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A Study of Polypharmacy and its Consequences in Geriatric Patients

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Abstract: ***The term polypharmacy is the concurrent use of five or more drug by a patient. In older persons, the cutoff threshold of five medicines is linked to the unfavourable outcomes such falls, disability, and mortality one of the crucial components. The main components of polypharmacy therapy in the clinical setting are reviewed in this study. Potential Drug-Drug Interactions (pDDIs) and Potentially Inappropriate Medications (PIMs) are threatening and contribute to increased rate of morbidity and mortality rate. The present study was performed on the prevalence of pDDIs and PIMs among the geriatric patients at a tertiary care hospital.***
Methodology: ***The study was Prospective, Cross-sectional study carried out for a period of six months in General Medical Ward at Akash hospital, Bangalore PIMs were analyzed using Beer's criteria and pDDIs were analyzed using online data base system (Micromedex 2.2)***
Results: ***In this study, a total of 110 patients were enrolled, out of which 69 (62.72%) were males and 41 (37.28%) were females. Out of which 21 (19.10%) prescription showed PIMs and 66 (56%) prescription showed pDDIs. A total of 180 pDDIs were observed, 3 interactions (1.7%) come under the classification of contraindication, 87 (48.3%) fall under major severity, 85 (47.29%) were of moderate severity and 5 (2.8%) were of minor severity. Among 180 pDDIs, 13 (7.2%) were of rapid, 21 (11.6%) were delayed and 146 (81.6%) were not specified. 97 (57.30%) were of synergism, 49 (27.40%) were antagonism and 34 (18.80%) were unknown. 13 (7.2%) were of excellent, 29 (16.20%) were good and 138 (76.60%) were fair.***
Conclusion: ***This study concluded that awareness on the most prevalent pDDIs can help the practitioners to prescribe drugs with a low risk for pDDIs and prevent the concomitant use of various drug combinations.***

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Keywords: Pims, Pddis, Micromedex 2.2 and Beer's Criteria.

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. 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 (Maher, R.L. et al., 2014).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 (Vrdoljak, D., and Borovac, J.A., 2015). 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) (Snyder, B.D. et al., 2012). 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. [4]

Types of Poly Pharmacy:
Although there is no single, accepted definition of polypharmacy, there are three basic types:
1**. Excessive Polypharmacy (EPP):** using ten or more medications concurrently.
2**. Polypharmacy (PP):** taking five to nine medications.
3. No **polypharmacy:** not taking more than four medications, including those who don't take any [1]

Associated Factors:

Individualelements	Physician related factors	Systems- level elements
• Advancing age	• Lack of education	• Different electronic medical systems
• Female gender	• High patient work	• Poor physician-physician

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	load	communication
• White ethnicity/race	• Improper medication reconciliation	• Lack of continuity between multiple medical providers
• Lower socioeconomic status	• Poorphysician-patient communication	

Issues of Concern in Polypharmacy

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

1. 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].
2. 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. 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 [6]. E.g., anti-inflammatory medications may increase blood pressure and deteriorate renal function. [9]
3. 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.
4. 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].

Consequences of Polypharmacy:

➢ **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.

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- 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].

Drug-Drug Possible Interaction:
One type of DRP (drug-related problem) is drug-drug possible interactions (pDDIs) (Ahmad, A et al., 2015). 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 (Bajracharya, N. et al., 2018).
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. (Kaliamurthy and colleagues) (1930).

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 (Patel, P. S. et al., 2014).

- **Potentially Inappropiate 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' (Corsonello, A. et al., 2009). The lack of research on PIM use in primary care and at-home healthcare was a limitation of the study (Al Odhayani, A et al., 2017).

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 (Beers, M.H., et al., 1991). 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.

Predisposing Factors:
Factors linked to inappropriate pharmaceutical use:
- Women;

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- 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 (Alhawassi, T.M. et al., 2015).

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 (Marinovic, I et al., 2021).

2. RELATED WORK

Bhavisha N Vegada Et Al (2020): 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.

Rudolf Et Al. (2021): 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.

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3. METHODOLOGY

Source of Data:

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

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.

Study Design:
Prospective, Cross-sectional study.
Study Period:
Period of six months (MAY – OCTOBER) 2023.
Study Site:
Akash Hospital, Devanahalli, Bangalore.
Study Criteria:
Inclusion Criteria:

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

Exclusion Criteria:

- Both female and male patients under 65 years of age.
- Patients over 65 who did not take prescription drugs

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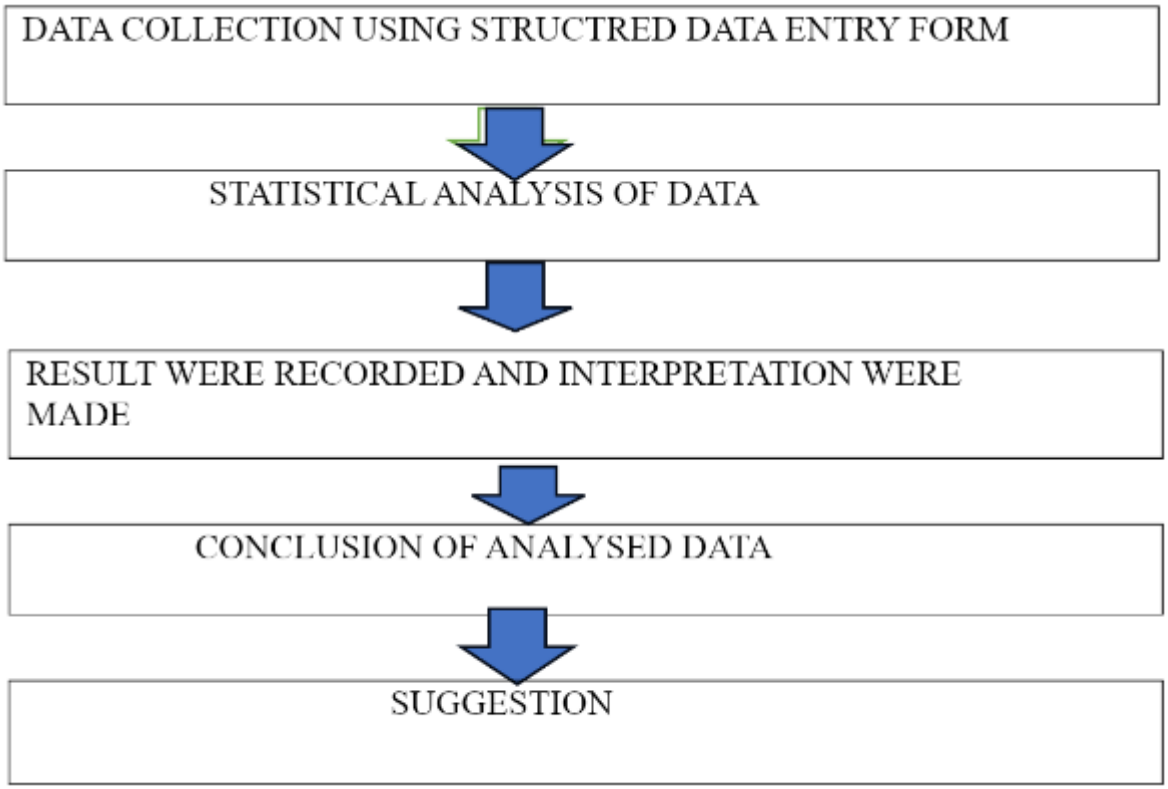
- Patients who decline to participate in the research are not included.

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.

Study Flow Chart



4. RESULTS AND DISSCUSSION

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.

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Table 1: Distribution of Gender

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

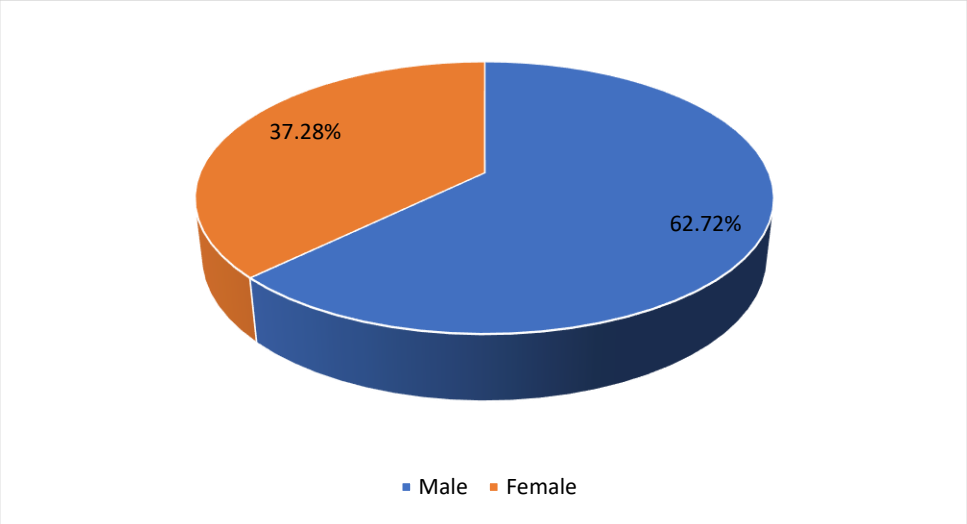

Figure 1: Gender Distribution

4.1.3 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

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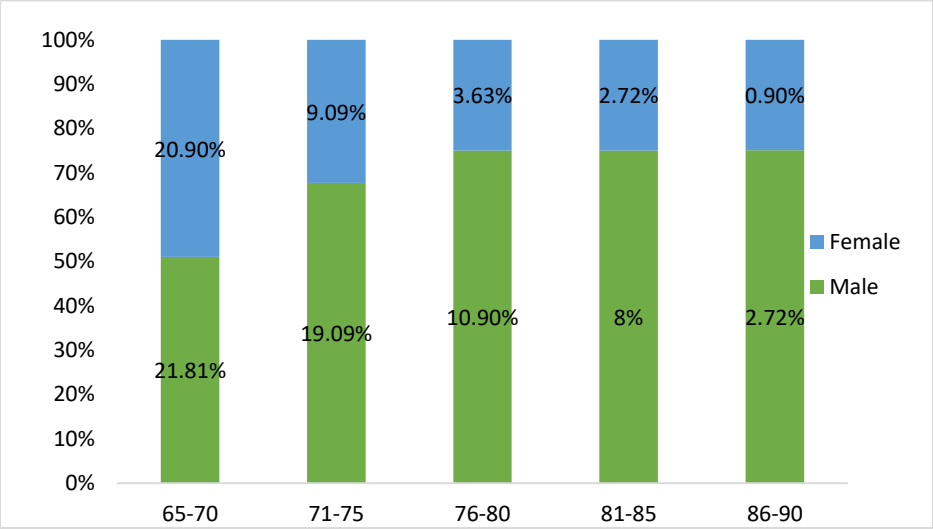
Figure 3: Gender distribution with age groups(years)



4.1.4. 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%

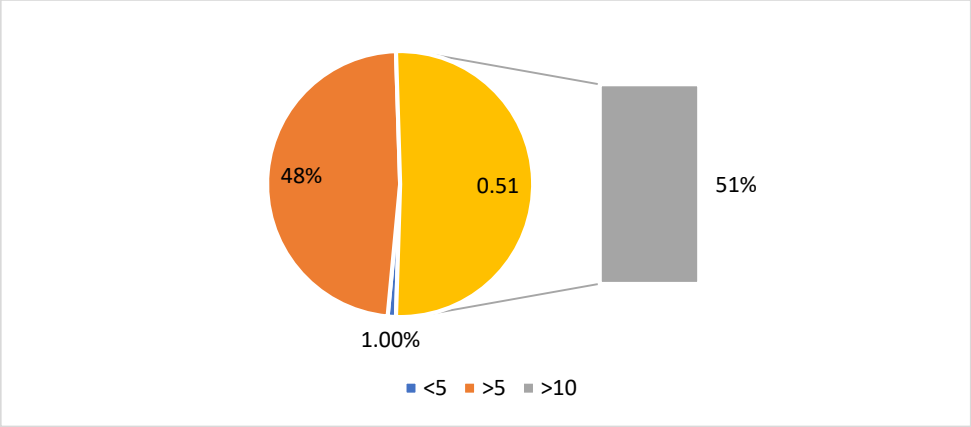


Figure 4: Number Of Medication Per Prescriptions.

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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 6: Presence of pDDIs

Comorbidities	Number of patients	Percentage
Present	66	60.00%
Absent	44	40.00%
Total	110	100%

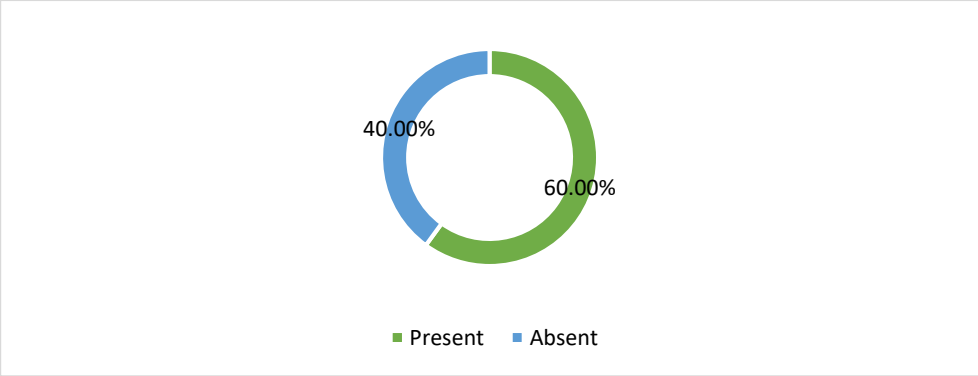

Figure 6: Presence of pDDIs

4.2.5 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 10: 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

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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

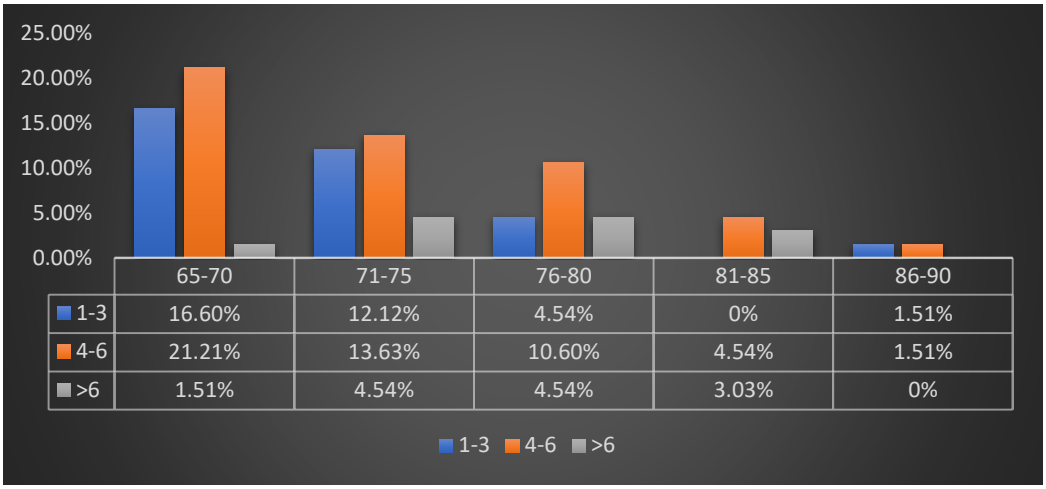

Figure 10: Age Wise Categorization Of pDDIs Per Prescription.

4.2.6 Mechanism, Effect and Frequency Of pDDIs:

The mechanism, effect, and frequency of the pDDIs found in this investigation were categorized (Table 13).

Table 11: 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-	1

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			hydroxyresiperidone exposure	

4.2.7 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 12: 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%

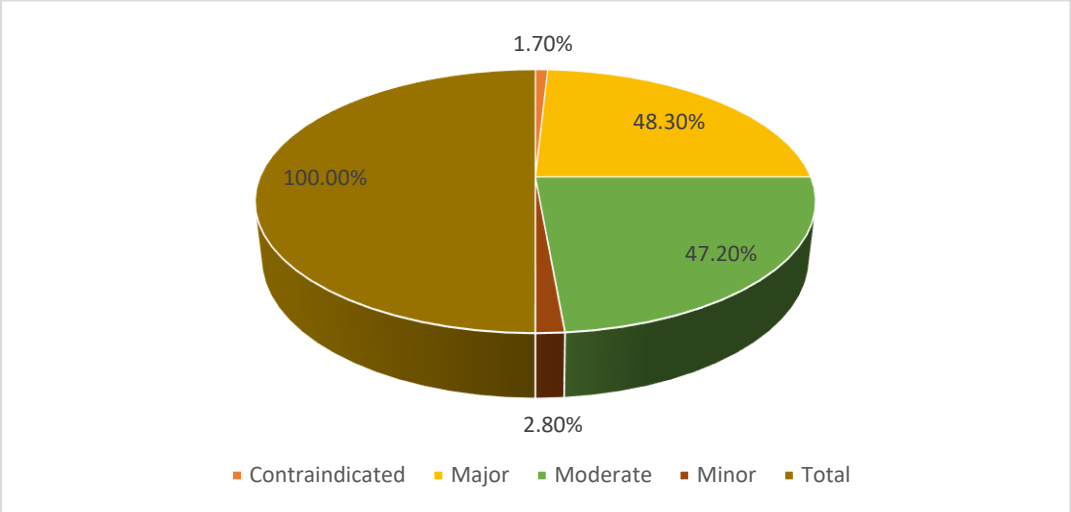

Figure 11: Severity of pDDIs.

4.2.11 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 20: Type of interaction of pDDIs.

Types of interaction	Number of pDDIs	Percentage
Synergism	97	53.80%
Antagonism	49	27.40%
Unknown	34	18.80%

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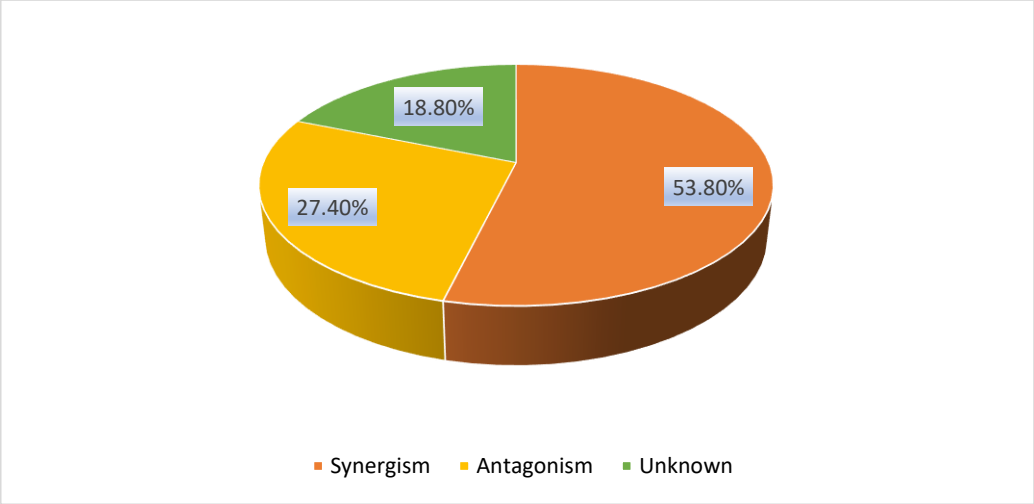
Total	180	100%

Figure 15: 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 22: Presence of pDDIs.

PIMs	Number of patients	Percentage
Present	21	19.10%
Absent	89	80.90%
Total	110	100%

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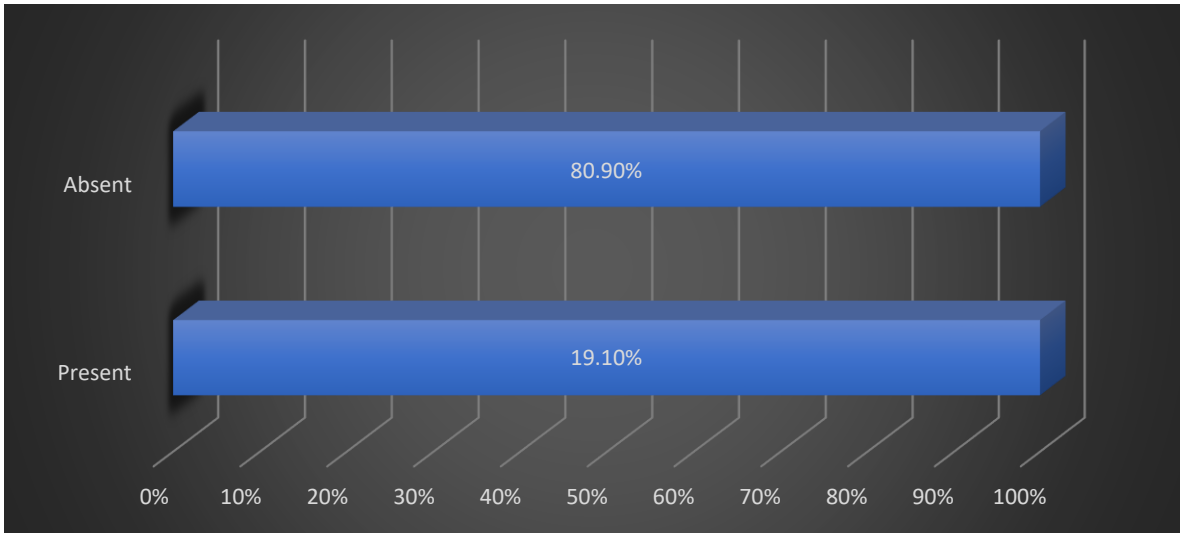

Figure 17: Presence of PIM.

Disscussion

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, Ahmed et al. (2015) found that 214 (53%) of the patientsin a study carried out by Bhagavathula et al. (2014), 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%)

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contained fewer than five medications. A total of 2557 prescriptions were written, averaging 7.47 <0x7E> 6.5 medications per prescription. According to Kapadia et al. (2013), 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. Rudolf et al. (2021), Mengyuan Fu et al. (2020), and Alkan et al. (2016) 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. Santos et al. (2017), Castilho et al. (2018), and Bhagavathula et al. (2014) 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 Nag et al. (2011) and Umretiya et al. (2015). However, according to studies done by Jimmy et al. (2012), 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 Umretiya et al. (2015). 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 Jimmy et al. 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

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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.

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