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Original Research Article

Study of prescription pattern of antihypertensives in diabetes with hypertension patients in geriatric population at tertiary care centre: a prospective observational study

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ABSTRACT

Background: Hypertension (HTN) and type 2 diabetes mellitus (T2DM) are prevalent chronic conditions that significantly affect elderly health, especially in India, where the dual occurrence of these diseases exacerbates cardiovascular risks. This study examines the prescription patterns of antihypertensive medications in geriatric patients with both conditions at a tertiary care center in Maharashtra, India.
Methods: A prospective, cross-sectional study was conducted at government medical college, Aurangabad, from March 2023 to August 2024. Patients aged 60 and older with HTN and T2DM were included. Prescription data for antihypertensive medications were collected and analyzed.
Results: The study included 1023 prescriptions, with 57.09% male patients. The most commonly prescribed antihypertensives were telmisartan (38.05%) and amlodipine (31.96%). Monotherapy was prescribed to 22.48% of patients, while 61.97% received two-drug combinations, and 14.66% received three-drug combinations. Only 0.88% of patients were prescribed more than three drugs. The most common combination therapy was Telmisartan and Amlodipine (59.78%). The majority of prescriptions were generic (91.18%), and 85.23% were from the national essential drug list (EDL) (India 2022), indicating cost-effective and standardized treatment practices.
Conclusions: The study reveals a preference for ARBs and calcium channel blockers for managing HTN in elderly patients with T2DM. The widespread use of combination therapies and generic drugs reflects an efficient approach. Additionally, the study follows the WHO prescription parameters, with the average number of drugs per encounter being 1.93, and a high percentage of prescriptions aligning with EDLs.

Keywords: Geriatric patients, Prescription patterns, Antihypertensives, Drug utilization studies, WHO-DUS indicators

INTRODUCTION

Hypertension (HTN) is a major contributor to both disease and mortality on a global scale. Globally, it is estimated that over 1.13 billion people are living with HTN, with only one in five having their condition under control.[1] The disease is a significant risk factor for cardiovascular diseases, stroke, kidney failure, and other life-threatening complications. In India, the prevalence of HTN is alarmingly high, affecting approximately 30% of the adult population.[2] HTN is directly linked to increased mortality rates, with hypertensive individuals facing a higher risk of heart disease and stroke. The burden of HTN is growing rapidly in both urban and rural areas, contributing to a rising public health challenge.[3]

Diabetes, particularly T2DM, is closely associated with HTN, and the co-occurrence of both diseases significantly increases the risk of adverse cardiovascular outcomes.[4] Nearly 50% of people with diabetes in India also suffer from HTN, which complicates disease management and increases the risk of complications such as coronary artery

disease, kidney failure, and neuropathy.[5] However, managing these dual conditions presents significant challenges, including the need for appropriate medication choices, monitoring, and addressing the complex interactions between antihypertensive and antidiabetic therapies.[6]

The management of HTN and diabetes becomes even more complex in the elderly population, who are particularly vulnerable to polypharmacy and age-related changes in drug metabolism.[7] Elderly patients often require multiple medications to manage their chronic conditions, making them susceptible to adverse drug reactions and interactions. Furthermore, age-related physiological changes such as reduced renal and hepatic function can alter the effectiveness and safety of drugs.[8] Managing both HTN and diabetes in this demographic demands a tailored approach, considering their comorbidities, frailty, and the risk of drug side effects. Given these challenges, there is an increasing need for studies that evaluate the prescription patterns of antihypertensive and antidiabetic drugs in the elderly to ensure optimal treatment and minimize risks.

In Maharashtra, India, where the burden of HTN and diabetes is rising, understanding the prescription patterns for managing these chronic conditions in the elderly is crucial. Tertiary care centers, being at the forefront of patient care, offer an opportunity to assess the real-world prescribing trends and identify potential gaps in treatment. This study aims to examine the prescription patterns of antihypertensive medications in geriatric patients with both HTN and type 2 diabetes at a tertiary care center in Maharashtra.

METHODS

This study was designed as a prospective, cross-sectional, observational investigation conducted at the department of pharmacology, in collaboration with the department of geriatrics, government medical college, Aurangabad. The objective was to analyse the prescription patterns of antihypertensive medications in geriatric patients who have both HTN and T2DM, focusing on individuals aged 60 years or older who are receiving treatment for these conditions.

The study specifically targeted patients who were aged 60 years or older, had received a diagnosis of HTN according to American heart association (AHA) guidelines, and type 2 diabetes in accordance with American diabetes association (ADA) guidelines, and were being treated with antihypertensive medications. Patients who either did not meet the inclusion criteria or opted to withdraw from the study were excluded from the analysis.

Before initiating the study, Ethical approval was obtained from the institutional ethics committee, and a no objection certificate (NOC) was secured from the head of the geriatrics department to ensure that all necessary permissions were granted. The investigator thoroughly explained the objectives and procedures of the study to the HOD, ensuring full understanding and support for the project.

The study enrolled all patients attending or admitted to the geriatrics department of government medical college, Aurangabad, from March 2023 to August 2024. To meet statistical rigor, the study followed the world health organization (WHO) guidelines for drug use surveys, which recommend a minimum of 300 patient encounters for a comprehensive prescription audit. A total of 1023 prescriptions were reviewed during the study.

Prescription data was collected for each patient, with a particular focus on antihypertensive medications. The collected data included details such as the class of antihypertensive drugs, dosage, and the treatment regimen. Patients whose data was incomplete (e.g., missing age, registration number, or treatment details) or who chose to withdraw were excluded from further analysis. All patient-related information was recorded in a case record form (CRF), ensuring confidentiality and that only anonymized data would be used in subsequent analysis and reporting.

The source documents for this study included CRFs from outpatient and inpatient patients, records from the health management information system (HMIS), and relevant documents from the medical records section of the geriatrics department. These documents were reviewed thoroughly to extract relevant data in line with the study objectives.

Data collected from the patients were analysed using Microsoft excel. The data were expressed as mean±standard deviation for continuous variables and as percentages for categorical variables.

RESULTS

The study included 1,023 patients, of whom 57.09% were male (584 patients) and 42.91% were female (439 patients) (Table 1).

Table 1: Gender distribution of patients.

Gender distribution	N	Percentage (%)
Male	584	57.09
Female	439	42.91
Total	1023	

The age-wise gender distribution of the patients shows that the majority of patients were in the 60-70 years age group (75.07%), with 436 males (42.62%) and 332 females (32.45%). The second-largest group was in the 71-80 years range, accounting for 20.92%, with 125 males (12.22%) and 89 females (8.70%). Only 6 patients (0.59%) were over 90 years old, all of whom were female. The detailed age-wise distribution is shown in Table 2.

The most commonly prescribed antihypertensive drug class was calcium channel blockers (CCBs), with further distribution as follows (Table 3). Among ARBs, the most frequently prescribed drug was telmisartan 40 mg, with 755 prescriptions (38.05%). In CCBs, the most prescribed drug was Amlodipine 5/10 mg, with 634 prescriptions (31.96%). In diuretics, chlorothiazide 6.25/12.5 mg was prescribed to 197 patients (9.93%). In beta-blockers, metoprolol 12.5/25/50 mg was prescribed to 146 patients (7.36%), and in ACE inhibitors, ramipril 2.5/5 mg was prescribed to 46 patients (2.32%).

Monotherapy was prescribed to 22.48% of patients (230 patients), while the majority were on combination therapy (Table 4). Two-drug combination therapy was prescribed to 61.97% of patients (634 patients), and three-drug combination therapy to 14.66% of patients (150 patients). Only 0.88% of patients (9 patients) were prescribed more than three drugs.

The trends observed in the monotherapy analysis are summarized below (Table 5). Telmisartan 40 mg was prescribed to 46.96% of patients on monotherapy, making it the most common choice. Amlodipine 5 mg was the most prescribed CCB monotherapy (26.96%), followed by beta-blockers (metoprolol 25 mg), which accounted for 6.09% of the monotherapy prescriptions.

For two-drug therapy, the most common combinations were ARB + CCB in 379 patients (59.78%), with the most common combination being Telmisartan 40 mg and Amlodipine 5 mg (307 patients). The ARB + beta-blocker (BB) combination was used in 51 patients (8.04%), with the most common combination being telmisartan 40 mg and metoprolol 25 mg (39 patients). The ARB + diuretic combination was used in 71 patients (11.20%), with the most common combination being telmisartan 40 mg and chlorothiazide 6.25 mg (41 patients). Please consult Table 6 for a complete breakdown.

The most common three-drug therapy regimen was ARB + CCB + diuretic in 96 patients (64.00%), with the most common combination being telmisartan 40 mg + amlodipine 5 mg + chlorothiazide 6.25 mg (53 patients), followed by the ARB + CCB + beta-blocker combination in 34 patients (22.67%), with the most common combination being telmisartan 40 mg + amlodipine 10 mg + metoprolol 12.5 mg (17 patients) (Table 7). A small proportion of patients were prescribed more than three drugs, with the most common combination being telmisartan 40 mg + amlodipine 5 mg + metoprolol 50 mg + chlorothiazide 6.25 mg (2 patients) (Table 8).

The WHO-DUS prescribing indicators revealed that the average number of drugs prescribed per encounter was 1.93. A high percentage of prescriptions were for generic drugs (91.18%). 85.23% of drugs prescribed were from the national EDL (India 2022), and 89.31% were from the EDL (WHO 2023). Only 2.92% of encounters involved an injection being prescribed (Table 9). Of the 1,984 prescriptions, the vast majority were prescribed by generic name (91.18%, or 1,809 prescriptions), while only 8.82% (or 175 prescriptions) were prescribed by brand name (Table 10).

Table 2: Age-wise gender distribution.

Age group (in years)	N	Percentage (%)	Male, N (%)	Female, N (%)
60-70	768	75.07	436 (42.62)	332 (32.45)
71-80	214	20.92	125 (12.22)	89 (8.70)
81-90	35	3.42	23 (2.25)	12 (1.17)
>90	6	0.59	0 (0.00)	6 (0.59)
Total	1023		584 (57.09)	439 (42.91)

Table 3: Most prescribed antihypertensives.

Drug class	Drug name	N	Percentage (%)
ACE inhibitors	Tab. ramipril 2.5/5 mg	46	2.32
ARB	Tab. telmisartan 40 mg	755	38.05
Calcium Ch blockers	Tab. amlodipine 5/10 mg	634	31.96
	Tab. Nicardia 5/10/20/30 mg	141	7.11
Beta blockers	Tab. metoprolol 12.5/25/50 mg	146	7.36
	Tab. atenolol 50 mg	6	0.30
	Inj. labetalol 20 mg	25	1.26
Diuretics	Tab. chlorothiazide 6.25 or 12.5 mg	197	9.93
	Inj. Lasix 20/40 mg	33	1.66
	Tab. Aldactone 50 mg	1	0.05
Total		1984	

Table 4: Treatment approaches for antihypertensives.

Therapy type	N	Percentage (%)
Monotherapy	230	22.48
2 drug	634	61.97
3 drug	150	14.66
>3 drug	9	0.88
Total	1023	

Table 5: Monotherapy drug classes for antihypertensives.

Monotherapy class	N	Percentage (%)	Drug name	Count	Percentage (%)
ACE inhibitors	11	4.78	Tab. ramipril 2.5 mg	7	3.04
			Tab. ramipril 5 mg	4	1.74
ARB	108	46.96	Tab. telmisartan 40 mg	108	46.96
Calcium Ch blockers	95	41.30	Tab. amlodipine 5 mg	62	26.96
			Tab. amlodipine 10 mg	7	3.04
			Tab. Nicardia 10 mg	3	1.30
			Tab. Nicardia 20 mg	15	6.52
			Tab. Nicardia 30 mg	8	3.48
Beta blockers	14	6.09	Tab. metoprolol 25 mg	14	6.09
Diuretics	2	0.87	Inj. Lasix 20 mg	2	0.87
Total	230			230	

Table 6: Combination therapy for antihypertensives.

Drugs class	N	Percent (%)	Drug 1	Drug 2	Count	Percent (%)
ACE + CCB	11	1.74	Tab. ramipril 2.5 mg	Tab. amlodipine 5 mg	7	1.10
			Tab. ramipril 2.5 mg	Tab. amlodipine 10 mg	2	0.32
			Tab. ramipril 5 mg	Tab. amlodipine 5 mg	2	0.32
ACE + BB	13	2.05	Tab. ramipril 2.5 mg	Tab. metoprolol 12.5 mg	5	0.79
			Tab. ramipril 2.5 mg	Tab. metoprolol 25 mg	8	1.26
ARB + CCB	379	59.78	Tab. telmisartan 40 mg	Tab. amlodipine 5 mg	307	48.42
			Tab. telmisartan 40 mg	Tab. amlodipine 10 mg	25	3.94
			Tab. telmisartan 40 mg	Tab. Nicardia 5 mg	4	0.63
			Tab. telmisartan 40 mg	Tab. Nicardia 10 mg	9	1.42
			Tab. telmisartan 40 mg	Tab. Nicardia 20 mg	29	4.57
			Tab. telmisartan 40 mg	Tab. Nicardia 30 mg	5	0.79
ARB + BB	51	8.04	Tab. telmisartan 40 mg	Tab. metoprolol 12.5 mg	4	0.63
			Tab. telmisartan 40 mg	Tab. metoprolol 25 mg	39	6.15
			Tab. telmisartan 40 mg	Tab. atenolol 50 mg	3	0.47
			Tab. telmisartan 40 mg	Inj. labetalol 20 mg	5	0.79
ARB + diuretics	71	11.20	Tab. telmisartan 40 mg	Tab. chlorothiazide 6.25 mg	41	6.47
			Tab. telmisartan 40 mg	Tab. chlorothiazide 12.5 mg	21	3.31
			Tab. telmisartan 40 mg	Inj. Lasix 40 mg	9	1.42
CCB + BB	44	6.94	Tab. amlodipine 5 mg	Tab. metoprolol 12.5 mg	5	0.79
			Tab. amlodipine 5 mg	Tab. metoprolol 25 mg	22	3.47
			Tab. amlodipine 10 mg	Tab. metoprolol 12.5 mg	4	0.63
			Tab. amlodipine 5 mg	Tab. atenolol 50 mg	3	0.47
			Tab. amlodipine 10 mg	Inj. labetalol 20 mg	7	1.10
			Tab. Nicardia 10 mg	Tab. metoprolol 25 mg	3	0.47
CCB + diuretics	40	6.31	Tab. amlodipine 5 mg	Tab. chlorothiazide 6.25 mg	10	1.58
			Tab. amlodipine 5 mg	Tab. chlorothiazide 12.5 mg	4	0.63
			Tab. amlodipine 10 mg	Tab. chlorothiazide 6.25 mg	9	1.42
			Tab. amlodipine 5 mg	Inj. Lasix 40 mg	2	0.32
			Tab. Nicardia 10 mg	Inj. Lasix 40 mg	3	0.47
			Tab. Nicardia 30 mg	Inj. Lasix 40 mg	12	1.89
BB + diuretics	5	0.79	Tab. metoprolol 25 mg	Tab. chlorothiazide 12.5 mg	5	0.79
2CCB's	20	3.15	Tab. amlodipine 5 mg	Tab. Nicardia 10 mg	5	0.79
			Tab. amlodipine 5 mg	Tab. Nicardia 20 mg	10	1.58
			Tab. amlodipine 10 mg	Tab. Nicardia 20 mg	5	0.79
Total	634				634	

Table 7: Three-drug therapy for antihypertensives.

Drugs class	N	Percent (%)	Drug 1	Drug 2	Drug 3	Count	Percent (%)
ACE + ARB + CCB	1	0.67	Tab. ramipril 2.5 mg	Tab. telmisartan 40 mg	Tab. amlodipine 5 mg	1	0.67
ACE + CCB + BB	10	6.67	Tab. ramipril 2.5 mg OD	Tab. amlodipine 5 mg	Tab. metoprolol 50 mg	6	4.00
			Tab. ramipril 2.5 mg OD	Tab. Nicardia 5 mg	Tab. metoprolol 12.5 mg	4	2.67
ARB + CCB + BB	34	22.6	Tab. telmisartan 40 mg	Tab. amlodipine 10 mg	Inj. labetalol 20 mg	8	5.33
			Tab. telmisartan 40 mg	Tab. Nicardia 20 mg	Inj. labetalol 20 mg	5	3.33
			Tab. telmisartan 40 mg	Tab. amlodipine 5 mg	Tab. metoprolol 12.5 mg	17	11.33
			Tab. telmisartan 40 mg	Tab. amlodipine 10 mg	Tab. metoprolol 25 mg	4	2.67
ARB + CCB + diuretics	96	64	Tab. telmisartan 40 mg	Tab. amlodipine 5 mg	Inj. Lasix 40 mg	2	1.33
			Tab. telmisartan 40 mg OD	Tab. amlodipine 5 mg	Tab. chlorothiazide 6.25 mg	53	35.33
			Tab. telmisartan 40 mg OD	Tab. amlodipine 5 mg	Tab. chlorothiazide 12.5 mg	25	16.67
			Tab. telmisartan 40 mg OD	Tab Amlodipine 10 mg	Tab. chlorothiazide 6.25 mg	4	2.67
			Tab. telmisartan 40 mg OD	Tab. amlodipine 10 mg	Tab. chlorothiazide 12.5 mg	4	2.67
			Tab. telmisartan 40 mg OD	Tab. Nicardia 20 mg	Tab. chlorothiazide 6.25 mg	8	5.33
ARB + BB + diuretics	2	1.33%	Tab. telmisartan 40 mg	Tab. metoprolol 25 mg	Inj. Lasix 40 mg	2	1.33
2CCB + ARB	4	2.67	Tab. amlodipine 5 mg	Tab. Nicardia 20 mg	Tab. telmisartan 40 mg	4	2.67
2CCB + diuretics	3	2	Tab. amlodipine 5 mg	Tab. Nicardia 20 mg	Tab. chlorothiazide 6.25 mg	3	2.00
Total	150					150	

Table 8: More than three-drug therapy for antihypertensives.

Drugs class	Drug 1	Drug 2	Drug 3	Drug 4	No. of patients	Percent (%)
ARB + CCB + BB + diuretics	Tab. telmisartan 40 mg	Tab. amlodipine 5 mg	Tab. metoprolol 50 mg	Tab. chlorothiazide 6.25 mg	2	22.22
	Tab. telmisartan 40 mg	Tab. Nicardia 30 mg	Tab. metoprolol 25 mg	Tab. chlorothiazide 12.5 mg	3	33.33
2 CCB + ARB+ diuretics	Tab. amlodipine 5 mg	Tab. Nicardia 20 mg	Tab. telmisartan 40 mg	Tab. chlorothiazide 12.5 mg	3	33.33
2 diuretics + ARB+ BB	Inj. Lasix 40 mg	Tab. aldactone 50 mg	Tab. telmisartan 40 mg	Tab. metoprolol 12.5 mg	1	11.11
Total					9	

Table 9: WHO-DUS prescribing indicators.

Prescribing indicators	Counts and percentages
Total number of prescriptions analysed	1023
Total number of drugs prescribed	1984
The average number of drugs per encounter	1.93
Percentage of drugs prescribed by generic name	91.18%
Percentage of drugs prescribed from EDL (India 2022)	85.23%
Percentage of drugs prescribed from EDL (WHO 2023)	89.31%
Percentage of encounters with an injection prescribed	2.92%

Table 10: Drugs prescribed by generic and brand names.

Type of prescription	N	Percent (%)
Generic	1809	91.18
Brand	175	8.82
Total	1984	

DISCUSSION

The study population consisted of 1,023 patients, with a higher proportion of males (57.09%) compared to females (42.91%), which is consistent with the findings of Altaf et al. and Bhandari et al.[9-10] Interestingly, the age distribution revealed that 75.07% of patients were aged between 60 and 70 years, a group that is particularly prone to HTN due to age-related vascular changes.[11] However, the female population showed a notable increase in the >90 years category (0.59%).

A total of 1,984 drugs were prescribed to 1,023 patients, spanning various classes. There was a clear preference for CCBs, which accounted for 39.07% of prescriptions, aligning with the findings of Mishra et al and Mohd et al where CCBs were used in 31.2% and 37% of patients, respectively.[12,13] In the present study, angiotensin receptor blockers (ARBs) were the second most commonly prescribed class, with Telmisartan 40 mg being the most frequently prescribed antihypertensive, used by 38.05% of patients. This is in line with current clinical guidelines, which recommend CCBs and ARBs as preferred treatments for patients with both HTN and diabetes.[14] Similar findings were observed in studies by Suman et al and Mohd et al where ARBs were used in 28% and 21% of patients, respectively.[13,15] The use of diuretics (11.64%) and beta-blockers (8.92%) was less common.

The study showed that monotherapy was prescribed to 22.48% of patients, with telmisartan 40 mg being the most common monotherapy (46.96%), which aligns with the findings of Tripathee et al.[16] This was followed by amlodipine 5 mg, the most prescribed CCB monotherapy (26.96%). These findings are similar to those of Vishwanath et al where amlodipine was used in 78.5% of CCB monotherapies.[17] In the present study, beta-blockers (Metoprolol 25 mg) accounted for 6.09% of monotherapy prescriptions, with the least common being ACE inhibitors (3.04%) and diuretics (0.87%).

A significant observation from the study was the frequent use of combination therapy, with 61.97% of patients being prescribed two-drug combinations. This aligns with the results reported by Mishra et al and Sinha et al where two-drug combinations were prescribed to 46.92% and 62.44% of patients, respectively.[18,19] The most common two-drug combination was ARBs + CCBs, prescribed to 59.78% of patients, particularly the combination of telmisartan and amlodipine. This aligns with the findings of Prem et al and Singh et al.[20,21] These findings contrast with studies conducted at tertiary care hospitals, where ARBs + diuretics was the most common combination therapy.[12,13,22] The use of ARBs with diuretics (11.20%) further reflects the need for comprehensive management of fluid retention and HTN, especially in geriatric patients with diabetes and heart failure. Interestingly, combinations with beta-blockers and diuretics were less common.

The study found that 14.66% of patients were prescribed three-drug regimens, with the most common combination being ARBs + CCBs + diuretics (96 patients, 64.00%). This three-drug combination is consistent with the findings of Yang et al.[23] In the present study, the ARB + CCB + beta-blocker combination was prescribed to 34 patients (22.67%). The use of four-drug combinations was relatively rare (0.88%) but not unexpected in patients with severe, resistant HTN or those with additional conditions such as heart failure or chronic kidney disease. This cohort predominantly received the ARB + CCB + beta-blocker + diuretic combination. These findings emphasize the complex nature of managing HTN in elderly diabetic patients and the need for personalized treatment strategies. Comparable results were observed in the study by Kumar et al.[22]

A high proportion of generic drug prescriptions (91.18%) was observed, consistent with national and global efforts to promote generic prescribing as a way to reduce healthcare costs while ensuring effective treatment. Similar findings were seen in Vishwanath et al.[17] However, other studies, such as Ahluwalia et al showed a

lower rate of generic prescriptions (33.60%).[24] The remaining 8.82% of prescriptions were for brand-name drugs, which may reflect preferences for specific formulations or patient-specific considerations, such as tolerability.

The WHO-DUS prescribing indicators revealed positive results. The average number of drugs per encounter was 1.93, similar to patterns seen in studies by Ahluwalia et al, Suman et al and Vishwanath et al with averages of 1.45, 2.38, and 2.46, respectively.[15,16,24] Furthermore, the high percentage of drugs prescribed from the EDL (85.23% for India, 2022; 89.31% for WHO, 2023) reflects adherence to recommended guidelines, ensuring that the drugs prescribed are both clinically effective and cost-effective.[25,26] Similar findings were observed in Bhavika et al.[27] The low percentage of encounters with injections (2.92%) further underscores the preference for oral medications in this patient population.

Limitations

While this study provides valuable data on prescription patterns, several limitations should be considered: The study was conducted at a single tertiary care center, which may limit the generalizability of the results to other healthcare settings, particularly in primary care or rural areas. Patient adherence to prescribed regimens was not evaluated, and poor adherence may influence the effectiveness of the treatment.

There is no data on long-term outcomes such as blood pressure control, renal function, or cardiovascular events, which would provide further insights into the real-world effectiveness of these treatment regimens.

CONCLUSION

This study highlights the prevalence of combination antihypertensive therapy in geriatric patients with diabetes and HTN, with ARBs and CCBs being the most commonly prescribed drug classes. The use of generic drugs and adherence to EDLs (NLEM 2022 and WHO 2023) demonstrate a rational and cost-effective approach to managing HTN in this vulnerable population. Further research is warranted to evaluate the long-term outcomes and adherence patterns in this cohort.

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REFERENCES

1. Kumar GHM, Priyan S, Arunachalam P, Elavarasan K. Hypertension: A Review. Medico-Leg Update. 2020;20(4):2321-3.
2. Mohanty S, Nagarathna R, Metri K, Patil S, Kumar S, Singh A, et al. Trends of Hypertension and Neurological Diseases in India: A Nationwide Survey Reporting the Distribution Across Geographical Areas. Ann Neurosci. 2020;27(3-4):162-8.
3. Gupta R, Gupta S. Hypertension in India: Trends in Prevalence, Awareness, Treatment and Control. RUHS J Health Sci. 2017;2(1):40.
4. Bell DSH. Hypertension and diabetes: a toxic combination. Endocr Pract Off J Am Coll Endocrinol Am Assoc Clin Endocrinol. 2008;14(8):1031-9.
5. Swami SS, Swami SC, Patil VW, Kanhere AM. Hypertension and Diabetes in India: A Review. Int J Clin Biochem Res. 2015;2(1):54-8.
6. Anwer Z, Sharma RK, Garg VK, Kumar N, Kumari A. Hypertension management in diabetic patients. Eur Rev Med Pharmacol Sci. 2011;15(11):1256-63.
7. Mukete BN, Ferdinand KC. Polypharmacy in Older Adults with Hypertension: A Comprehensive Review. J Clin Hypertens. 2016;18(1):10-8.
8. Klotz U. Pharmacokinetics and drug metabolism in the elderly. Drug Metab Rev. 2009;41(2):67-76.
9. Altaf M, Rasheed A, Mujtaba A, Mohammed S. Drug utilisation evaluation of antihypertensives in geriatric patients in a tertiary care hospital. Int J Pharm Pharm Sci. 2014;6(9):261-4.
10. Bhandary A, Bhandari PR. Drug usage pattern of anti-hypertensive drugs in elderly diabetic, hypertensive in-patients with or without impaired renal function in a tertiary care hospital. Int J Basic Clin Pharmacol. 2018;7(4):696-706.
11. Dwivedi S, Singh G, Agarwal MP. Profile of hypertension in elderly subjects. J Assoc Physicians India. 2000;48(11):1047-9.
12. Mishra R, Kesarwani P, Keshari S. Prescription pattern of antihypertensive drugs in a tertiary care teaching hospital. Int J Med Sci Public Health. 2017;6(4):1.
13. Mohd A, Mateti U, Konuru V, Parmar M, Kunduru B. A study on prescribing patterns of antihypertensives in geriatric patients. Perspect Clin Res. 2012;3(4):139.
14. Hernandez-Vila E. A Review of the JNC 8 Blood Pressure Guideline. Tex Heart Inst J. 2015;42(3):226-8.
15. Suman RK, Singh HK, Patil VG. Prescribing patterns of antihypertensive drugs in tertiary care teaching hospital. Int J Basic Clin Pharmacol. 2021;10(4):420-4.
16. Tripathee A, Jha BK, Sha RK, Gupta A, Sharma T. PS-C22-2: Understanding Clinical Effectiveness of Telmisartan as Monotherapy for Hypertension management in Nepal. J Hypertens. 2023;41(1):e401.
17. Vishwanath M, Murgesh J.V, Arpitha D, Nithiya D. Prospective study on prescribing pattern of

antihypertensive drugs at a tertiary care hospital. Int J Basic Clin Pharmacol. 2018;7(11):2126-31.
18. Mishra PS, Gawali UP, Rizvi SH, Kaur S. Drug utilization study in patients of hypertension in tertiary care hospital. Int J Basic Clin Pharmacol. 2020;9(8):1275-9.
19. Sinha DP, Kumar A, Sinha KK. Study of drug prescription pattern of anti-hypertensives in a tertiary care hospital. Int J Acad Med Pharm. 2014;6(4):1079-82.
20. Kumar AP, Anirudra G, Vasudev K, Dash RK, Aravinda J, Shamanna P, et al. Clinical data analysis of telmisartan for hypertension management in Indian population. Bioinformation. 2021;17(6):652-9.
21. Singh D, Katiyar P, Sawlani K, Chaudhary S, Nath R, Fatima S, et al. Drug utilization study of antihypertensive treatment being prescribed in patients coming to medicine OPD of a tertiary care hospital in northern India. Int J Pharm Sci Res. 2020;11(3):1410-6.
22. Kumar A, Malhotra A, Malhotra P, Mantoo S. Prescribing patterns of antihypertensive drugs: An observational hospital based study in outpatient department of a medical college in north India. J Med Sci Clin Res. 2020;08:01.
23. Yang R, Tang J, Kuang M, Liu H. Analysis of prescription status of antihypertensive drugs in Chinese patients with hypertension based on real-world study. Ann Med. 2023;55(1):276-84.
24. Ahluwalia PS, Baig MS, Bhattacharya M. Drug utilization study of anti-hypertensive drugs at a tertiary care hospital. Int J Basic Clin Pharmacol. 2020;9(8):1241.
25. Central Drugs Standard Control Organization. National List of Essential Medicines (NLEM) 2022. Available at: https://cdsco.gov.in/opencms/opencms/en/consumer/Essential-Medicines/. Accessed on 12 November 2024.
26. WHO Model List of Essential Medicines-23rd list, 2023. Available at: https://www.who.int/publications/i/item/WHO-MHP-HPS-EML-2023.02. Accessed on 12 November 2024.
27. Bhavika D, Prasanna V, Swathi B. Drug utilization study of anti-hypertensive drugs in a tertiary care hospital. Int J Basic Clin Pharmacol. 2016;5(4):1580-5.

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