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“IMPACT OF POLYPHARMACY IN GERIATRIC PATIENTS IN A TERTIARY CARE TEACHING HOSPITAL”

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ABSTRACT

Ageing is a natural process and as age progresses, the number of incurable disease increases. This increase leads to the increase in the medications; resulting in polypharmacy. The objectives of this study was to assess the impact of polypharmacy in geriatric patients and also to assess the severity of drug interactions as a result of polypharmacy. The prospective observational study was conducted for a period of 6 months. Ethical clearance was obtained from the Institutional Ethical Committee of Bapuji Pharmacy College, Davangere. Data of geriatric patients collected from the Medicine and Emergency wards were included in the study. The collected cases were analyzed using the commercially available Micromedex. The identified DDIs were categorized on the basis of their severity. In our study the prevalence of polypharmacy was more in males compared to females. It was found that the age group of 60-69 had the higher incidence of polypharmacy compared to the other age groups. Among the classes of drugs prescribed, the CVS drugs were prescribed more followed by GI drugs. Not only this, most of the patients were prescribed drugs between 5-10. On analyzing the prescriptions for drug interactions, 320 drug interactions were found. Based on the severity of drug interactions, moderate interactions were found to be the highest. The actual and potential DDIs increase as per number of drugs in prescription. The management of clinically relevant DDIs can be improved by clinical pharmacist interventions. Advice on withdrawal or substituting the precipitant drug would be beneficial.

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INTRODUCTION

Polypharmacy, is defined as a certain more number of drugs are prescribed or the intake of drugs more than clinically appropriate. There are two definitions of polypharmacy. The consequences of polypharmacy includes interactions, nonadherence, increased risk of cognitive impairment, impaired balance and falls, and increased risk of morbidity, hospitalization and mortality. The most threatening consequences of polypharmacy include the drug related problems such as occurrence of ADRs, Drug-Drug interactions, Medication errors and increased risk of hospitalization leading to the increase of the cost to manage the same and the quality of life of the patients which is an important fact.[1]

The etiology of polypharmacy is generally multiple. Use of multiple drugs typically results sometimes even with the same ingredients or belonging to the same class. Furthermore, generally symptoms of the elderly are commented to be due to a disease process or aging itself. Therefore, prescription of a new drug to compensate an unconsidered effect of the current regimen is not unusual in the elderly. Advanced age and living in nursing home are already documented risk factors for polypharmacy.[2]

Multimorbidity has a proportional relationship with polypharmacy. Multimorbidity is all about the usage of multiple drugs and this ultimately leads to the phenomenon called polypharmacy. The chances of unintended adverse drug reactions due to drug-drug interactions are greater in geriatric patients as a particular number of different drugs may be administered to a patient depending on the disease/symptoms.[3]

The potential risks of polypharmacy are evident, so are the benefits of patients when medication therapies are combined to cure, slow the progression, or reduce the symptoms of disease. In addition, a plethora of drug therapies for chronic disease can improve quality of life and prevent complications, including disability and unnecessary hospitalization. Balancing the risks and benefits of multiple drug therapies in older adults become a challenging endeavor for prescribers.[4]

Treatment of elderly patients exhibits special characteristics and is often a sensitive process within the scope of a general practitioner's work. Quite often, it is a real challenge to administer proper therapy in elderly patients where there is significant potential for developing side-effects due to chronic use of drugs that can elicit strong systemic interactions.[5]

Drug interaction represents a major problem in day-to-day practice. Drug interaction is a modification of the effect of a drug when it is administered with another drug and this effect may increase or decrease the action of either substance or drug. Whenever more than 2 drugs are taken concurrently, there is a chance that there will be an interaction between the drugs, and which may harm the patient leading to therapeutic failure. The likelihood of the drug interactions increases as the number of drugs which are taken by the patient increases.[6]

There are different types of drug interactions responsible for alteration of clinical effect of drugs. Drug-drug interaction between prescribed drugs or between OTC drugs, interaction of drugs with food may change the absorption and transit rate of drugs. A number of variables like age, gender, disease state and genetic constitution of individual influence the activity of drug and its ability to interact with other agents to produce effect of drug interaction.[7]

Prescribing of multiple medication and increased prevalence of comorbidity in elderly patients may result in DDIs with altered clinical outcomes therefore this study carried out to assess prescribed medications, comorbidity and DDIs which will be useful in minimizing DDIs.[8]

With the rise in proportion of elderly people in India, various problems related to their health are also on the rise. Elderly patients show multiple disease state; duplicative prescribing result owing to multiple prescribers; and in patients with intrinsic communication problems, misdiagnosis, unclear drug indications, and use of drugs without indications can occur. Therefore, pharmacists have the potential to have a large effect in combating this problem through a variety of interventions.[9]

As compared to young adults, elderly persons have more illnesses, as ageing is often accompanied by chronic diseases, comorbidity, disability and social isolation. Not only this, they are the most common group admitted to hospitals compared to the other age groups. Surprisingly, both the frequency of drug therapy and the average number of drugs taken per person progressively increases with age. So it is important to assess the impact of polypharmacy in geriatric age groups and the potential drug-drug interactions occurring in this particular age group.

METHODS

Study Site:

The study was conducted in department of Medicine and Emergency, SSIMS & RC, Davangere, a 400 bedded hospital

Study Design:

The present study is prospective observational study.

Study Period and Duration;

The study is carried out for 6 months period between September 2016 and February 2017.

ETHICAL CONSIDERATIONS:

The study protocol was submitted to the Institutional Ethical Committee of Bapuji Pharmacy College

Selection Procedure:

The patients admitted to the medicine and emergency were enrolled based on the inclusion and exclusion criteria.

Inclusion Criteria:

All inpatients above 60 years of age in medicine and emergency wards undergoing polypharmacy, irrespective of sex was included in the study.

Exclusion Criteria:

Patients admitted to the ICU, with malignancy and those passed away during the course of treatment were excluded in the study.

Data Analysis:

The data were collected in a well designed data collection form and the collected data were analyzed using Microsoft Excel 2010

RESULTS

After the scrutiny, using inclusion and exclusion criteria 150 patients were enrolled into the study.

Table 1: Gender Wise Distribution of Patients.

SL.NO	Gender	Number	Percentage
1	Males	96	64%
2	Females	54	36%
3	Total	150	100%

Out of 150 patients admitted in hospital during study period ;96(64.66%) were males and 54(35.33%) were females.Mean age of patients was 67.62±6.43.(Table 1)

Table 2: Age Wise Distribution of Patients.

SL.NO	AGE	Number	Percentage
1	60 - 69 YEARS	102	68%
2	70 - 79 YEARS	35	23.33%
3	≥ 80 YEARS	13	8.67%
4	TOTAL	150	100%

Total admitted elderly patients were classified into 3 age groups 60-69, 70-79 and ≥ 80. Majority of patients were in the age group 60-69 (68%), followed by 70-79(23.33%) , ≥80(8.67) respectively. (Table 2)

TABLE 3: Number of Drugs During Admission and Discharge in Different Age Groups.

SL.NO	AGE	NO OF PATIENTS	NO OF DRUGS PRESCRIBED DURING ADMISSION	MEAN ± SD	NO OF DRUGS PRESCRIBED DURING DISCHARGE	MEAN±SD
1	60-69	102	787	7.72±2.22	379	3.72±1.40
2	70-79	35	286	8.17±2.06	145	4.14±1.67
3	≥80	13	97	7.46±2.07	49	3.77±2.35
4	TOTAL	150	1170	7.8±2.18	573	3.82±1.57

On admission,number of drugs prescribed increased as the age of patients increased except in the case of patients ≥ 80 years.)More than half of admitted and discharged elderly patients received drugs between 5 to 9.Among 40% of discharged patients and 20% of admitted patients prescribed number of drugs was between 0-5 while 25% of admitted patients were prescribed drugs between 10-14 in number.None of the patients discharged was prescribed 10-14 drugs while 33 admitted elderly patients were prescribed 10-14 drugs.

Table 4: Drug-Drug Interactions During Admission and Discharge.

Sl.no	TYPES OF DRUG-DRUG INTERACTIONS	NUMBER OF DRUG-DRUG INTERACTIONS	PERCENTAGE
1	Severe	28	8.75%
2	Moderate	201	62.81%
3	Mild	91	28.44%

Table 5: List of Potential Drug-Drug Interactions.

SL.NO	LIST OF DRUG-DRUG INTERACTIONS	NUMBER OF TIMES IT OCCURRED IN THE STUDY	PERCENTAGE
1	Azithromycin + Ondansetron	7	25%
2	Levofloxacin + Ondansetron	4	14.29%
3	Rabeprazole + Clopidogrel	4	14.29%
4	Ceftriaxone + Heparin	2	7.14%
5	Clonidine + Metoprolol	2	7.14%
6	Cefpodoxime + Heparin	1	3.57%
7	Phenytoin + Rabeprazole	1	3.57%
8	Fluconazole + Clopidogrel	1	3.57%
9	Losartan + Aspirin	1	3.57%
10	Omeprazole+ Clopidogrel	1	3.57%
11	Amitriptyline + Ondansetron	1	3.57%
12	Piperacillin + Enoxaparin	1	3.57%
13	Amiodarone + Digoxin	1	3.57%
14	Ramipril + Telmisartan	1	3.57%
15	Total	28	100%

Out of total 1132 medicines prescribed on admission and 600 medicines prescribed on discharge; 320 drug – drug interactions were observed. Most common drug interaction observed in admitted as well as in discharged patients was of moderate grade and was 62.8125%(N=201). Severe drug interactions in elderly patients were 8.75%(N=28) and mild drug interactions in elderly patients were 28.437%(N=91) respectively.

TABLE 6: Different Classes of Drugs Prescribed to Admitted and Discharged Patients.

SL.NO	DRUGS	ADMISSION	PERCENTAGE	DISCHARGE	PERCENTAGE
1	GI Drugs	127	20.32%	64	14.71%
2	RS Drugs	50	8%	79	18.16%
3	CVS Drugs	138	22.08%	99	22.76%
4	Antibiotics	119	19.04%	92	21.15%
5	Endocrine Drugs	10	1.6%	4	0.92%
6	Analgesics	56	8.96%	23	5.29%
7	Haematological Drugs	7	1.12%	3	0.69%
8	Vit.&Mineral, Supplements	41	6.56%	29	6.67%

On analyzing the prescriptions for drug druginteractions;Azithromycin+Ondansetron was the most observed followed by levofloxacin + Ondansetron and Rabeprazole + Clopidogrel. (Table 5)CVS drugs were most commonly prescribed in both admitted and discharged elderly patients, followed by GI drugs during admission and antimicrobials during discharge respectively.

Table 7: Number of Patients With or Without Comorbidities.

SL.NO	PATIENTS WITH OR WITHOUT COMORBIDITY	NUMBER	PERCENTAGE
1	Patients with comorbidity	121	80.67%
2	Patients	29	19.33%
3	Total	150	100%

Out of 150 cases analyzed, we found that 121 patients were with comorbidities whereas 29 patients were without any comorbidity.

Table 8: Age Wise Categorization of Patients Without Comorbidities.

SL.NO	AGE WISE CATEGORIZATION	NUMBER OF PATIENTS	PERCENTAGE
1	60-69	23	79.31%
2	70-79	4	13.79%
3	≥80	2	6.90%
4	TOTAL	29	100%

Out of the 29 patients without comorbidities, we observed that 23 patients (79.31%) were between the age group of 60-69 followed by 70-79 (13.79%) and ≥ 80 (6.90%) respectively.

Table 9: Polypharmacy vs Gender.

SL.NO	NUMBER OF DRUGS	MALES	FEMALES	TOTAL	PERCENTAGE
1	≤5 DRUGS	14	1	15	10 %
2	MORE THAN 5	82	53	135	90 %

Out of 150 cases analyzed major polypharmacy was found in 82 male patients and 53 female patients.

DISCUSSION

A total of 150 patients were enrolled in this study. Out of 150 prescriptions analyzed 96(64.66%) were males and 54(35.33%) were females. This study was found to be similar to the studies conducted by Kumar Swamy RC et al, Maheshkumar VP et al and Pawaret al. [6-7, 10]

Majority of the patients were between 60-69 years followed by 70-79 years which is in compliance with the study done by Maheshkumar VP et al. The other age group (≥80 years) were found to be less. [10]

Majority of the drugs were given for cardiovascular diseases. This was found to be similar with the studies conducted by Karthik Janardhan Salwe et al, Kumara Swamy RC et al and Maheshkumar VP. [3, 6, 10]

Major polypharmacy was common in the hospitalized patients as 90% of the study patients were given >5 drugs during the hospital stay, that is they were categorized as major polypharmacy which was found to be similar to the study conducted by Maheshkumar VP et al. [10]

In our study, most commonly prescribed drugs were CVS drugs (22.09%), GI (20.33%), antimicrobial (19.05%), analgesics (8.97%), hypolipidaemic (4.9%). Similar observations were made by Karthik Janardhan Salwe et al in their study. [3]

The relationship between medication prescribed and actual DDIs were found that DDIs increased as number of drugs increased in therapy. These results were found similar with the study carried out in Brazil by Raquel S Mendes Netto et al. [11]

Total 320 drug interactions were found, on the severity assessment of the drug interactions 62.82% of actual DDIs were found to be moderate and 8.75% were severe. This was found to be similar to the study conducted by Pawaret al. [7]

Ondansetron, Azithromycin, Levofloxacin were frequently involved in severe DDIs. Furosemide, Digoxin, Aspirin were frequently responsible for moderate DDIs. The study conducted by KL Naveen Kumar et al showed the similar drug involved in moderate and severe DDIs. [12]

CONCLUSION

Polypharmacy cannot be avoided as the elderly patients usually suffer from chronic diseases which lead to the use of multiple drugs resulting in complex regimen. In order to reduce burden of drug-drug interactions due to polypharmacy, educational programmes should be encouraged but it might require a considerable amount of time and close monitoring. Further studies are required for raising physician's awareness and steps to sensitize higher authorities regarding polypharmacy and dangerous drug-drug interactions may help to curb irrational prescriptions and ensure safety of the elderly.

Conflict of Interest:

There was no conflict of interest

Abbreviations:

SI.NO	ABBREVIATION	DETAILS
01	CNS	Central Nervous System
02	CVS	Cardiovascular System
03	DDIs	Drug-Drug Interactions
05	GI	Gastrointestinal
06	OTC	Over The Counter
07	RS	Respiratory System

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