



Research Article

Clinical Evaluation of Drug-Related Problems among Out-Patients in a Community Health Facility of Pauri District, Garhwal Region, Uttarakhand

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Background: Drug-related problems (DRPs) are common in outpatient healthcare settings and may negatively affect therapeutic outcomes, patient safety, and quality of life. Polypharmacy, inappropriate prescribing, drug interactions, and poor medication adherence are major contributors to DRPs, particularly among elderly patients and individuals with multiple co-morbidities. **Aim:** To clinically evaluate drug-related problems among out-patients attending a community health facility in Pauri District, Garhwal Region, Uttarakhand. **Methodology:** A retrospective, observational, cross-sectional study was conducted among 80 outpatient prescriptions collected from CHC Pokhra, RHTC Pokhra, and government hospitals of Pokhra block. Demographic profile, clinical characteristics, prescribing patterns, drug utilization, and DRPs were assessed using patient records and prescription data. **Results:** The majority of patients belonged to the 41–60 years age group (37.5%), with male predominance (56.25%). Hypertension (22.5%) and respiratory disorders (20%) were the most common disease conditions. A total of 310 drugs were prescribed, with an average of 3.9 drugs per prescription. Drug-related problems were identified in 42.5% of prescriptions. Drug-drug interactions (35.3%) were the most common DRPs, followed by inappropriate drug selection and polypharmacy. Antibiotics and NSAIDs were the drug classes most frequently associated with DRPs. Elderly patients, multiple co-morbidities, and polypharmacy were major risk factors associated with DRPs. **Conclusion:** The study demonstrated a considerable prevalence of DRPs among out-patients in rural healthcare settings. Rational prescribing, regular prescription review, patient counseling, and clinical pharmacist involvement are essential to improve medication safety and therapeutic outcomes.

Keywords: Drug-Related Problems, Polypharmacy, Prescribing Pattern, Out-Patients, Drug Utilization, Medication Adherence, Drug-Drug Interaction, Community Health Facility, Uttarakhand.

INTRODUCTION

Drug therapy plays a central role in the management of diseases across all levels of healthcare. However, inappropriate use of medicines may lead to Drug-Related Problems (DRPs), which can negatively affect therapeutic outcomes, increase morbidity, raise healthcare costs, and reduce patient quality of life. The Pharmaceutical Care Network Europe (PCNE) defines a drug-related problem as “an event or circumstance involving drug therapy that actually or

potentially interferes with desired health outcomes¹.” Globally, DRPs are recognized as a major public health concern. Recent studies published between 2022 and 2024 indicate that nearly 30–50% of patients in outpatient settings experience at least one drug-related problem, with a higher prevalence observed among elderly patients, individuals with multiple co-morbidities, and those receiving polypharmacy². Out-patient departments are particularly vulnerable to DRPs due to high patient load, short consultation times, limited follow-up, and widespread self-

medication practices. In India, the burden of DRPs is substantial due to factors such as polypharmacy, irrational prescribing, lack of patient counseling, easy availability of over-the-counter medicines, self-medication, and poor medication adherence. Recent Indian studies conducted between 2021 and 2024 have reported DRP prevalence ranging from 25% to 60% in outpatient populations³. Commonly identified problems include inappropriate drug selection, incorrect dosing, drug-drug interactions, untreated indications, adverse drug reactions, and non-adherence to prescribed therapy. Chronic diseases such as hypertension, diabetes mellitus, respiratory disorders, and musculoskeletal conditions significantly increase the risk of DRPs due to long-term and multi-drug therapy⁴. Recent research further highlights the clinical impact of DRPs in outpatient care. A retrospective outpatient study from North India reported that approximately 9.9% of outpatients aged ≥ 50 years experienced one or more DRPs, with adverse drug reactions and drug-drug interactions being the most frequent causes. Importantly, nearly 15.8% of identified DRPs resulted in hospitalization, emphasizing their serious clinical consequences⁵. Another cross-sectional study among hypertensive and type-2 diabetic outpatients reported a 76% prevalence of DRPs, where non-adherence, sub-optimal therapeutic goals, and ineffective drug therapy were major contributors. Additionally, observational studies from rural tertiary care settings revealed that 41–44% of DRPs were related to inappropriate drug selection or sub-therapeutic treatment, with drug-drug interactions forming a substantial proportion of the total DRP burden⁶. Rural and hilly regions such as the **Garhwal Region of Uttarakhand, including Pauri District**, face additional challenges in medication management due to limited healthcare infrastructure, shortage of trained professionals, low health literacy, difficult geographical access, and dependence on informal healthcare sources. These factors increase the risk of drug-related problems, as patients often consume multiple medicines without adequate understanding of dosage, duration, or potential adverse effects⁷. Out-patient settings at **Community Health Facilities (CHFs)** are crucial for evaluating DRPs, as most patients receive ambulatory care without continuous monitoring. Systematic identification of DRPs in OPD patients allows early intervention, prevention of

complications, and optimization of pharmacotherapy, with growing evidence supporting the role of clinical pharmacists in DRP detection and prevention⁸. Despite increasing national and global evidence, **region-specific data on DRPs from Pauri District and the Garhwal Region remain limited**, particularly in outpatient populations. Therefore, the present study was undertaken to clinically evaluate drug-related problems among out-patients attending a community health facility in Pauri District, Uttarakhand, focusing on demographic factors, prescribing patterns, co-morbidities, medication use, self-medication practices, and medication adherence, with the aim of improving rational drug use and patient safety in rural healthcare settings.

AIM

To clinically evaluate drug-related problems (DRPs) among out-patients attending a community health facility in Pauri District, Garhwal Region, Uttarakhand.

OBJECTIVES

1. To study the demographic profile (age and gender) of out-patients attending the selected community health facility.
2. To assess the clinical characteristics of out-patients, including disease conditions and associated co-morbidities.
3. To evaluate the prescribing pattern in out-patients, including the average number of drugs prescribed per prescription.
4. To analyze the therapeutic class-wise distribution of drugs prescribed to out-patients.
5. To determine the prevalence of drug-related problems (DRPs) among out-patient prescriptions.
6. To identify and classify the types of drug-related problems using a standard classification system.
7. To assess the drug class-wise distribution of DRPs among out-patients.

8. To evaluate the association between patient-related factors (age, number of drugs prescribed, co-morbidities) and the occurrence of DRPs.
9. To assess self-medication practices and medication adherence among out-patients attending the community health facility.

METHODOLOGY

1. Study Design:

This was a retrospective, observational, cross-sectional study designed to clinically evaluate drug-related problems (DRPs), prescribing patterns, and associated risk factors among out-patients attending a community health facility in Pauri District, Garhwal Region, Uttarakhand.

2. Study Site:

The study was conducted at the following healthcare facilities in the Pokhra block of Pauri Garhwal district, Uttarakhand:

- Outpatient Department (OPD) of the Community Health Centre (CHC), Pokhra
- Outpatient Department (OPD) of the Rural Health Training Centre (RHTC), Pokhra
- Government hospitals in the Pokhra block

3. Study Duration:

The study was conducted over a period of 6 months (e.g., July 2026 to December 2026). The retrospective data were collected from OPD patient records and prescriptions covering one year (e.g., January 2025 to December 2025).

4. Study Criteria:

Inclusion Criteria:

- Out-patients attending the OPD during the study period.
- Patients of all age groups and both genders.
- Patients with complete prescription records.
- Patients receiving at least one prescribed medication.
- Residents of Garhwal region, specifically Pokhra block.

Exclusion Criteria:

- Patients with incomplete or missing prescription records were excluded.
- Patients without medication prescriptions were excluded.
- Duplicate prescription records were excluded.
- Records with insufficient clinical or drug-related information were excluded.

5. Source of Data:

- Patient records and prescriptions were collected from OPD registers of CHC, RHTC, and government hospitals.
- Hospital OPD prescription records and case sheets were reviewed.
- Patient medical records and treatment charts were reviewed.

6. Data Collection:

Data were collected through:

- Review of OPD patient records for demographic details (age, gender, etc.).
- Collection of clinical information including diagnosis and co-morbidities.
- Assessment of prescribing pattern including number of drugs per prescription.
- Collection of drug-related information including drug name, dose, frequency, and duration.
- Identification and classification of drug-related problems (DRPs) such as drug-drug interactions, inappropriate drug selection, dosing errors, and polypharmacy.

7. Study Procedure:

1. OPD patient records and prescriptions from selected healthcare centers were reviewed.
2. Eligible patient records were identified based on inclusion and exclusion criteria.
3. Demographic, clinical, and prescription-related data were recorded.
4. Drug-related problems were identified and classified based on standard criteria.

5. Information was collected using a structured Case Record Form (CRF).
6. Collected data were compiled and verified for completeness and accuracy.

8. Data Analysis:

Data were analyzed by preparing tables and graphs using Microsoft Excel.

Need of the Study

- Drug-Related Problems (DRPs) are common in outpatient settings and can negatively affect therapeutic outcomes and patient safety.
- DRPs such as inappropriate drug selection, polypharmacy, drug interactions, and dosing errors increase the risk of adverse effects and treatment failure.
- The prevalence of DRPs is higher in patients with multiple diseases and those receiving multiple medications.
- There is limited region-specific data available on DRPs among out-patients in the Pauri Garhwal region.
- Evaluation of prescribing patterns helps in identifying irrational drug use and improving prescription quality.

- Identification and classification of DRPs help in optimizing pharmacotherapy and improving patient care.
- The findings of this study will support rational drug use and highlight the role of clinical pharmacists in improving patient safety and treatment outcomes.

RESULTS

A total of **80 outpatient prescriptions** were analyzed from CHC Pokhra, RHTC Pokhra and Government Hospitals in Pokhra block, Pauri Garhwal to evaluate prescribing pattern and drug-related problems (DRPs)

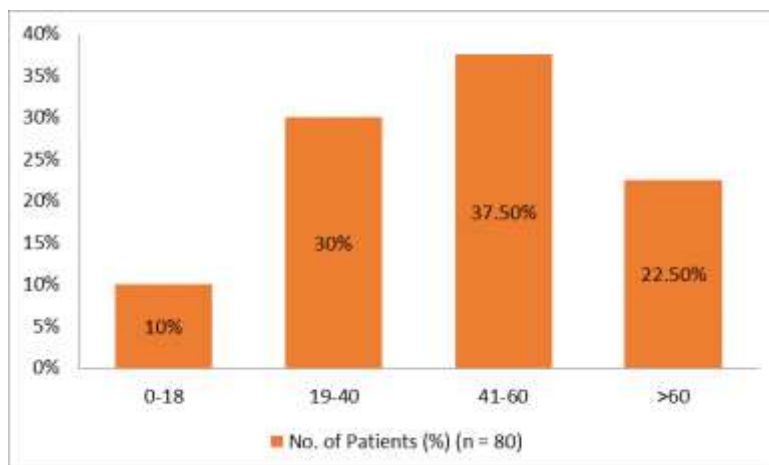
Objective 1: To study the demographic profile (age and gender) of out-patients attending the selected community health facility

The demographic analysis revealed that the majority of patients belonged to the **41–60 years age group**, accounting for 37.5% of the study population, followed by patients above 60 years of age. Male patients constituted a slightly higher proportion (56.25%) compared to females (43.75%). The findings indicate that middle-aged and elderly populations were more frequent users of outpatient healthcare services.

1. Demographic Profile of Patients

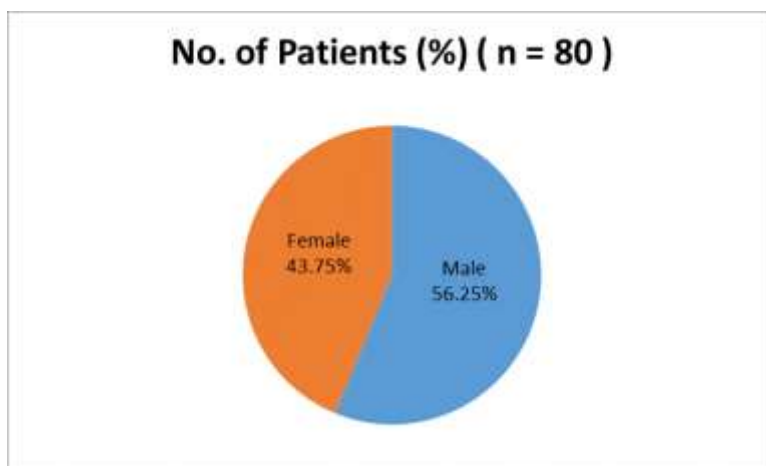
Age Distribution

Age Group (Year)	No. of Patients (%) (n = 80)
0-18	8 (10%)
19-40	24 (30%)
41-60	30 (37.5%)
>60	18 (22.5%)



Gender Distribution

Gender	No. of Patients (%) (n = 80)
Male	45 (56.25%)
Female	35 (43.75%)



Objective 2: To assess the clinical characteristics of out-patients, including disease conditions and associated co-morbidities

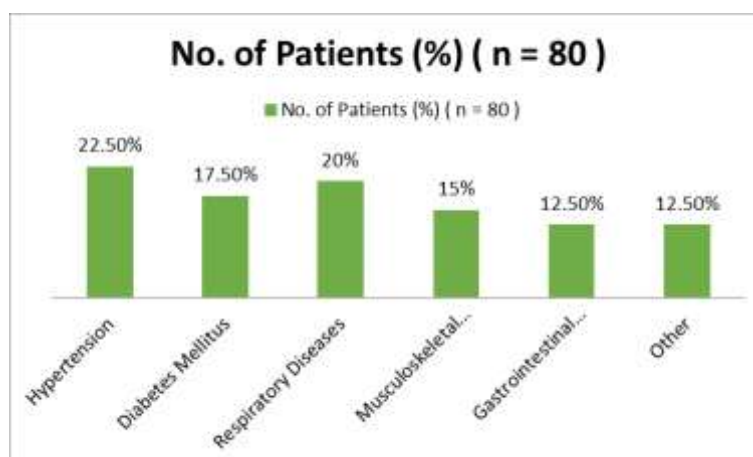
Hypertension was the most common clinical condition observed, affecting **18 patients (22.5%)**, followed by respiratory disorders in **16 patients (20%)** and diabetes mellitus in **14 patients (17.5%)**. Musculoskeletal disorders and gastrointestinal disorders accounted for 15% and 12.5% respectively.

Among co-morbid conditions, hypertension was present in **16 patients (20%)**, diabetes mellitus in **12 patients (15%)**, and combined hypertension with diabetes in **8 patients (10%)**. Thyroid disorders and anemia were also observed in some patients.

2. Clinical Characteristics and Co-morbidities

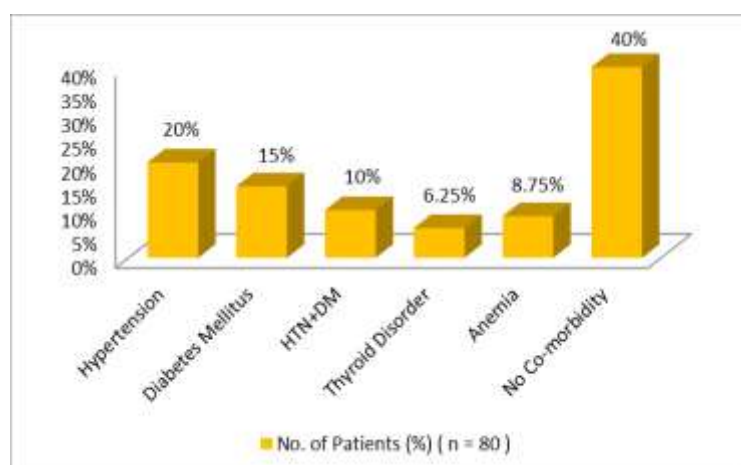
Major Disease Conditions

Disease	No. of Patients (%) (n = 80)
Hypertension	18 (22.5%)
Diabetes Mellitus	14 (17.5%)
Respiratory Diseases	16 (20%)
Musculoskeletal Disorder	12 (15%)
Gastrointestinal Disorder	10 (12.5%)
Other	10 (12.5%)



Co-morbidities

Co-morbidities	No. of Patients (%) (n = 80)
Hypertension	16 (20%)
Diabetes Mellitus	12 (15%)
HTN+DM	8 (10%)
Thyroid Disorder	5 (6.25%)
Anemia	7 (8.75%)
No Co-morbidity	32 (40%)



Objective 3: To evaluate the prescribing pattern in out-patients, including the average number of drugs prescribed per prescription

A total of **310 drugs** were prescribed in 80 prescriptions, with an average of **3.9 drugs per**

prescription. Most prescriptions contained **3–5 medications**, while a smaller proportion involved more than five drugs.

3. Prescribing Pattern

Indicator	Value
Total Prescriptions analyzed	80
Total Drugs prescribed	310
Average Drugs per prescription	3.9 drugs

Objective 4: To analyze the therapeutic class-wise distribution of drugs prescribed to out-patients

Antibiotics were the most frequently prescribed drug class, accounting for **62 prescriptions**, followed by analgesics/NSAIDs (55 prescriptions) and anti-

hypertensive drugs (40 prescriptions). Gastroprotective agents were prescribed in 38 cases, whereas vitamin supplements and anti-diabetic drugs were prescribed in 35 and 32 cases respectively.

4. Therapeutic Class-wise Distribution of Drugs

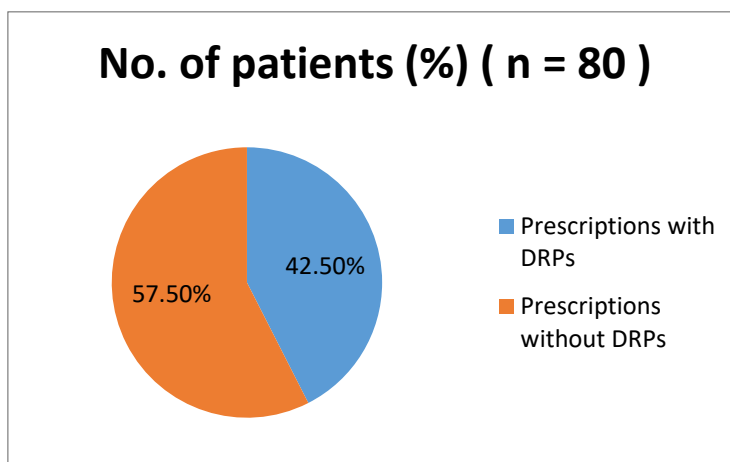
Drug Class	Frequency
Antibiotics	62
Analgesics / NSAIDs	55
Anti-hypertensives	40
Anti-diabetics	32
Gastro-protective drug	38
Anti-histamines	26
Vitamins / Supplements	35
Bronchodilators / Respiratory drug	22

Objective 5: To determine the prevalence of drug-related problems (DRPs) among out-patient prescriptions Drug-related problems were identified in **34 out of 80 prescriptions**, giving an overall DRP

prevalence of **42.5%**. The remaining 46 prescriptions did not show any significant DRPs.

5. Prevalence of Drug-Related Problems

Category	No. of patients (%) (n = 80)
Prescriptions with DRPs	34 (42.5%)
Prescriptions without DRPs	46 (57.5%)



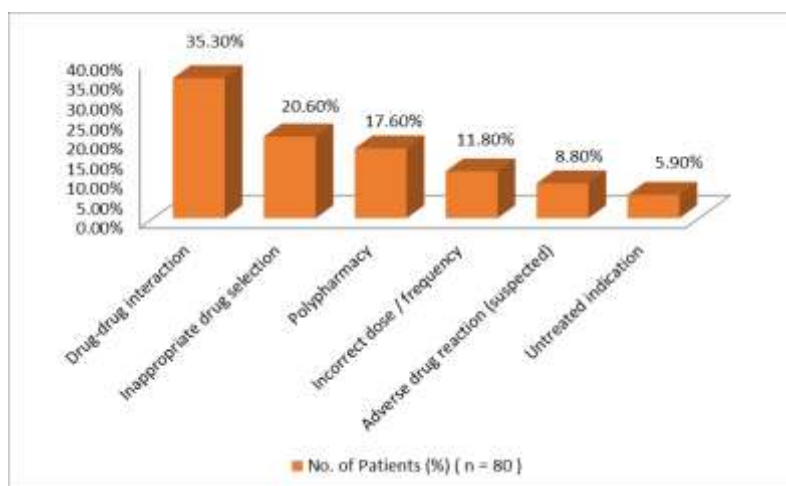
Objective 6: To identify and classify the types of drug-related problems using a standard classification system

Among the identified DRPs, **drug-drug interactions** were the most common, accounting for **12 cases (35.3%)**. Inappropriate drug selection was observed

in **7 cases (20.6%)**, while polypharmacy-related issues accounted for **6 cases (17.6%)**. Dosing errors, untreated indications, and suspected adverse drug reactions were also identified.

6. Types of Drug-Related Problems

Type of DRP	No. of Patients (%) (n = 80)
Drug-drug interaction	12 (35.3%)
Inappropriate drug selection	7 (20.6%)
Polypharmacy	6 (17.6%)
Incorrect dose / frequency	4 (11.8%)
Adverse drug reaction (suspected)	3 (8.8%)
Untreated indication	2 (5.9%)



Objective 7: To assess the drug class-wise distribution of DRPs among out-patients

Antibiotics were associated with the highest number of DRPs (**10 cases**), followed by NSAIDs (**8 cases**).

Anti-diabetic drugs and anti-hypertensive medications contributed to 5 and 4 DRP cases respectively.

7. Drug Class-wise Distribution of DRPs

Drug Class	DRP Cases
Antibiotics	10
NSAIDs	8
Anti-diabetics	5
Anti-hypertensive	4
Respiratory drug	3
Others	4

Objective 8: To evaluate the association between patient-related factors (age, number of drugs prescribed, co-morbidities) and the occurrence of DRPs

The occurrence of DRPs was higher among patients aged above 60 years, where **12 DRP cases** were

identified. Patients receiving more than five drugs accounted for **15 DRP cases**, whereas patients with multiple co-morbidities contributed to **10 DRP cases**.

8. Factors Associated with DRPs

Risk Factor	DRP Cases
Age >60 Years	12
Polypharmacy (>5 drugs)	15
Multiple co-morbidities	10

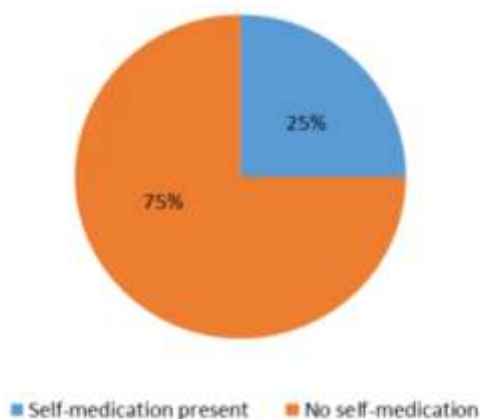
Objective 9: To assess self-medication practices and medication adherence among out-patients attending the community health facility

Self-medication practices were reported in **20 patients (25%)**, while 75% of patients denied self-

medication. Medication adherence assessment revealed good adherence in **50 patients (62.5%)**, moderate adherence in **20 patients (25%)**, and poor adherence in **10 patients (12.5%)**.

9. Self-Medication and Medication Adherence

Category	No. of Patients (%) (n = 80)
Self-medication present	20 (25%)
No self-medication	60 (75%)



DISCUSSION

Study: Clinical Evaluation of Drug-Related Problems among Out-Patients in a Community Health Facility of Pauri District, Garhwal Region, Uttarakhand. The present study was conducted among **80 outpatient prescriptions** to evaluate drug-related problems (DRPs), prescribing patterns, and associated risk factors in community healthcare facilities. In the demographic analysis, the majority of patients belonged to the **41–60 years age group (37.5%)**, followed by elderly patients above 60 years (22.5%). Male patients (56.25%) were slightly higher than females (43.75%). Similar findings have been reported in previous outpatient studies where middle-aged and elderly patients constituted the major proportion of chronic disease cases⁹. Hypertension (22.5%), respiratory disorders (20%), and diabetes mellitus (17.5%) were the most common disease conditions observed in the study. Hypertension was also the most frequent co-morbidity, present in 20% of patients. The presence of multiple co-morbidities increased the complexity of pharmacotherapy and contributed to polypharmacy. A total of **310 drugs** were prescribed in 80 prescriptions, with an average of **3.9 drugs per prescription**. Most prescriptions contained 3–5 drugs, indicating moderate polypharmacy. Antibiotics (62 prescriptions) and NSAIDs (55 prescriptions) were the most commonly prescribed therapeutic classes. Similar prescribing trends have been observed in primary healthcare settings due to the high prevalence of infections and pain-related conditions¹⁰. The study identified DRPs in **34 prescriptions (42.5%)**, indicating a significant prevalence of medication-related problems. Drug-drug interactions were the most common DRP,

accounting for **35.3%** of identified cases, followed by inappropriate drug selection (20.6%) and polypharmacy (17.6%). Antibiotics and NSAIDs were the drug classes most frequently associated with DRPs¹¹. The occurrence of DRPs was higher among elderly patients, patients with multiple co-morbidities, and those receiving more than five drugs. Patients with polypharmacy showed a greater risk of drug interactions and medication-related complications. Similar findings have been reported in previous Indian studies. Self-medication practices were observed in **25% of patients**, mainly involving antibiotics and analgesics. Medication adherence assessment revealed good adherence in 62.5% of patients, while poor adherence was observed in 12.5% of cases¹². Overall, the study demonstrated a considerable burden of drug-related problems among out-patients in rural healthcare settings. The findings emphasize the importance of rational prescribing, prescription monitoring, patient counseling, and clinical pharmacist involvement in improving medication safety and therapeutic outcomes.

CONCLUSION

The present study demonstrated a significant prevalence of drug-related problems (DRPs) among out-patients attending community healthcare facilities in Pauri Garhwal region. A total of 80 prescriptions were analyzed, with DRPs identified in 42.5% of cases. Drug-drug interactions and polypharmacy were the most common DRPs observed. Elderly patients, multiple co-morbidities, and increased number of prescribed drugs were major risk factors associated with DRPs. The study emphasizes the importance of rational prescribing, patient counseling, and clinical

pharmacist involvement to improve medication safety and therapeutic outcomes.

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