**Journal of Community Pharmacy Practice**
Vol: 04, No. 02, July-Dec 2024
ISSN: 2799-1199, DOI: 10.55529/jcpp.45.1.17 

**Research Paper**

# A study of polypharmacy and its consequences in geriatric patients

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**Article Info**

***Article History:***
Received: 02 May 2024
Revised: 11 July 2024
Accepted: 19 July 2024
Published: 04 September2024

***Keywords:***
Pims
Pddis
Micromedex 2.2
Beer's Criteria
Care Hospital

**ABSTRACT**

**Objective:** To evaluate the prevalence of potential drug-drug interactions (pDDIs) and potentially inappropriate medications (PIMs) among geriatric patients in a tertiary care hospital.
**Methods:** A prospective cross-sectional study was conducted over six months (May – October 2023) in the General Medicine Department of Akash Hospital, Bangalore. A total of 110 patients aged ⩾65 years were included. PIMs were assessed using Beers Criteria, and pDDIs were identified using Micromedex 2.2.
**Results:** Among 110 patients, 69 (62.72%) were males and 41 (37.28%) were females. PIMs were identified in 21 (19.10%) patients, while pDDIs were detected in 66 (60%) prescriptions. A total of 180 interactions were identified, including 87 (48.30%) major, 85 (47.20%) moderate, 5 (2.80%) minor, and 3 (1.70%) contraindicated interactions.
**Conclusion:** The prevalence of pDDIs and PIMs among geriatric patients highlights the importance of medication review, clinical monitoring, and pharmacist-led interventions to improve medication safety and promote rational prescribing.

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## 1. INTRODUCTION

Polypharmacy refers to the practice of administering more medications than what is clinically indicated or of using various drugs at the same time [1]. A patient 65 years of age and older who is getting five or more appropriate medications is considered to be polypharmacy in the geriatric's context [2].

Adverse drug responses (ADRs) and drug-drug interactions (DDIs) have a substantial correlation with the usage of many medications. A drug-drug interaction (DDI) occurs when two drugs are administered together and one of them influences an activity or the other. This could have an antagonistic, synergistic, or novel effect that neither medication would have on its own. Patients who take multiple prescription medications are more likely to experience DDIs [3].

Because of the higher risk of unfavorable pharmacodynamic and pharmacokinetic effects that increase morbidity and mortality in the elderly, medications given to them are more likely to lead to polypharmacy [4]. People over 60 have a higher likelihood of using pharmaceuticals and are more likely to have polypharmacy due to comorbid diseases, which reduces quality of life.

Elderly care issues are a cause for concern and will present a significant barrier in clinical practice. Given that the prescription consists of high-risk drugs, it is inappropriate to use medications that may cause undesirable side effects through potential drug-drug interactions (pDDIs). Elderly patients are more likely to obtain PIMs when they have polypharmacy [3].

Geriatrics: According to "WHOGuidelines," a geriatric is defined as the patient who has more than 65 years of age and is considered to be a geriatric. According to WHO rules, individuals in the geriatric population require additional medications since they are more likely than younger individuals to have chronic conditions. Taking additional medicines is considered a risk factor due to increased side effects, non-adherence, cost, drug-drug interactions, and morbidity implications. [5] Types of Poly Pharmacy:

Although there is no single, accepted definition of polypharmacy, there are three basic types:

- **Excessive Polypharmacy (EPP):** Using ten or more medications concurrently.
- **Polypharmacy (PP):** Taking five to nine medications.
- **No Polypharmacy:** Not taking more than four medications, including those who don't take
- Any [1].

Table 1. Associated Factors

| Individualelements | Physician Related Factors | Systems- Level Elements |
|---|---|---|
| Advancing age | Lack of education | Different electronic medical systems |
| Female gender | High patient work load | Poor physician-physician communication |
| White ethnicity/race | Improper medication reconciliation | Lack of continuity between multiple medical providers |
| Lower socioeconomic status | Poorphysician-patient communication | |

### 1.1 Issues of Concern in Polypharmacy

For the reasons listed below, polypharmacy is a particular cause for concern among older adults.

- **Adverse Effects (ADE):** An injury resulting from drug use is defined as a substance's harmful effects at prescribed levels. ADEs are the primary cause of 5% to 28% of acute geriatric medical hospitalizations. Preventable adverse drug events are among the worst consequences of improper medication usage in the elderly (ADEs). NSAIDs, hypoglycemics, diuretics, anticoagulants, and cardiovascular medications are the pharmacological classes most commonly associated with preventable adverse drug events. Adverse pharmacological effects are more likely in older adults due to slower medication clearance and age-related metabolic changes. The risk increases with the use of more drugs [6].
- **Drug Interactions:** Using a lot of drugs increases the risk of drug-drug interactions, which are defined as a pharmacologic or clinical response to the administration of a drug combination that is different from the response anticipated from the known effects of either of these two agents when given alone [7]. Cardiovascular drugs are involved in the majority of drug interactions. The most common adverse effects associated with drug-drug interactions are cognitive (delirium), acute renal failure, and

hypotension [8]. E.g., anti-inflammatory medications may increase blood pressure and deteriorate renal function [9].

Studies have shown that over-the-counter and complementary medicines are highly prevalent among the elderly population, which has led to an increase in their use over the past 10 years. Fewer than half of patients discuss utilizing herbal supplements, other products, or further treatment with their physicians. Their use raises safety issues, such as the possibility of drug-herb interactions.

Changes brought on by aging in the distribution, metabolism, absorption, and excretion of drugs. Numerous physiological changes associated with aging affect the pharmacokinetics and pharmacodynamics of medications, increasing the likelihood of adverse drug reactions. For elderly patients to receive the best pharmacological care, initial dose modification, periodic medication reconciliation, and prescription list review are essential [10].

## 1.2 Consequences of Polypharmacy

### 1.2.1 Drug Interactions

When a medicine is taken with certain other medications, meals, or supplements, or when it is taken while you have certain medical conditions, it can alter how the drug behaves in the body. Examples include: Combining two medications, like aspirin and blood thinner. Medicines and health issues, such as aspirin and medicine interactions, could alter how effective a medicine is, induce side effects, or alter how one or both drugs work [11].

### 1.2.2 Drug-Drug Possible Interaction

One type of DRP (drug-related problem) is drug-drug possible interactions (pDDIs) [12]. When two or more medications are administered simultaneously, pDDIs may result, wherein there may be a change in the medication's efficacy or a rise in the frequency of a new adverse effect [13]. Interactions between drugs can be beneficial or harmful. The desired results may outweigh the drug's therapeutic benefit and have unintended, detrimental, or even fatal effects in the body in addition to increasing treatment expenses. The planned treatments for concomitant diseases, increased efficacy, fewer adverse events, and dose reduction are considered positive benefits. Unwanted interactions could impact the patient.

### 1.2.3 Possible Drug-Drug Interaction Risk Factors

- Narrow therapeutic index pharmaceuticals (e.g., phenytoin, digoxin, lithium)
- high-risk individuals (older adults, those with hepatic and renal impairment)
- polypharmacy
- The sequence in which medications are administered.
- Patients-related factors:
- Age
- Gender
- Genetic variants
- Comorbid conditions
- Concurrent disorders impacting drug clearance, and the number of doctors they see can all have an impact on the likelihood of unfavorable drug-drug interactions.

## 1.3 Potentially Inappropriate Medications

Potentially inappropriate medications (PIMs) are those for which the likelihood of a drug-related problem is likely greater than the expected positive clinical outcome. The most commonly used set of criteria in the literature is Beers'. The lack of research on PIM use in primary care and at-home healthcare was a limitation of the study.

Beers and colleagues used the Delphi method to generate these criteria through an evidence-based, in-depth literature review and consensus among an expert panel. These standards were first developed in

1991 for nursing home patients, and they were updated in 1997 and 2003 to expand their use to all geriatric consideration settings.

### 1.4 Predisposing Factors

Factors linked to inappropriate pharmaceutical use:

- Women;
- Polypharmacy;
- Advanced age;
- Multiple prescribers;
- Physicians;
- Poor health condition;

In comparison to older persons without chronic illnesses, those with diabetes, osteoporosis, depression, hypertension, and dementia have also been linked to a higher incidence of PIM usage.

### 1.5 Role of Pharmacist in Drug Related Problems

A pharmacist's duty is to guarantee that patients are shielded from DRPs. The pharmacist can correlate and extrapolate any unexpected symptoms or responses seen by the patients to potentially improper prescriptions due to their extensive understanding of substances. Experts in pharmacy ensure that the administration of possibly inappropriate medications is minimized. In order to identify, prevent, document, and report PIMs and pDDIs, pharmacists are essential.

## 2. RELATED WORK

Conducted a study titled "Drug-drug interactions and polypharmacy in older patients." The study comprised 484 geriatric patients (those over 65) who met the eligibility requirements. Prescription data was used to assess polypharmacy. P DDI was evaluated via computer-based tests that could be accessed online. Six prescriptions were given to 111 patients (22.93%) at the same time, a condition known as polypharmacy. Ten medications were provided to six patients at once (hyperpharmacy). 191 (39.46%) prescriptions have at least one pDDI in total; of these, 98 (20.24%), 63 (13.02%), and 30 (6.20%) have one or more pDDIs (1-2, 3-5, and 6 pDDIs, respectively, for a total of 578 pDDIs. There is a statistically significant correlation (<0x7E>0.0001) between polypharmacy and pDDI. Polypharmacy was found to be a significantly significant factor.

Evaluated the potential for PRISCUS cards and specialized training to reduce PIM and unwanted drug-drug interactions (DDI) in elderly primary care patients. Two regions of Germany were the sites of a three-armed, cluster-randomized controlled study. At the onset of the experiment, 453 patients (39.8%) out of 1138 patients consistently ingesting more than five drugs had at least one PIM/DDI. At the start of the experiment and a year later, PIM/DDI percent periods were 37.0% and 37.6% in the control group and 43.0% and 41.3% in the intervention groups. According to survey results, there was a 2.3% (p = 0.36) mediation impact of any intervention (69 practices) vs. control (68 practices) and a 4.3% (p = 0.22) mediation impact of group training (35 practices) compared to physician training (34 practices). This study's hypothesis was that the number of patients with PIM or DDI did not entirely decrease despite the RIME (Reduction of Potentially Inappropriate Medication in the Elderly) trial interventions.

## 3. METHODOLOGY

### 3.1 Source of Data

- Data collection form
- Patients medical record /prescriptions
- Interviewing patients/patient attender.

### 3.2 Study Procedure

Elderly patient's ≥ 65 years visiting the Akash hospital will be included for the study, and patients <65 years will be excluded. Patients will be enrolled in the study after obtaining signatures on the consent form before initiating the study. The enrolled patients will be reviewed for medication use and drug-drug interactions. Source of medical history: reviewing of inpatient and outpatient files, treating clinician's admission notes, discharge summaries from previous hospitalizations, interviewing patients and their caretakers at the time of inclusion in the study. Treatment charts and nursing notes will be reviewed throughout the patient's stay. For a period of six months, a prospective analysis of prescriptions for pDDIs and PIM was done. From their case, all relevant and required data about the patient was obtained, including clinical data like hematology and biochemistry, therapeutic data like dose, duration, frequency, route, time of administration, and concurrent medications, and demographic data like age, gender, body weight, past medical history, reason for admission, and co-morbidities. Beer's criteria were used to determine which PIMs existed. The pDDIs and PIMs that were noticed were recorded. To find pDDIs and PIMs, the patients were monitored till their release.

Data on known pDDIs were filtered and classified using the Micromedex online database system. Furthermore, pDDIs were classified as contraindicated, major, moderate, and minor in addition to the interaction mechanism, which was determined by the type and intensity of the interactions. All of this data was compiled, examined, and presented as frequencies and percentages in tables and graphs. Additionally, significant connections were examined using a conventional statistical procedure.

### 3.3 Study Design

Prospective, Cross-sectional study.

### 3.4 Study Period

Period of six months (MAY – OCTOBER) 2023.

### 3.5 Study Site

Akash Hospital, Devanahalli, Bangalore.

### 3.6 Study Criteria

#### 3.6.1 Inclusion Criteria:

Patients with polypharmacy who are older than 65 years of both genders are eligible.

#### 3.6.2 Exclusion Criteria

- Both female and male patients under 65 years of age.
- Patients over 65 who did not take prescription drugs
- Patients who decline to participate in the research are not included.

### 3.7 Statistical Method

- Descriptive statistics: Standard descriptive summaries will be used to summarize the baseline and demographic variables.
- Example: The gender continuous variable's mean and standard deviation.
- For categorical characteristics like gender, frequency and percentages are used.
- The variable polypharmacy is continuous.
- Medication errors and drug interactions are examples of categorical variables.

## 4. RESULTS AND DISCUSSION

### 4.1 Population Demographic Features of the Study

#### 4.1.1 Distribution of Gender

Out of the 110 patients that were enrolled in the current study, 41 (37.8%) were female and 69 (62.72%) were male.

Table 2. Distribution of Gender

| Gender | Distribution of Gender | Percentage |
|---|---|---|
| Male | 69 | 62.72% |
| Female | 41 | 37.28% |
| Total | 110 | 100.00% |

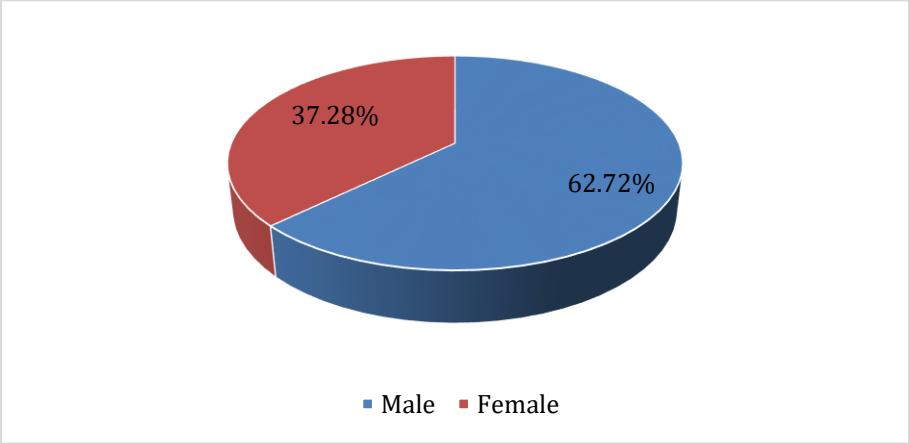



Figure 1. Gender Distribution

### 4.1.2 Variations in Gender within Age Group Classification

Out of the 110 patients who were enrolled in the study, 24 (34.7%) male patients and 23 (56.09%) female patients fell within the 65-70 year age range; 21 (30.4%) male patients and 10 (24.3%) female patients fell within the 71-75 year age range; 12 (17.3%) male patients and 4 (9.7%) female patients fell within the 76-80 year age range; 9 (13%) male patients and 3 (7.31%) female patients fell within the 81-85 year age range; 3 (4.34%) male patients and 1 (2.43%) female patient were in the 86-90 year age range.

Table 3. Gender Distribution with Age Group

| Age Group (Years) | Male | | Female | | Total |
|---|---|---|---|---|---|
| | Number of Patients | Percentage | Number of Patients | Percentage | |
| 65 -70 | 24 | 34.70% | 23 | 56.09% | 47 |
| 71 -75 | 21 | 30.40% | 10 | 24.30% | 31 |
| 76 -80 | 12 | 17.30% | 4 | 9.70% | 16 |
| 81-85 | 9 | 13% | 3 | 7.31% | 12 |
| 86-90 | 3 | 4.34% | 1 | 2.43% | 4 |
| Total | 69 | 62.72% | 41 | 37.28% | 110 |

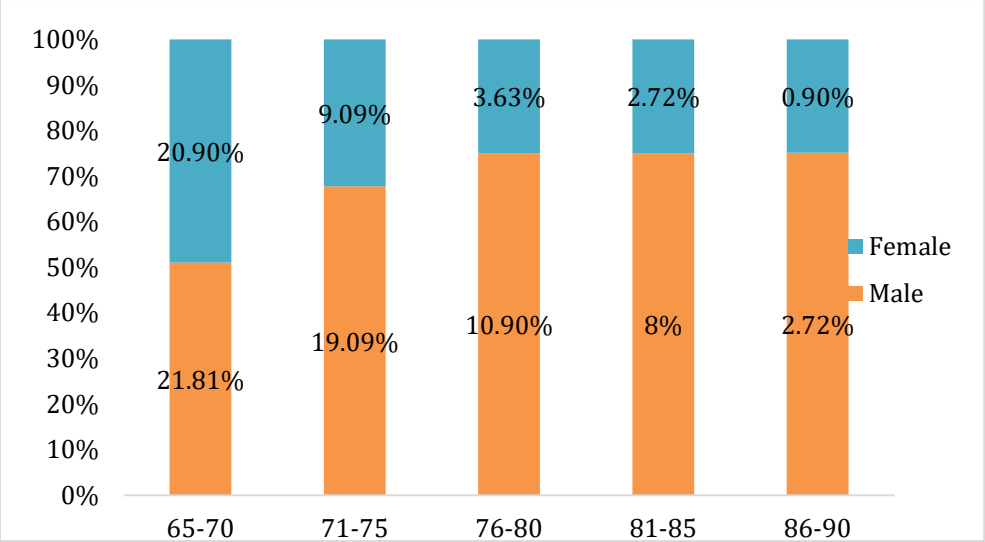



Figure 2. Gender Distribution with Age Groups (Years)

### 4.1.3 Number of Medications per Prescription

Among 110 prescriptions, 53(48%) prescriptions were above or equal to 5 medications ,56 (51%) prescriptions were above or equal to 10 medications and 1(1%) prescription were below 5 medications.

Table 4. Number of Medications per Prescription

| Number of Medications | Number of Prescriptions | Percentage |
|---|---|---|
| <5 | 1 | 1.00% |
| ≥5 | 53 | 48% |
| ≥10 | 56 | 51% |
| Total | 110 | 100% |

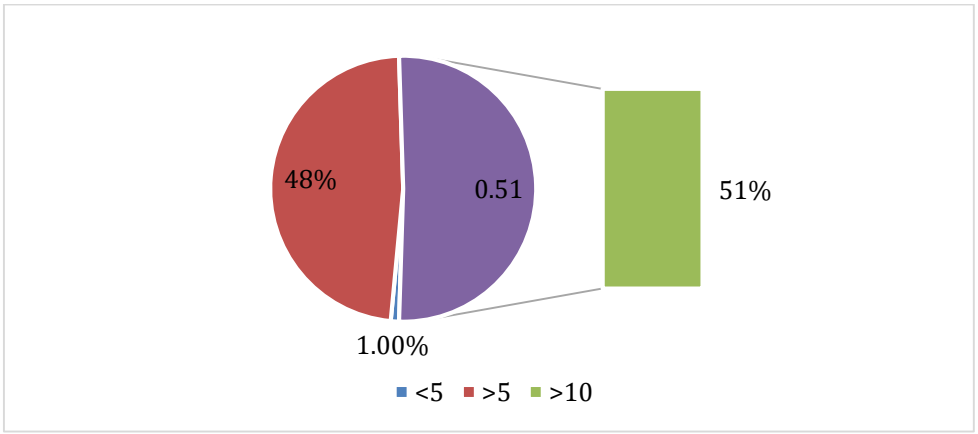



Figure 3. Number of Medication per Prescriptions

## 4.2 Potential Drug- Drug Interactions

### 4.2.1 Presence of Pddis

Out of 110 prescriptions, 66 (or 60%) had pDDIs, while the remaining 44 (or 40%) did not.

Table 5. Presence of PDDIs

| Comorbidities | Number of Patients | Percentage |
|---|---|---|
| Present | 66 | 60.00% |
| Absent | 44 | 40.00% |

| Total | 110 | 100% |
|---|---|---|

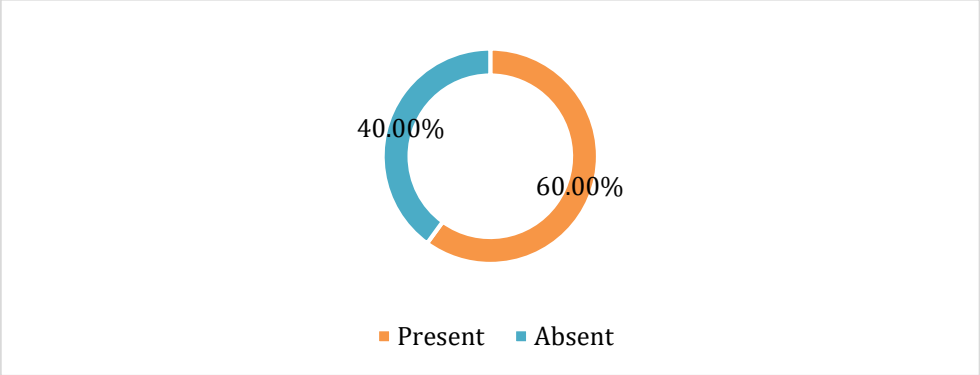



Figure 4. Presence of PDDIs

### 4.2.2 Age Wise Categorization of pDDIs Per Prescription

1-3 pDDIs were found in 11 (16.6%) , 4-6 pDDIs in 14 (21.21%), above 6 pDDIs in 1 (1.51%) among patients aged between 65-70 years followed by 1-3 pDDIs were found in 8 (12.12%) , 4-6 pDDIs in 9 (13.63%), above 6 pDDIs in 3 (4.54%) among patients aged between 71-75 years, 1-3 pDDIs were found in 3 (4.54%) , 4-6 pDDIs in 7 (10.60%), above 6 pDDIs in 3 (4.54%) among patients aged between 76-80 years, 1-3 pDDIs were found in 0 (0%) , 4-6 pDDIs in 3 (4.54%), above 6 pDDIs in 2 (3.03%) among patients aged between 81-85 years, 1-3 pDDIs were found in 1 (1.51%) , 4-6 pDDIs in 1 (1.51%), above 6 pDDIs in 0 (0%) among patients aged between 86-90 years.

Table 6. Age Wise Categorization of pDDIs Per Prescription

| Age Group (Years) | 1-3 | | 4-6 | | >6 | | Total |
|---|---|---|---|---|---|---|---|
| | Number of Patients | Percentage | Number of Patients | Percentage | Number of Patients | Percentage | |
| 65-70 | 11 | 16.6% | 14 | 21.21% | 1 | 1.51% | 26 |
| 71-75 | 8 | 12.12% | 9 | 13.63% | 3 | 4.54% | 20 |
| 76-80 | 3 | 4.54% | 7 | 10.60% | 3 | 4.54% | 13 |
| 81-85 | 0 | 0% | 3 | 4.54% | 2 | 3.03% | 5 |
| 86-90 | 1 | 1.51% | 1 | 1.51% | 0 | 0% | 2 |
| Total | 23 | 34.77% | 34 | 51.49% | 9 | 13.62% | 66 |

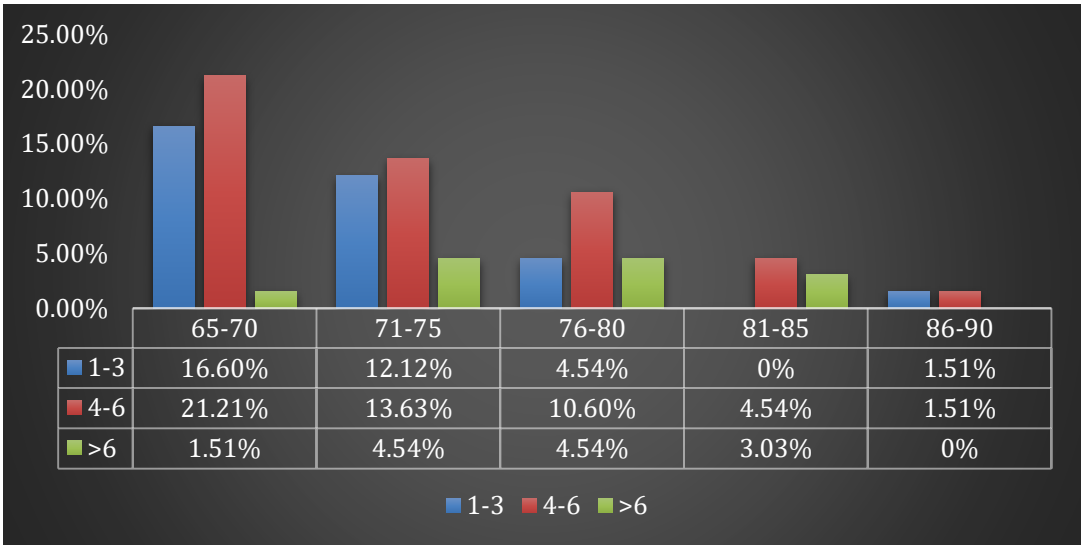



Figure 5. Age Wise Categorization of pDDIs Per Prescription

### 4.2.3 Mechanism, Effect and Frequency Of pDDIs

The mechanism, effect, and frequency of the pDDIs found in this investigation were categorized (Table 7).

Table 7. Mechanism, Effects, and Frequency of pDDIs

| SL. No | pDDIs | Mechanism | Effect | Frequency |
|---|---|---|---|---|
| 1 | Aceclofenac + Budesonide | Additive effects | Result in increased risk of gastrointestinal ulcer or bleeding. | 1 |
| 2 | Aceclofenac + Nortriptyline | Unknown | May result in an increased risk of bleeding | 1 |
| 4 | Aceclofenac + Telmisartan | Additive effects on renal function; decreased renal prostaglandins synthesis | May result in reduced antihypertensives effects and renal dysfunction | 1 |
| 5 | Amiloride + Insulin | Additive CNS depression | Result in increased risk of CNS and respiratory depression | 1 |
| 6 | Amitriptyline + Amlodipine | Inhibition of CYP2D6-mediated metabolism of risperidone | May result in increased risperidone exposure and reduced 9-hydroxyresiperidone exposure | 1 |

### 4.2.4 Severity/Degree of pDDIs

There was at least one interacting medication combination in 66 (60%) of the 110 prescriptions altogether. Out of the 180 pDDIs, 3 interactions (1.7%) are classified as contraindicated, 87 (48.3%) as significantly severe, 85 (47.2%) as moderately severe, and 5 (2.8%) as minorly severe.

Table 8. Degree/Severity of pDDIs

| Severity | Number of pDDIs | Percentage |
|---|---|---|
| Contraindicated | 3 | 1.70% |
| Major | 87 | 48.30% |
| Moderate | 85 | 47.20% |
| Minor | 5 | 2.80% |
| Total | 180 | 100.00% |

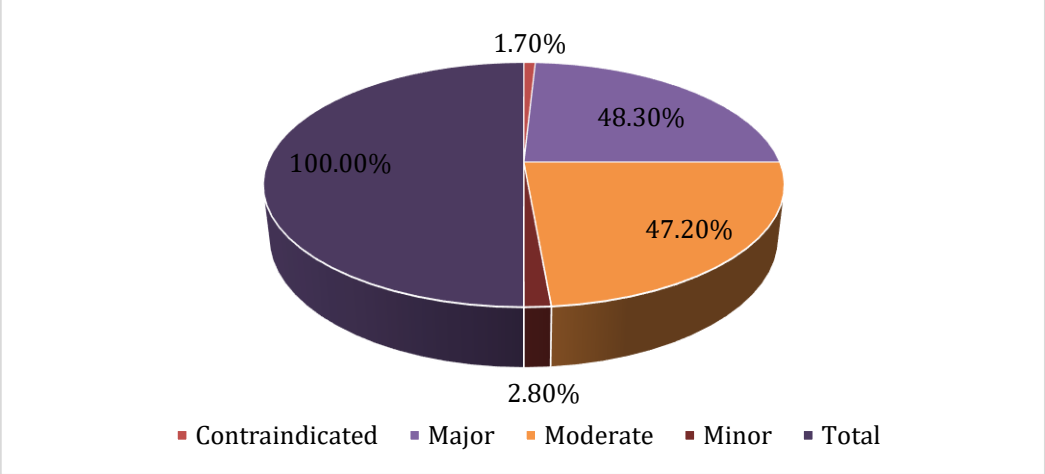



Figure 6. Severity of PDDIs

### 4.2.5 Type of Interaction of pDDIs

Out of 180 pDDIs, 97(53.8%) were of synergism, 49 (27.4%) were antagonism and 34 (18.8%) were unknown.

Table 9. Type of Interaction of pDDIs

| Types of Interaction | Number of pDDIs | Percentage |
|---|---|---|
| Synergism | 97 | 53.80% |
| Antagonism | 49 | 27.40% |
| Unknown | 34 | 18.80% |
| Total | 180 | 100% |

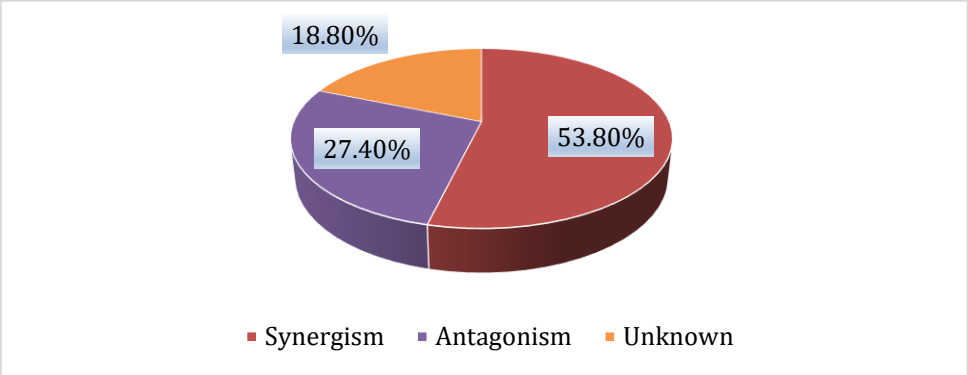



Figure 7. Type of Interaction of PDDIs

### 4.3 Potentially Inappropriate Medications

### 4.3.1 Presence of PIM

Among 110 patients involved in this study, 21 (19.10%) patients had PIM whereas 89 (80.90%) patients had no PIM.

Table 10. Presence of pDDIs

| PIMs | Number of Patients | Percentage |
|---|---|---|
| Present | 21 | 19.10% |
| Absent | 89 | 80.90% |
| Total | 110 | 100% |

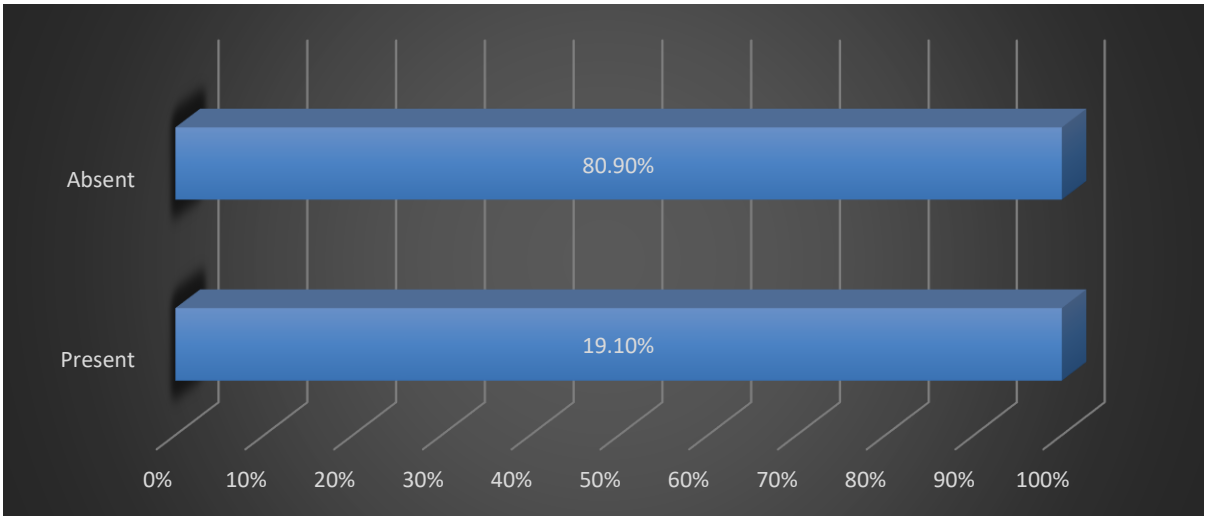



Figure 8. Presence of PIM

### 4.4 Discussion

This was a cross-sectional, prospective study that lasted six months. It was done at the Akash Hospital's geriatrics department in Devanahalli, Bangalore. Micromedex 2.2, an online database system, was used to assess each patient's prescriptions during the trial for pDDIs. Tabulated data included the quantity of prescription medications, the number of prescriptions and pDDIs, and the distribution of pDDIs by age. The PIMs were examined according to Beer's standards. Drug interactions are known to be among the most hazardous DRPs. The most frequent risk factors for pDDIs are co-morbidities, female gender, polypharmacy, and advanced age. Of the 110 patients chosen for this study, 69 (62.72%) were men and 41 (37.28%) were women. After six months of reviewing 404 patients' case files from the general medicine ward, found that 214 (53%) of the patientsin a study carried out by, a total of 100 patients were examined, of whom 39 were female and 61 were male. Similar to our analysis, the aforementioned studies includemoremale patients than female patients.

The study involved 110 patients. Of these, 24 (21.81%) male patients and 23 (20.90%) female patients fell within the 65-70 year age range; 21 (19.01%) male patients and 10 (9.09%) female patients fell within the 71-75 year age range; 12 (10.90%) male patients and 4 (3.63%) female patients fell within the 76-80 year age range; 9 (8.18%) male patients and 3 (2.72%) female patients fell within the 81-85 year age range; 3 (2.72%) male patients and 1 (0.9%) female patient were in the age range 86-90 years. There is no appreciable difference in the proportion of pDDIs among both genders with different age groups.

The quantity of prescriptions and medications was determined. The research population's minimum prescription quantity was four and its maximum prescription quantity was fourteen. Out of 110 prescriptions, 109 (99%) contained five or more medications, while 1 (1%) contained fewer than five medications. A total of 2557 prescriptions were written, averaging 7.47 <0x7E> 6.5 medications per prescription. According to, the average number of pharmaceuticals prescribed per prescription was 8.28 <0x7E> 2.77. Of these, 19 prescriptions contained fewer than five drugs, 98 contained five to seven drugs, and 140 contained more drugs.

Of the 110 patients who took part in this investigation, 21 (19.10%) had PIM and 89 (80.90%) did not. 19.10% was the total prevalence of PIM, according to our research. reported PIM prevalence rates of 39.8%, 14.1%, and 26.6%, respectively.

Of the 110 prescriptions in this study, 66 (or 60%) were discovered to have pDDIs, while the remaining 44 (or 40%) individuals did not. 180 pDDIs in all, averaging 3.49–2.24 pDDIs per patient, were discovered. According to our research, 60% of people have pDDIs overall. Reported prevalence rates of pDDIs of 36.9%, 67.0%, and 78%, respectively.

Of the 110 prescriptions, 66 prescriptions for pDDI were detected; of these, 28 (42%) were found in females and 38 (58%) in males. It was found by the study that men were more likely than women to have pDDIs. The study results are in agreement with research conducted by. However, according to studies done by, women were more likely than men to experience DDIs. Of 200 patients, 126 had DDIs, and the remaining 74 did not have DDIs, according to. 49 (37.30%) females and 79 (62.70%) males were present.

According to age distribution, patients between the ages of 65 and 70 had the highest incidence rate of pDDIs at 29 (44%). Patients between the ages of 71 and 75 had the next highest incidence rate at 24 (36%), patients between the ages of 76 and 80 had 6 (9%), 81–85 years had 3 (5%), and 86–90 years had 4 (6%). The incidence of DDIs was 30.95% in the over-60 age group, according to a study done in 2012 by. Among the thing's causing polypharmacy is age. Polypharmacy and advanced age were the predisposing factors in the aforementioned investigation.

Of the 66 prescriptions, 11 (16.6%) had 1-3 pDDIs, 14 (21.21%) had 4-6 pDDIs, and 1 (1.51%) had above 6 pDDIs among patients aged 65-70 years, which was followed by 8 (12.2%) with 1-3 pDDIs, 9 (13.63%), and above 6 pDDIs in 3 (4.54%) among patients aged 71-75 years, 1-3 pDDIs in 3 (4.54%) and 4-6 pDDIs in 7 (10.60%), above 6 pDDIs in 3 (4.54%) among patients aged 76-80 years, 1-3 pDDIs in 0 (0%), 4-6 pDDIs in 3 (4.54%), above 6 pDDIs in 2 (3.03%) among patients aged 81-85 years.Among patients between the ages of 86 and 90, 1-3 pDDIs were detected in 1 (1.51%), 4-6 pDDIs in 1 (1.51%), and above 6 pDDIs in 0 (0%) cases. Among 180 pDDIs, 97 (53.80%) were of synergism, 49 (27.40%) were of antagonism, and 34 (18.80%) were unknown.

## 5. CONCLUSION

According to the study's findings, there is a significant prevalence of pDDIs at the study site (56%). Most of the patients were taking multiple medications. Three factors were found to be predictive of pDDIs: age, gender, and polypharmacy. Therefore, creating a methodical strategy to reduce potential pDDIs is crucial. Programs for education are needed to help the research site's clinicians identify and treat pDDIs.

The current study's findings indicate that pDDIs were highly prevalent in older patients. This suggests that there is a positive relationship between the patient's age and the drug interaction. Most of the interactions were substantial in severity and synergistic in character. It's also critical to remember that patients exposed to polypharmacy experienced the majority of pDDIs. This shows a direct correlation between the quantity of prescription medications written and pDDIs. Consequently, lowering the quantity of medications provided and closely monitoring patients may help to lower the incidence of pDDIs. It is frequently challenging to cut back on the number of medications used to treat several chronic disorders; as a result, careful consideration of therapeutic options is needed to limit the frequency of prescription drug interactions.

According to the study's findings, all hospital departments can implement a stringent PIM monitoring system to prevent negative drug side effects and enhance patient quality of life. The development of this system ought to involve cooperation between physicians, nurses, pharmacists, and other medical specialists.

### Acknowledgments

The authors have no specific acknowledgments to make for this research.

### Funding Information

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

### Author Contributions Statement

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C : **C**onceptualization
M : **M**ethodology
So : **So**ftware
Va : **Va**lidation
Fo : **Fo**rmal analysis
I : **I**nvestigation
R : **R**esources
D : **D**ata Curation
O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

### Conflict of Interest Statement

The authors declare that there are no conflicts of interest regarding the publication of this paper.

### Informed Consent

All participants were informed about the purpose of the study, and their voluntary consent was obtained prior to data collection.

### Ethical Approval

Not Applicable.

### Data Availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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**How to Cite:** Sandesh G N, Venkat Reddy R V, Dharani. V, Shobha Rani R Hiremath. (2024). A study of polypharmacy and its consequences in geriatric patients. Journal of Community Pharmacy Practice (JCPP), 4(2), 50-63. https://doi.org/10.55529/jcpp.45.1.17

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