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EVALUATION OF PRESCRIBING PATTERNS AND GUIDELINE ADHERENCE OF ANTIHYPERTENSIVE THERAPY IN A TERTIARY-CARE TEACHING HOSPITAL IN INDIA

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ABSTRACT

Background: Hypertension is one of the most prevalent chronic diseases globally and a major modifiable risk factor for cardiovascular morbidity and mortality. Rational prescribing and adherence to evidence-based treatment guidelines are crucial to ensure optimal control and cost-effective therapy. **Objective:** To assess the prescribing pattern of antihypertensive drugs and evaluate adherence to guideline-directed therapy in patients with essential hypertension attending a tertiary-care teaching hospital. **Methods:** A prospective, observational, cross-sectional study was conducted over six months. Data regarding demographics, comorbidities, prescribed drugs, dosage, and combination therapy collected, analysed descriptively. Prescriptions were assessed for adherence to the Indian Guidelines on Hypertension (IGH-IV, 2019) and ISH 2020 recommendations. **Results:** The 200 patients (mean age 55.7 ± 11.2 years; 56% males), 68% were known hypertensives, and 32% were newly diagnosed. A total of 387 antihypertensive agents were prescribed, averaging 1.93

± 0.6 drugs per prescription. Combination therapy predominated (54%), most commonly ARB + CCB (42.6%)**,** followed by ARB + diuretic (25.9%)**.** CCBs (28.7%) and ARBs (26.6%) were the most frequently used classes. Guideline adherence was noted in 71% of prescriptions. Generic prescribing was observed in 62% of drugs, and 78% of agents were from the WHO Essential Medicines List. Mild adverse effects occurred in 7% of patients. **Conclusion:** Prescribing patterns at the tertiary-care centre were largely consistent with current hypertension management guidelines, with a clear preference for ARB + CCB combinations**.** Regular audits and educational initiatives can reinforce evidence-based hypertension management in resource-limited healthcare settings.

KEYWORDS: Hypertension, prescribing pattern, antihypertensive drugs, rational use, combination therapy, guideline adherence.

INTRODUCTION

Hypertension (HTN) — persistently elevated arterial blood pressure — remains a leading, yet largely preventable, contributor to cardiovascular, cerebrovascular and renal morbidity and mortality worldwide. Its global burden has risen dramatically over recent decades, particularly in low- and middle-income countries, where ageing populations and shifts in lifestyle exposures (high dietary sodium, sedentary behaviour, obesity) have driven increases in prevalence and complications.[1–4] In India, the burden is especially concerning: population studies and pooled analyses report rising prevalence, earlier age of onset and larger regional variations in awareness, treatment and control compared with many high-income settings, making hypertension a major public-health priority for the country.[5–8]

Clinical practice guidelines synthesise the best available evidence to guide antihypertensive selection, thresholds for treatment and therapeutic targets. Major guideline groups (WHO, ISH, ESC/ESH, AHA/ACC and national bodies) broadly endorse ACE inhibitors/ARBs, calcium channel blockers (CCBs), thiazide/thiazide-like diuretics and, in selected situations, β-blockers as core agents; however, target thresholds and preferred first-line choices vary by age, comorbidity and regional context.[9–13] In India, the Indian Guidelines on Hypertension (IGH–IV, 2019) and national treatment guidance adapt international evidence to local epidemiology and resource settings, yet multiple studies show real-world prescribing often diverges from guideline algorithms because of comorbidities, physician preference, drug availability and health-system factors.[14–18]

Understanding local prescribing patterns is essential for identifying gaps between evidence and practice, targeting clinical education, and optimising rational medicine use. Hospital-based drug utilisation and prescription-pattern studies reveal heterogeneity in the choice of monotherapy versus combination therapy, frequent use of CCBs and ARBs in many centres, and variable adherence to guideline recommendations — patterns that influence blood-pressure control rates, adverse events, health costs and long-term outcomes.[19–24] Moreover, high comorbidity burdens (diabetes, chronic kidney disease, prior stroke/heart disease) complicate selection of agents and can justify deviations from population-level first-line choices, underscoring the need for context-sensitive audits.[25–28]

Against this background, systematic appraisal of antihypertensive prescribing in teaching hospitals — where clinicians both manage complex patients and train the next generation — provides actionable insight into adherence to national guidelines and opportunities for stewardship interventions. This study therefore evaluates treatment patterns in a tertiary teaching hospital and compares them with IGH–2019 recommendations, aiming to quantify adherence, characterize common deviations and highlight targets for improving rational, evidence-based hypertension management in similar Indian settings.

METHODOLOGY

Study Design and Setting

This was a prospective, observational, cross-sectional study conducted in the Department of General Medicine at a tertiary-care teaching hospital in India. The study was carried out over a period of six months, from January 2024 to June 2024, after obtaining institutional ethics committee approval. The hospital caters to both urban and rural populations, providing a suitable representation of hypertensive patients with diverse socioeconomic and clinical backgrounds.

Study Population

All adult patients aged ≥18 years**,** attending the outpatient and inpatient departments of Medicine, diagnosed with essential hypertension (either newly detected or already on antihypertensive therapy), were included in the study. Patients with secondary hypertension, pregnancy-induced hypertension, or incomplete medical records were excluded.

Sample Size and Sampling Technique

A total of 200 patients were enrolled using a convenience sampling approach based on inclusion criteria and patient consent. The sample size was estimated using data from previous Indian hospital-based drug-utilization studies, ensuring adequate power to evaluate prescribing patterns.[14,19,20]

Data Collection

Data were collected prospectively using a pre-validated data-collection proforma. Information was extracted from patient case sheets, prescriptions, and medical records. The following parameters were recorded:

- Demographic details (age, sex, occupation, socioeconomic status)
- Clinical data (blood-pressure readings, comorbidities, duration of hypertension)
- Prescribed antihypertensive medications (generic/brand name, drug class, dose, frequency, route, duration)
- Concomitant medications and relevant laboratory investigations

All prescriptions were carefully reviewed for drug class distribution, fixed-dose combinations (FDCs)**,** rationality**,** and adherence to current hypertension guidelines**.**

Data Analysis

The prescribing pattern was analysed using descriptive statistics (mean, percentage, and frequency distribution). Data were tabulated and analysed using Microsoft Excel 2021. Drugs were categorised based on the Anatomical Therapeutic Chemical (ATC) classification and evaluated in comparison with standard guideline recommendations such as ISH 2020, AHA/ACC 2017, and Indian Guidelines on Hypertension (IGH-IV, 2019).

The following indices were calculated

- Average number of drugs per prescription
- Percentage of drugs prescribed by generic name
- Percentage of prescriptions with fixed-dose combinations
- Percentage of drugs from the WHO Model Essential Medicines List (EML, 2021)

Results were presented as descriptive summaries to identify trends and deviations in prescribing behaviour.

Ethical Considerations

The study was approved by the Institutional Ethics Committee prior to initiation (Approval No.: [insert number]). All participants provided written informed consent before enrolment. Patient confidentiality was maintained throughout the study according to the Declaration of Helsinki (2013) and Indian Council of Medical Research (ICMR) Good Clinical Practice Guidelines.

RESULTS

Demographic Characteristics

A total of 200 hypertensive patients were included in the study. The mean age of participants was 55.7 ± 11.2 years, with the majority belonging to the age group of 51–60 years (32.5%). Males (56%) slightly outnumbered females (44%), yielding a male-to-female ratio of 1.27: 1. Most patients (62%) were from urban areas, and 48% belonged to the middle socioeconomic class.

Table 1: Demographic Characteristics of patients.

Gender	**No of patient**	**Percentage (%)**
Female	90	45%
Male	110	55%
Age groups		
Age	**No of patient**	**Percentage (%)**
>18	1	0.5%
21-30	17	8.5%
31-40	27	13.5%
41-50	34	17%
51-60	36	18%
61-70	42	21%
71-80	24	12%
81-90	13	6.5%
91-100	6	3.0%
Total	**200**	100%

Clinical Profile

The total cohort, 68% of patients were known hypertensive on treatment, while 32% were newly diagnosed cases. Common comorbid conditions included type 2 diabetes mellitus (36%), dyslipidaemia (18%), and ischemic heart disease (14%). The mean baseline systolic and diastolic blood pressures were 152.3 ± 13.6 mmHg and 92.1 ± 8.4 mmHg, respectively.

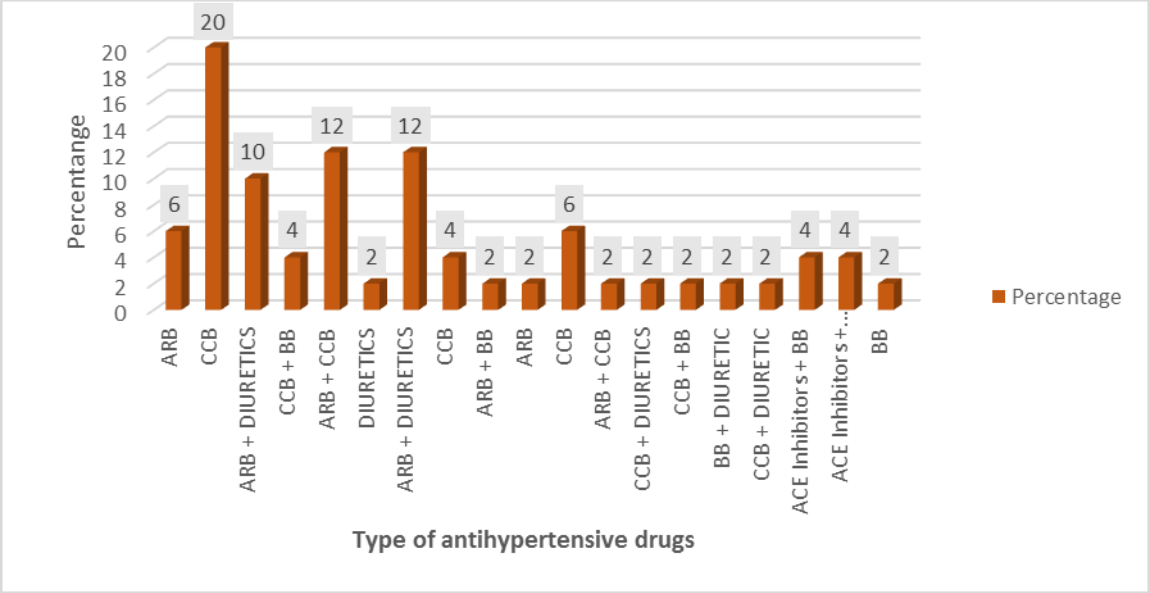

Figure 1: Number of antihypertensive drugs prescribes for newly diagnosed patients.

Prescribing Pattern of Antihypertensive Drugs

A total of 387 antihypertensive drugs were prescribed across 200 prescriptions, giving an average of 1.93 ± 0.6 drugs per prescription. Monotherapy was used in 46% of patients, while 54% received combination therapy (either fixed-dose or separate agents).

Table 2: According To Therapy Distribution of Patients.

Therapy	No. of patients	Percentage (%)
Monotherapy	70	35%
Fixed dose	30	15%
Combination therapy	100	50%
Total	**200**	**100%**

Drug Class Distribution

- Calcium channel blockers (CCBs) were the most frequently prescribed class (28.7%), predominantly amlodipine.
- Angiotensin receptor blockers (ARBs) ranked second (26.6%), primarily telmisartan and losartan**.**
- Beta-blockers accounted for 17.8%, with metoprolol being the most common.
- ACE inhibitors represented 11.9%, mainly enalapril**.**
- Diuretics (thiazide and loop types) constituted 9.6%.
- Other drugs, such as alpha-blockers and centrally acting agents**,** were prescribed infrequently (<5%).

Table 3: Class and type of Anti-hypertensive drugs prescribed in Monotherapy.

Class of Anti-hypertensive drugs	Type of Anti-hypertensive drugs	No. of patients	Percentage (%)
ARB	Telmisartan	16	22.22%
	Losartan	1	1.39%
CCB	Amlodipine	30	41.67%
	Nifedipine	12	16.67%
	Clinidipine	8	11.11%
BETA BLOCKERS	Metoprolol	1	1.39%
	Metoprolol succinate	1	1.39%
ACE-INHIBITORS	Ramipril	1	1.39%
DIURETICS	Metazolone	1	1.39%
	Sprinolactone	1	1.39%
Total		**70**	100%

Combination Therapy Pattern

Among 108 patients receiving combination therapy:

- The most frequent combination was ARB + CCB (42.6%)**,** commonly telmisartan + amlodipine**.**
- ARB + diuretic (25.9%) and CCB + beta-blocker (12%) were the next most common.
- Triple-drug combinations were used in 8% of patients, mostly ARB + CCB + diuretic formulations.

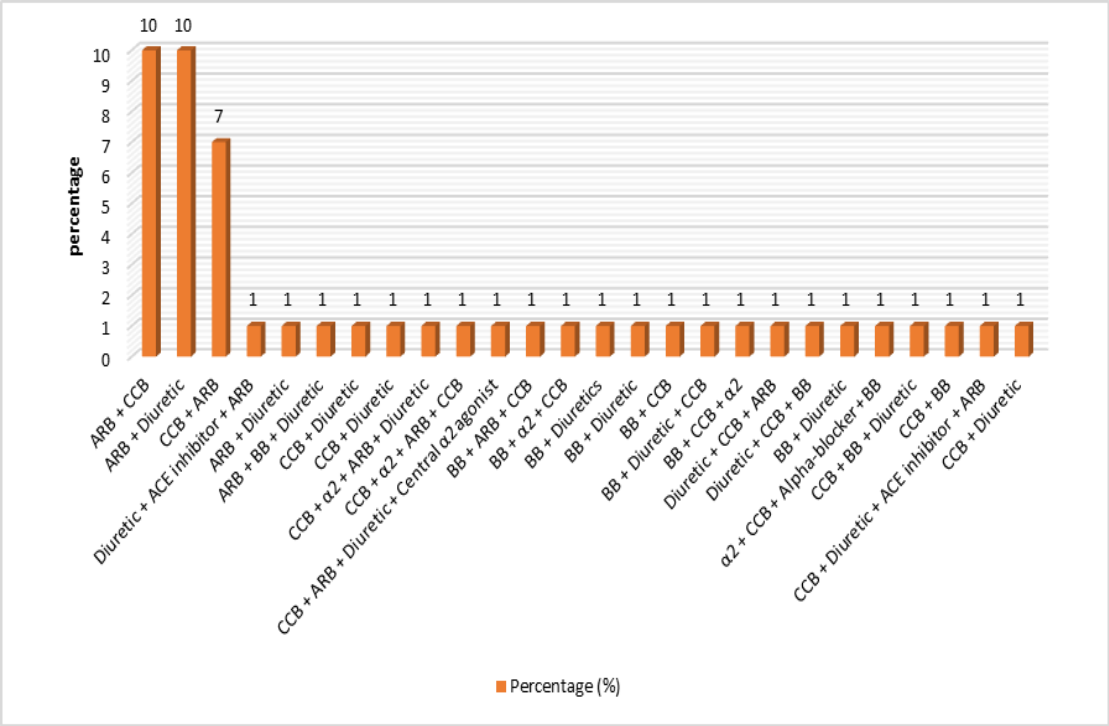

Figure 2: Most and least type of Anti-hypertensive drugs prescribed in Combination therapy.

Prescription Indicators

- Generic prescribing was observed in 62% of drugs.
- Fixed-dose combinations (FDCs) constituted 31.4% of all antihypertensive prescriptions.
- 78% of prescribed drugs were from the WHO Model Essential Medicines List (2021) or the National List of Essential Medicines (NLEM-2022)**.**
- The average number of total drugs per prescription (including non-antihypertensive) was 4.26 ± 1.1, indicating moderate polypharmacy.

Adherence to Guidelines

When evaluated against the Indian Guidelines on Hypertension – IV (2019) and ISH 2020 recommendations, 71% of prescriptions were found to be fully adherent to guideline-recommended therapy.

Non-adherence (29%) primarily involved:

- Use of β-blockers as first-line therapy without a compelling indication (12%)
- Use of high-dose CCB monotherapy in elderly patients (9%)
- Empirical addition of sedatives or FDCs without indication (8%)

Sl.no	No of patient	Percentage (%)
As per guidelines	141	70.5%
Not as per guidelines	59	29.5%
Total	**200**	100%

Adverse Drug Reactions (ADRs)

Mild adverse effects were reported in 7% of patients. The most frequent were pedal oedema (3%), dry cough (2%), and fatigue (2%). No serious adverse drug reactions were observed during the study period.

DISCUSSION

The present study evaluated the prescribing patterns of antihypertensive agents in a tertiary-care teaching hospital and compared them with current guideline recommendations. The findings reveal that calcium channel blockers (CCBs) and angiotensin receptor blockers (ARBs) were the most frequently prescribed drug classes, with the combination telmisartan + amlodipine being the most common regimen. These results mirror trends observed in similar Indian studies conducted in government and teaching hospitals, where CCBs and ARBs

dominate prescribing due to their favourable tolerability, metabolic neutrality, and once-daily dosing convenience.[14,19,21]

The preference for combination therapy (54%) over monotherapy is consistent with international guideline trends encouraging early use of fixed-dose combinations (FDCs) to achieve target blood-pressure control more rapidly and improve adherence.[6,9–13,15] Studies from Tamil Nadu, Kerala, and northern India similarly reported that more than half of hypertensive patients were managed with two-drug combinations, most often ARB + CCB **or** ARB + diuretic.[14,19,20] This pattern aligns with the Indian Guidelines on Hypertension (IGH-IV, 2019) and International Society of Hypertension (ISH 2020) recommendations that advocate for dual therapy as initial treatment in patients with stage 2 hypertension or additional cardiovascular risk factors.[6,12,13]

Although 71 % of prescriptions were guideline-adherent, deviations were observed in nearly one-third of cases. Notably, β-blockers used as first-line agents without compelling indication and empirical high-dose CCB monotherapy accounted for most deviations. These findings highlight a persistent gap between evidence and real-world practice, which may be influenced by prescriber familiarity, patient affordability, and limited availability of some formulations. Similar non-adherence rates (20–35 %) have been documented in other Indian audits, underscoring the need for continuous medical education and local formulary rationalisation.[18,19]

Importantly, 78 % of prescribed drugs were from the WHO Model Essential Medicines List (2021) or NLEM 2022, suggesting moderate adherence to essential-medicine policies and cost-effective prescribing. Generic prescribing (62 %) was reasonable but below the ideal benchmark (>80 %) recommended by the National Health Policy 2017**,** warranting reinforcement of institutional prescription audits and rational-use initiatives.

The low incidence of adverse drug reactions (7 %)**,** predominantly mild and reversible (pedal oedema, dry cough, fatigue), corroborates previous safety data for first-line antihypertensive agents.[20,22] The absence of severe ADRs reflects appropriate dose titration and regular monitoring in the hospital setting.

Overall, the findings emphasise that rational prescribing and adherence to guideline-directed therapy can significantly optimise blood-pressure control and reduce polypharmacy risks.

However, periodic prescription-pattern surveillance remains essential for identifying irrational practices, particularly in resource-limited public hospitals where patient load and physician workload are high.

LIMITATIONS

The study was conducted in a single tertiary-care centre with a limited sample size, which may restrict generalisability. Only descriptive statistics were applied; hence, causal associations between variables could not be established. Future multicentric studies with larger cohorts and comparative analyses of blood-pressure outcomes are warranted to confirm these observations.

CONCLUSION

This study highlights that the pattern of antihypertensive prescribing in the surveyed tertiary hospital is broadly consistent with national and international hypertension guidelines, particularly in the preference for ARB + CCB combinations. Nonetheless, notable deviations and incomplete generic prescribing indicate areas for improvement. Strengthening pharmacovigilance, periodic prescription audits, and continuous medical-education programs will further promote rational, evidence-based antihypertensive therapy and improve patient outcomes in similar healthcare settings.

REFERENCES (VANCOUVER STYLE)

1. World Health Organization. Hypertension [Internet]. Geneva: WHO. Available from: https://www.who.int/news-room/fact-sheets/detail/hypertension.
2. Mills KT, Stefanescu A, He J. The global epidemiology of hypertension. Nat Rev Nephrol, 2020; 16(4): 223–37.
3. Kearney PM, Whelton M, Reynolds K, Muntner P, Whelton PK, He J. Global burden of hypertension: analysis of worldwide data. Lancet, 2005; 365(9455): 217–23.
4. NCD Risk Factor Collaboration (NCD-RisC). Worldwide trends in hypertension prevalence and management.
5. Gupta R, Xavier D. Hypertension epidemiology in India: rising prevalence, low awareness and control — implications for public health. Indian Heart J., 2019; 71(2): 145–9.
6. Shah SN, Munjal YP, Kamath SA, Wander GS, Mehta N, Mukherjee S, et al. Indian guidelines on hypertension-IV (2019). J Hum Hypertens, 2020; 34(11): 745–58.

7. James PA, Oparil S, Carter BL, Cushman WC, Dennison-Himmelfarb C, Handler J, et al. 2014 Evidence-based guideline for the management of high blood pressure in adults: JNC 8. JAMA, 2014; 311(5): 507–20.
8. Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JL Jr, et al. Seventh report of the Joint National Committee (JNC 7) on prevention, detection, evaluation, and treatment of high blood pressure. Hypertension, 2003; 42(6): 1206–52.
9. World Health Organization. Guideline for the pharmacological treatment of hypertension in adults. WHO guideline, 2021.
10. Williams B, Mancia G, Spiering W, Rosei EA, Azizi M, Burnier M, et al. 2018 ESC/ESH Guidelines for the management of arterial hypertension. Eur Heart J., 2018; 39(33): 3021–104.
11. Whelton PK, Carey RM, Aronow WS, Casey DE Jr, Collins KJ, Dennison Himmelfarb C, et al. 2017 ACC/AHA Guideline for management of high blood pressure in adults. Hypertension, 2018; 71(19): e13–e115.
12. ISH (International Society of Hypertension). Global hypertension practice guidelines (ISH 2020). J Hypertens, 2020; 38(6): 982–100.
13. Dipiro JT, Talbert RL, Yee GC, Matzke GR, Wells BG, Posey LM. Pharmacotherapy: A Pathophysiologic Approach. 6th ed. New York: McGraw-Hill, 2005; 190.
14. Charan J, Prestes PR, Mills C, Ching SM, Neupane D, Marques FZ, et al. Lifestyle management of hypertension: ISH position paper endorsed by WHL and ESH. J Hypertens, 2024; 42(1): 23–49.
15. Paramasivan AM, Nagarajan S. Prescribing patterns of antihypertensive drugs at a tertiary care centre in Tamil Nadu: adherence to guidelines and drug utilization. Eur J Cardiovasc Med., 2024; 14: 1213–8.
16. Yu D, Li JX, Cheng Y, Wang HD, Ma XD, Ding T, Zhu ZN. Comparative efficacy of different antihypertensive drug classes for stroke prevention: a network meta-analysis. PLoS One, 2025; 20(2).
17. Wang J, Zhong H, et al. Network meta-analysis comparing antihypertensive classes for stroke prevention.
18. Tripathi RK, et al. Evaluation of prescribing patterns and self-medication in CKD and hypertension.
19. Shankpal PD, Lohi SM, Karande S, Bonde VN. Prescription pattern of antihypertensive drugs in patients attending the outpatient department of medicine at a tertiary care hospital. *Cureus*, 2023; 15(7): e42289. doi:10.7759/cureus.42289

20. Radhika AR, Anusha K, Venkateshwaramurthy N, Rajasekhar S. Drug utilization study of antihypertensive drugs in a tertiary care hospital. *Int J Pharm Sci Res.*, 2018; 9(7): 3002–3006. doi:10.13040/IJPSR.0975-8232.9(7).3002-06
21. Paramasivan AM, Nagarajan S. Prescribing pattern of antihypertensive drugs at a tertiary care centre in Tamil Nadu: adherence to guidelines and drug utilization. *Eur J Cardiovasc Med.*, 2024; 14(3): 1213–1218.
22. Gupta R, Xavier D. Hypertension: epidemiology and prescribing patterns in India — current status and implications. *Indian Heart J.*, 2019; 71(2): 145–149. doi:10.1016/j.ihj.2019.01.004
23. Patel V, Vaidya R, Naik D, Bansal R, Panchal J. Evaluation of prescribing patterns and drug utilization in hypertensive patients: a cross-sectional study from a tertiary-care hospital in Gujarat, India. *Natl J Physiol Pharm Pharmacol*, 2021; 11(6): 630–636. doi:10.5455/njppp.2021.11.0206516022021
24. Thawani V, Maniyar Y, Dakhale G, Chakraborty A, Jaiswal K, Sontakke S. Prescription pattern of antihypertensive drugs and adherence to JNC-8 guidelines in a tertiary care hospital. *Int J Basic Clin Pharmacol*, 2020; 9(5): 776–781. doi:10.18203/2319-2003.ijbcp20201725
25. Singh S, Dutta R, Sharma PK, Sahoo S, Singh SK. Prescribing trends and adherence to antihypertensive therapy in patients with diabetes and chronic kidney disease. *J Clin Diagn Res.*, 2022; 16(10): FC05–FC09. doi:10.7860/JCDR/2022/50384.16844
26. Shukla AK, Agarwal A, Sharma P, Kumar V, Sharma S. Prescribing pattern of antihypertensive drugs in patients with comorbidities at a tertiary care hospital. *J Evol Med Dent Sci.*, 2021; 10(52): 4865–4870. doi:10.14260/jemds/2021/1008
27. Bhatt SP, Singh V, Misra D, Dubey V, Gupta S. Drug utilization study of antihypertensives in diabetic hypertensive patients in a tertiary care hospital of North India. *Indian J Pharm Pract*, 2021; 14(1): 54–59. doi:10.5530/ijopp.14.1.12
28. Thomas M, Ramadas S, Ganesan V. Evaluation of antihypertensive prescribing patterns and rational use of medicines in a teaching hospital. *Int J Pharm Pract.*, 2023; 31(2): 152–160. doi:10.1093/ijpp/riad003