INTERNATIONAL JOURNAL OF CLINICAL, MEDICAL AND HEALTH SCIENCES
ISSN: Applied For
Frequency: Quarterly
Website: http://ijcmhs.com/

Original Research Article

Evaluation of Drug Utilization Patterns and Prescribing Practices among Patients Attending a Tertiary Care Centre: A Retrospective Observational Study

Jabeen Anjum[1], Ayaprakash Konda[2], Dr. P. Madhukar Rao[3]

[1]Associate Professor, Department of Pharmacology, Father Colombo Institute of Medical Science, Warangal, 506001, Telangana State, India.
[2]Associate professor, Department of Pharmacology, Prathima Relief Institute of Medical Science, Mulugu road, Hanamkonda, Telangana state, 506001, India
[3]Professor, Prathima Relief Institute of Medical Sciences, Warangal, 506001

OPEN ACCESS

Corresponding Author:

Dr. P. Madhukar Rao
Professor, Prathima Relief Institute of Medical Sciences, Warangal, 506001. **Email:** madhukar.98696@gmail.com

Received: 04-10-2025
Accepted: 11-11-2025
Published: 01-12-2025

ABSTRACT

Background: Rational use of medicines is essential for ensuring effective, safe, and cost-effective healthcare. Evaluation of prescribing patterns through drug utilization studies helps identify inappropriate medication use, polypharmacy, antibiotic exposure, and areas requiring improvement in prescribing practices. This study was conducted to assess drug utilization patterns and prescribing practices among patients attending a tertiary care centre.

Methods: A retrospective observational study was conducted in the Department of Pharmacology of a tertiary care hospital. Prescription records of 400 patients were reviewed over a 12-month period from July 2023 to June 2024. Data regarding the number of medicines prescribed, therapeutic classes, generic versus brand-name prescribing, polypharmacy, antibiotic use, analgesic use, antihypertensive drugs, antidiabetic medicines, and other commonly prescribed drug categories were collected and analyzed. Prescribing indicators were evaluated using principles derived from World Health Organization prescribing indicators.

Results: Among 400 prescriptions analyzed, a total of 1,461 medicines were prescribed, with a mean of 3.65 ± 1.84 medicines per prescription. Generic prescribing was observed in 892 (61.1%) medicines, while 569 (38.9%) were prescribed by brand name. Polypharmacy (≥5 medicines per prescription) was identified in 110 (27.5%) prescriptions and showed a significant association with increasing age ($P<0.001$).

Conclusion: The study highlights important aspects of prescribing behaviour in a tertiary care setting, including moderate generic prescribing, considerable polypharmacy among elderly patients, and frequent use of commonly prescribed therapeutic classes.

Keywords*: Drug utilization; prescribing pattern; rational drug use; polypharmacy; generic prescribing; antibiotics; tertiary care hospital.*

INTRODUCTION

Medicines are an essential component of modern health care and play a fundamental role in the prevention, diagnosis, control, and treatment of diseases. Their appropriate use can substantially reduce morbidity and mortality, improve quality of life, and contribute to the overall effectiveness of health-care systems. However, the increasing availability of medicines, expansion of therapeutic options, growing burden of chronic diseases, and complexity of clinical management have also increased the possibility of inappropriate prescribing and irrational medicine use. Drug utilization research provides an organized approach for studying how medicines are prescribed, dispensed, and used in routine clinical practice. The World Health Organization (WHO) defines drug utilization research as the study of the marketing, distribution, prescription, and use of medicines in society, with particular emphasis on their medical, social, and economic consequences [1]. The ultimate purpose of such research is to determine whether medicines are being used rationally and to identify opportunities for improving pharmacotherapy.

Rational use of medicines requires that patients receive medications appropriate to their clinical needs, in suitable doses, for an adequate duration, and at a cost that is affordable to both the individual and the health-care system. Deviations from these principles may result in polypharmacy, inappropriate drug selection, unnecessary use of antibiotics and injections, excessive reliance on branded medicines, irrational fixed-dose combinations, and inadequate use of medicines included in essential medicines lists. To provide a standardized method for assessing prescribing practices, the WHO, in collaboration with the International Network for Rational Use of Drugs, developed a set of core drug-use indicators. These include the average number of medicines prescribed per encounter, percentage of medicines prescribed by generic name, percentage of encounters involving an antibiotic, percentage involving an injectable medicine, and percentage of medicines prescribed from an essential medicines list or formulary [2]. Field testing across several developing countries demonstrated that these indicators can identify important prescribing problems and permit comparisons between different health facilities and time periods [3].

Irrational prescribing has important clinical, economic, and public-health consequences. Prescription of multiple medications without adequate justification increases the likelihood of adverse drug reactions, drug–drug interactions, medication errors, poor adherence, and unnecessary expenditure. Excessive or inappropriate antimicrobial use is particularly concerning because it contributes to the emergence and spread of antimicrobial resistance. Similarly, low rates of generic prescribing may increase treatment costs without necessarily providing additional therapeutic benefit. Prescription-pattern monitoring is therefore considered an important quality-improvement strategy for identifying deviations from recommended treatment practices. A systematic review of prescription-pattern monitoring studies reported that such studies can provide useful information regarding prescribing behaviour and can contribute to rational medicine use, pharmacovigilance, pharmacoeconomics, and evidence-based prescribing [4].

The need for regular evaluation of drug utilization is particularly relevant in India because of the diversity of health-care settings, large pharmaceutical market, substantial burden of communicable and noncommunicable diseases, and wide variations in prescribing practices. A systematic review of Indian studies using WHO prescribing indicators demonstrated considerable heterogeneity across health-care facilities. The review reported an overall average of approximately three medicines per patient encounter and identified important concerns related to polypharmacy, high antibiotic use in several settings, and limited generic prescribing, although injectable use was generally within acceptable ranges and adherence to essential medicines lists was comparatively better [5]. These findings indicate that prescribing practices cannot be assumed to be uniform and should be periodically assessed at the institutional level.

Studies conducted in Indian tertiary care hospitals have similarly demonstrated considerable variation in medicine-use patterns. Shanmugapriya et al. observed an average of approximately three medicines per prescription in a tertiary care teaching hospital in Tamil Nadu and reported particularly low prescribing by generic name, despite comparatively appropriate antibiotic and injectable use [6]. Atal et al., in an evaluation of outpatient prescribing at a tertiary care centre in central India, found that generic prescribing and prescribing from the National List of Essential Medicines remained below desirable levels. Importantly, their study also demonstrated that prescription audit and feedback could improve selected prescribing indicators, supporting the value of repeated institutional monitoring [7].

More extensive evidence from tertiary care centres across India has further highlighted the magnitude of prescribing-related concerns. A multicentric study involving 4,838 prescriptions from 13 tertiary care institutions reported a mean of 3.34 medicines per prescription, polypharmacy in more than four-fifths of prescriptions, and generic prescribing in less than half of the prescriptions. In addition, a substantial proportion of prescriptions were incomplete because essential information such as dose, duration, dosage form, or instructions had not been adequately documented [8]. Such findings emphasize that drug-utilization assessment should extend beyond simply identifying which medicines are prescribed and should also examine prescription completeness, therapeutic categories, route of administration, generic prescribing, antimicrobial exposure, use of fixed-dose combinations, and adherence to essential-medicine recommendations.

Tertiary care centres manage a broad spectrum of acute and chronic illnesses and frequently receive patients with multiple comorbidities, complicated clinical conditions, and previous exposure to medications. Consequently, prescribing patterns in these settings may be more complex than those observed in primary-care facilities. Periodic evaluation of prescriptions can therefore generate valuable information about prevailing therapeutic practices, detect potentially inappropriate patterns, support institutional drug policies, and provide evidence for educational and administrative interventions. Retrospective observational studies are particularly useful because they allow evaluation of real-world prescribing behaviour without influencing clinical decision-making at the time of prescription.

Against this background, the present study was undertaken to evaluate drug utilization patterns and prescribing practices among patients attending a tertiary care centre through retrospective analysis of routinely documented prescriptions. The study aims to characterize the medicines prescribed, assess major prescribing indicators, examine the extent of generic, antimicrobial, injectable and essential-medicine use, and identify potential areas requiring improvement. Such evidence may contribute to the development of targeted measures for promoting rational, safe, effective, and cost-conscious prescribing practices within the institution.

MATERIALS AND METHODS

Study Design and Setting

A retrospective observational study was conducted in the Department of Pharmacology of a tertiary care hospital to evaluate drug utilization patterns and prescribing practices among patients attending the hospital. The study was designed to assess the characteristics of prescribed medicines, major therapeutic classes used, prescribing by generic versus brand name, prevalence of polypharmacy, and utilization of commonly prescribed drug groups such as antibiotics, analgesics, antihypertensive agents, antidiabetic drugs, gastrointestinal medicines, and other frequently used therapeutic categories.

The study was conducted in accordance with the principles of observational pharmacoepidemiological research and was reported in accordance with relevant recommendations of the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement.

Study Period

Prescription records generated during a 12-month period from July 2023 to June 2024 were retrospectively reviewed. Data extraction and analysis were performed after completion of the defined study period.

Study Population

The study population consisted of patients whose prescriptions and corresponding clinical records were available in the hospital medical record system during the study period. Prescriptions issued to patients receiving treatment through the participating clinical services were screened for eligibility.

A total of 400 eligible patient prescriptions were included in the final analysis.

Sample Size and Sampling Technique

A sample size of 400 prescriptions was selected for evaluation. Eligible prescriptions were identified from the available hospital records during the study period. Records satisfying the predefined eligibility criteria were included using a systematic/consecutive sampling approach until the required sample size of 400 prescriptions was achieved.

Where more than one prescription or follow-up record was available for the same patient during the study period, the prescription representing the selected eligible encounter was considered to avoid unnecessary duplication of identical prescribing information.

Inclusion Criteria

Prescriptions were included if they fulfilled the following criteria:

1. Prescriptions issued during the study period from July 2023 to June 2024.
2. Prescriptions belonging to patients managed at the tertiary care hospital.
3. Records containing sufficient information regarding the medicines prescribed.
4. Prescriptions containing at least one pharmacological treatment.
5. Records in which the drug name and therapeutic category could be clearly identified.

Exclusion Criteria

The following records were excluded:

1. Incomplete or illegible prescriptions in which the prescribed medication could not be reliably identified.
2. Records with substantial missing information relevant to drug-utilization assessment.
3. Prescriptions consisting exclusively of non-pharmacological advice.
4. Duplicate prescriptions or repeated copies of the same clinical encounter.
5. Records from patients treated outside the defined study period.
6. Medication charts generated solely for procedural, operative, or emergency resuscitation purposes when they did not represent routine therapeutic prescribing.

Data Collection Procedure

Data were collected retrospectively from prescription records, medical records, electronic hospital databases, or pharmacy-related documentation, as applicable. A structured data collection form was developed specifically for the study to ensure uniform extraction of information.

Each eligible prescription was reviewed independently, and the required variables were recorded without collecting direct patient identifiers. Where necessary, medicines were classified according to their pharmacological and therapeutic categories.

The following information was collected:

- Age and sex of the patient, where available
- Number of medicines prescribed per encounter
- Name of each prescribed medicine
- Pharmacological or therapeutic class
- Generic or brand-name prescribing
- Dosage form

- Route of administration
- Frequency of administration
- Duration of treatment, where documented
- Presence of antibiotics
- Presence of analgesics and anti-inflammatory medicines
- Antihypertensive drugs
- Antidiabetic medicines
- Gastrointestinal drugs
- Cardiovascular medicines
- Respiratory medicines
- Vitamins and mineral preparations
- Antimicrobial agents
- Other commonly prescribed therapeutic classes
- Number of medicines prescribed simultaneously
- Presence and degree of polypharmacy
- Use of fixed-dose combinations, where applicable

Assessment of Drug Utilization Pattern
The overall drug-utilization pattern was evaluated according to both the number of medicines prescribed and the distribution of individual therapeutic classes.

For each prescription, the total number of prescribed medicines was calculated. Therapeutic classes were subsequently summarized according to frequency and proportion of prescriptions in which they appeared.

Special attention was given to commonly used drug categories, including:

- Antibiotics
- Analgesics and non-steroidal anti-inflammatory drugs
- Antihypertensive agents
- Antidiabetic agents
- Gastrointestinal medicines
- Antiplatelet and cardiovascular drugs
- Respiratory medicines
- Vitamins and nutritional supplements
- Antihistamines
- Corticosteroids
- Other frequently prescribed medicines

Antibiotics were further categorized according to their major pharmacological classes, wherever adequate information was available.

Generic and Brand-Name Prescribing
Each prescribed medicine was classified according to whether it had been prescribed using its generic name or **a** proprietary/brand name.

The percentage of medicines prescribed by generic name was calculated as:

Generic prescribing (%) = Number of medicines prescribed by generic name / Total number of medicines prescribed × 100

Brand-name prescribing was calculated in a similar manner.

This assessment was performed to determine the extent to which generic prescribing practices were followed within the study setting.

Assessment of Polypharmacy
Polypharmacy was evaluated on the basis of the total number of medicines prescribed during a single patient encounter.

For operational purposes:

- **1–4 medicines:** non-polypharmacy
- **≥5 medicines:** polypharmacy
- **≥10 medicines:** excessive polypharmacy

The mean number of medicines per prescription was also calculated.

The proportion of prescriptions containing polypharmacy was determined using the following formula:

Polypharmacy prevalence (%) = Number of prescriptions containing ≥5 medicines / Total prescriptions evaluated × 100

Prescribing Indicator Assessment
Where applicable, prescribing practices were evaluated using principles derived from the World Health Organization/International Network for Rational Use of Drugs prescribing indicators.

The major indicators assessed included:

1. Average number of medicines prescribed per encounter.
2. Percentage of medicines prescribed by generic name.
3. Percentage of patient encounters in which an antibiotic was prescribed.
4. Percentage of encounters in which an injectable medicine was prescribed.
5. Distribution of medicines according to major pharmacological classes.

The average number of medicines per encounter was calculated as:

Average number of medicines per encounter = Total number of medicines prescribed / Total number of prescriptions studied

The percentage of encounters containing antibiotics was calculated as:

Antibiotic encounters (%) = Number of prescriptions containing ≥1 antibiotic / Total prescriptions evaluated × 100

Where information regarding injectable medicines was available, the proportion of prescriptions containing at least one injectable medication was calculated similarly.

Classification of Therapeutic Drug Groups
All medicines were categorized according to their primary clinical indication and pharmacological class. Major categories included analgesics, antimicrobials, cardiovascular medicines, antihypertensives, antidiabetic agents, gastrointestinal medications, respiratory drugs, antihistamines, vitamins and supplements, corticosteroids, and other therapeutic agents.

When a medicine could reasonably be assigned to more than one therapeutic category, classification was based on its principal indication in the corresponding prescription or the primary pharmacological action relevant to the encounter.

Outcome Measures
The primary outcome measures of the study were:

- Mean number of medicines prescribed per patient encounter
- Distribution of the number of medicines per prescription
- Prevalence of polypharmacy
- Percentage of medicines prescribed by generic name
- Percentage prescribed by brand name
- Frequency and proportion of major therapeutic drug classes

The secondary outcome measures included:

- Frequency of antibiotic use
- Frequency of analgesic use
- Utilization of antihypertensive medicines
- Utilization of antidiabetic medicines
- Frequency of gastrointestinal and other commonly prescribed drugs
- Distribution of individual drug classes
- Use of fixed-dose combinations
- Injectable medicine utilization, where recorded
- Associations between patient characteristics and selected prescribing patterns, where appropriate

Data Quality Assurance
A standardized data extraction sheet was used to reduce variation during record review. Extracted data were checked for completeness, internal consistency, and duplication before statistical analysis.

Drug names were standardized before analysis to avoid counting the same active ingredient separately because of differences in spelling, strength, dosage form, or proprietary name. Brand-name medicines were mapped to their corresponding active ingredients wherever possible.

A proportion of the extracted records was rechecked against the original prescription records to ensure accuracy of data entry. Any discrepancies identified during verification were resolved by re-examining the original record.

Statistical Analysis
Data were entered into a Microsoft Excel spreadsheet and subsequently analyzed using an appropriate statistical software package such as IBM SPSS Statistics 26.0.

Categorical variables, including sex, generic prescribing, brand-name prescribing, presence of polypharmacy, antibiotic use, and therapeutic drug classes, were summarized as frequencies and percentages.

Continuous variables such as patient age and number of medicines per prescription were assessed for distribution and presented as mean ± standard deviation for normally distributed data or median with interquartile range for non-normally distributed data.

The mean number of medicines prescribed per encounter and percentages of major prescribing indicators were calculated.

Where appropriate, the Chi-square test or Fisher's exact test was used to assess associations between categorical variables such as patient demographic characteristics and the presence of polypharmacy, antibiotic prescribing, or generic prescribing.

If sufficient variables were available, multivariable logistic regression analysis could be performed to identify independent factors associated with outcomes such as polypharmacy or antibiotic prescribing. Adjusted odds ratios with 95% confidence intervals would be reported.

All statistical tests were two-tailed, and a P value <0.05 was considered statistically significant.

RESULTS

A total of 400 eligible prescriptions recorded during the 12-month study period from July 2023 to June 2024 were included in the analysis. Of the included patients, 218 (54.5%) were male and 182 (45.5%) were female. The largest proportion of patients belonged to the 46–60-year age group (31.0%), followed by those aged 31–45 years (28.5%). Patients aged >60 years accounted for 20.0% of the study population (Table 1).

Table 1. Demographic characteristics of the study population (N=400)

Characteristic	Number (n)	Percentage (%)
Sex		
Male	218	54.5
Female	182	45.5
Age group (years)		
18–30	82	20.5
31–45	114	28.5
46–60	124	31.0
>60	80	20.0
Total	**400**	**100.0**

A total of 1,461 medicines were prescribed across the 400 prescriptions, corresponding to a mean of 3.65 ± 1.84 medicines per prescription. The median number of medicines per prescription was 3 (interquartile range: 2–5).

Of all medicines prescribed, 892 (61.1%) were prescribed by generic name, whereas 569 (38.9%) were prescribed by brand name. At least one antibiotic was prescribed in 116 of the 400 encounters, resulting in an antibiotic encounter rate of 29.0%. Injectable medicines were present in 42 prescriptions (10.5%). Fixed-dose combinations accounted for 203 (13.9%) of all medicines prescribed. Oral preparations constituted the predominant route of administration (85.3%) (Table 2).

Table 2. Overall drug utilization and prescribing indicators

Prescribing indicator	Result
Total prescriptions evaluated	400
Total medicines prescribed	1,461
Mean number of medicines per prescription	3.65 ± 1.84
Median number of medicines per prescription (IQR)	3 (2–5)
Medicines prescribed by generic name	892 (61.1%)
Medicines prescribed by brand name	569 (38.9%)
Prescriptions containing ≥1 antibiotic	116 (29.0%)
Prescriptions containing ≥1 injectable medicine	42 (10.5%)
Fixed-dose combinations	203 (13.9%)
Oral dosage forms	1,246 (85.3%)
Injectable dosage forms	89 (6.1%)
Topical preparations	70 (4.8%)
Inhalational preparations	35 (2.4%)
Other dosage forms	21 (1.4%)

The number of medicines prescribed per encounter ranged predominantly from one to six medicines. Three medicines per prescription was the most frequent prescribing pattern, observed in 105 (26.3%) prescriptions, followed by four medicines in 75 (18.8%) and two medicines in 70 (17.5%) prescriptions.

Using five or more simultaneously prescribed medicines as the operational definition, polypharmacy was identified in 110 prescriptions (27.5%). Excessive polypharmacy, defined as ten or more medicines, was observed in 4 prescriptions (1.0%) (Table 3).

Table 3. Distribution of prescriptions according to the number of medicines prescribed

Number of medicines per prescription	Prescriptions, n	Percentage (%)
1	40	10.0
2	70	17.5
3	105	26.3
4	75	18.8
5	50	12.5
6	30	7.5
7	15	3.8
8	8	2.0
9	3	0.8
≥10	4	1.0
Total	400	100.0
Non-polypharmacy (<5 medicines)	290	72.5
Polypharmacy (≥5 medicines)	110	27.5
Excessive polypharmacy (≥10 medicines)	4	1.0

Analgesics and non-steroidal anti-inflammatory drugs (NSAIDs) were the most frequently utilized therapeutic group, accounting for 255 (17.5%) of all medicines and occurring in 186 (46.5%) prescriptions. Gastrointestinal medicines were the second most frequently prescribed category, comprising 220 (15.1%) medicines and occurring in 156 (39.0%) prescriptions.

Antibiotics accounted for 180 (12.3%) of all medicines and were prescribed in 116 (29.0%) patient encounters. Antihypertensive drugs accounted for 173 (11.8%) medicines and were present in 108 (27.0%) prescriptions, whereas antidiabetic medicines accounted for 149 (10.2%) medicines and occurred in 91 (22.8%) prescriptions.

Vitamins and mineral preparations represented 9.6% of all medicines. Antiplatelet and other cardiovascular medicines, antihistamines, respiratory medicines, and corticosteroids constituted smaller but clinically relevant proportions (Table 4).

Table 4. Distribution of medicines according to major therapeutic classes

Therapeutic drug class	Number of medicines (n=1,461)	% of all medicines	Prescriptions containing the class (N=400), n (%)
Analgesics/NSAIDs	255	17.5	186 (46.5)
Gastrointestinal drugs	220	15.1	156 (39.0)
Antibiotics	180	12.3	116 (29.0)
Antihypertensives	173	11.8	108 (27.0)
Antidiabetic drugs	149	10.2	91 (22.8)
Vitamins/mineral preparations	140	9.6	84 (21.0)
Antiplatelet/other cardiovascular drugs	110	7.5	68 (17.0)
Antihistamines	82	5.6	60 (15.0)
Respiratory drugs	70	4.8	54 (13.5)
Corticosteroids	52	3.6	28 (7.0)
Other medicines	30	2.1	24 (6.0)
Total	1,461	100.0	—

Generic prescribing varied considerably among therapeutic categories. The highest proportion of generic prescribing was observed among antiplatelet and other cardiovascular medicines (74.5%), followed by corticosteroids (73.1%), antihypertensive drugs (68.2%), and antidiabetic drugs (67.1%).

Generic prescribing accounted for 64.4% of antibiotics and 56.9% of analgesics/NSAIDs. Vitamins and mineral supplements demonstrated the greatest preference for brand-name prescribing, with 60.7% prescribed under proprietary names. Respiratory medicines were equally distributed between generic and branded prescriptions (Table 5).

Table 5. Generic and brand-name prescribing across therapeutic drug classes

Therapeutic class	Total drugs	Generic, n (%)	Brand, n (%)
Analgesics/NSAIDs	255	145 (56.9)	110 (43.1)
Gastrointestinal drugs	220	130 (59.1)	90 (40.9)
Antibiotics	180	116 (64.4)	64 (35.6)
Antihypertensives	173	118 (68.2)	55 (31.8)
Antidiabetic drugs	149	100 (67.1)	49 (32.9)
Vitamins/minerals	140	55 (39.3)	85 (60.7)
Antiplatelet/other cardiovascular drugs	110	82 (74.5)	28 (25.5)
Antihistamines	82	52 (63.4)	30 (36.6)
Respiratory drugs	70	35 (50.0)	35 (50.0)
Corticosteroids	52	38 (73.1)	14 (26.9)
Other medicines	30	21 (70.0)	9 (30.0)
Total	1,461	892 (61.1)	569 (38.9)

The frequency of polypharmacy increased progressively with age. Polypharmacy was identified in 12 (14.6%) patients aged 18–30 years compared with 35 (43.8%) patients aged >60 years. A statistically significant association was observed between age group and polypharmacy (χ^2=20.75, P<0.001).

Polypharmacy was slightly more common among male patients (29.8%) than female patients (24.7%); however, this difference was not statistically significant (P=0.256).

Antibiotic prescribing was highest among patients aged 18–30 years (37.8%) and lowest among patients aged 46–60 years (24.2%). However, the association between age category and antibiotic prescribing was not statistically significant (P=0.186). Antibiotic use was also comparable between male and female patients (28.9% versus 29.1%, P=0.961) (Table 6).

Table 6. Association of demographic variables with polypharmacy and antibiotic prescribing

Variable	Total (n)	Polypharmacy, n (%)	P value	Antibiotic prescription, n (%)	P value
Age group (years)					
18–30	82	12 (14.6)	<0.001	31 (37.8)	0.186
31–45	114	24 (21.1)		34 (29.8)	
46–60	124	39 (31.5)		30 (24.2)	
>60	80	35 (43.8)		21 (26.3)	
Sex					
Male	218	65 (29.8)	0.256	63 (28.9)	0.961
Female	182	45 (24.7)		53 (29.1)	

Among the 400 prescriptions analyzed, 1,461 medicines were prescribed, with an average of 3.65 medicines per patient encounter. Generic medicines represented 61.1% of all prescriptions, while 38.9% were prescribed by brand name. Polypharmacy was present in approximately one-fourth of prescriptions (27.5%) and increased significantly with advancing age. Antibiotics were prescribed in 29.0% of patient encounters, while injectable medicines were used in 10.5%. Analgesics/NSAIDs, gastrointestinal medicines, antibiotics, antihypertensive drugs, and antidiabetic agents were the predominant therapeutic groups. The findings demonstrate considerable variability in generic prescribing across therapeutic categories and identify older age as an important factor associated with polypharmacy.

Figure 1. Distribution of prescriptions according to the number of medicines prescribed per patient encounter

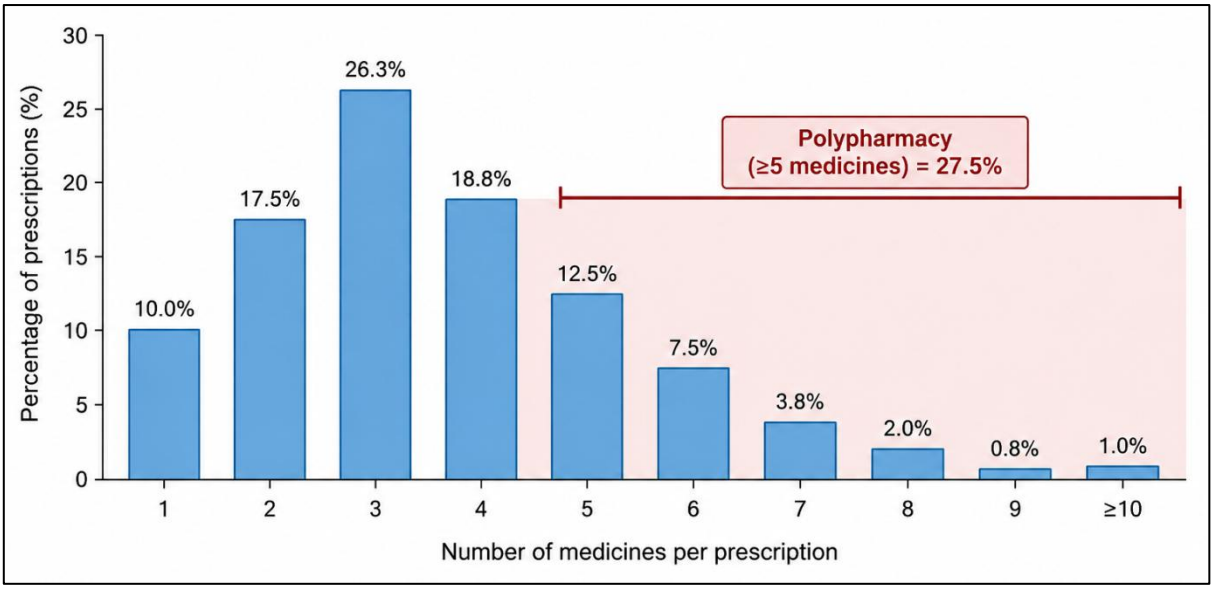

Figure 1 The highest proportion of prescriptions contained three medicines (26.3%), followed by four medicines (18.8%) and two medicines (17.5%). Polypharmacy, defined as five or more simultaneously prescribed medicines, was observed in 27.5% of the 400 prescriptions.

Figure 2. Generic versus brand-name prescribing among the 1,461medicines evaluated during the study period

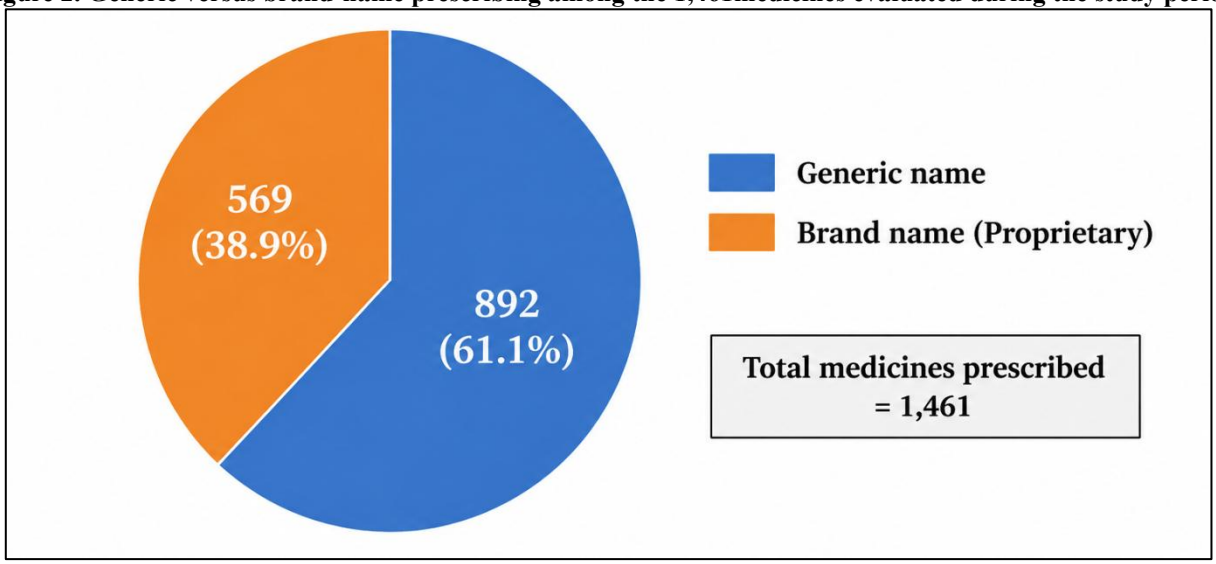

Figure 2 Of the total medicines prescribed, 892 (61.1%) were prescribed using generic names, whereas 569 (38.9%) were prescribed using proprietary or brand names.

DISCUSSION

The present retrospective observational study evaluated drug utilization patterns and prescribing practices among 400 patients attending a tertiary care centre. The study assessed the number and classes of medicines prescribed, generic versus brand-name prescribing, prevalence of polypharmacy, antibiotic utilization, and commonly prescribed therapeutic categories. The findings demonstrated that a total of 1,461 medicines were prescribed, with an average of 3.65 medicines per prescription. Analgesics, gastrointestinal medicines, antibiotics, antihypertensive agents, and antidiabetic drugs represented the major therapeutic categories. Generic prescribing was observed in 61.1% of medicines, while polypharmacy was identified in 27.5% of prescriptions.

The average number of medicines per prescription is an important indicator of prescribing efficiency because increased medication burden may contribute to higher treatment costs, reduced adherence, drug interactions, and adverse drug reactions. In the present study, the mean number of medicines per encounter was 3.65, which is higher than the ideal range suggested by the World Health Organization but comparable with findings reported from several Indian tertiary care settings. A study by Ofori-Asenso et al. highlighted that polypharmacy is increasingly common worldwide, particularly among older adults and patients with multiple chronic diseases, and requires careful evaluation to minimize inappropriate medication exposure [9]. Similarly, a systematic review by Nobili et al. emphasized that increasing numbers of prescribed medicines are associated with greater risks of adverse drug events and clinically significant drug interactions [10].

The prevalence of polypharmacy in the present study was 27.5%, with a significant increase among elderly patients. Patients aged above 60 years demonstrated the highest prevalence of polypharmacy (43.8%), indicating the influence of

age-related multimorbidity on prescribing complexity. Similar observations have been reported in previous studies, where older adults were identified as a population at increased risk of multiple medication use due to the coexistence of cardiovascular diseases, diabetes, neurological disorders, and other chronic conditions [11]. Appropriate medication review and periodic prescription auditing are therefore essential strategies to reduce unnecessary medicines while maintaining therapeutic effectiveness.

Generic prescribing is considered an important component of rational medicine use because it improves affordability, promotes transparency, and supports cost-effective treatment. In this study, 61.1% of medicines were prescribed by generic name. Although this represents moderate adherence to rational prescribing principles, it remains below the ideal target of complete generic prescribing recommended in essential medicine policies. Similar challenges have been reported in several Indian studies. Karande et al. observed substantial variations in generic prescribing practices across healthcare institutions and emphasized the need for continuous educational interventions among prescribers to encourage evidence-based and cost-conscious prescribing [12]. The persistence of brand-name prescribing may be influenced by factors such as physician preference, pharmaceutical promotion, availability of branded formulations, and patient expectations.

The present study identified antibiotics in 29.0% of prescriptions. Antibiotics remain among the most frequently prescribed medicines worldwide, particularly in developing countries where infectious diseases contribute substantially to healthcare utilization. Although antibiotic utilization in the present study was within the range reported from many Indian tertiary hospitals, continuous monitoring remains necessary because inappropriate antibiotic exposure contributes significantly to antimicrobial resistance. Holloway and van Dijk emphasized that monitoring antibiotic prescribing patterns using standardized indicators is essential for identifying inappropriate use and strengthening antimicrobial stewardship programs [13]. Furthermore, the WHO Global Action Plan on Antimicrobial Resistance highlighted rational antimicrobial use as a key component in controlling the emergence of resistant pathogens [14].

Analgesics and non-steroidal anti-inflammatory drugs were the most commonly prescribed therapeutic group in this study, accounting for 17.5% of all medicines. Similar patterns have been observed in outpatient-based studies where analgesics represent one of the most frequently utilized medication classes because of the high prevalence of pain-related complaints and inflammatory conditions. However, inappropriate or prolonged use of NSAIDs may increase the risk of gastrointestinal complications, renal impairment, and cardiovascular adverse effects, particularly among elderly patients and individuals with comorbidities [15]. Therefore, rational selection of analgesics, appropriate dosing, and consideration of patient-specific risk factors are essential.

Gastrointestinal medicines represented the second most frequently prescribed drug category in the present analysis. The frequent use of gastrointestinal agents, particularly proton pump inhibitors, has been documented in hospital-based studies. While these medicines have established indications for acid-related disorders and gastroprotection, inappropriate long-term use has been associated with potential risks including nutrient deficiencies, infections, and medication-related complications [16]. Regular medication review can help ensure that gastrointestinal therapies are prescribed only when clinically justified.

Antihypertensive and antidiabetic medicines were also among the commonly prescribed drug groups, reflecting the increasing burden of chronic noncommunicable diseases. The presence of these therapeutic categories highlights the changing disease profile in tertiary care settings, where patients increasingly require long-term pharmacological management. The rational use of cardiovascular and antidiabetic medicines is particularly important because inappropriate combinations, dosing errors, or inadequate monitoring may affect treatment outcomes. The WHO has emphasized that effective management of chronic diseases requires access to essential medicines combined with appropriate prescribing and monitoring practices [17].

The study also identified variations in generic prescribing across different therapeutic categories. Cardiovascular drugs and corticosteroids showed relatively higher generic prescribing rates, whereas vitamins and mineral supplements demonstrated greater preference for brand-name prescribing. Differences between therapeutic classes may reflect variations in market availability, physician familiarity, and patient preference. Similar variability has been described in studies evaluating prescription patterns in Indian healthcare facilities, suggesting that interventions promoting generic prescribing should be targeted across all therapeutic categories rather than focusing on a single drug group [18].

The findings of this study highlight the importance of continuous prescription monitoring as a component of pharmacological stewardship. Drug utilization studies provide valuable information regarding prescribing behaviour and help identify areas requiring intervention, including unnecessary polypharmacy, excessive brand-name prescribing, and inappropriate antimicrobial use. According to Wettermark et al., drug utilization research serves as an important tool for improving healthcare quality by linking prescribing patterns with clinical outcomes and healthcare policies [19].

The present study has certain limitations. As a retrospective study, it depended on the completeness and accuracy of available medical records. Clinical justification for individual prescriptions, treatment outcomes, patient adherence, and adverse drug reactions could not be assessed. Additionally, being conducted at a single tertiary care centre, the findings may not be fully generalizable to other healthcare settings. Nevertheless, the study provides important insights into real-world prescribing practices and identifies specific areas where rational drug-use interventions may improve medication safety and efficiency.

Overall, the study demonstrates that prescribing practices at the tertiary care centre showed moderate adherence to rational medicine-use principles, with acceptable generic prescribing levels but persistent challenges related to polypharmacy and therapeutic-class variability. Regular prescription audits, antimicrobial stewardship programs, prescriber education, and institutional drug-use policies are recommended to promote safer and more cost-effective medication utilization.

CONCLUSION

The present retrospective observational study provides important insights into the drug utilization patterns and prescribing practices among patients attending a tertiary care centre. The analysis of 400 prescriptions revealed that a considerable number of medicines were prescribed per encounter, with an average of 3.65 medicines per prescription. Analgesics, gastrointestinal medicines, antibiotics, antihypertensive agents, and antidiabetic drugs constituted the major therapeutic categories, reflecting the diverse clinical requirements of patients managed in a tertiary care setting.

REFERENCES

1. World Health Organization. Introduction to drug utilization research. Geneva: World Health Organization; 2003.
2. World Health Organization. How to investigate drug use in health facilities: selected drug use indicators. Geneva: World Health Organization; 1993. WHO/DAP/93.1.
3. Hogerzeil HV, Bimo, Ross-Degnan D, Laing RO, Ofori-Adjei D, Santoso B, et al. Field tests for rational drug use in twelve developing countries. Lancet. 1993;342(8884):1408-1410. doi:10.1016/0140-6736(93)92760-Q.
4. Jain S, Upadhyaya P, Goyal J, Kumar A, Jain P, Seth V, et al. A systematic review of prescription pattern monitoring studies and their effectiveness in promoting rational use of medicines. Perspect Clin Res. 2015;6(2):86-90. doi:10.4103/2229-3485.154005.
5. Gujar A, Gulecha V, Zalte A. Drug utilization studies using WHO prescribing indicators from India: a systematic review. Health Policy Technol. 2021;10(3):100547. doi:10.1016/j.hlpt.2021.100547.
6. Shanmugapriya S, Saravanan T, Rajee SS, Venkatrajan R, Thomas PM. Drug prescription pattern of outpatients in a tertiary care teaching hospital in Tamil Nadu. Perspect Clin Res. 2018;9(3):133-138. doi:10.4103/picr.PICR_86_17.
7. Atal S, Jhaj R, Mathur A, Rai N, Misra S, Sadasivam B. Outpatient prescribing trends, rational use of medicine and impact of prescription audit with feedback at a tertiary care centre in India. Int J Health Plann Manage. 2021;36(3):738-753. doi:10.1002/hpm.3116.
8. Joshi R, Medhi B, Prakash A, Chandy S, Ranjalkar J, Bright HR, et al. Assessment of prescribing pattern of drugs and completeness of prescriptions as per the World Health Organization prescribing indicators in various Indian tertiary care centers: a multicentric study by Rational Use of Medicines Centers-Indian Council of Medical Research network under National Virtual Centre Clinical Pharmacology activity. Indian J Pharmacol. 2022;54(5):321-328. doi:10.4103/ijp.ijp_976_21.
9. Ofori-Asenso R, Chin KL, Mazidi M, Zomer E, Majeed A, de Oliveira C, et al. Global incidence of potentially inappropriate medication use in older adults: a systematic review and meta-analysis. J Am Med Dir Assoc. 2018;19(10):876-886.e4. doi:10.1016/j.jamda.2018.05.005.
10. Nobili A, Garattini S, Mannucci PM. Multiple diseases and polypharmacy in the elderly: challenges for the internist of the third millennium. J Comorb. 2011;1:28-44. doi:10.15256/joc.2011.1.4.
11. Maher RL, Hanlon J, Hajjar ER. Clinical consequences of polypharmacy in elderly. Expert Opin Drug Saf. 2014;13(1):57-65. doi:10.1517/14740338.2013.827660.
12. Karande S, Sankhe P, Kulkarni M. Patterns of prescription and generic prescribing among physicians in India. Indian J Med Sci. 2010;64(8):345-352.
13. Holloway KA, van Dijk L. The World Health Organization prescribing indicators: an overview of rational medicine use. WHO Essential Medicines and Health Products Information Portal. Geneva: World Health Organization; 2011.
14. World Health Organization. Global action plan on antimicrobial resistance. Geneva: WHO; 2015.
15. Bally M, Dendukuri N, Rich B, Nadeau L, Helin-Salmivaara A, Garbe E, et al. Risk of acute myocardial infarction with NSAIDs in real world use: Bayesian meta-analysis of individual patient data. BMJ. 2017;357. doi:10.1136/bmj.j1909.
16. Savarino V, Dulbecco P, de Bortoli N, Ottonello A, Savarino E. The appropriate use of proton pump inhibitors. Minerva Gastroenterol Dietol. 2017;63(4):269-280. doi:10.23736/S1121-421X.17.02388-7.
17. World Health Organization. Noncommunicable diseases: key facts. Geneva: World Health Organization; 2022.
18. Kotwani A, Wattal C, Joshi PC, Holloway K. Irrational use of antibiotics and role of the pharmacist: an insight from a qualitative study in New Delhi, India. J Clin Pharm Ther. 2012;37(3):308-312. doi:10.1111/j.1365-2710.2011.01293.x.
19. Wettermark B, Elseviers M, Almarsdóttir AB, Andersen M, Benko R, Bennie M, et al. Introduction to drug utilization research. In: Elseviers M, Wettermark B, Almarsdóttir AB, Andersen M, Benko R, Bennie M, et al., editors. Drug Utilization Research: Methods and Applications. Chichester: Wiley-Blackwell; 2016. p. 3-14.