Section: Pharmacology

Original Research Article

# OBSERVATIONAL STUDY ON DRUG-DRUG INTERACTIONS IN PRESCRIPTIONS OF PATIENTS ATTENDING A TERTIARY CARE HOSPITAL

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ABSTRACT

**Background:** Drug-drug interactions (DDIs) are a significant cause of preventable adverse drug events, especially in settings where polypharmacy is common. This study aimed to assess the prevalence, pattern, and severity of potential DDIs in prescriptions of patients attending a tertiary care hospital.
**Objectives:** To evaluate the frequency and severity of potential DDIs in outpatient prescriptions and to identify the most common interacting drug pairs.
**Materials and Methods:** A cross-sectional observational study was conducted over a period of three months in the outpatient department of a tertiary care hospital. A total of 100 prescriptions were analyzed. The demographic details, number of drugs per prescription, and presence of potential DDIs were recorded. DDIs were classified based on severity into minor, moderate, or major categories. Statistical analysis was performed using chi-square test, and a p-value <0.05 was considered statistically significant.
**Results:** Among the 100 prescriptions analyzed, 66% exhibited at least one potential DDI. The prevalence of minor, moderate, and major interactions was 22%, 28%, and 16% respectively. The mean number of drugs per prescription was 5.2 ± 2.1. A statistically significant association was found between polypharmacy (more than 6 drugs) and increased DDIs ($p < 0.05$). Patients over 50 years had a higher incidence of major interactions ($p < 0.05$). The most frequent interacting pairs included Aspirin + Clopidogrel and Metformin + Furosemide.
**Conclusion:** Potential DDIs are common in prescriptions, particularly among elderly patients and those with polypharmacy. Rational prescribing and routine medication review are essential to minimize adverse outcomes.
**Keywords:** Drug-drug interactions, Polypharmacy, Adverse drug events, Prescription analysis, Tertiary care hospital.

## INTRODUCTION

Drug-drug interactions (DDIs) are a significant cause of preventable adverse drug events and remain an important concern in modern clinical practice, particularly in settings where polypharmacy is common. The use of multiple medications, especially among elderly patients and those with chronic conditions, increases the risk of potentially harmful DDIs, which can lead to therapeutic failure, increased toxicity, hospitalization, and even life-threatening outcomes.[1,2]

Polypharmacy has become increasingly prevalent due to the rising burden of non-communicable diseases such as hypertension, diabetes, and cardiovascular disorders, particularly in the elderly population.[1,3] Previous studies have reported that a substantial proportion of prescriptions, especially in inpatient and outpatient hospital settings, contain potentially significant drug interactions that often go unnoticed by clinicians.[3,4] The absence of routine monitoring systems and the lack of awareness among healthcare providers further exacerbate this issue,

leading to a higher risk of medication errors and adverse drug events.[2,4]

Research conducted in both adult and pediatric populations has highlighted the critical need for improved medication surveillance and systematic evaluation of prescriptions to identify and manage DDIs effectively.[5] Furthermore, specific studies focusing on hypertensive patients have revealed that polypharmacy is a primary factor contributing to the increased prevalence of DDIs in tertiary care settings.[6]

The present study was undertaken to assess the prevalence, pattern, and severity of potential drug-drug interactions in prescriptions of patients attending a tertiary care hospital. Additionally, the study aimed to identify the most commonly encountered interacting drug pairs and analyze the association between polypharmacy and the risk of DDIs.

## MATERIALS AND METHODS

**Study Design and Setting**

A hospital-based cross-sectional observational study was conducted at Sreenarayana Institute of Medical Sciences, Chalakka, Ernakulam, Kerala.

**Study Period**

The study was carried out over a period of seven months, from May 2015 to November 2015.

**Study Population**

The study population consisted of patients attending the outpatient departments of the hospital during the study period. Prescriptions containing at least two medications were considered for analysis.

**Sample Size**

A total of 100 prescriptions were randomly selected and analyzed.

**Inclusion Criteria**

1. Prescriptions of adult patients (aged 18 years and above).
2. Prescriptions containing two or more drugs.

**Exclusion Criteria**

1. Prescriptions with only single-drug therapy.
2. Incomplete or illegible prescriptions.

**Data Collection**

Data were collected prospectively from outpatient prescriptions after obtaining necessary permissions from the hospital authorities. Demographic details such as age and gender, along with the total number of drugs prescribed, were recorded.

**Assessment of Drug-Drug Interactions**

The identified prescriptions were evaluated for potential drug-drug interactions using standard reference sources including drug interaction checkers and pharmacology databases. The interactions were classified based on their severity into:

Minor: Minimal clinical significance.

Moderate: May require dose adjustment or monitoring.

Major: May require avoidance of the combination due to significant clinical risks.

**Statistical Analysis**

Data were entered into Microsoft Excel and analyzed using descriptive statistics. The association between polypharmacy and the presence of potential DDIs was evaluated using the Chi-square test. A p-value $< 0.05$ was considered statistically significant.

## RESULTS

A total of 100 prescriptions from patients attending the tertiary care hospital were analyzed for potential drug-drug interactions (DDIs).

The demographic characteristics of the study population are presented in Table 1. The majority of the patients were aged above 50 years (45%), followed by those in the 31–50 years age group (35%) and patients below 30 years (20%). There was a slight male predominance, with 56% males and 44% females.

Polypharmacy was prevalent in the study population, with 48% of prescriptions containing 4–6 drugs and 30% containing more than 6 drugs. Only 22% of prescriptions included three or fewer medications. The mean number of drugs per prescription was 5.2 ± 2.1 (Table 2).

Out of the 100 prescriptions evaluated, 66% demonstrated at least one potential drug-drug interaction, while 34% of prescriptions showed no interaction (Table 3). The severity of DDIs was categorized as minor in 22% of prescriptions, moderate in 28%, and major in 16%. The most common drug combinations associated with potential interactions are detailed in Table 4. The combination of Aspirin and Clopidogrel accounted for the highest number of major interactions (12 cases), followed by Atorvastatin and Clarithromycin (5 cases). Moderate interactions were frequently observed with combinations such as Metformin with Furosemide (10 cases), Losartan with NSAIDs (9 cases), and Omeprazole with Clopidogrel (8 cases).

Further analysis revealed a statistically significant association between the number of drugs prescribed and the occurrence of potential DDIs ($p < 0.05$). The prevalence of moderate and major interactions increased notably in prescriptions containing more than six drugs. Additionally, patients aged above 50 years exhibited a higher incidence of major drug-drug interactions compared to younger age groups, which was also statistically significant ($p < 0.05$).

**Table 1: Demographic Characteristics of Study Population (n = 100)**

| Characteristic | Frequency (n) | Percentage (%) |
|---|---|---|
| Age Group | | |
| <30 years | 20 | 20% |
| 31–50 years | 35 | 35% |

| | | |
|---|---|---|
| >50 years | 45 | 45% |
| Gender | | |
| Male | 56 | 56% |
| Female | 44 | 44% |

**Table 2: Polypharmacy Status in the Study Population**

| Number of Drugs per Prescription | Frequency (n) | Percentage (%) |
|---|---|---|
| ≤3 drugs | 22 | 22% |
| 4–6 drugs | 48 | 48% |
| >6 drugs | 30 | 30% |

**Table 3: Prevalence and Severity of Potential Drug-Drug Interactions**

| Severity Level of DDI | Number of Prescriptions (n) | Percentage (%) |
|---|---|---|
| No interaction | 34 | 34% |
| Minor interaction | 22 | 22% |
| Moderate interaction | 28 | 28% |
| Major interaction | 16 | 16% |

**Table 4: Most Common Drug-Drug Interaction Pairs Identified**

| Drug Combination | Number of Occurrences (n) | Severity |
|---|---|---|
| Aspirin + Clopidogrel | 12 | Major |
| Metformin + Furosemide | 10 | Moderate |
| Losartan + NSAIDs | 9 | Moderate |
| Omeprazole + Clopidogrel | 8 | Moderate |
| Atorvastatin + Clarithromycin | 5 | Major |

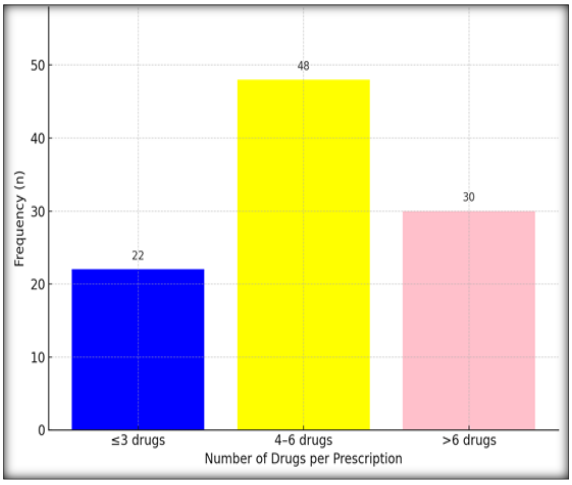


**Figure 1: Polypharmacy Status in the Study Population**

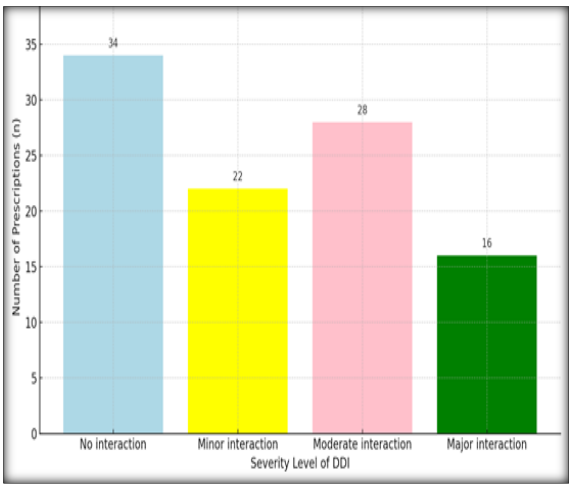


**Figure 2: Prevalence and Severity of Potential Drug-Drug Interactions**

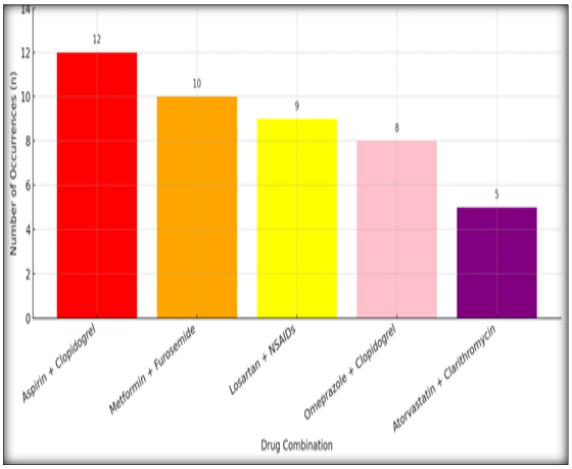


**Figure 3: Most Common Drug-Drug Interaction Pairs Identified**

## DISCUSSION

The present study assessed the prevalence and severity of potential drug-drug interactions (DDIs) in prescriptions of patients attending a tertiary care hospital. The findings revealed that 66% of prescriptions contained at least one potential DDI, highlighting the considerable risk associated with polypharmacy in routine clinical practice. This prevalence is consistent with previous studies reporting DDI rates ranging between 50% and 70% in outpatient settings, emphasizing the need for greater vigilance in prescription monitoring to prevent avoidable adverse drug events.[6,7]

A significant association was found between the number of drugs prescribed and the likelihood of encountering potential DDIs ($p < 0.05$), a finding well supported by earlier research identifying polypharmacy as a key contributor to DDIs.[7,8] In our study, the mean number of drugs per prescription was

5.2 ± 2.1, reinforcing the observation that as the number of concurrently prescribed medications increases, so does the risk of interactions.

The elderly population (>50 years) exhibited a higher prevalence of major interactions, which is in line with existing literature that highlights age-related pharmacokinetic and pharmacodynamic changes, multiple comorbidities, and higher medication use as contributing factors to DDIs.[8,9] Similar trends were also observed in international studies assessing DDI risks in various patient groups, including those in oncology and chronic disease management.[10,12]

The most frequently identified major interaction in this study was between Aspirin and Clopidogrel, both antiplatelet agents that when combined, significantly increase the risk of bleeding. Other commonly observed moderate interactions, such as Metformin with Furosemide and Losartan with NSAIDs, are well-documented in pharmacological literature and are consistent with the patterns reported in earlier studies.[9,10]

These findings are in agreement with studies from diverse healthcare settings, including oncology inpatients,[10] ophthalmology outpatients,[11] and targeted therapy populations,[12] all of which underscore the universal importance of addressing DDIs across specialties. The cumulative evidence suggests that prescription auditing, use of electronic DDI checkers, and ongoing healthcare professional education are essential strategies to minimize the risk of harmful interactions.[6,7,9]

Furthermore, patient education and interprofessional collaboration are crucial, particularly in elderly and polymedicated populations, to ensure the safe and effective use of medications. Implementing these measures can significantly reduce the occurrence of clinically significant DDIs and improve overall patient safety.[6,8,12]

## CONCLUSION

This study highlights that potential drug-drug interactions (DDIs) are common in outpatient prescriptions, particularly among elderly patients and those receiving multiple medications. A significant association was observed between polypharmacy and the prevalence of DDIs, with the risk increasing as the number of prescribed drugs increased. Major interactions, such as the combination of antiplatelet agents, pose considerable clinical risks and warrant careful monitoring. These findings underscore the need for routine prescription audits, increased awareness among healthcare professionals, and the use of drug interaction checking tools to enhance patient safety. Rational prescribing practices and regular medication reviews are essential to minimize adverse outcomes associated with DDIs.

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