International Journal of Research in Medical Sciences
Patil SB et al. Int J Res Med Sci. 2026 May;14(5):1897-1903
www.msjonline.org
pISSN 2320-6071 | eISSN 2320-6012
DOI: https://dx.doi.org/10.18203/2320-6012.ijrms20261324

Original Research Article

Prescription audit of tertiary care centre using world health organization core prescribing indicators: an observational study

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Received: 13 February 2026
Revised: 17 March 2026
Accepted: 07 April 2026

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ABSTRACT

Background: Rational use of medicines is a cornerstone of effective healthcare delivery. Inappropriate prescribing practices can lead to polypharmacy, increased healthcare costs, ADRs and poor patient compliance. DUS, using World Health Organization (WHO) prescribing indicators, are essential tools for evaluating prescription patterns and promoting rational drug use, especially in tertiary care settings where patient load and disease complexity are high. Analyse prescription patterns using WHO drug use indicators. Assess the extent of polypharmacy & use of generic versus brand-name drugs. Commonly prescribed drugs & their combinations.
Methods: A prospective, observational study was conducted in all OPDs of a tertiary care centre. A total of 1,050 prescriptions were analysed over a study period from March 2024 to August 2025.
Results: The average number of drugs per prescription was 5.84. 81.54% of drugs were prescribed by generic name. Antibiotics were prescribed in 15.72% of encounters, while injections were used in 1.81%. NSAIDs, particularly paracetamol and diclofenac, often co-prescribed with proton pump inhibitors. Antihypertensive and antidiabetic medications were commonly used due to the high burden of comorbid conditions.
Conclusions: The study reveals a high level of polypharmacy in the OPD setting, though prescribing practices largely adhered to rational drug use principles. The high rate of generic prescribing and limited use of injections reflect appropriate prescribing behaviour. Continuous prescription auditing and periodic training programs are recommended to further improve rational drug use and minimize unnecessary polypharmacy.

Keywords: DUS, OPD patients, WHO audit

INTRODUCTION

Pharmacotherapy is fundamental to disease management and the improvement of patient well-being; however, inappropriate or irrational use of medicines can result in avoidable drug-related complications.[1] One of the key steps in ensuring rational therapy is accurate prescribing, which involves a legally valid written order issued by a qualified healthcare professional for the management of a patient's health condition.[2] Mistakes in the prescribing process may contribute to improper drug selection, increased incidence of adverse drug reactions and poor adherence to treatment.[3] Drug utilization research focuses on the systematic assessment of how medications are prescribed, dispensed and used within healthcare institutions. Such evaluations are essential for identifying inappropriate prescribing trends and for generating data that support interventions aimed at promoting rational drug use.[4] Prescription auditing, as an integral component of drug utilization studies, functions as an effective quality assurance measure to improve therapeutic effectiveness and patient safety.[5] In the Indian healthcare system, the continuous rise in treatment costs underscores the need for optimal use of available medical resources. Ongoing evaluation of prescribing practices helps ensure economical therapy, encourages the use of generic

medicines and minimizes unnecessary multiple-drug therapy.[6] Factors such as insufficient professional training and the absence of routine prescription review often contribute to irrational prescribing; these issues can be mitigated through regular audits and continuing medical education programs.[7]

With this background, the present study was conducted to evaluate prescribing patterns in a tertiary care hospital by applying World Health Organization prescribing indicators, with the aim of assessing current practices and identifying opportunities for improvement.

METHODS

This study was designed as a prospective, cross-sectional, observational investigation conducted at the department of pharmacology, in collaboration with the OPDs of all departments, government medical college, Chhatrapati Sambhajinagar. The objective was to analyse the prescription patterns of patients of all age groups and both genders, OPD patients with a documented diagnosis.

Patients with incomplete details and prescriptions with incomplete or unclear diagnosis were excluded from the analysis. Before initiating the study ethical approval was obtained from the institutional ethics committee. The investigator thoroughly explained the objectives and procedures of the study to the HODs, ensuring full understanding and support for the project. The study enrolled all patients attending OPDs of all department of government medical college, Chhatrapati Sambhajinagar, from March 2024 to August 2025. To meet statistical rigor, the study followed the WHO guidelines for drug use surveys, which recommend a minimum of 300 patient encounters for a comprehensive prescription audit. A total of 1050 prescriptions were reviewed during the study.

Prescription data was collected for each patient, with a focus on patients receiving which type of medications. The collected data included details such as the class of 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, records from the health management information system (HMIS) and relevant documents from the medical records section of the medicine 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 gender distribution shows a nearly equal representation of both sexes in the study population. Females constituted a slightly higher proportion (50.86%) compared to males (49.14%) indicating a balanced gender distribution among the 1,050 participants.

The age-wise distribution showed that the majority of patients belonged to the 41–60 years age group (344 patients), followed by the 21–40 years group (286 patients). Among males, the highest proportion was observed in the 41–60 years category (31.20%), while among females the highest proportion was also noted in the same age group (34.26%). Patients aged above 60 years constituted a relatively higher proportion of males compared to females. Overall, the study population was predominantly middle-aged, with a balanced gender distribution across different age groups.

The majority of prescriptions were written using generic names (81.54%), while a smaller proportion used brand names (18.46%). This indicates a strong preference for generic prescribing, which promotes cost-effective treatment and improves medication accessibility. The prescribing trends observed in this study illustrate the diverse clinical needs of the patient population. Paracetamol (45.72%) emerged as the most frequently prescribed medication, reflecting its widespread use in the treatment of pain and pyrexia. The high prescription rate of pantoprazole (44.66%) suggests a preventive approach toward gastrointestinal adverse effects, particularly in patients receiving NSAIDs or multiple drug therapies.

The frequent inclusion of antimicrobial agents such as amoxicillin–clavulanate (18.28%), azithromycin (18%), ciprofloxacin (10.10%), metronidazole (12.57%) and fluconazole (11.08%) indicate active treatment of infectious conditions and reinforces the need for judicious antimicrobial prescribing to curb resistance. Cardiovascular medications, including amlodipine (33.72%), telmisartan (29.42%), metoprolol-XL (10.38%), nicardia (9.14%), aspirin (14.95%) and atorvastatin (14.38%), point toward a substantial burden of hypertension, ischemic heart disease and lipid disorders.

The use of antidiabetic drugs such as metformin (16.66%) and glimepiride (12.28%) reflects ongoing management of type 2 diabetes mellitus, often in the presence of cardiovascular comorbidities. Common use of analgesic and anti-inflammatory agents, including diclofenac (19.90%) and prednisolone (8.32%), highlights the treatment of pain and inflammatory conditions, frequently necessitating gastro-protective support. Prescriptions of calcium (24.32%), vitamin C (20.58%), multivitamin B-complex (15.14%) and iron–folic acid (17.04%) demonstrate attention toward nutritional supplementation. The use of central nervous system drugs and symptomatic medications such as ondansetron (19.72%), dicyclomine (18.85%), cough syrup (25.42%) and cetirizine (18.10%)

further reflects comprehensive management of psychiatric, neurological, gastrointestinal, respiratory and allergic conditions. Overall, the findings indicate balanced and comprehensive prescribing practices; however, the extensive use of antimicrobials and gastro-protective agents emphasizes the importance of ongoing prescription review to ensure rational and evidence-based drug therapy.

The drug class–wise analysis shows that NSAIDs were the most commonly prescribed, with paracetamol (55.90%) and diclofenac (19.90%), indicating frequent management of pain and fever. Proton pump inhibitors, particularly pantoprazole (44.66%), were widely used, reflecting routine gastric protection. Antimicrobials such as azithromycin (27.53%) and amoxicillin–clavulanate (20.28%) were commonly prescribed, suggesting a considerable burden of infectious diseases. Multivitamins and supplements including calcium, vitamin C and iron–folic acid were frequently used, indicating supportive and nutritional therapy.

The use of antihistamines (cetirizine, 18.10%) reflects treatment of allergic conditions. Cardiovascular and metabolic drugs, including calcium channel blockers (amlodipine), ARBs (telmisartan), statins (atorvastatin) and antidiabetic agents (metformin and glimepiride), indicate a high prevalence of hypertension, diabetes and dyslipidaemia. Antiemetics such as ondansetron (19.72%) were commonly prescribed for nausea and vomiting. Overall, the pattern reflects comprehensive management of acute and chronic conditions. The two-drug therapy pattern shows that the most common combination was telmisartan with amlodipine (7.24%), indicating combination treatment for hypertension. This was followed by metformin with glimepiride (6.58%), reflecting dual therapy for type 2 diabetes mellitus.

Combinations involving olanzapine with benzodiazepines or sodium valproate were frequently used for the management of psychiatric disorders. Paracetamol with cetirizine and paracetamol with cough syrup indicate symptomatic treatment of fever, allergy and respiratory conditions. The use of dicyclomine with pantoprazole reflects management of gastrointestinal complaints, while aspirin with atorvastatin represents standard therapy for cardiovascular risk reduction. Overall, the two-drug combinations suggest rational use of fixed or co-prescribed therapies to improve efficacy and patient compliance. The three-drug therapy pattern shows that the most commonly prescribed combinations were used for acute respiratory and infectious conditions, such as amoxicillin–clavulanate with paracetamol and cough syrup (11.72%) and amoxicillin–clavulanate with paracetamol and pantoprazole (10.58%). These combinations indicate treatment of infections along with symptomatic relief and gastric protection. Combinations like paracetamol, pantoprazole and azithromycin and azithromycin, paracetamol and cetirizine further reflect management of febrile and respiratory illnesses. Chronic disease management is evident from combinations such as telmisartan, amlodipine and calcium for hypertension and metformin, dapagliflozin and glimepiride for type 2 diabetes mellitus. The use of prednisolone, calcium and cetirizine suggests treatment of inflammatory or allergic conditions with steroid support and supplementation. Gastrointestinal symptom control is reflected by combinations including dicyclomine, pantoprazole and ondansetron. Overall, the three-drug regimens demonstrate rational combination therapy aimed at addressing the primary disease along with associated symptoms and preventive supportive care.

The prescribing pattern of more than three-drug therapy indicates the presence of patients with multiple comorbid conditions requiring comprehensive treatment. The most common combination was metformin, glimepiride, dapagliflozin and calcium (10.10%), reflecting intensive management of type 2 diabetes with supportive supplementation. Combinations such as diclofenac, pregabalin, calcium and multivitamin B-complex indicate treatment of chronic pain or neuropathic conditions. Regimens including azithromycin, paracetamol, pantoprazole and cetirizine were commonly used for infectious and respiratory illnesses with symptomatic and gastric protection.

Cardiovascular polytherapy was evident with combinations of aspirin, atorvastatin, amlodipine, telmisartan and metoprolol, reflecting management of hypertension, ischemic heart disease and dyslipidaemia. The use of multiple antimicrobials with gastrointestinal drugs suggests management of mixed infections with associated abdominal symptoms. Overall, the use of more than three drugs reflects rational polypharmacy tailored to complex clinical conditions, while highlighting the need for careful monitoring to minimize drug–drug interactions and adverse effects.

The average number of drugs per prescription was 5.84, indicating a relatively high level of polypharmacy. Generic prescribing was common (81.54%), reflecting adherence to cost-effective and rational prescribing practices. Antibiotics were prescribed in 15.72% of encounters, suggesting controlled and judicious use of antimicrobials. Injections were used in only 1.81% of encounters, indicating a preference for oral therapy and rational use of injectable formulations.

Table 1: Details of gender distribution of patients.

Gender distribution	N	(%)
Male	516	49.14
Female	534	50.86
Total	1050	100

Table 2: Age wise gender distribution.

Age (in years)	No. of patients	No. of patients			
		Male	%	Female	%
0-20	186	83	16.09	103	19.28
21-40	286	137	26.55	149	27.90
41-60	344	161	31.20	183	34.26
>60	234	135	26.16	99	18.54
Total	1050	516	100	534	100

Table 3: Drugs prescribed by generic and brand names.

Type of prescription	Number (%)
Generic	81.54
Brand	18.46

Table 4: Details of drugs prescribed.

Name of drug	No. of prescriptions	(%)
Tab. Paracetamol	480	45.72
Tab. Pantoprazole	468	44.66
Tab. Azithromycin	189	18
Tab. Amoxycillin Clavum	192	18.28
Tab. Diclofenac	209	19.90
Tab. Ceterizine	190	18.10
Tab. Amlodipine	354	33.72
Tab. Metformin	175	16.66
Tab. Telmisartan	309	29.42
Tab. Calcium	258	24.32
Tab. Mvbc	159	15.14
Tab. Aspirin	157	14.95
Tab. Atorvastatin	151	14.38
Tab. Metoprolol-Xl	109	10.38
Tab. Glimepiride	129	12.28
Syrup. Cough	267	25.42
Tab. Nicardia	96	9.14
Tab. Ciprofloxacin	106	10.10
Tab. Fsfa	179	17.04
Tab. Vitamin C	216	20.58
Tab. Olazapine	108	10.28
Tab. Tolanzapine	82	7.80
Tab. Lorazepam	76	7.24
Tab. Sod. Valproate	104	9.90
Tab. Prednisolone	86	8.32
Tab. Ondansetron	207	19.72
Tab. Metronidazole	132	12.57
Tab. Pregabalin	76	7.24
Tab. Fluconazole	117	11.08
Tab. Dicyclomine	198	18.85
Tab. Clozapine	76	7.24

Table 5: Most prescribed class of drugs.

Drug class	Drug name	%
NSAIDS	Tab. Paracetamol 500 mg	55.90
	Tab. Diclofenac 50 mg	19.90

Continued.

Drug class	Drug name	%
PPI	Tab. Pantoprazole 40 mg	44.66
Antimicrobials	Tab. Azithromycin 500 mg	27.53
	Tab. Amoxycillin-Clavum 625 mg	20.28
Multivitamins	Tab. Calcium 500 mg	24.95
	Tab. Vitamin C 500 mg	20.58
	Tab. FSFA	17.04
Antihistamines	Tab. Cetirizine 5, 10 mg	18.10
CCB	Tab. Amlodipine 5, 10 mg	17.42
ARB's	Tab. Telmisartan 20,40 mg	16
Biguinides	Tab. Metformin 500, 1000 mg	16.66
Statin	Tab. Atorvastatin 20,40,80 mg	14.38
Sulfonylurea	Tab. Glimepiride 0.5,1,2 mg	15.14
Antiemetics	Tab. Ondansetron 4 mg	19.72

Table 6: Combination of 2 drugs class prescribed.

2-Drug	Number of patients	%
Tab. Telmisartan+Tab. Amlodipine	76	7.24
Tab. Metformin+Tab. Glimepiride	69	6.58
Tab. Olazapine+Tab. Clonazepam	40	3.80
Tab. Tolanzapine+Tab. Lorazepam	28	2.66
Tab. Olanzapine+Tab. Sodium Valproate	27	2.60
Tab. Paracetamol+Tab. Cetirizine	27	2.60
Tab. Dicyclomine+Tab. Pantoprazole	19	1.80
Tab. Olanzapine+Tab. Lorazepam	18	1.72
Tab. Paracetamol+Syrup. Cough	16	1.52
Syrup. Chymoral Forte+Syp. Zerodol SP	13	1.24
Tab. Aspirin+Tab. Atorvastatin	11	1.05

Table 7: Combination of 3 drugs class prescribed.

3 Drug therapy	Number of patients	%
Tab. Amoxclavum+Tab Paracetamol+Syrup. Cough	123	11.72
Tab. Amoxclavum+Tab. Paracetamol+Tab. Pantoprazole	111	10.58
Tab. Telmisartan+Tab. Amlodipine+Tab. Calcium	109	10.40
Tab. Paracetamol+Tab. Pantoprazole+Tab. Azithromycin	102	9.72
Tab. Prednisolone+Tab. Calcium+Tab. Cetirizine	86	8.20
Tab. Paracetamol+Tab. Pantoprazole+Diclofenac Gel	79	7.52
Tab. Azithromycin+Tab. Paracetamol+Tab. Cetirizine	72	6.85
Tab. Metformin+Tab. Dapagliflozin+Tab. Glimepiride	65	6.20
Tab. Thyroxine+Tab. Calcium+Tab. Mvbc	47	4.48
Syrup. Levipril+Syrup. Levocetrizine+Syrup.Tab. Paracetamol	38	3.62
Tab. Amoxclav+Tab. Cetirizine+Syrup. Cough	34	3.24
Tab. Fluconazole+Cream 2% Miconazole+Cr. 1% Luliconazole	29	2.76
Tab. Dicyclomine+Tab. Pantoprazole+Tab. Ondansetron	27	2.585

Table 8: Combination of more than 3 drug therapy.

More than 3 drug therapy	Number of patients	%
Tab. Metformin+Tab. Glimiperide+Tab. Dapagliflozin+Tab. Calcium	106	10.10
Tab. Diclofenac+Tab. Pregabalin+Tab.Calcium+Tab. Mvbc	76	7.24
Tab. Azithromycin+Tab. Paracetamol+Tab. Pantoprazole+Tab. Cetirizine	69	6.58

Continued.

More than 3 drug therapy	Number of patients	%
Tab. Aspirin+Tab. Atorvastatin+Tab. Amlodipine+Tab. Telmisartan	62	5.90
Tab. Aspirin+Tab. Atorvastatin+Tab. Metoprolol-Xl+Tab. Telmisartan	54	5.14
Tab. Metronidazole+Tab. Ciprolfoxacin +Tab. Dicyclomine+Tab. Pantoprazole	47	4.48
Tab. Amoxycillin+Tab. Paracetamol+Tab. Paracetamol+Tab. Cetirizine	34	3.24
Tab. Telmisartan+Tab. Amlodipine+Tab. Dapagliflozin+Tab. Atorvastatin	27	2.58
Tab. Clozapine+Tab.Trifluperazine+Tab. Trihexiphenidyl+Tab. Sodium Valprpoate	19	1.80

Table 9: Analysis of prescription patterns according to the WHO drug use indicators.

Parameters	Findings
The average number of drugs per prescription	5.84
The percentage of drugs prescribed by generic name	81.54
Percentage of encounters with an antibiotic prescribed	15.72
Percentage of encounters with an injection prescribed	1.81

DISCUSSION

The present prospective, cross-sectional study evaluated prescribing patterns among outpatients attending Government Medical College, Chhatrapati Sambhajinagar, using WHO prescribing indicators. A total of 1,050 prescriptions were analysed. The gender distribution was nearly equal, which is consistent with the findings of Karande et al, suggesting equitable healthcare utilization among males and females in Indian outpatient department (OPD) settings. Most patients belonged to the 41–60 years age group, reflecting a higher burden of chronic illnesses such as hypertension, diabetes mellitus and musculoskeletal disorders. Similar age-related trends have been reported by Sarkar et al, who documented increased drug utilization among middle-aged and elderly populations.[8,9]

The average number of drugs per prescription was 5.64, exceeding the WHO-recommended range and indicating a high prevalence of polypharmacy. Comparable observations were reported by Ahsan et al particularly in tertiary care hospitals where multiple comorbidities are common.[10] Around, 81.54% of drugs were prescribed by their generic names, reflecting good adherence to national prescribing policies. Similar improvements in generic prescribing have been described by Desalegn et al and Mishra et al likely due to increased awareness and government initiatives such as the Jan Aushadhi scheme.[11,12]

Antibiotics were prescribed in 15.72% of encounters, which falls within WHO-recommended limits and indicates rational antimicrobial use. This finding is consistent with studies by Kumar et al and Pathak et al, which reported controlled antibiotic prescribing in OPD settings.[13,14] Injectable use was minimal (1.81%), significantly lower than WHO reference values, further supporting rational prescribing practices. Non-steroidal anti-inflammatory drugs (NSAIDs) were the most frequently prescribed medications, with paracetamol and diclofenac being predominant. Similar prescribing patterns have been reported by Dutta et al reflecting the high prevalence of pain and inflammatory conditions.[15]The frequent co-prescription of proton pump inhibitors, particularly pantoprazole, aligns with observations by Patel et al indicating preventive strategies against NSAID-induced gastrointestinal adverse effects.[16] Among cardiovascular medications, amlodipine and telmisartan were the most commonly prescribed agents, consistent with national hypertension treatment guidelines and the findings of Gupta et al.[17] For diabetes management, metformin and glimepiride were most frequently used, in accordance with standard treatment recommendations and studies by Ramesh et al.[18] Combination therapy was commonly observed, particularly among patients with chronic illnesses. Although clinically justified in many cases, excessive polypharmacy may increase the risk of adverse drug reactions and reduced compliance, as emphasized by WHO and supported by Mahato et al.[19]

Limitations

While this study provides valuable data on prescription patterns, several limitations should be considered: The study was conducted at a single tertiary care centre, which may limit the generalizability of the results to other healthcare settings, particularly in primary care or rural areas. There is no data on long-term outcomes such as blood sugar control, blood pressure control, renal function

or cardiovascular events, which would provide further insights into the real-world effectiveness of these treatment regimens.

CONCLUSION

Polypharmacy was highly prevalent in the outpatient department, with NSAIDs and proton pump inhibitors being the most commonly prescribed drugs. Generic prescribing was notably high, while the use of antibiotics and injections remained within acceptable limits, indicating largely rational prescribing practices. However, continuous monitoring through regular prescription audits and ongoing training programs is essential to further optimize rational drug use and enhance patient safety.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Patil SB, Baig MS, Pal AD. Prescription audit of tertiary care centre using world health organization core prescribing indicators: an observational study. Int J Res Med Sci 2026;14:1897-903.