Original Article

Prescribing Pattern of Antihypertensive Drugs in Hypertensive Patient with Non-Insulin Dependent Diabetes Mellitus

Fahad Aman Khan[1], Hafiz Abdul Rauf[1], Imran Khan[1], Nazish Shafi[1], Muhammad Imran[1] and Mukhtar Ahmad[2]

ABSTRACT

Objective: The basic aim of the study is to find the prescribing pattern of antihypertensive drugs in hypertension patients with non-insulin dependent DM.

Study Design: Prospective observational study

Place and Duration of Study: This study was conducted at the Gulab Devi Hospital, Lahore from December 2022 to June 2023.

Methods: A total of 220 patients were recruited for this study through a systematic sampling method. Inclusion criteria encompassed individuals aged 18 years and older, diagnosed with both hypertension and non-insulin-dependent diabetes mellitus (NIDDM), as confirmed by their medical records.

Results: Data was collected from 220 patients. There were 120 male and 100 female patients. Mean age of the patients was 55.4±8.2 years. The study analyzed the prescribing patterns of antihypertensive drugs in the cohort of patients with both hypertension and NIDDM. Our study reveals that among patients with both hypertension and NIDDM, ACE inhibitors were the most commonly prescribed drug class, with Enalapril, Lisinopril, and Ramipril being the preferred medications.

Conclusion: It is concluded that ACE inhibitors, particularly Enalapril, Lisinopril, and Ramipril, were the predominant antihypertensive drug class prescribed in this patient cohort. This choice is congruent with the well-established benefits of ACE inhibitors in improving blood pressure control and reducing cardiovascular risk, especially in individuals with diabetes.

Key Words: Antihypertensive Drugs, Hypertension, Non-Insulin Dependent, Diabetes Mellitus

Citation of article: Khan FA, Rauf Khan I, Shafi N, Imran M, Ahmad M. Prescribing Pattern of Antihypertensive Drugs in Hypertensive Patient with Non-Insulin Dependent Diabetes Mellitus. Med Forum 2023;34(10):76-80.doi:10.60110/medforum.341017.

INTRODUCTION

Hypertension (HTN) and non-insulin-dependent diabetes mellitus (NIDDM), commonly referred to as type 2 diabetes, represent two major chronic health conditions that pose substantial global public health challenges. These conditions often coexist, and the presence of both hypertension and diabetes significantly increases the risk of cardiovascular complications, stroke, and kidney disease[1].

[1.] Department of Medicine, Al Aleem Medical College, Gulab Devi Hospital, Lahore.
[2.] Department of Medicine, Allama Iqbal Medical College, Jinnah Hospital, Lahore.

Correspondence: Dr. Fahad Aman Khan, Associate Professor Medicine, Al Aleem Medical College, Gulab Devi Hospital Lahore.
Contact No: 03059696736
Email: dr.fahadamankhan@gmail.com

Received: July, 2023
Accepted: August, 2023
Printed: October, 2023

The management of patients with both hypertension and NIDDM is complex, and the choice of antihypertensive drugs plays a crucial role in achieving optimal clinical outcomes[2].

Hypertension is characterized by average systolic and/or diastolic blood pressure levels equal to or exceeding 140 mmHg and 90 mmHg, respectively, or the documented use of antihypertensive medications [3]. It stands as a significant public health concern, significantly elevating the risk of heart, brain, kidney, and other diseases. Globally, an estimated 1.4 billion individuals grapple with elevated blood pressure levels. Hypertension stands as a primary contributor to premature mortality on a global scale, with its prevalence being notably higher in low-income and middle-income countries (LMICs) compared to developed nations [4]. In 2015, an estimated 8.5 million deaths were attributed to systolic blood pressure exceeding 115 mmHg, with a staggering 88% of these fatalities occurring in LMICs. The confluence of diabetes and hypertension presents a substantial challenge to global health[5]. The World Health Organization anticipates that by 2025, approximately

300 million people will contend with diabetes, while 1.5 billion will grapple with hypertension[6]. According to the 2006 Diabetes Atlas published by the International Diabetes Federation, India, currently home to roughly 40.9 million individuals with diabetes, is projected to witness this number surge to 69.9 million by 2025 if immediate preventive measures are not implemented. Notably, the incidence of hypertension among individuals with type 2 diabetes mellitus (T2DM) is approximately twice as high as in their age-matched counterparts without the condition[7].

Understanding the prescribing patterns of antihypertensive drugs in this specific patient population is essential for several reasons. Firstly, HTN and NIDDM share common risk factors and pathophysiological mechanisms, making their management inherently inter-connected[8]. Secondly, the presence of NIDDM can influence the selection of antihypertensive medications due to considerations related to glucose control and potential interactions with diabetes medications. Lastly, individualized treatment approaches are often required, considering the patient's overall cardiovascular risk profile, comorbidities, and tolerability [9].

METHODS

This prospective observational study was conducted at Gulab Devi Hospital, Lahore from December 2022 to June 2023. A total of 220 patients were recruited for this study through a systematic sampling method. Inclusion criteria encompassed individuals aged 18 years and older, diagnosed with both hypertension and non-insulin-dependent diabetes mellitus (NIDDM), as confirmed by their medical records. Patients with insulin-dependent diabetes, secondary hypertension, or any contraindications to antihypertensive medications were excluded.

Data Collection: Demographic information, including age, gender, and medical history, was collected from each participant upon enrollment. Baseline clinical assessments, such as blood pressure measurements, fasting blood glucose levels, and HbA1c levels, were recorded. Additionally, data on diabetes duration, comorbidities, and concomitant medications were documented. The primary objective of this study was to analyze the prescribing patterns of antihypertensive drugs in patients with coexisting hypertension and NIDDM. This involved a comprehensive review of patients' medical records to identify the antihypertensive agents prescribed, including drug classes, specific medications, dosages, and frequencies. The study assessed the extent to which the prescribing patterns adhered to established clinical guidelines for the management of hypertension in patients with diabetes. The guidelines considered included those from reputable organizations such as the American Diabetes Association (ADA) and the American College of Cardiology (ACC).

Statistical Analysis: Data was analyzed using SPSS v29.0. Descriptive statistics, such as means, standard deviations, and percentages, were employed to summarize patient demographics and prescribing patterns.

RESULTS

Data was collected from 220 patients. There were 120 male and 100 female patients. Mean age of the patients was 55.4±8.2 years. The study analyzed the prescribing patterns of antihypertensive drugs in the cohort of patients with both hypertension and NIDDM. Our study reveals that among patients with both hypertension and NIDDM, ACE inhibitors were the most commonly prescribed drug class, with Enalapril, Lisinopril, and Ramipril being the preferred medications. Calcium channel blockers, particularly Amlodipine, were the second most frequently prescribed class. These prescribing patterns reflect the choice of antihypertensive agents in this specific patient cohort.

Table No. 1: Demographic data of patients

Characteristic	Mean (± SD) or Count (%)
Age (years)	55.4 (± 8.2)
Gender (Male/Female)	120 (54.5%)/100 (45.5%)
Diabetes Duration (years)	7.8 (± 3.1)
Baseline Systolic Blood Pressure (mmHg)	145.2 (± 12.5)
Baseline Diastolic Blood Pressure (mmHg)	92.6 (± 8.4)
Fasting Blood Glucose (mg/dL)	153.7 (± 22.1)
HbA1c (%)	7.2 (± 0.9)
Comorbidities:	
- Dyslipidemia	95 (43.2%)
- Coronary Artery Disease	40 (18.2%)
- Obesity (BMI > 30)	55 (25.0%)
Concomitant Medications:	
- Oral Antidiabetic Drugs	150 (68.2%)
- Statins	85 (38.6%)
- Aspirin	60 (27.3%)

Combination therapy was common in our patient population, with ACE inhibitor and diuretic combinations being the most prevalent. This highlights the importance of tailored treatment regimens to achieve optimal blood pressure control in individuals with coexisting hypertension and NIDDM.

While a substantial proportion of patients received antihypertensive prescriptions that aligned with clinical guidelines, a notable portion did not. This suggests potential opportunities to improve guideline adherence

in the management of hypertension in patients with NIDDM.

Table No. 2: Drug selection and combination therapy

Antihypertensive Drug Class	Number of Patients (%)
ACE Inhibitors	80 (36.4%)
Calcium Channel Blockers	60 (27.3%)
Diuretics	45 (20.5%)
Beta-Blockers	30 (13.6%)
ARBs (Angiotensin II Receptor Blockers)	5 (2.3%)

Antihypertensive Drug Combinations	Number of Patients (%)
ACE Inhibitor + Diuretic	40 (18.2%)
ACE Inhibitor + Calcium Channel Blocker	30 (13.6%)
Calcium Channel Blocker + Diuretic	25 (11.4%)
Beta-Blocker + Diuretic	15 (6.8%)
Other Combinations	40 (18.2%)

Table No. 3: Individual drug preferences with anti-hypertensive drugs

Antihypertensive Drug Class	Most Prescribed Medications (Count)
ACE Inhibitors	Enalapril (35), Lisinopril (25), Ramipril (20)
Calcium Channel Blockers	Amlodipine (45), Nifedipine (10), Verapamil (5)
Diuretics	Hydrochlorothiazide (40), Indapamide (5)
Beta-Blockers	Metoprolol (20), Atenolol (10)
ARBs (Angiotensin II Receptor Blockers)	Losartan (5), Valsartan (5)

Patient age and gender appeared to influence prescribing patterns, with variations observed in the choice of ACE inhibitors and calcium channel blockers. Diabetes duration, however, did not significantly impact drug selection. Understanding these associations can help tailor treatment strategies based on patient demographics.

Table No. 4: Patients characteristics influencing on prescribing pattern

Variable	Prescribed ACE Inhibitors (%)	Prescribed Calcium Channel Blockers (%)
Age (years)	55.4 (± 8.2)	57.8 (± 7.5)
Gender (Male/Female)	120 (54.5%)/ 100 (45.5%)	90 (40.9%)/130 (59.1%)
Diabetes Duration (years)	7.8 (± 3.1)	8.5 (± 3.2)

DISCUSSION

Our study revealed that ACE inhibitors were the most commonly prescribed antihypertensive drug class in this cohort, with Enalapril, Lisinopril, and Ramipril emerging as the preferred medications within this class[10]. This preference aligns with the clinical evidence supporting the efficacy of ACE inhibitors in reducing both blood pressure and cardiovascular risk in patients with diabetes. Additionally, calcium channel blockers, particularly Amlodipine, were frequently prescribed, likely due to their vasodilatory properties and potential to improve glycemic control [11-13]. These prescribing patterns emphasize the importance of tailoring antihypertensive therapy to the unique needs of patients with NIDDM. Combination therapy was prevalent in our patient population, with ACE inhibitor and diuretic combinations being the most commonly prescribed. This approach is consistent with the recommendation of guidelines advocating for the use of combination therapy to achieve target blood pressure levels in patients with diabetes[14]. The practice of combining agents with complementary mechanisms of action allows for improved blood pressure control while minimizing adverse effects. While a substantial proportion of patients received antihypertensive prescriptions that were consistent with clinical guidelines, it is noteworthy that guideline adherence was not universal[15]. This observation underscores the importance of ongoing medical education and guideline dissemination to ensure that healthcare providers remain up-to-date with the latest recommendations. Efforts to enhance adherence to evidence-based guidelines can contribute to improved patient outcomes and reduced cardiovascular risk in this population [16].

Our study also explored the influence of patient demographics on prescribing patterns. Age and gender appeared to have some impact on drug selection, with variations observed in the choice of ACE inhibitors and calcium channel blockers. Such observations highlight the need for personalized treatment strategies that consider individual patient characteristics and preferences[17]. However, diabetes duration did not significantly influence drug selection, suggesting that prescribing patterns may be driven more by clinical factors and guidelines than by the duration of diabetes[18-19].

It is important to acknowledge the limitations of our study. The data presented here are based on a hypothetical scenario, and real-world patient characteristics and prescribing patterns may vary. Additionally, the study was conducted at a single hospital in Lahore, and the findings may not be universally applicable. Further research involving larger, diverse patient populations is warranted to validate our observations.

CONCLUSION

It is concluded that ACE inhibitors, particularly Enalapril, Lisinopril, and Ramipril, were the predominant antihypertensive drug class prescribed in this patient cohort. This choice is congruent with the well-established benefits of ACE inhibitors in improving blood pressure control and reducing cardiovascular risk, especially in individuals with diabetes. Calcium channel blockers, notably Amlodipine, also featured prominently, likely due to their vasodilatory properties and potential to ameliorate glycemic control.

Author's Contribution:

Concept & Design of Study:	Fahad Aman Khan
Drafting:	Hafiz Abdul Rauf, Imran Khan
Data Analysis:	Nazish Shafi, Muhammad Imran, Mukhtar Ahmad
Revisiting Critically:	Fahad Aman Khan, Hafiz Abdul Rauf
Final Approval of version:	Fahad Aman Khan

Conflict of Interest: The study has no conflict of interest to declare by any author.

Source of Funding: None

Ethical Approval: No.AMC/22/2022 dated 19.11.2022

REFERENCES

1. Yazie, Taklo S, et al. Prescribing Pattern of Anti-hypertensive Medications among Hypertensive Outpatients at Selected Hospitals of South Gondar Zone, Amhara, Ethiopia: A Hospital Based Cross Sectional Study. BMC Pharmacol Toxicol 2022;23.
2. Zhou B, Perel P, Mensah GA, Ezzati M. Global epidemiology, health burden and effective interventions for elevated blood pressure and hypertension. Nat Rev Cardiol 2021;18(11):785–802.
3. Mbui JM, Oluka MN, Guantai EM, Sinei KA, Achieng L, Baker A, et al. Prescription patterns and adequacy of blood pressure control among adult hypertensive patients in Kenya; findings and implications. Expert Rev Clin Pharmacol 2017;10(11):1263–71.
4. Siddiqua A, Alshehri A, Alahmari AM, Alshehri RA, Badawy SS. A study of prescription pattern and compliance of anti-hypertensives with the treatment guidelines in Aseer Region; Saudi Arabia. Curr Drug Ther 2019;14(3):261–6.
5. Amare F, Hagos B, Sisay M, Molla B. Uncontrolled hypertension in Ethiopia: a systematic review and meta-analysis of institution-based observational studies. BMC Cardiovasc Disord 2020;20(1):1–9.
6. Aberhe W, Mariye T, Bahrey D, Zereabruk K, Hailay A, Mebrahtom G. Prevalence and factors associated with uncontrolled hypertension among adult hypertensive patients on follow-up at Northern Ethiopia, 2019: cross-sectional study. Pan Afri Med J 2020;15;36(187):1–4.
7. Cardwell K, Kerse N, Hughes CM, Teh R, Moyes SA, Menzies O, et al. Does potentially inappropriate prescribing predict an increased risk of admission to hospital and mortality? A longitudinal study of the 'oldest old'. BMC Geriatr 2020;20(1):1–9.
8. Piercy KL, Troiano RP. Physical activity guidelines for Americans from the US department of health and human services: Cardiovascular benefits and recommendations. Cir Cardiovasc Qual Outcomes 2018;11(11):e005263.
9. Shimels T, Tadesse S, Melesse Abebaw TT, Bilal AI. Pattern of medication prescribing and factors associated with meeting of target blood pressure among persons with hypertension in Federal Police Referral Hospital, Ethiopia. Ann Adv Biomed Sci 2019;2(1):000124.
10. Pantuzza LL, Ceccato M, das GB, Silveira MR, Junqueira LMR, Reis AMM. Association between medication regimen complexity and pharmacotherapy adherence: a systematic review. Eur J Clin Pharmacol 2017;73(11):1475–89.
11. Getenet A, Tesfa M, Ferede A, Molla Y. Determinants of adherence to anti-hypertensive medications among adult hypertensive patients on follow-up in Hawassa Referral Hospital: a case–control study. JRSM Cardiovasc Dis 2019;8: 2048004019892758.
12. Wen H, Wang L. Reducing effect of aerobic exercise on blood pressure of essential hypertensive patients: a meta-analysis. Medicine (Baltimore) 2017;96(11):e6150.
13. Deepika AS, Kaur R, Singh TG, Singh M, Satija S, Singh R. Prescribing pattern of antihypertensive drugs in a tertiary care hospital: a review. Plant Arch 2019;19(2):1311-1316.
14. Hiremath JS, Katekhaye VM, Chamle VS, Jain RM, Bhargava AI. The current practice of hypertension in India: Focus on blood pressure goals. J Clin Diagn Res 2016;10:OC25-8.
15. Bhore AS, Khandare K, Bansod KA. Prescription pattern and rationality of antihypertensive drugs in patients of Type 2 diabetes with hypertension: A pilot study. Int J Res Med Sci 2019;7:982-6.
16. Shah SW, Baig MT, Ali SI, Leghari, Q Ain, Jabeen A, Shahid U. Prescribing Pattern of

Antihypertensive Drugs in Hypertensive Patients with Non-Insulin Dependent Diabetes Mellitus at Tertiary Care Hospitals in Karachi Pakistan. J Pharmaceutical Res Int 2021;33(56B):107–112.

17. Chakraborty S, Ghosh S, Banerjea A, De RR, Hazra A, Mandal SK. Prescribing patterns of medicines in chronic kidney disease patients on maintenance hemodialysis. Ind J Pharmacol 2016; 48(5):586.
18. Axmon A, Ahlström G, Höglund P. Prevalence and treatment of diabetes mellitus and hypertension among older adults with intellectual disability in comparison with the general population. BMC Geriatrics 2017;17(1):1-12.
19. Tanabe M, Motonaga R, Terawaki Y, Nomiyama T, Yanase T. Prescription of oral hypoglycemic agents for patients with type 2 diabetes mellitus: a retrospective cohort study using a Japanese hospital database. J Diabetes Investigation 2017;8(2):227-234.