

PREVALENCE AND SEVERITY OF POSSIBLE DRUG-DRUG INTERACTIONS AMONG THE GERIATRIC PATIENTS AT AN INDIAN TERTIARY CARE TEACHING HOSPITAL

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ABSTRACT

Objective: The objective of this study was to study the prevalence and severity of possible drug-drug interactions (DDIs) among the geriatric patients.

Methods: The present study was a retrospective cross-sectional study. Case records of geriatric inpatients from the medical records department were included in the study and the case records of all the remaining age group inpatients were excluded from the study. All the collected cases were subjected to check for the DDIs using the software Micromedex 2.0 and were categorized into minor, moderate, and major based on the severity.

Results: In this study, a total of 85 cases were screened for possible DDIs, and among them, 54 cases were found to be with 179 possible DDIs. The prevalence was observed to be 63.5%. Most of the possible DDIs were found to be with moderate severity (65.4%) followed by major (25.7%). Majority of the possible DDIs were observed in the Department of General Medicine (83.2%) followed by chest and tuberculosis (7.8%).

Conclusion: Majorly, the severity of interactions was found to be moderate in this study. To reduce the DDIs, rationale prescriptions have to be prescribed by considering the risk-benefit ratio. Geriatrics should be prescribed very cautiously because the age-related pharmacokinetics plays a significant role. By taking all the above aspects into consideration, clinical pharmacist should play a crucial role in the prevention and management of DDIs, especially in geriatrics.

Keywords: Drug-drug interactions, Geriatrics, Polypharmacy.

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INTRODUCTION

Improving the health-related quality of life in geriatric patients is one of the significant challenges faced by the health-care fraternity [1,2]. When compared to younger individuals, individuals over the age of 65 years are more likely to be on drug therapy. Usually, they used to be under polypharmacy due to comorbid disease conditions [3,4]. Polypharmacy is a significant risk factor in resulting the drug-drug interactions (DDIs) [5-7]. A DDI can be defined as a clinically meaningful alteration in the effect of the object drug as a result of the coadministration of the precipitant drug [8-10]. Aging associated with altered drug pharmacokinetics contributes to DDIs that represent a considerable source of preventable harm in geriatric patients [11-15]. A recent study on the incidence and preventability of adverse drug events among the older persons in the ambulatory setting revealed that about 13% of preventable prescribing errors were involved with drug interactions [16]. According to a study in Finland, about 4.8% of the residents were observed to be with significant drug interactions clinically [17]. A higher prevalence of potentially harmful drug combinations (25%) was reported by a study from Taiwan in the year of 2008 [18]. In developing countries, little information is available about the prevalence of DDIs in geriatrics [19]. Hence, in this study, we made an attempt to assess the prevalence and severity of possible DDIs among the geriatric patients.

METHODS

The present study was a retrospective cross-sectional study, conducted at Konaseema Institute of Medical Sciences, Amalapuram, Andhra Pradesh, India. This study was approved by the Institutional Ethics Committee (No: 97/2015). Case records of the geriatric inpatients (≥ 65 years) from the medical records department were included in the

study and the case records of all the remaining age group inpatients were excluded from the study. All the collected cases were subjected to check for the possible DDIs using the software Micromedex 2.0 and were categorized into minor, moderate, and major based on the severity [17-20].

Statistical analysis

SPSS 21.0 was used to perform the statistical analysis. Chi-square test was performed and *p* value was obtained by two-tailed method at 95% confidence interval.

RESULTS

In our study, a total of 85 cases were screened for DDIs using the software. Among them, 54 cases were observed with 179 possible DDIs, and the prevalence was observed to be 63.5%. Table 1 represents the gender-wise categorization of the patients involved in the study and Fig. 1 represents the prevalence of drug-drug interactions.

Table 2 represents the age-wise categorization of the patients observed with possible interactions. Among the 54 cases observed with possible DDIs 35 (64.8%) were observed to be in the age group of 65-69 years, 11 (20.4%) were in the age group of 70-74 years, 5 (9.3%) were in the age group of 75-79 years, and 3 (5.6%) were in the age group of 80-84 years.

Fig. 2 graphically represents the type of polypharmacy observed among the prescriptions observed with possible DDIs. Among them, 38 (70.4%) were observed with major polypharmacy (≥ 9 drugs), 11 (20.4%) were observed with moderate polypharmacy (6-8 drugs), and 5 (9.2%) were observed with minor polypharmacy (3-5 drugs).

Table 1: Gender-wise categorization of patients involved in the study

Gender	Cases observed with interactions (%)	Cases observed without interactions (%)	Total (%)	χ^2 value	p value
Male	23 (42.6)	16 (51.6)	39 (45.9)	0.645	0.42
Female	31 (57.4)	15 (48.4)	46 (54.1)		
Total	54 (100)	31 (100)	85 (100)		

Table 2: Age-wise categorization of patients with drug-drug interactions

Age	Male (%)	Female (%)	Total (%)
65-69	15 (65.2)	20 (64.5)	35 (64.8)
70-74	4 (17.4)	7 (22.6)	11 (20.4)
75-79	2 (8.7)	3 (9.7)	5 (9.3)
80-84	2 (8.7)	1 (3.2)	3 (5.6)
Total	23 (100)	31 (100)	54 (100)

Table 3: Severity of possible DDIs involved in the study

Severity	Male (%)	Female (%)	Total (%)	χ^2 value	p value
Minor	5 (6.9)	11 (10.3)	16 (8.9)	2.512	0.28
Moderate	52 (72.2)	65 (60.8)	117 (65.4)		
Major	15 (20.9)	31 (28.9)	46 (25.7)		
Total	72 (100)	107 (100)	179 (100)		

DDIs: Drug-drug interactions

Table 3 represents the severity of possible DDIs involved in the study. Among the 179 possible DDIs, 16 (8.9%) were found to be minor, 117 (65.4%) were found to be moderate, and 46 (25.7%) were found to be major interactions.

Fig. 3 represents the department-wise categorization of possible DDIs among the geriatric patient population. Among the total possible DDIs observed in this study, 83.2% were observed in the Department of General Medicine, 7.8% were observed in the Department of Chest and Tuberculosis (TB), 4.5% were in the Department of Gynecology and Obstetrics, and again, 4.5% were in the Department of Orthopedics.

DISCUSSION

DDIs are the significant subgroup of adverse drug events that are highly prevalent in geriatric patients. In this study, a total of 85 cases were screened for possible DDIs, and among them, 54 cases were found to be with possible DDIs. Among them, females (57.4%) were found to be with more number of possible DDIs when compared to males (42.6%). The prevalence was observed to be 63.5%. The prevalence of possible DDIs in the age group of 65-69 years (64.8%) was found to be high followed by the age group of 70-74 years (20.4%). This result was found to be differed from the study done by Rahmawati *et al.* as their study revealed very less prevalence (16%) of possible DDIs in the age group of 65-69 years [19].

Geriatric patients would be more prone to DDIs due to the age-related physiologic changes and increased risk of developing diseases related to age when compared to younger patients. Polypharmacy can be observed in the prescriptions which were prescribed to treat the chronic diseases. In this study, the majority of the prescriptions were observed to be with major polypharmacy (70.4%) followed by moderate polypharmacy (20.4%) as geriatric patients were mainly observed with multiple disease conditions. Most of the possible DDIs were found to be with moderate severity (65.4%) followed by major (25.7%). Majority of the possible DDIs were observed in the Department of General Medicine (83.2%) followed by the chest and TB department (7.8%).

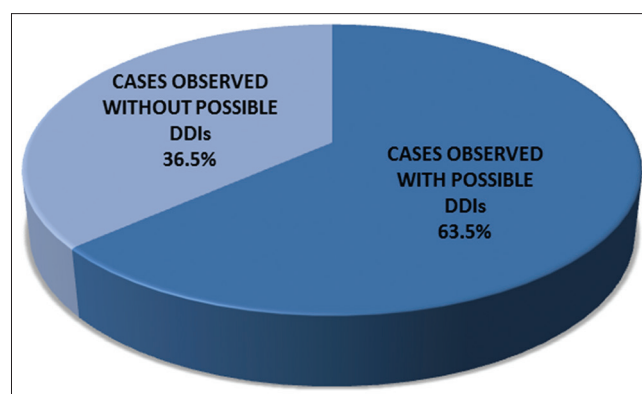


Fig. 1: Prevalence of possible drug-drug interactions among the geriatric patients

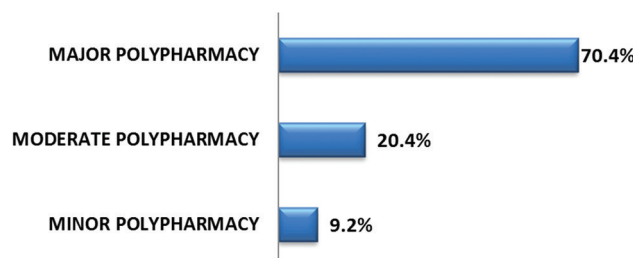


Fig. 2: Types of polypharmacy involved in the study

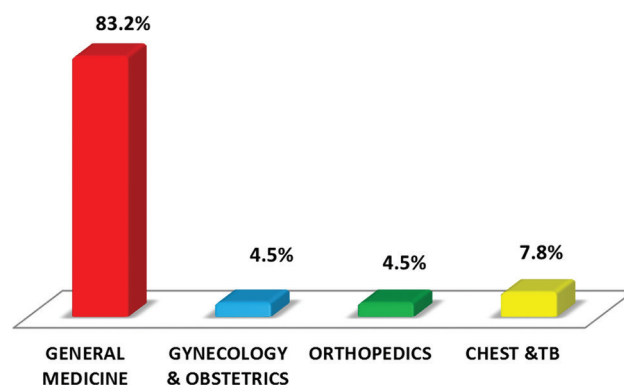


Fig 3: Department-wise categorization of possible drug-drug interactions among the geriatric patient population

CONCLUSION

In this study, the prevalence of possible DDIs among the geriatrics was found to be 63.5%. Majority of the prescriptions were observed with major polypharmacy. Prescribing the drugs in geriatrics is a unique challenge and polypharmacy become a significant consideration. Polypharmacy became more common to manage the complex and chronic diseases in geriatrics, and thus, DDIs became a major concern in clinical practice. Majorly, the severity of interactions was found to be moderate in geriatrics in our study. To reduce the DDIs, rationale

Table 4: Examples of interactions observed in the study

Major interactions	Moderate interactions	Minor interactions
Metronidazole+Ondansetron	Atorvastatin+Clopidogrel	Aspirin+Phenytoin
Rifampicin+Phenytoin	Dexamethasone+Rifampicin	Bisacodyl+Ranitidine
Ciprofloxacin+Metronidazole	Ciprofloxacin+Diclofenac	Isoniazid+Theophylline

prescriptions have to be prescribed by considering the risk-benefit ratio. Geriatrics should be prescribed very cautiously because the age-related pharmacokinetics plays a significant role. By taking all the above aspects into consideration, clinical pharmacist should play a crucial role in the prevention and management of DDIs in geriatrics especially.

LIMITATION

This study with a prospective type of approach along with the involvement of other health-care professionals would show a significant impact in screening the clinically encountered DDIs for providing the better pharmaceutical care for the patients by the direct involvement of the clinical pharmacist.

AUTHORS CONTRIBUTION

All authors had equally contributed to the research work.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

REFERENCES

- Maher RL, Hanlon J, Hajjar ER. Clinical consequences of polypharmacy in elderly. *Expert Opin Drug Saf* 2014;13:57-65.
- Kim HA, Shin JY, Kim MH, Park BJ. Prevalence and predictors of polypharmacy among Korean elderly. *PLoS One* 2014;9:e98043.
- Kaufman DW, Kelly JP, Rosenberg L, Anderson TE, Mitchell AA. Recent patterns of medication use in the ambulatory adult population of the United States: The slone survey. *JAMA* 2002;287:337-44.
- Nolan L, O'Malley K. Prescribing for the elderly. Part I: Sensitivity of the elderly to adverse drug reactions. *J Am Geriatr Soc* 1988;36:142-9.
- Dobova Dubova SV, Reyes-Morales H, Torres-Arreola Ldel P, Suárez-Ortega M. Potential drug-drug and drug-disease interactions in prescriptions for ambulatory patients over 50 years of age in family medicine clinics in Mexico city. *BMC Health Serv Res* 2007;7:147.
- Aparasu R, Baer R, Aparasu A. Clinically important potential drug-drug interactions in outpatient settings. *Res Social Adm Pharm* 2007;3:426-37.
- Yanti E, Kristin E, Yasmina A. Potential drug interactions in hypertensive patients in Liwa district hospital, Lampung Barat, Indonesia. *Int J Pharm Pharm Sci* 2017;9:134-8.
- Hines LE, Murphy JE. Potentially harmful drug-drug interactions in the elderly: A review. *Am J Geriatr Pharmacother* 2011;9:364-77.
- Vanitha Jyothi N, Bharathi DR, Prakruthi GM. Evaluation of drug-drug interactions in patients of general medicine, ICU and emergency departments at a tertiary care hospital. *Int J Curr Pharm Res* 2018;10:68-71.
- Murthy NV, Krishnaveni K, Freeda RM, Kumar RS. Assessment of potential drug-drug interaction in stroke patients. *Int J Pharm Pharm Sci* 2016;8:221-4.
- Seymour RM, Routledge PA. Important drug-drug interactions in the elderly. *Drugs Aging* 1998;12:485-94.
- Mallet L, Spinewine A, Huang A. The challenge of managing drug interactions in elderly people. *Lancet* 2007;370:185-91.
- Hilmer SN, McLachlan AJ, Le Couteur DG. Clinical pharmacology in the geriatric patient. *Fundam Clin Pharmacol* 2007;21:217-30.
- Hilmer SN, Gnjdic D. The effects of polypharmacy in older adults. *Clin Pharmacol Ther* 2009;85:86-8.
- McDonnell PJ, Jacobs MR. Hospital admissions resulting from preventable adverse drug reactions. *Ann Pharmacother* 2002;36:1331-6.
- Gurwitz JH, Field TS, Harrold LR, Rothschild J, Debellis K, Seger AC. Among older persons in the ambulatory setting incidence and preventability of adverse drug events. *JAMA* 2003;289:1107-16.
- Hosia-Randell HM, Muurinen SM, Pitkälä KH. Exposure to potentially inappropriate drugs and drug-drug interactions in elderly nursing home residents in Helsinki, Finland: A cross-sectional study. *Drugs Aging* 2008;25:683-92.
- Dolton MJ, Pont L, Stevens G, McLachlan AJ. Prevalence of potentially harmful drug interactions in older people in Australian aged-care facilities. *J Pharm Pract Res* 2012;42:33-6.
- Rahmawati F, Hidayati N, Rochmah W, Sulaiman SA. Potentiality of drug-drug interactions in hospitalized geriatric patients in a private hospital, Yogyakarta, Indonesia. *Asian J Pharm Clin Res* 2010;3:191-4.
- Ramam S, Kumar SV, Devanna N, Reddy KR. Prevalence and severity of possible drug-drug interactions in the inpatient department of internal medicine. *Int J Pharm Clin Res* 2016;8:1212-4.