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Original Research Article

Prescription pattern of antihypertensive drugs in a tertiary care hospital: a cross-sectional study

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ABSTRACT

Background: Hypertension is a significant public health issue requiring long-term pharmacological management. This study aimed to analyse the prescription pattern of antihypertensive drugs and evaluate adherence to WHO prescribing indicators in a tertiary care hospital.

Methods: A cross-sectional study was conducted among 178 hypertensive patients attending the Medicine Out-Patient Department of VMMC and Safdarjung Hospital, Delhi. The sociodemographic details were recorded, and prescriptions were analysed using WHO Core Drug Prescribing Indicators.

Results: The majority of the study population (67%) was aged above 50 years, with females (63.48%) outnumbering males (36.52%). The most commonly diagnosed hypertension grade was pre-hypertension (43.25%), followed by stage 1 (38.20%) and stage 2 (16.30%). Monotherapy was observed in 38.76% of prescriptions, while dual therapy (46.06%) was the most frequently prescribed combination. Amlodipine (5mg,10mg) was the most commonly used monotherapy (20.22%), whereas Amlodipine + Telmisartan (17.41%) was the most prescribed dual therapy. WHO prescribing indicators revealed an average of 4.76 drugs per prescription, with 73.58% of drugs prescribed by generic name and 71.34% from the WHO Essential Drug List.

Conclusions: The study highlights a preference for combination therapy in hypertension management, with adherence to WHO prescribing guidelines showing room for improvement. Emphasis should be placed on rational prescribing, especially with generic drugs, to optimize treatment outcomes.

Keywords: Antihypertensive drugs, Prescription pattern, WHO prescribing indicators, Hypertension, Generic name

INTRODUCTION

Hypertension affects 1.13 billion people globally, with a rising prevalence in low- and middle-income countries. In India, nearly 30% of the population is hypertensive, with higher rates in individuals over 44 years.¹ As a leading risk factor for cardiovascular diseases, it contributes

significantly to morbidity and mortality. Despite various treatment options, optimal blood pressure control remains a challenge, particularly with increasing cases among young adults. Comorbidities like diabetes and kidney disease further complicate treatment decisions, highlighting the need for a patient-centered approach.^{2,3} The increasing prevalence of hypertension has been

attributed to population growth, ageing and behavioural risk factors, such as unhealthy diet, excessive intake of alcohol, sedentary lifestyle, obesity, and exposure to constant stress.⁴ Antihypertensive prescriptions vary due to evolving guidelines, physician experience, and patient-specific factors. While Joint National Committee (JNC) 8 and American College of Cardiology/American Heart Association (ACC/AHA) provide recommendations, real-world prescribing often differs due to clinical judgment, cost, drug availability, and adherence issues. Data on antihypertensive prescription trends in India are limited, with studies showing that only one in eight patients achieves adequate blood pressure control.^{5,6} This study analyses prescribing pattern of antihypertensive medications in a tertiary care hospital, assessing adherence to World Health Organisation (WHO) prescribing indicators. Understanding these trends can help optimize clinical outcomes, encourage rational drug use, and improve cost-effective, pharmacological management of hypertension.

METHODS

This cross-sectional study was conducted in the Departments of Pharmacology and Medicine at Vardhman Mahavir Medical College and Safdarjung Hospital, New Delhi. The study included hypertensive patients above 18 years who had been on antihypertensive medication for at least three months. Critically ill and hemodynamically unstable patients were excluded. The study received ethical clearance dated 27/03/2023, under Certificate No: IEC/VMMC/SJH/THESIS/2023/CC-256, prior to commencement. The study was conducted from July 2023 to August 2024. Using the formula, sample size $(n) = Z^2 P(1-P)/d^2$ where $Z=1.96$ for a 95% confidence interval, P was the prevalence (0.3)¹ of hypertension among adults in India derived out from previous study by Ramakrishnan S et al, 'd' was the precision value (0.05) and adding 10% non-response rate, a total of 178 patients were recruited from the Medicine Outpatient Department after obtaining informed consent. Data were collected using a structured case record form, which documented patient demographics, hypertension history, and prescribed medications. Prescription patterns were analyzed using WHO prescription indicators to evaluate adherence to standard treatment guidelines and rational drug use. The collected questionnaires were reviewed for completeness, and data was cleaned to correct errors and missing values. A Master Chart was prepared, and the corrected data was entered into Microsoft Excel. Descriptive statistics, including mean and standard deviation, were used for analysis, with results presented through tables and charts.

RESULTS

Sociodemographic characteristics

Figure 1 shows that the majority of participants (67%) were aged above 50 years, indicating a higher prevalence of hypertension in older age groups. Illustration from

Figure 2 reveals that female patients (63.48%) outnumbered male patients (36.52%).

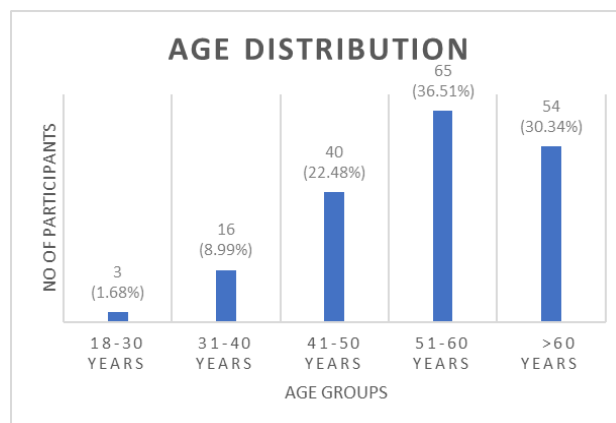


Figure 1: Age distribution of participants.

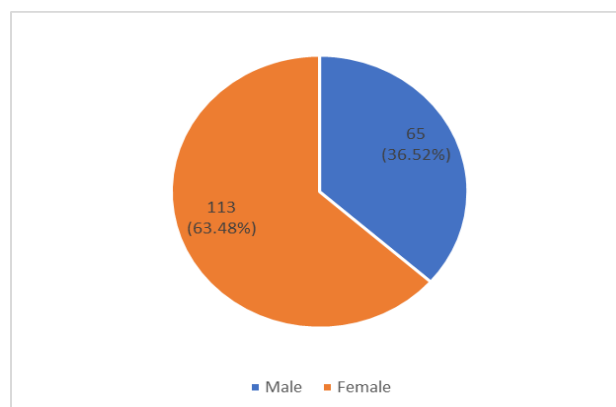


Figure 2: Gender distribution of participants.

Hypertension classification

In Figure 3, based on the JNC 8 classification, pre-hypertension was the most prevalent stage (43.25%), followed by stage 1 hypertension (38.20%) and stage 2 hypertension (16.30%).

Prescription pattern

In a total of 178 prescriptions, 848 drugs were prescribed, of which 316 were antihypertensive medications. Among the antihypertensives, Angiotensin Receptor Blockers (ARBs) (Telmisartan, Olmesartan) accounted for the highest proportion with 122 prescriptions (38.6%), followed by Calcium Channel Blockers (CCBs) (Amlodipine, Cilnidipine) with 112 prescriptions (35.4%). Looking at individual drugs, Amlodipine (5mg, 10 mg), with an average duration of use ranging from 6 months to 30 years, was the most frequently prescribed, appearing in 111 cases (35%). This was followed by Telmisartan (40 mg), prescribed in 85 cases (27%) with an average duration of 1 to 15 years, and Olmesartan (20mg, 40 mg), prescribed in 37 cases (12%) with an average duration

ranging from 4 months to 10 years. All the drugs were prescribed in a tablet form (Table 1).

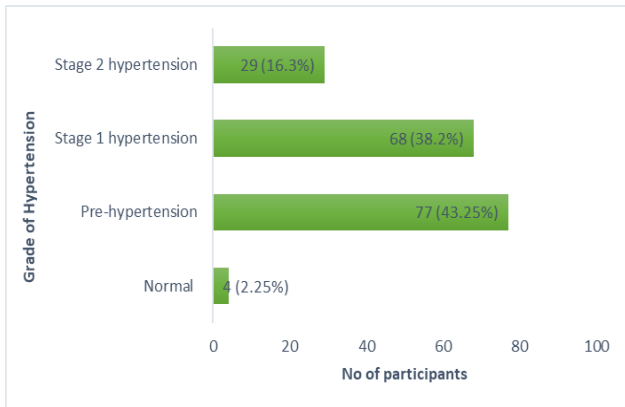
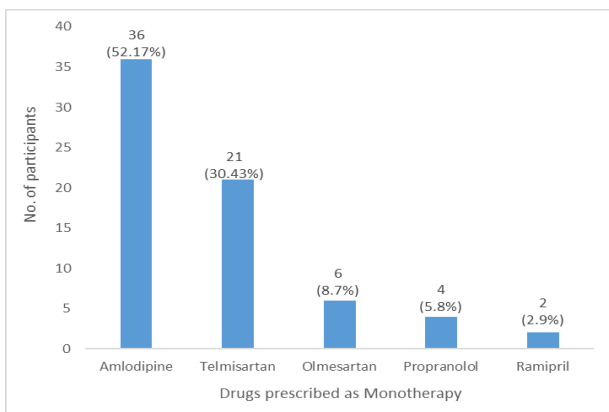
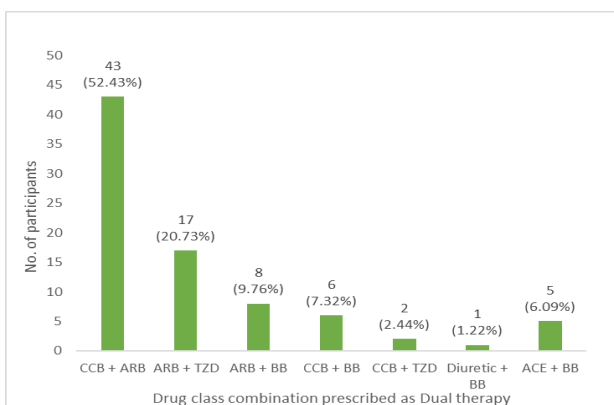


Figure 3: Grade of hypertension.



% (among drugs prescribed as monotherapy)

Figure 4: Antihypertensive drugs prescribed as monotherapy.



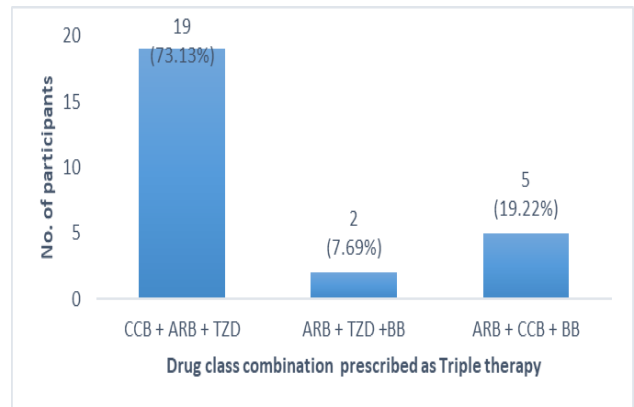
% (among drugs prescribed as dual therapy)

Figure 5: Antihypertensive drugs prescribed as dual therapy.

Monotherapy (38.76%)

Figure 4 shows that Amlodipine (52.17%) was the most commonly prescribed single agent. In the majority of cases, patients with a hypertension duration of ≤ 2 years, no

associated comorbidities, and stage 1 hypertension were managed with monotherapy. Propranolol was prescribed as monotherapy for patients with hypertension associated with hyperthyroidism, anxiety.



% (among drugs prescribed as triple therapy)

Figure 6: Antihypertensive drugs prescribed as triple therapy.

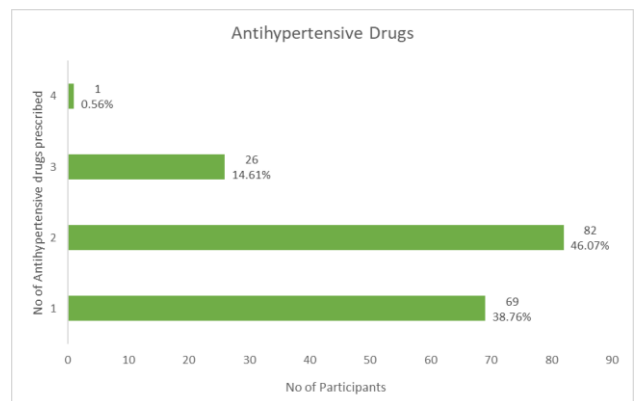


Figure 7: Number of antihypertensive drugs prescribed to study participants.

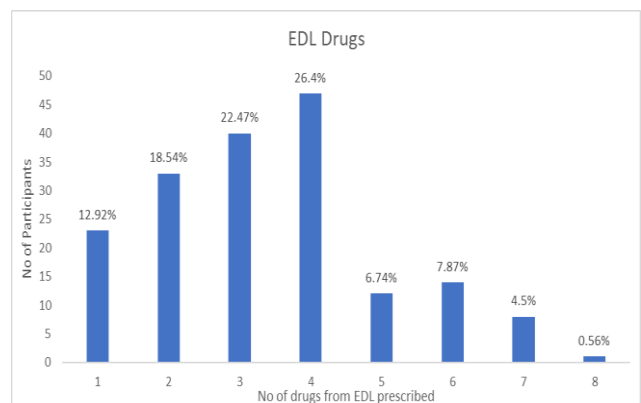


Figure 8: Prescription of drugs from EDL.

Dual therapy (46.06%)

In Dual Therapy, the most commonly prescribed combination is CCB+ARB, in that Amlodipine+

Telmisartan (37.8%) combination was prescribed more often (Figure 5).

Triple therapy (14.6%)

CCB+ARB+Thiazide Diuretics (TZD) was the most frequent combination among triple therapy. Amlodipine + Telmisartan+Chlorthalidone (30.76%) was prescribed more often from that combination (Figure 6). In the majority of cases, patients with a hypertension duration of >3 years, with associated comorbidities were managed with dual and triple therapy.

Quadruple therapy (0.56%)

Amlodipine + Telmisartan + Hydrochlorothiazide + Metoprolol was the only quadruple therapy observed.

Figure 7 presents the number of antihypertensive agents prescribed per prescription, indicating the preference for monotherapy or combination therapy. Figure 8 displays the proportion of drugs prescribed from the Essential Drug List (EDL) per prescription, providing insight into the rational use of essential medicines.

WHO prescribing indicators

The average number of drugs per prescription was found to be 4.76, which is significantly higher than the WHO standard of 1.6 to 1.8. Antihypertensive medications were prescribed in 37.14% of patient encounters, while only 0.24% of prescriptions included injectables. 73.58% of the drugs were prescribed using their generic names, and 71.34% of the prescribed medications were from the WHO Essential Drug List, indicating a considerable adherence to essential medicine guidelines (Table 2).

Table 1: Antihypertensives prescribed with their dose, dosage form, route, frequency and duration.

| Drug | Dose (mg) | Dosage form | Route | Frequency | Duration (m-months, y- years) | Total count of drug prescriptions | % prescribed among antihypertensives |
|---------------------|-----------|-------------|-------|-----------|-------------------------------|-----------------------------------|--------------------------------------|
| Amlodipine | 5 | Tablet | Oral | OD | 6 m – 30 y | 63 | 35 |
| Amlodipine | 10 | Tablet | Oral | OD | 1 – 10 y | 48 | |
| Telmisartan | 40 | Tablet | Oral | OD | 1 – 15 y | 80 | 27 |
| Telmisartan | 40 | Tablet | Oral | BD | 5 y | 5 | |
| Olmesartan | 20 | Tablet | Oral | OD | 4 m-10 y | 21 | 12 |
| Olmesartan | 40 | Tablet | Oral | OD | 3 – 15 y | 15 | |
| Olmesartan | 40 | Tablet | Oral | BD | 10 y | 1 | |
| Ramipril | 2.5 | Tablet | Oral | OD | 4 m – 5 y | 5 | 1.6 |
| Propranolol | 20 | Tablet | Oral | BD | 1 y | 4 | 1.6 |
| Propranolol | 40 | Tablet | Oral | OD | 3 y | 1 | |
| Hydrochlorothiazide | 12.5 | Tablet | Oral | OD | 7 y | 9 | 3.8 |
| Hydrochlorothiazide | 12.5 | Tablet | Oral | BD | 5 y | 3 | |
| Metoprolol | 12.5 | Tablet | Oral | BD | 15 y | 1 | 6.6 |
| Metoprolol | 25 | Tablet | Oral | OD | 3 – 15 y | 14 | |
| Metoprolol | 25 | Tablet | Oral | BD | 3 – 15 y | 3 | |
| Metoprolol | 50 | Tablet | Oral | OD | 1 y | 3 | |
| Chlorthalidone | 12.5 | Tablet | Oral | OD | 5 – 7 y | 29 | 9.2 |
| Cilnidipine | 10 | Tablet | Oral | STAT | - | 1 | 0.3 |
| Atenolol | 50 | Tablet | Oral | OD | 2 y | 4 | 1.3 |
| Enalapril | 5 | Tablet | Oral | OD | 10 y | 2 | 0.6 |
| Bisoprolol | 5 | Tablet | Oral | OD | 5 y | 1 | 0.3 |
| Nebivolol | 5 | Tablet | Oral | OD | 2 y | 1 | 0.3 |
| Furosemide | 10 | Tablet | Oral | OD | 10 y | 1 | 0.3 |
| Spirolactone | 25 | Tablet | Oral | OD | 10 y | 1 | 0.3 |
| Total | | | | | | 316 | 100 |

Table 2: Analysis of prescription according to WHO prescribing indicators.

| WHO indicators | Total | Hypertension |
|---|-------|--------------|
| Average number of drugs prescribed per prescription | 4.76 | 1.77 |
| Total percentage of antihypertensives prescribed | 37.14 | 37.14 |
| Percentage of drugs prescribed by generic name | 73.58 | 80.7 |
| Percentage of encounters with an injection prescribed | 0.24 | 0 |
| Percentage of drugs prescribed from EDL | 71.34 | 78.16 |

DISCUSSION

The prescribing trends for antihypertensive drugs have evolved, with newer agents like ARBs and CCBs replacing older treatments such as beta-blockers (BB) and some diuretics due to better side effect profiles. ARBs are often preferred over ACE inhibitors due to the risk of chronic cough, while CCBs are less likely to cause metabolic side effects compared to diuretics. JNC 8 guidelines recommend CCBs, ACE inhibitors, ARBs, or thiazide-type diuretics as first-line treatment for the general non-Black population, whereas CCBs or thiazide diuretics are preferred for Black patients. ACE inhibitors or ARBs are recommended for CKD patients to improve renal outcomes.⁷

In our study, 67% of hypertensive patients were aged above 50 years, which is consistent with the observations made by Supriya Selvakumar et al. In our study, the maximum number of participants after antihypertensive therapy were in pre-hypertension stage (43.25%), followed by Stage 1 (38.20%) and Stage 2 hypertension (16.3%). This pattern differs from Selvakumar et al, where Stage 1 hypertension was reported as the most common.⁸ Additionally, our study had a female predominance (63.48%), whereas Rajkumar Suman et al reported a male majority of 62%, highlighting a contrasting gender distribution.⁹

Most patients received multiple antihypertensives (61.24%), with dual therapy being the most common (46.06%), followed by triple therapy (14.6%). Monotherapy was used in 38.76% of cases. These findings contrast with Sharma V et al, where monotherapy was dominant (58.45%), followed by dual (28.39%) and triple therapy (10.05%). Amlodipine was the most prescribed drug (20.22%), followed by Amlodipine+Telmisartan (17.41%) and Telmisartan (11.8%). While Sharma V et al also found Amlodipine to be the most prescribed monotherapy, their study reported CCB+BB as the most common dual therapy, whereas ours found CCB+ARB (24.15%) to be predominant. Triple therapy in our study was mainly CCB+ARB+TZD (10.68%), whereas Sharma V et al reported ARB+TZD+BB.¹⁰ The extra blood pressure reduction from combining drugs from 2 different classes is approximately 5 times greater than doubling the dose of 1 drug.¹¹ According to a study by Akkamma D et al, the most commonly used combination therapies were ACEI/ARB + diuretics or beta-blockers (3%), CCB + beta-blockers (5%), and CCB+diuretics (5%).¹² In another study by Kavya NS et al, amlodipine was the most frequently prescribed antihypertensive drug (31.44%) among 795 prescriptions, which is consistent with the findings of our study.¹³

The study also evaluated prescription pattern using WHO indicators. The average number of drugs per prescription was 4.76, higher than the standard (1.6-1.8), similar to findings by Sahrish Junaid et al (3.76). Generic prescriptions accounted for 73.58% in our study whereas Junaid et al reported only 25.53% generic prescriptions.¹⁴

In the present study, 71.34% of the prescribed drugs were listed in the WHO Essential Medicines List, which is lower compared to 97.89% reported by Vishwanath M et al. Injection prescriptions were identified in only one case (0.24%) in our study, whereas Vishwanath M et al documented a higher frequency (4.62%), with the majority prescribed for insulin therapy. Similarly, the single injection prescribed in our study was also insulin.¹⁵

This study has some limitations. It was done in a single centre with a small sample size, so the results may not apply to all settings. Only patients from the Medicine outpatient department were included, so patients who went directly to the emergency department may have been missed. Pregnant women, who usually visit the Obstetrics OPD, were also not included. In addition, critically ill patients (admitted in ICU or as inpatients) and individuals below 18 years of age were excluded.

CONCLUSION

Based on the present study, it can be concluded that Amlodipine (5 mg and 10 mg) was the most frequently prescribed antihypertensive, both as monotherapy and in combination with other drugs. Dual therapy is most commonly prescribed followed by Monotherapy, Triple therapy and Quadruple therapy. The most common dual therapy was CCB+ARB (Amlodipine+Telmisartan), triple therapy was mainly CCB + ARB + TZD and only one case had quadruple therapy (CCB+ARB+ BB +TZD). Effective treatment of hypertension in older adults can significantly reduce the risk of stroke, heart failure, and other cardiovascular events. The prescription pattern in our study indicates that the majority of prescriptions adhered to JNC 8 guidelines, recommending CCBs, ARBs, TZDs, and ACEs as first-line agents for hypertension management, both as monotherapy and in combination therapy. All the antihypertensive drugs were prescribed in oral dosage form (Tablet). Majority of the drugs were prescribed by generic name and from Essential Drug List, but still physicians need to be encouraged to write prescription with generic names in order to promote rational prescribing and to achieve a standard value of 100%.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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