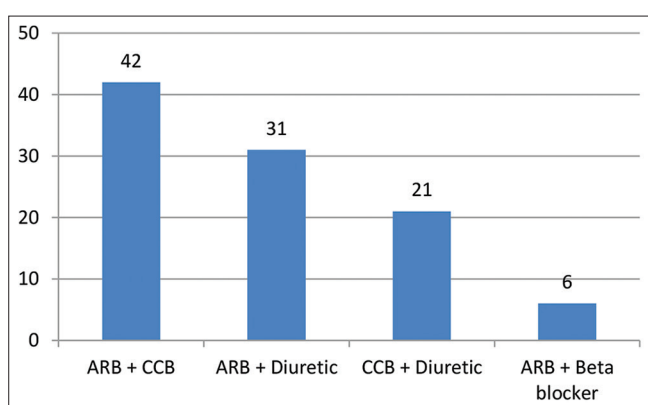


Fig. 4: Patterns of dual therapy antihypertensive drugs prescribed in patients

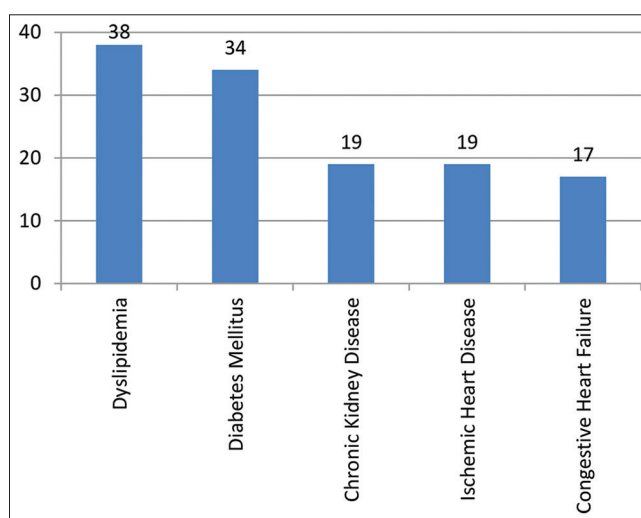


Fig. 7: Common comorbidities associated with hypertension

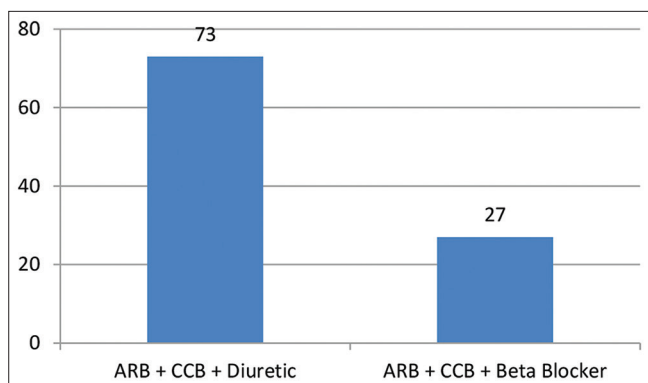


Fig. 5: Pattern of antihypertensive drugs prescribed in multi-drug therapy

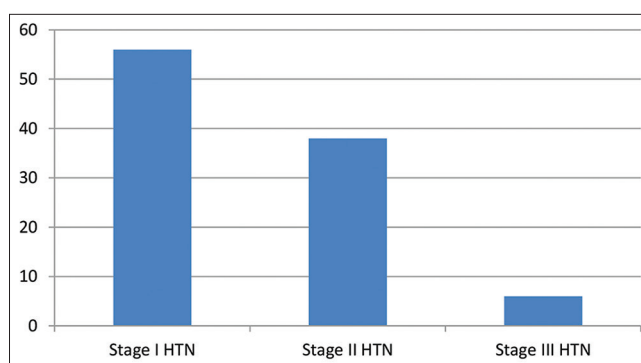


Fig. 8: Staging of hypertension

ARB+CCB+diuretic (73%) followed by ARB+CCB+BBs (27%) was the most preferred treatment of choice. In our study, out of individual drug choices, the most preferred was amlodipine (36%) then telmisartan (19%), cilnidipine (12%), losartan (10%), and the least preferred was atenolol (9%).

**DISCUSSION**

The study findings show that the prevalence of HTN in man and woman are 58% and 42%, respectively (Fig. 1). Literature review shows that there is inconsistent finding in the sex distribution of hypertensive

population as many studies had more percentage of hypertensive man and many studies had more percentage of hypertensive females [3,7,8]. Although in our study, man was more associated with HTN than woman which corresponds to earlier research of Gupta et al. [9]. Most participants are in the age of 50-59 years in our study. The outcome is the same as the earlier study. Strong genetic etiology in HTN can be derived from the finding that 52% of our participants gave a positive history of HTN in their families (Fig. 9) [3,8]. Most study participants had a normal BMI (56%), 42% of the participants had obesity and 2% of participants had been found to be below normal BMI (Fig. 10). The

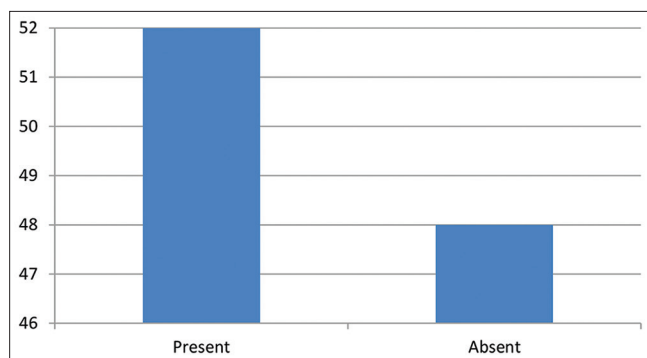


Fig. 9: Family of hypertension

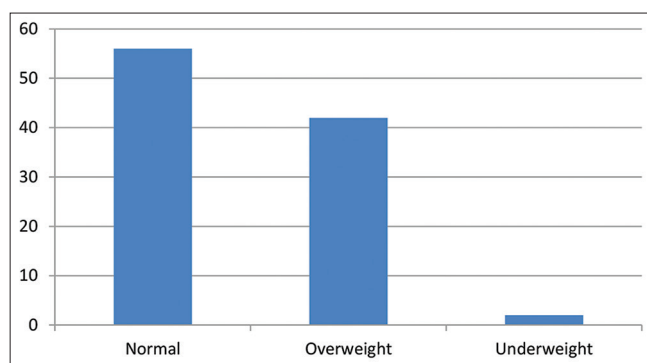


Fig. 10: Body mass index of patients

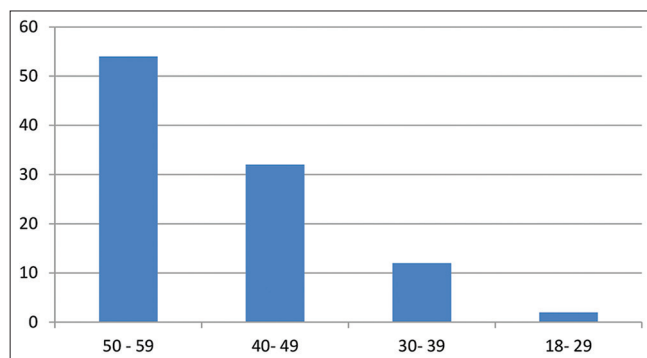


Fig. 11: Age of the patients in years

findings of the study are not consistent with the earlier research of Pittrow *et al.* [10]. In the current study, as shown in Fig. 2, monotherapy (69%) has been more prescribed than dual therapy (26%), and multidrug therapy (5%), in comparison to an earlier study of Kulkarni *et al.* where they found that drug combination therapy was a more rational way to decrease the cardiac morbidity and mortality [11]. The findings of many researches showed that combined drug treatment is needed in around 70% of the hypertensive population for control of BP [12,13]. In this study, a very commonly used single drug was CCB, then ARB, BBs, Diuretics, and ACEI, respectively (Fig. 3). For dual therapy, CCB+ARB was the most preferred treatment, followed by ARB+Diuretics (Fig. 4). In multi-drug therapy, ARB+CCB+diuretic was the most preferred treatment (Fig. 5). Our study shows thiazides being given as the initial drug, which resembles to JNC-VII recommendations. Earlier researches have also found similar results [14]. The above findings have similarity to the results of [13] Pr R, *et al.* Dyslipidemia was most frequently associated with HTN followed by Type 2 DM and CKD (Fig. 7). These findings are similar to that of [14] Schmieder RE, *et al.* Our study corresponds to another HTN study by Chou *et al.* [15] where the very frequently used drugs for HTN are: ACEIs (31.5%); beta-blockers

(43.5%); calcium antagonists (54.9%); diuretics (23.2%); and "others" (16.9%). In both sex groups, CCBs and BBs were mostly used for single-drug therapy, and CCBs+BBs and ACEIs+CCBs for multidrug therapy. Other studies where dual therapy was most commonly preferred than monotherapy were done by Manasa Cidda *et al.*, which had 360 patients. Man and woman were 59% and 41%, respectively. As shown in Fig. 11, 50–59 years (32.2%) was the most common age group and most participants (56.73%) were in Stage-I HTN (Fig. 8). Most participants were treated with two drug regimen (48%), single drug regimen (30.24%), three drug regimen (13%), more than three drugs regimen (8.31%). The findings showed that two drug regime was mostly used for decreasing SBP with ARBs+BBs than with ARBs alone. For DBP, better decrease was seen with CCBs+ACEIs, in contrast to a single use of ACEIs (Fig. 6). The pattern of prescriptions of anti-hypertensive medications relatively followed the WHO 2021 HTN management algorithm (Table 1).

#### Limitations of the study

The study period was of 6 months duration only. It was only one hospital setup only study.

#### CONCLUSION

Our study found that the most preferred treatment for Stage I, II, and III HTN, was mono-therapy, dual therapy, and multidrug therapy respectively. In dual therapy, CCB+ARB was the commonly used combination. ARB+CCB+thiazide combination was the preferred combination in multidrug therapy. In both SBP and DBP, the decrease in BP was more with the combined regime than monotherapy. The patterns of prescription of antihypertensive medications followed the WHO recommendations for control of HTN.

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#### AUTHOR'S CONTRIBUTION

Aritra Gupta: One of the researchers who came up with the study concept and research topic. Moreover being involved in the design of the study, defining intellectual content, searching the literature, obtaining and analyzing data, he was also involved in preparing and editing manuscript, and also reviewing it. Sarajita Barman: One of the authors who came up with the study's framework, was also involved in data collection, literature search, study design, intellectual content definition, collecting data, and manuscript writing. Dolly Roy: One of the developers of the study's concept. In addition, she had also contributed in the design of the study, defining the intellectual contents, searching the literature, acquiring data, preparing and reviewing the manuscript, and supervised all phases of the research process.

#### CONFLICTS OF INTEREST

Authors do not have any conflicts of interest.

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