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Research Article

Evaluation Of Antimicrobial Utilization in the Outpatient Department of A Community Health Center In Kashmir: A Prospective Observational Study

Dr. Hibba Dar[1], Dr. Mahish Mehraj[1], Dr. Sabah Nisar[1], Dr. Suhaib Qayoom[2], Dr. Zaid Bin Feroz[3]

[1]Department of Pharmacology, Government Medical College, Srinagar, Jammu and Kashmir, India
[2]Clinical Research Unit, Department of Medicine, Carilion Clinic, Roanoke, Virginia, USA
[3]Holy Family Red Crescent Medical College and Hospital, Dhaka, Bangladesh

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Corresponding Author:

Dr. Sabah Nisar
Department of Pharmacology,
Government Medical College,
Srinagar, Jammu and Kashmir, India

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ABSTRACT

Background: Antimicrobial resistance (AMR) has emerged as a major public health concern worldwide, driven largely by irrational and excessive use of antibiotics. Understanding local prescribing trends helps identify patterns of inappropriate antimicrobial use and informs corrective interventions. Drug utilization studies, therefore, serve as a key tool to promote rational prescribing and strengthen antimicrobial stewardship, particularly at the primary-care level where most patient encounters occur.

Objective: The study aimed to evaluate the prescribing patterns of antimicrobial agents (AMAs) in the outpatient department of a sub-district hospital in Pampore, District Pulwama, Jammu and Kashmir, and to assess the rationality of prescriptions using World Health Organization (WHO) prescribing indicators.

Methods: This prospective observational study was conducted between August 2022 and January 2023. A total of 650 outpatient prescriptions were reviewed, of which 435 contained at least one AMA. Data regarding demographics, classes of AMAs, commonly prescribed agents, fixed-dose combinations (FDCs), comedications, routes of administration, and prescription rationality were analyzed. Seasonal variation and indication-specific use were also assessed.

Results: Of the 435 prescriptions containing AMAs, 55.4% were issued to male patients and 44.6% to females. The majority of recipients were aged 40–50 years (28%). Cephalosporins (23.2%) were the most prescribed antimicrobial class, followed by penicillins (20.5%), fluoroquinolones (15.6%), and macrolides (15.2%). Amoxicillin-clavulanic acid (17.9%) was the most common individual drug, followed by azithromycin (11.3%) and cefuroxime (6.2%). While 68% of AMAs were from the WHO Essential Medicines List (EML), 32% were non-EML, highlighting reliance on broader-spectrum options. Generic prescribing was low (17.5%), with brand prescribing dominating (82.5%). Oral administration was preferred (86.7%), with limited parenteral (11.5%) and topical (1.8%) use. Most prescriptions contained 3–4 drugs. FDCs were commonly used, with amoxicillin-clavulanic acid being the most frequent. Comedications included proton pump inhibitors (71%), vitamins (49%), and NSAIDs (29%). Indications most commonly associated with antimicrobial prescribing were respiratory tract infections (31.7%), urinary tract infections (21.6%), and gastroenteritis (14.7%). A seasonal surge in prescribing was observed during November–January.

Conclusion: The study revealed widespread prescribing of broad-spectrum AMAs, limited use of generics, frequent FDC use, and high rates of polypharmacy. Although antimicrobial prescribing was rational in many cases, inappropriate use of non-EML drugs and excessive reliance on brand prescribing highlight areas for improvement. Interventions to strengthen antimicrobial stewardship at the community level are urgently needed.

***Keywords**: Antimicrobials, Prescribing pattern, Rational drug use, WHO prescribing indicators, Outpatients, Kashmir.*

INTRODUCTION

Antimicrobials are among the most frequently prescribed drugs worldwide and play a crucial role in reducing morbidity and mortality from infectious diseases. However, inappropriate prescribing, such as unnecessary use of broad-spectrum antibiotics, irrational fixed-dose combinations (FDCs), and preference for branded formulations, contributes significantly to antimicrobial resistance (AMR) — a global health threat with serious clinical and economic implications [1–3]. The misuse and overuse of antibiotics not only accelerate the development of resistant strains but also increase treatment costs and hospitalization rates, posing a serious challenge to public health systems globally. This irrational use is especially concerning in low- and middle-income countries where antibiotics are often available over the counter, and self-medication is common.

Drug utilization studies serve as powerful tools to evaluate prescribing practices, identify patterns of irrational use, and provide evidence for promoting rational prescribing [4]. They also help in identifying gaps between standard treatment guidelines and real-world clinical practice, thus offering opportunities for corrective measures through prescriber education and antimicrobial stewardship programs. The WHO has proposed core prescribing indicators to standardize such evaluations, including the average number of drugs per prescription, proportion of drugs prescribed by generic name, percentage of encounters with an antimicrobial, and distribution by dosage form [5]. These indicators enable comparison of prescribing trends across regions and help monitor interventions aimed at improving rational drug use.

In India, antimicrobial prescribing patterns vary widely depending on setting, prescriber preferences, and availability of medicines. Studies from tertiary care centers have highlighted over-prescription of cephalosporins and fluoroquinolones, frequent polypharmacy, and low generic prescribing [6–9]. However, these findings may not fully represent the practices in smaller health facilities, where prescribing behaviors are influenced by resource limitations and patient expectations. In peripheral and sub-district hospitals, physicians often rely on empirical treatment due to limited diagnostic infrastructure, contributing to higher use of broad-spectrum agents. Furthermore, the influence of pharmaceutical marketing, lack of regular prescription audits, and inadequate awareness about antimicrobial guidelines may further perpetuate irrational practices.

Rational antimicrobial use at the community level is crucial for preventing the emergence of resistance and ensuring the sustainability of effective therapies. Primary- and secondary-level facilities serve as the first point of contact for a large proportion of the population, especially in rural and semi-urban areas. Therefore, assessing prescribing patterns in such settings is essential for identifying existing gaps and guiding targeted interventions. The present study was therefore undertaken to assess antimicrobial prescribing patterns in the outpatient department (OPD) of a sub-district hospital (Community Health Center) in Pampore, District Pulwama, Jammu and Kashmir. By analyzing demographic trends, antimicrobial class preferences, prescribing indicators, and rationality, this study provides insights into outpatient antimicrobial utilization at a primary-care level in Northern India.

METHODS

Study design and setting:

This was a prospective, cross-sectional observational study conducted in the outpatient departments of the Sub-District Hospital, Pampore (Community Health Center), District Pulwama, Jammu and Kashmir, over six months (August 2022 to January 2023).

Sample size:

A total of 650 outpatient prescriptions were screened. Of these, 435 contained one or more antimicrobial agents (AMAs) and were included for analysis. Prescriptions without AMAs were excluded.

Inclusion criteria:

- Prescriptions containing at least one AMA.
- Patients of either gender, aged ≥18 years.
- All clinical diagnoses for which AMAs were prescribed.

Exclusion criteria:

- Incomplete prescriptions.
- Prescriptions with illegible drug names.
- Pediatric prescriptions (age <18 years).

Data collection:

Prescription data were collected using a structured proforma. Information included patient demographics (age, gender), clinical diagnosis, class and name of AMA prescribed, WHO Essential Medicines List (EML) inclusion, generic vs brand

prescribing, route of administration, fixed-dose combinations (FDCs), comedications, and total number of drugs per prescription. Seasonal variation and indication-specific antimicrobial use were also noted.

Data analysis:
Data were entered into Microsoft Excel and analyzed descriptively. Frequencies and percentages were calculated. WHO core prescribing indicators were applied. Results are presented in tables and graphs.

Ethical considerations:
Institutional Ethics Committee approval was obtained prior to study initiation. Patient confidentiality was maintained throughout, with no personal identifiers recorded.

RESULTS

Demographics

Of the 435 prescriptions containing AMAs, 241 (55.4%) were for male patients and 194 (44.6%) for females. The most common age group was 40–50 years (28%), followed by 51–61 years (22%). (Figure 1) (Figure 2)

Table 1. Age and gender distribution of patients receiving AMAs

Age group (years)	No. of patients, n (%)	Male (%)	Female (%)
18–28	48 (11.0)	6.2	4.8
29–39	84 (19.3)	10.8	8.5
40–50	122 (28.0)	15.2	12.8
51–61	96 (22.1)	12.2	9.9
62–72	52 (12.0)	6.9	5.1
>72	33 (7.6)	4.0	3.6
Total	435 (100)	55.4	44.6

Antimicrobial classes and agents

Cephalosporins were most frequently prescribed (23.2%), followed by penicillins (20.5%), fluoroquinolones (15.6%), and macrolides (15.2%). Amoxicillin-clavulanic acid was the single most common drug (17.9%), followed by azithromycin (11.3%) and cefuroxime (6.2%).
(Figure 3)

Table 2. Distribution of antimicrobial classes and major agents prescribed

Class	Major drugs	Prescriptions (n)	% of total	WHO EML status
Penicillins	Amox-Clav (78), Amox (7), Pip-Tazo (4)	89	20.5	Mostly EML
Cephalosporins	Cefuroxime (27), Cefixime (24), Ceftriaxone (26), Ceftriaxone+Sulbactam (13), Cefpodoxime (11)	101	23.2	Mixed
Fluoroquinolones	Levo (23), Moxi (14), Cipro (9), Oflox (4), Oflox+Ornidazole (14), Cipro+Tinidazole (4)	68	15.6	Mixed
Macrolides	Azithro (49), Clarithro (17)	66	15.2	EML
Nitroimidazoles	Metronidazole (21), Tinidazole (3), Ornidazole (14 with Oflox), Cipro+Tinidazole (4)	42	9.6	Mixed
Tetracyclines	Doxycycline (17)	17	3.9	EML
Aminoglycosides	Gentamicin (2), Neomycin (5)	7	1.6	Mixed
Others	Clindamycin (3), Fosfomycin (7), Nitrofurantoin (21), Rifaximin (14)	45	10.3	Mixed

WHO prescribing indicators

- Average number of drugs per prescription: 3.8 (most common: 3–4 drugs).
- Generic vs brand: 17.5% generic vs 82.5% brand. (Figure 4)
- Route: Oral (86.7%), Parenteral (11.5%), Topical (1.8%).

Fixed-dose combinations (FDCs)

- Amoxicillin + Clavulanic acid (78; 17.9%).
- Ceftriaxone + Sulbactam (13; 3.0%).
- Ofloxacin + Ornidazole (14; 3.2%).
- Ciprofloxacin + Tinidazole (4; 0.9%).

Comedications

Most frequent comedications were PPIs (71%), vitamins/supplements (49%), NSAIDs (29%), paracetamol (24%), antihistamines (19%), and probiotics (16%).

Indications for antimicrobial prescribing

Respiratory tract infections were the leading indication (31.7%), followed by urinary tract infections (21.6%), gastroenteritis (14.7%), and pelvic inflammatory disease (8.5%). (Figure 5)

Table 3. Indications for antimicrobial prescriptions

Indication	**Prescriptions (n)**	**%**
Respiratory tract infections	138	31.7
Urinary tract infections	94	21.6
Gastroenteritis/diarrhea	64	14.7
Skin & soft tissue infections	25	5.7
Pelvic inflammatory disease	37	8.5
Others (e.g., pyelonephritis, pharyngitis, AOM)	77	17.7

Seasonal variation

A surge in AMA prescriptions was noted during November–January, coinciding with peak respiratory infections in winter. (Figure 6)

Figures

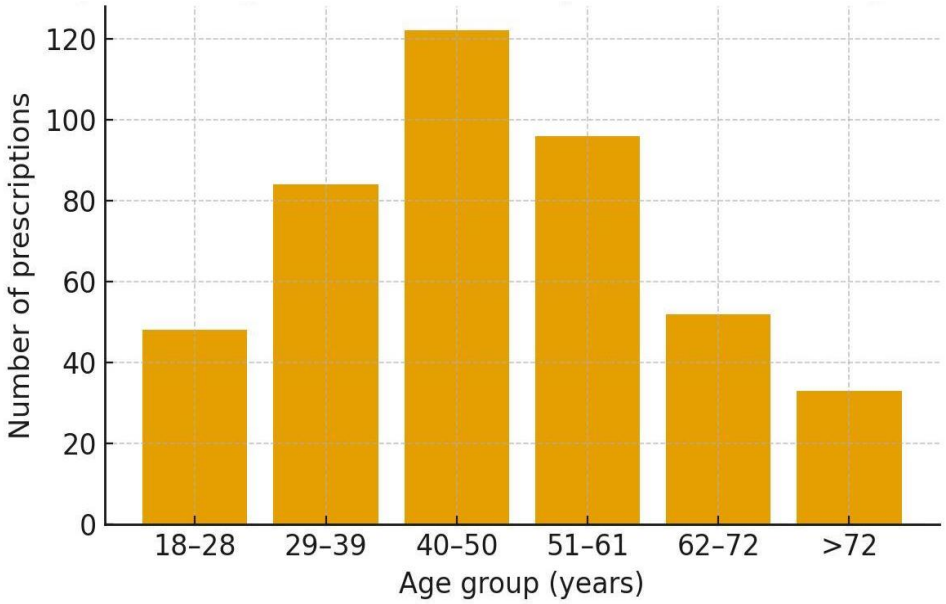

Figure 1. Age distribution of patients receiving antimicrobial agents (n=435). Middle-aged adults (40–50 years) were the largest group.

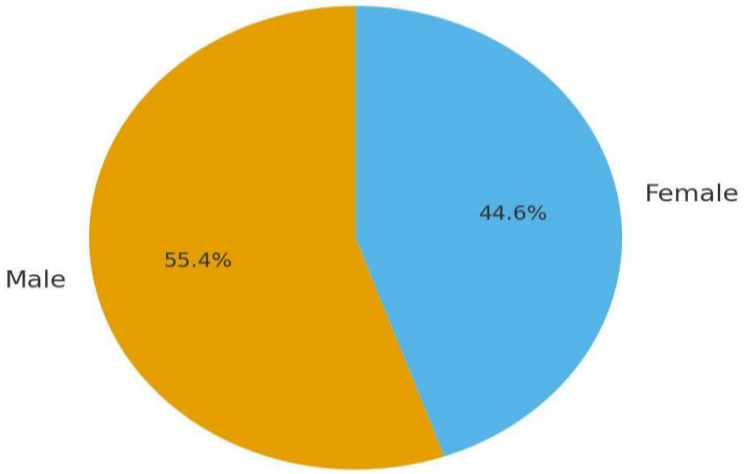

Figure 2. Gender distribution of patients receiving antimicrobial agents. Males (55.4%) slightly outnumbered females (44.6%).

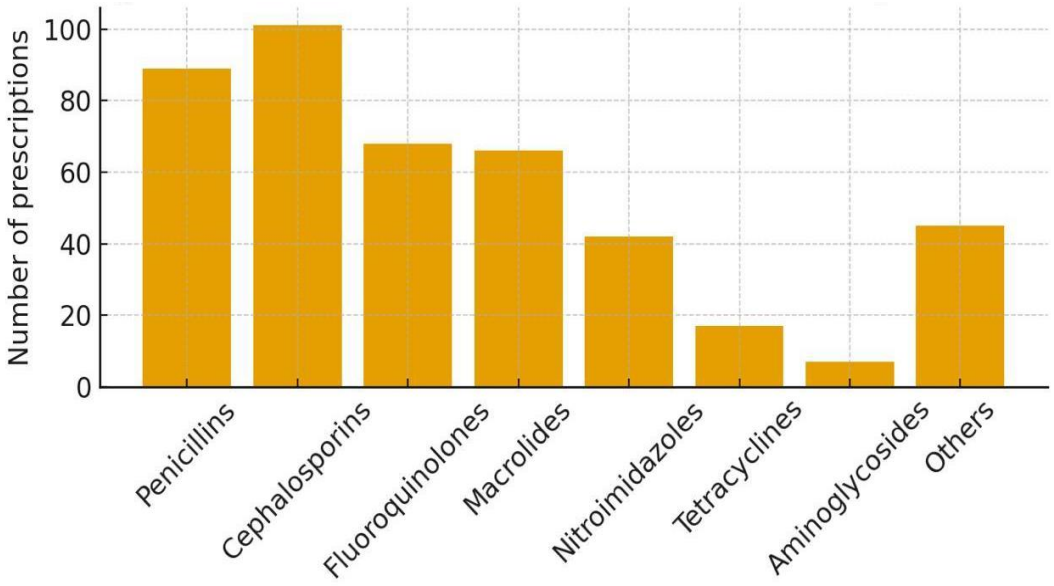

Figure 3. Distribution of antimicrobial classes prescribed in the outpatient department. Cephalosporins were the most commonly prescribed class, followed by penicillins and fluoroquinolones.

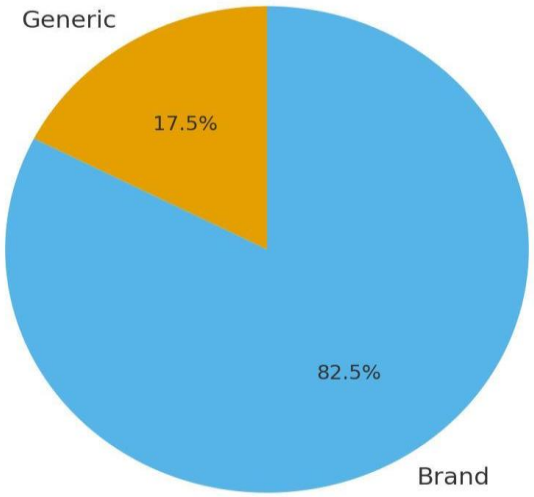

Figure 4. Generic vs brand prescribing pattern. The majority of prescriptions were brand-based (82.5%), with low generic prescribing (17.5%).

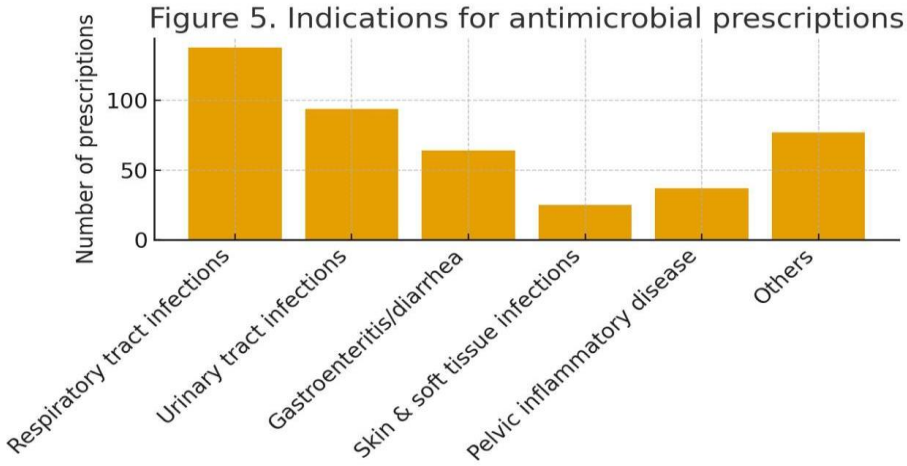

Figure 5. Indications for antimicrobial prescriptions. Respiratory tract infections were the most common indication, followed by urinary tract infections and gastroenteritis.

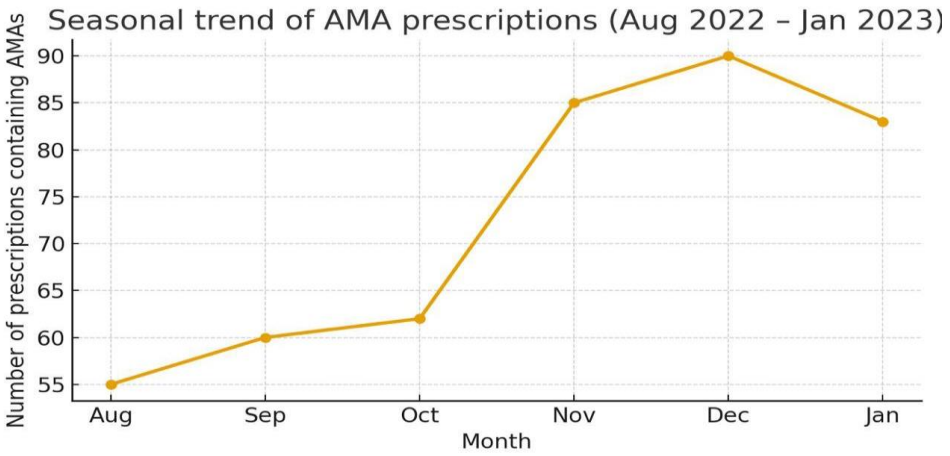

Figure 6. Seasonal trend of AMA prescriptions (Aug 2022–Jan 2023). A distinct surge in prescribing was observed during the winter months (Nov–Jan).

DISCUSSION

Our study provides an in-depth analysis of antimicrobial prescribing in a community hospital outpatient setting in Kashmir. Cephalosporins were the most prescribed class, consistent with studies from other parts of India [6,8]. Ceftriaxone, prescribed both alone and in FDC with sulbactam, was among the top agents, highlighting its widespread use. This pattern indicates a strong preference for third-generation cephalosporins even in mild-to-moderate infections, a trend commonly attributed to their broad-spectrum activity and clinician perception of greater efficacy. However, reliance on broad-spectrum cephalosporins and irrational FDCs (such as ceftriaxone+sulbactam) raises concerns of AMR development.

Amoxicillin-clavulanic acid was the single most common drug, also reported as dominant in multiple tertiary-care studies [7,10]. Its frequent use reflects prescribers' preference for broad-spectrum coverage over narrower-spectrum alternatives like plain amoxicillin or first-generation cephalosporins.

Generic prescribing was alarmingly low (17.5%), far below the WHO-recommended 100% [5]. Similar findings of brand-heavy prescribing have been reported in India [9,11], suggesting systemic influences such as pharmaceutical marketing and prescriber habits. The high prevalence of brand-name prescribing not only increases the economic burden on patients but also raises ethical concerns regarding industry influence on prescribing behavior.

Polypharmacy was common, with an average of 3–4 drugs per prescription. This mirrors findings from other utilization studies [6,8] and may contribute to higher costs, drug interactions, and adherence issues. While some level of polypharmacy is inevitable in comorbid patients, excessive and unnecessary additions—particularly symptomatic or supplementary agents—should be discouraged. Regular prescription audits and continuing medical education (CME) sessions focused on rational therapy can help address this issue.

Comedication patterns showed frequent co-prescription of PPIs (71%) and vitamins (49%), often without strong clinical justification. This trend has been noted in prior Indian studies [12], indicating irrational add-on prescribing. PPIs are often prescribed prophylactically, even in short courses of antibiotics, leading to unnecessary cost and potential long-term side effects. Similarly, routine inclusion of vitamins and supplements, in the absence of nutritional deficiency or specific indication, adds little therapeutic value.

The seasonal surge in prescribing during winter months corresponded to a rise in respiratory infections. Such seasonal variation is consistent with other regional studies [13], underscoring the importance of context in antimicrobial use. This increase may be linked to higher incidence of viral respiratory infections, where antibiotics are often prescribed empirically despite limited bacterial involvement. Public awareness programs emphasizing the distinction between viral and bacterial illnesses could help reduce unnecessary antibiotic use during these peak seasons. Additionally, development of local antimicrobial guidelines reflecting regional disease patterns and resistance trends would guide more rational empiric therapy.

While many prescribed drugs were from the WHO EML, a considerable proportion were non-EML (e.g., ceftriaxone+sulbactam, ornidazole combinations), reflecting irrational use. Similar concerns have been highlighted in national surveys [14].

Overall, although prescribing in this setting was partly rational, significant gaps remain: overuse of broad-spectrum antibiotics, irrational FDCs, brand preference, and unnecessary comedications. The findings highlight an urgent need to implement antibiotic stewardship interventions even at peripheral hospitals.

CONCLUSION

This study highlights important trends in outpatient antimicrobial prescribing in a community health center in Kashmir. Cephalosporins and amoxicillin-clavulanic acid dominated prescribing, while brand-heavy, polypharmacy-prone practices persisted. Seasonal surges in antimicrobial use and reliance on non-EML drugs raise concerns of AMR and cost burden. Strengthening antimicrobial stewardship, encouraging generic prescribing, and promoting rational FDC use are urgent needs in such settings.

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Conflicts of Interest

The authors declare no conflicts of interest.

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