

Prevalence and Severity of Possible Drug-Drug Interactions in the Inpatient Department of Internal Medicine

Ramam Sripada^{1*}, S V Suresh Kumar², N Devanna³, Kandula Ravindra Reddy⁴

¹Research Scholar, CES College of Pharmacy, Kurnool, Andhra Pradesh, India, 518218.

²Professor, Department of Pharmacognosy, CES College of Pharmacy, Kurnool, Andhra Pradesh, India, 518218.

³Department of Chemistry, JNTUA college of Engineering, Anantapur, 515002.

⁴Professor & Ex-Principal, CES College of Pharmacy, Kurnool, Andhra Pradesh, India, 518218.

Available Online: 10th August, 2016

ABSTRACT

Background: Drug-drug interactions became a major concern in clinical practice at present. The change in the effect of the object drug as a result of the co administration of the precipitant drug is known as a drug-drug interaction. In order to manage the complex and chronic diseases, multiple drug therapy became more common and thus drug-drug interactions became a major concern for both the patients and health care providers. Even today, research on drug-drug interactions was very limited in India. Hence in this study, we made an attempt to assess the prevalence and severity of possible drug-drug interactions in the inpatient department of internal medicine.

Methods: The present study was a retrospective cross-sectional study. Case records of the in-patients of internal medicine from the medical records department were included and the records of the ambulatory patients were excluded from the study. All the collected cases were subjected to check for the drug-drug interactions by using the software MICROMEDEX 2.0.

Results: During the study period, a total of 437 cases were screened for drug-drug interactions by using the software. Among them, 227 cases were observed with 675 possible drug-drug interactions and the prevalence was found to be 51.9%. Among the total cases observed with possible drug-drug interactions, 115 (50.7%) were found to be in males and 112 (49.3%) were found to be in females. The prevalence of possible drug-drug interactions in the elderly age group was found to be significantly higher than all the other age groups in our study. Among the 227 prescriptions, which were observed with possible drug-drug interactions, 131 (57.7%) were observed with major polypharmacy, 65 (28.6%) were observed with moderate polypharmacy and 31 (13.7%) were observed with minor polypharmacy. In our study, 6.8% of the interactions were of minor severity, 63.3% were of moderate severity and 29.9% were of major severity. Minor, moderate and major interactions are highly prevalent in the age group 61-70 years.

Conclusion: According to our study, elderly patients were more prone to have more number of possible drug-drug interactions than other age groups because of the concurrent disease conditions and poly pharmacy. Based on the poly pharmacy classification, major poly pharmacy is the major factor for the chance of occurring drug-drug interactions. The severity of the majority of the interactions was found to be moderate in this department. By taking all the above aspects into consideration, clinical pharmacist should play a crucial role in the prevention and management of drug-drug interactions.

Keywords: Drug-Drug interactions, Internal Medicine, Polypharmacy.

INTRODUCTION

Drug-drug interactions became a major concern in clinical practice at present. The change in the effect of the object drug as a result of the co administration of the precipitant drug is known as a drug-drug interaction¹. According to a recent review, around 0.6% of the hospital admissions, 0.1% of the re-hospitalizations and 0.05% of the emergency department visits were caused due to adverse drug reactions as a result of drug-drug interactions^{2,3}. In order to manage the complex and chronic diseases, multiple drug therapy became more common and thus drug-drug interactions became a major concern for both the patients and health care providers^{4,9}. Even today,

research on drug-drug interactions was very limited in India. Hence in our study, we made an attempt to assess the prevalence and severity of possible drug-drug interactions in the inpatient department of internal medicine.

METHODS

The present study was a retrospective cross-sectional study, conducted at Konaseema Institute of Medical Sciences (KIMS), Amalapuram, Andhra Pradesh, India. This study was approved by the institutional ethics committee. Case records of the in-patients of internal medicine from the medical records department were

Table 1: Gender wise categorization of the patients.

Gender	Cases observed with interactions (%)	Cases observed without interactions (%)	Total (%)	Odds ratio (95% CI)	p-value
Male	115 (50.7)	127 (60.5)	242 (55.4)	0.67 (0.45-0.98)	0.03*
Female	112 (49.3)	83 (39.5)	195 (44.6)		
Total	227 (100)	210 (100)	437(100)		

*Indicates statistically significant

Table 2: Age wise categorization of the patients observed with interactions.

Age	Male (%)	Female (%)	Total (%)
≤ 20	5 (4.3)	9 (8)	14 (6.2)
21-30	13 (11.3)	9 (8)	22 (9.7)
31-40	14 (12.2)	14 (12.5)	28 (12.3)
41-50	17 (14.8)	21 (18.8)	38 (16.7)
51-60	37 (32.2)	26 (23.2)	63 (27.8)
61-70	26 (22.6)	26 (23.2)	52 (22.9)
71-80	3 (2.6)	7 (6.3)	10 (4.4)
TOTAL	115 (100)	112 (100)	227 (100)

Table 3: Type of polypharmacy observed among the prescriptions observed with interactions.

Type of polypharmacy	No.of prescriptions (%)
MINOR (3-5 drugs)	31 (13.7)
MODERATE (6-8 drugs)	65 (28.6)
MAJOR (≥9 drugs)	131 (57.7)
TOTAL	227 (100)

included and the records of the ambulatory patients were excluded from the study. All the collected cases were subjected to check for the drug-drug interactions by using the software **MICROMEDEX 2.0** and the interactions were categorized based on the severity into minor, moderate and major.

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 AND DISCUSSION

During the study period, a total of 437 cases were screened for drug-drug interactions by using the software. Among them, 227 cases were observed with 675 possible drug-drug interactions and the prevalence was observed to be 51.9%. Out of these cases, a total of 675 possible drug-drug interactions were observed. Among the total cases observed with possible drug-drug interactions, 115 (50.7%) were found to be in males and 112 (49.3%) were found to be in females. Table 1 represents the gender wise categorization of the patients. Table 2 represents the age wise categorization of the patients observed with interactions. The prevalence of possible drug-drug interactions in the age group 51-60 years (27.8%) was found to be high followed by the age group 61-70 years (22.9%). The prevalence of possible drug-drug interactions in the elderly age group was found to be significantly higher than all the other age groups in our study. Elderly patients would be more prone to drug-drug interactions due

to the age related physiologic changes and increased risk of developing diseases related to age when compared to younger patients. Drug-drug interactions are the significant subgroup of adverse drug events that are highly prevalent in patients with polypharmacy. The risk of drug-drug interactions is very high and common especially in case of chronic diseases. Polypharmacy can be observed in the prescriptions which were prescribed to treat the chronic diseases. Table 3 represents the type of polypharmacy observed among the prescriptions observed with interactions. Among the 227 prescriptions, which were observed with possible drug-drug interactions, 131 (57.7%) were observed with major polypharmacy, 65 (28.6%) were observed with moderate polypharmacy and 31 (13.7%) were observed with minor polypharmacy. Table 4 represents the severity of interactions based on gender wise categorization and Table 5 Severity of drug-drug interactions based on age wise categorization. In our study, 6.8% of the interactions were of minor severity, 63.3% were of moderate severity and 29.9% were of major severity. Majority of the interactions were of moderate severity followed by major and minor. Minor, moderate and major interactions are highly prevalent in the age group 61-70 years and some of the examples observed in our study were represented in the table 6.

CONCLUSION

According to our study, elderly patients were more prone to have more number of possible drug- drug interactions than other age groups because of the concurrent disease condition and poly pharmacy. Based on the poly pharmacy classification, major poly pharmacy is the major factor for the chance of occurring drug-drug interactions. The severity of the majority of the interactions was found to be moderate in this department. By taking all the above aspects into consideration, clinical pharmacist should play a crucial role in the prevention and management of drug-drug interactions.

Table 4: Severity of interactions based on gender wise categorization.

Severity	Male	Female	Total (%)	Chi Square value	p-value
Minor	27 (8.7)	19 (5.3)	46 (6.8)	5.22	0.07
Moderate	202 (64.7)	225 (61.9)	427 (63.3)		
Major	83 (26.6)	119 (32.8)	202 (29.9)		
Total	312 (100)	363 (100)	675 (100)		

Table 5: Severity of drug-drug interactions based on age wise categorization.

Age	Percentage of patients observed with drug-drug interactions			
	Minor (%)	Moderate (%)	Major (%)	Total (%)
≤ 20	1 (2.2)	19 (4.5)	23 (11.4)	43 (6.4)
21-30	5 (10.9)	26 (6.1)	18 (8.9)	49 (7.3)
31-40	4 (8.7)	45 (10.5)	23 (11.4)	72 (10.7)
41-50	9 (19.6)	65 (15.2)	26 (12.9)	100 (14.8)
51-60	11 (23.9)	124 (29)	48 (23.8)	183 (27.1)
61-70	14 (30.4)	132 (30.9)	50 (24.7)	196 (29)
71-80	2 (4.3)	16 (3.8)	14 (6.9)	32 (4.7)
TOTAL	46 (100)	427 (100)	202 (100)	675 (100)

Table 6: Examples of interactions observed in our study

Major interactions	Moderate interactions	Minor interactions
ciprofloxacin + metronidazole	amlodipine + aspirin	aspirin + ranitidine
artesunate + azithromycin	pantoprazole + propranolol	amikacin + ampicillin
amlodipine + clopidogrel	doxycycline + ferrous sulphate	ampicillin + gentamicin
azithromycin + ondansetron	enalapril + metformin	furosemide + theophylline
amikacin + furosemide	diclofenac + telmisartan	amikacin + amoxicillin

REFERENCES

1. Sonu, Sharma G, Harikumar SL, Navis S. A Review on Drug-Drug and Drug-Food Interactions in Patients During the Treatment of Diabetes Mellitus. *Int J Pharmacol and Clin Sci.* 2015; 4(4): 98-105.
2. Mateti U, Rajakannan T, Nekkanti H, Rajesh V, Mallaysamy S, Ramachandran P. Drug-drug Interactions in Hospitalized Cardiac Patients. *Journal of Young Pharmacists: JYP.* 2011; 3(4): 329-333.
3. Patel VK, Acharya LD, Rajakannan T, Surulivelrajan M, Guddattu V, Padmakumar R. Potential drug interactions in patients admitted to cardiology wards of a south Indian teaching hospital. *The Australasian Medical Journal.* 2011;4 (1):9-14.
4. Anastasia Rivkin, Hongjun Yin. Evaluation of the role of the critical care pharmacist in identifying and avoiding or minimizing significant Drug-Drug interactions in medical intensive care patients. *Journal of Critical Care.* 2011; 26: 1-6.
5. Hui-Ling Liao, Jin-Tang Chen, Tso-Chiang Ma, Yuan-Shiun Chang. Analysis of drug-drug interactions (DDIs) in nursing homes in Central Taiwan. *Archives of Gerontology and Geriatrics.* 2008; 47: 99-107.
6. Priska Vonbach, Andre Dubied, Stephan Krahenbuhl, Jurg H. Beer. Prevalence of drug-drug interactions at hospital entry and during hospital Stay of patients in internal medicine. *European Journal of Internal Medicine.* 2008; 19: 413-420.
7. Kamran Akram, Swapna Rao, Miriam Parker. A lesson for everyone in drug-drug interactions. *International Journal of Cardiology.* 2007; 118: 19-20.
8. Kohler GI, Bode-Boger SM, Busse R, Hoopmann M, Welte T, Boger RH. Drug-drug interactions in medical patients: effects of in-hospital treatment and relation to multiple drug use. *Int J Clin Pharmacol Ther.* 2000 Nov; 38(11): 504-513.
9. Galindo-Ocana J, Gil-Navarro MV, Garcia-Morillo JS, Bernabeu Wittel M, Ollero Baturone M, Ortiz-Camunez MA. Drug-drug interactions in multicentre polypathological polymedicated patients. *Rev Clin Esp.* 2010 Jun; 210(6): 270-278.