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Original Research Article

EVALUATION OF PRESCRIBING TRENDS, DISPENSING PRACTICES, AND MEDICATION ADHERENCE AMONG HYPERTENSIVE PATIENTS AT A TERTIARY CARE TEACHING HOSPITAL IN DELHI

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ABSTRACT

Background: Hypertension remains a leading cause of cardiovascular morbidity and mortality worldwide. Appropriate prescribing, proper dispensing, and regular medication adherence are critical for effective blood pressure control and prevention of long-term complications. **Objectives:** To assess prescribing trends, dispensing practices, and medication adherence among hypertensive patients attending the outpatient department (OPD) of General Medicine at North DMC Medical College and Hindu Rao Hospital, Delhi. **Materials and Methods:** A hospital-based cross-sectional observational study was conducted among 100 adult patients with hypertension. Data were collected through prescription review, direct observation of dispensing practices, and structured patient interviews. Medication adherence was evaluated using the Morisky-Green-Levine 4-item scale (MMAS-4). Descriptive statistics, chi-square tests, and Fisher's exact test were used for data analysis. **Results:** Mean age was 55 ± 12 years; males constituted 62% of participants. Monotherapy was prescribed in 62% of patients; among monotherapy users (n=62), calcium channel blockers (CCBs) were the most commonly prescribed class (58% of monotherapy prescriptions; 36% of all patients, followed by ACE inhibitors (42%). Combination therapy was prescribed in 38% of patients, with CCB plus beta-blocker being the most frequent regimen (22/38, 58%), followed by ACE inhibitor plus diuretic (16/38, 42%). Mean dispensing time was 1.6 ± 0.7 minutes. Only 32% of patients received adequate counselling (95% CI: 23–42%). Adherence was observed in 66% of patients (95% CI: 56–75%). Non-adherence was significantly associated with inadequate counselling ($\chi^2 = 4.88$, $p = 0.027$) and combination therapy ($\chi^2 = 6.99$, $p = 0.008$). **Conclusion:** Prescribing practices were partially consistent with standard treatment recommendations. While ACE inhibitor use among diabetic patients aligned with guideline recommendations, the frequent use of CCB plus beta-blocker combinations warrants further evaluation regarding guideline conformity. Significant deficiencies were identified in counselling practices, and non-adherence was statistically associated with inadequate dispensing counselling. Enhanced pharmacist involvement and structured patient education programmes are recommended to improve adherence and treatment outcomes.

INTRODUCTION

Hypertension is one of the most prevalent non-communicable diseases and a leading modifiable risk factor for cardiovascular disease, stroke, heart failure, and chronic kidney disease.[1,2] Despite the availability of a wide range of effective antihypertensive medications, adequate blood pressure control remains difficult to achieve in a substantial proportion of patients globally.

In India, the prevalence of hypertension has risen steadily over the past two decades, driven by urbanization, sedentary lifestyles, dietary changes, obesity, and increasing life expectancy.[3] Estimates suggest that approximately one-third of urban adults in India are hypertensive, yet awareness, treatment, and control rates remain suboptimal.[3]

Effective hypertension management depends on three interdependent components: rational prescribing based on evidence-based guidelines, correct dispensing with adequate patient counselling, and sustained medication adherence by the patient.[4] Deficiencies in any one of these components can lead to inadequate blood pressure control and increased risk of complications. Poor medication adherence, in particular, has been identified as a major barrier to treatment success, with reported adherence rates ranging from 50% to 80% in various Indian settings.[5-9]

Drug utilisation studies provide a systematic framework for evaluating prescribing quality, dispensing practices, and patient adherence within a real-world healthcare setting.[6] Earlier studies from India and elsewhere have individually examined either prescribing patterns or medication adherence among hypertensive patients.[8-10] However, studies that simultaneously assess all three domains — prescribing, dispensing, and adherence — within a tertiary care hospital setting are comparatively limited, particularly from Delhi. A similar integrated assessment was conducted by Shukrala and Gabriel at an Ethiopian tertiary hospital, which found that over 75% of patients left the dispensing counter with inadequate medication information, highlighting the global nature of this problem.[11]

The present study was therefore undertaken to evaluate prescribing trends, dispensing practices, and medication adherence together in a real outpatient setting at a tertiary care teaching hospital in Delhi, with a view to identifying specific, actionable gaps in clinical practice.

2. Aim and Objectives

2.1 Aim

To assess prescribing trends, dispensing practices, and medication adherence among hypertensive patients attending the outpatient department of General Medicine at North DMC Medical College and Hindu Rao Hospital, Delhi.

2.2 Objectives

- To analyses the prescribing pattern of antihypertensive medications used as monotherapy and combination therapy, and compare findings with standard treatment guidelines.
- To evaluate dispensing and counselling practices in the outpatient pharmacy, including dispensing time and the quality of patient education provided.
- To assess medication adherence among hypertensive patients using the Morisky-Green-Levine 4-item scale (MMAS-4).
- To identify factors associated with poor medication adherence using inferential statistical analysis.

MATERIALS AND METHODS

3.1 Study Design and Setting

This hospital-based cross-sectional observational study was conducted in the outpatient department of General Medicine at North DMC Medical College and Hindu Rao Hospital, Delhi. The study was carried out over two months (1 July 2022 to 31 August 2022) after obtaining approval from the Institutional Ethics Committee (IEC/NDMC/2022/132).

3.2 Study Population and Sampling

The sample size was calculated using the formula $n = Z^2PQ/d^2$, assuming a medication adherence prevalence of 50%, 95% confidence level, and absolute precision of 10%. The minimum calculated sample size was 96 participants. To account for incomplete data, 100 patients were enrolled.

3.3 Inclusion and Exclusion Criteria

Patients aged 18 years and above with a confirmed diagnosis of hypertension who were receiving antihypertensive treatment were included. Patients presenting with hypertensive emergencies, critically ill patients, and patients with psychiatric illness affecting communication were excluded.

3.4 Ethical Considerations

Written informed consent was obtained from all participants prior to enrolment. Patient identity and personal information were maintained confidentially throughout the study.

3.5 Data Collection

Prescription Analysis: Prescriptions were reviewed to collect information on demographic characteristics, blood pressure values, associated comorbidities, number of medications prescribed, and classes of antihypertensive drugs used. Hypertension stage was classified using the blood pressure recorded during the study visit according to the JNC 7 classification system. Patients with systolic blood pressure 140–159 mmHg and/or diastolic blood pressure 90–99 mmHg were classified as Stage 1 hypertension, while those with systolic blood pressure ≥160 mmHg and/or diastolic blood pressure ≥100 mmHg were classified as Stage 2 hypertension. Prescribing patterns were evaluated against JNC 8 recommendations for antihypertensive drug selection and the WHO rational drug use indicators, which are

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internationally accepted standards for assessing prescribing practices in drug utilization studies. JNC 7 criteria were used for hypertension staging because JNC 8 provides recommendations for treatment initiation and drug selection, but does not redefine hypertension stages.[1,2,6]

Observation of Dispensing Practices: Dispensing practices were assessed through direct observation of pharmacist-patient interactions in the outpatient pharmacy. Parameters recorded included dispensing time (measured by stopwatch) and whether counselling covered dosage, duration, adverse effects, and lifestyle modification. Counselling was classified as adequate only if all four components were addressed.

Patient Interviews: Medication adherence was evaluated using the validated MMAS-4 scale.[12] Patients scoring 0 were classified as high adherers, those scoring 1–2 as medium adherers, and those scoring 3–4 as low adherers, consistent with the original Morisky scoring scheme. For dichotomous analysis, patients with scores of 0–2 were grouped as 'adherent' and those with scores of 3–4 as 'non-adherent', as applied in prior Indian hypertension studies.[13] The rationale for this dichotomization was pre-specified in the study protocol.

3.6 Statistical Analysis

Data were entered into Microsoft Excel and analyzed using IBM SPSS Statistics version 28. Quantitative variables are expressed as mean ± standard deviation (SD). Qualitative variables are presented as frequencies and percentages with 95% confidence intervals (CIs) calculated using the Wilson method. Chi-square tests were used to examine associations between categorical variables. Fisher's exact test was applied when any expected cell frequency was less than 5. An independent-samples Student's t-test was used to compare mean dispensing times between peak and off-peak outpatient hours. A p-value <0.05 was considered statistically significant.

RESULTS

4.1 Demographic Characteristics

A total of 100 hypertensive patients participated in the study. The mean age was 55 ± 12 years. Male participants constituted 62% (95% CI: 52–71%) of the study population, and females 38% (95% CI: 29–48%). Stage 1 hypertension was present in 65% of patients and Stage 2 in 35%. Diabetes mellitus was the most common comorbidity (34%), followed by ischemic heart disease (10%) and chronic kidney disease (5%). Demographic details are presented in Table 1.

Table 1: Demographic Characteristics of Study Participants (n = 100)

Parameter	Value (n = 100)
Age, mean ± SD (years)	55 ± 12
Male	62 (62%; 95% CI: 52–71%)
Female	38 (38%; 95% CI: 29–48%)
Stage 1 Hypertension	65 (65%; 95% CI: 55–74%)
Stage 2 Hypertension	35 (35%; 95% CI: 26–45%)
Diabetes Mellitus	34 (34%; 95% CI: 25–44%)
Ischaemic Heart Disease	10 (10%; 95% CI: 5–17%)
Chronic Kidney Disease	5 (5%; 95% CI: 2–11%)

4.2 Prescribing Pattern

Monotherapy was prescribed in 62 patients (62%; 95% CI: 52–71%), while combination therapy was used in 38 patients (38%; 95% CI: 29–48%). Among monotherapy prescriptions, calcium channel blockers were the most commonly used class (36 patients, 58%), followed by ACE inhibitors (26 patients, 42%). A substantial proportion of diabetic patients received ACE inhibitors, which is consistent with recommendations supporting renin–angiotensin system blockade in selected patients with diabetes. Among combination regimens, CCB plus beta-blocker was the most frequently prescribed (22 patients, 58% of combinations), followed by ACE inhibitor plus diuretic (16 patients, 42% of combinations). It is noted that CCB plus beta-blocker is not among the preferred first-line combination regimens recommended by JNC 8, which favors combinations including thiazide diuretics, ACE inhibitors, ARBs, or CCBs. The clinical indications for beta-blocker use (e.g., ischemic heart disease, heart failure, arrhythmia) were not systematically recorded in the present study; therefore, the appropriateness of this combination cannot be determined from the available data. Generic prescribing was observed in 70% (95% CI: 60–78%) of prescribed drugs. Prescribing patterns are summarized in Table 2.

Combination therapy was significantly more frequent in Stage 2 hypertension (57.1%; 20/35 patients) compared to Stage 1 hypertension (27.7%; 18/65 patients), totaling 38 patients on combination therapy ($\chi^2 = 8.38$, df = 1, $p = 0.004$), consistent with guidelines recommending two-drug regimens for higher-stage disease.

Table 2: Prescribing Pattern of Antihypertensive Drugs (n = 100)

Drug Class / Regimen	n	Percentage (95% CI)
Monotherapy (total)	62	62% (52–71%)
Calcium Channel Blockers	36	58% (45.7–69.7%)
ACE Inhibitors	26	42% (30.3–54.3%)

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Combination Therapy (total)	38	38% (29–48%)
ACE Inhibitor + Diuretic	16	42% of the combination (27–59%)
CCB + Beta-Blocker	22	57.9% of combination regimens (22 of 38)
Generic Prescribing	70	70% (95% CI: 60–78%)

Note: Percentages for monotherapy drug classes (CCB 58%, ACE inhibitor 42%) are calculated as proportions of monotherapy patients only (n=62), not of the total study population (n=100). CCBs were prescribed to 36% and ACE inhibitors to 26% of all 100 patients."

4.3 Dispensing and Counselling Practices

The mean dispensing time was 1.6 ± 0.7 minutes (range: 0.5–3.8 minutes). This was notably lower during peak outpatient hours compared to off-peak hours (1.3 ± 0.5 vs 2.1 ± 0.6 minutes; $t = 4.62$, $p < 0.001$), likely reflecting the impact of heavy patient load on pharmacist-patient interaction time.

Only 32 patients (32%; 95% CI: 23–42%) received adequate counselling covering all four components: dosage instructions, duration of therapy, information about adverse effects, and lifestyle modification advice. Inadequate counselling was recorded in 68% of patients. Dispensing and counselling data are summarized in Table 3.

Table 3: Dispensing and Counselling Practices (n = 100)

Parameter	Value
Mean Dispensing Time (minutes)	1.6 ± 0.7
Peak-hour dispensing time (minutes)	1.3 ± 0.5
Off-peak dispensing time (minutes)	2.1 ± 0.6 ($p < 0.001$)
Adequate Counselling	32 (32%; 95% CI: 23–42%)
Inadequate Counselling	68 (68%; 95% CI: 58–77%)

4.4 Medication Adherence

Based on MMAS-4 scoring, 66 patients (66%; 95% CI: 56–75%) were classified as adherent and 34 patients (34%; 95% CI: 25–44%) as non-adherent. Chi-square analysis demonstrated that non-adherence was significantly associated with inadequate counselling ($\chi^2 = 4.88$, df = 1, $p = 0.027$) and combination therapy ($\chi^2 = 6.99$, df = 1, $p = 0.008$). Patients who received inadequate counselling were significantly more likely to be non-adherent than those who received adequate counselling. A trend towards higher non-adherence was observed among patients with Stage 2 hypertension; however, this association did not reach statistical significance ($\chi^2 = 3.12$, df = 1, $p = 0.077$). Age and sex were not significantly associated with medication adherence ($p > 0.05$). The associations between counselling quality, therapy type, and medication adherence are presented in Tables 4A and 4B.

Combination therapy:

Combination therapy was significantly associated with non-adherence ($\chi^2 = 6.99$, df = 1, $p = 0.008$). A trend towards higher non-adherence was observed among patients with Stage 2 hypertension; however, this association did not reach statistical significance ($\chi^2 = 3.12$, df = 1, $p = 0.077$). Age and sex were not significantly associated with medication adherence ($p > 0.05$). Overall, inadequate counselling and combination therapy were the only factors significantly associated with non-adherence in the present study.

DISCUSSION

The present study evaluated prescribing trends, dispensing practices, and medication adherence together in a real-world outpatient setting, providing an integrated assessment that addresses a gap in the existing literature from tertiary care hospitals in Delhi.

Calcium channel blockers and ACE inhibitors were the most commonly prescribed classes of antihypertensive drugs in the present study. Similar prescribing patterns have been reported in previous Indian studies conducted in tertiary care settings, where calcium channel blockers and renin–angiotensin system inhibitors constituted a substantial proportion of antihypertensive prescriptions.[8,10,13,14] These drug classes are widely used because of their established efficacy, favorable tolerability profile, and availability as cost-effective generic formulations. Generic prescribing was observed in 70% of prescriptions, reflecting a reasonably rational prescribing pattern consistent with formulary-based practice in public healthcare institutions. Evaluation of prescribing indicators remains an important component of promoting rational drug use and optimizing hypertension management.[7]

Combination therapy was prescribed in 38% of patients and was significantly more common among patients with Stage 2 hypertension. This finding is broadly consistent with JNC 8 recommendations and with observations from recent Indian studies that reported greater utilisation of combination therapy among patients with more severe hypertension and multiple comorbidities.[2,14,15,17] The predominance of CCB plus beta-blocker combinations warrants further evaluation because the specific clinical indications for beta-blocker use were not assessed in the present study. Since ischemic heart disease was present in only 10% of the study population, additional clinical factors may have influenced prescribing decisions.

The higher use of combination therapy among Stage 2 hypertensive patients is broadly consistent with guideline recommendations advocating multi-drug

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therapy for patients with greater blood pressure elevation.

The mean dispensing time of 1.6 ± 0.7 minutes is comparable to the 1.23 minutes reported by Shukla and Gabriel in their Ethiopian tertiary hospital study.[11] The significant reduction in dispensing time during peak hours (1.3 vs 2.1 minutes; $p < 0.001$) suggests that patient load is a key structural barrier to quality dispensing, a finding that has important implications for staffing and pharmacy workflow in busy government hospitals.

Only 32% of patients received adequate counselling in the present study. This is considerably better than the Ethiopian cohort, in which over 75% of patients left the counter without knowing the name, dose, or side effects of their medications.[11] But it still reflects a major deficit in pharmacy practice. The statistically significant association between inadequate counselling and non-adherence ($\chi^2 = 4.88$, $p = 0.027$) underscores the clinical importance of this gap. Patients receiving inadequate counselling had a significantly higher frequency of non-adherence. Medication adherence among hypertensive patients remains suboptimal in India, with substantial variation reported across studies and regions.[16] Poor adherence in the remaining one-third of patients was significantly associated with inadequate counselling and was more common in patients on combination therapy. The latter finding likely reflects the complexity and pill burden associated with multi-drug regimens, which is a recognized barrier to adherence in hypertension management.[18] Pharmacist-led counselling and structured patient education programs have been shown to improve adherence and therapeutic outcomes in hypertension, as demonstrated in studies from Portugal,[19] and in systematic reviews of adherence interventions.[20] The findings of this study provide further quantitative evidence supporting investment in the pharmacist workforce, structured counselling protocols, and patient education at OPD pharmacies in government teaching hospitals.

This study had some limitations. The sample size of 100 limits statistical power for subgroup analyses. Medication adherence was assessed using a self-reported scale (MMAS-4), which may be subject to recall and social desirability bias. The cross-sectional design precludes causal inference. Future studies with larger samples, objective adherence measures such as pill counts or pharmacy refill records, and longitudinal designs would further strengthen the evidence base.

Limitation

Direct observation of dispensing practices may have introduced Hawthorne effect bias, whereby pharmacists modified their behavior because they were aware of being observed.

CONCLUSION

Antihypertensive prescribing practices demonstrated partial conformity with JNC 8 recommendations, while ACE inhibitor use among diabetic patients aligned with guideline recommendations. However, deficiencies in dispensing counselling were identified, with only 32% of patients receiving comprehensive medication education. Inadequate counselling was significantly associated with poor medication adherence. Strengthening pharmacist-led counselling services, implementing standardized patient education protocols, and improving pharmacy staffing during peak outpatient hours may enhance adherence and long-term blood pressure control.

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