



Pattern of Possible Drug-Drug Interactions among Different Specialties at an Indian Tertiary Care Teaching Hospital

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Article History:

Received on: 04 Jan 2020

Revised on: 11 Feb 2020

Accepted on: 4 Mar 2020

Keywords:

Drug-drug interactions,
Gynecology & Obstetrics,
Orthopedics,
Psychiatry

ABSTRACT

To study the pattern of possible drug-drug interactions among different specialties at an Indian tertiary care teaching hospital. The present study was a retrospective study where the inpatient case records of psychiatry, chest & tuberculosis, gynecology & obstetrics and orthopedics were included. By using the software Micromedex 2.0, all the collected cases were screened for possible DDIs and the severity of the interactions was classified into minor, moderate and major. A total of 205 cases were screened for possible DDIs and about 120 (58.5%) cases were observed to be with possible DDIs. Among all the departments, moderate polypharmacy was observed to be more in the prescriptions (41.7%). A total of 314 possible DDIs were observed and most of the possible DDIs were of moderate severity (64.1%). Majority of the possible DDIs were found in the department of gynecology & obstetrics (42.4%) followed by the psychiatry department (29.6%). In order to reduce the DDIs, rationale prescriptions must be prescribed by considering the risk benefit ratio. Clinical pharmacists should take the responsibility in assisting all the prescribers for screening the possible DDIs in the prescriptions there by preventing them and providing a better pharmaceutical care in various specialties.



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ISSN: 0975-7538

DOI: <https://doi.org/10.26452/ijrps.v11i3.2591>

Production and Hosted by

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INTRODUCTION

Drug-drug interactions became a significant concern in the clinical practice for both the patients and health care professionals (Mezgebe, 2015). A

drug-drug interaction (DDI) can be defined as the pharmacological or clinical response to the administration of a drug with another drug that alters the response of the patient to the drug index (Malone et al., 2004). In the clinical scenario, managing the complex and chronic diseases with polypharmacy became more common (Cruciol-Souza and Thomson, 2006). Patients with chronic diseases, complex drug regimen and prolonged therapy with polypharmacy can be vulnerable to DDIs. DDIs may lead to an increased untoward effects or alteration of therapeutic response of the drugs that may result in hospitalization or even some times death (Ismail et al., 2012). The common risk factors of DDIs can be gender, age, polypharmacy, prolonged hospital stay and multiple disease conditions (Essock et al., 2011). Mal-absorption, impaired hepatic and/or renal function can be the other risk factors

of DDIs ([Malone et al., 2004](#)).

Recent studies revealed that DDIs may cause 20-30% of ADRs ([van Leeuwen et al., 2010](#); [Vasudev and Harrison, 2008](#)). According to a recent review, about 0.05% of the emergency department visits, almost 0.1% of the re-hospitalizations and around 0.6% of the hospital admissions were caused due to adverse drug reactions as a result of drug-drug interactions ([Mateti et al., 2011](#); [Patel, 2011](#)). DDIs have attained a great attention from the scientific, regulatory and healthcare communities globally. In developing countries, studies are required to explore and evaluate the pattern of possible DDIs among different specialties. In this study, we made an attempt in studying the pattern of possible drug-drug interactions among the psychiatry, chest & tuberculosis, gynecology & obstetrics and orthopedics departments.

MATERIALS AND METHODS

This study was approved by the institutional ethics committee (No: 97/2015) and was conducted retrospectively at Konaseema Institute of Medical Sciences (KIMS), Amalapuram, Andhra Pradesh, India. In-patient case records of psychiatry, gynecology & obstetrics, chest & TB and orthopedics were included in this study. Prescriptions with more than two drugs (polypharmacy) were taken for the screening of possible DDIs. Prescriptions with 3-5 drugs, 6-8 drugs and ≥ 9 drugs were considered to be minor, moderate and major polypharmacy prescriptions respectively. By using the software Micromedex 2.0, all the collected cases were screened for possible DDIs and the severity of the interactions was classified into minor, moderate and major ([Mezgebe, 2015](#); [Qorraj-Bytyqi et al., 2012](#)). Statistical analysis was performed by using SPSS 21.0. Chi square test was done and p-values were obtained by two tailed method at 95% confidence interval.

RESULTS AND DISCUSSION

A total of 205 cases were screened for possible DDIs and among them 120 cases were found to be with possible DDIs (Table 1). In this study, the prevalence was found to be 58.5% and this result was found to be little high when compared to the study done by ([RC et al., 2014](#)). Among the 120 cases which were found to be with possible DDIs, 45 (37.5%) were males and 75 (62.5%) were females.

Majority of the possible DDIs were observed in the age group of 21-30 years (28.4%) followed by the age group 41-50 years (20%) (Table 2).

The mean age of the patients was found to be 31.5 (± 11.6) years in the department of psychiatry, 33.3 (± 15.4) years in the department of gynecology & obstetrics, 49.9 (± 13.3) years in the department of chest & TB and 48.5 (± 18.1) years in the department of orthopedics.

According to the department wise categorization (Table 3), about 39.2% of the cases with possible DDIs were found in the psychiatry, 30% in the gynecology & obstetrics, 18.3% in the chest & TB and 12.5% in the orthopedics. In this study, prescriptions observed with possible DDIs were categorized based on the classification of polypharmacy. About 28.3% of the prescriptions were of minor polypharmacy, 41.7% were of moderate polypharmacy and 30% were of major polypharmacy.

Among all the departments, moderate polypharmacy (6-8 drugs) was observed to be more in the prescriptions. In this study, duration of stay was also taken into consideration and most of the cases were found to have stayed for 6-10 days (44.2%) followed by 1-5 days (29.2%). In this study, the average length of stay of the patients with DDIs was observed to be 5.2 (± 2.1) days in psychiatry, 11.8 (± 6.1) days in gynecology & obstetrics, 8.8 (± 3.6) days in chest & TB and 11.8 (± 5.2) days in the orthopedics.

A total of 314 possible drug-drug interactions were observed in this study and among them 47 (14.9%) were of minor interactions, 201 (64.1%) were of moderate interactions and 66 (21%) were of major interactions (Table 4). Most of the possible DDIs were of moderate severity followed by major and minor.

Based on the department wise categorization (Table 5), 29.6% were observed in the psychiatry, 42.4% were in the gynecology & obstetrics, 17.2% were in the chest & TB and 10.8% were in the orthopedics. Majority of the possible DDIs were observed in the gynecology & obstetrics (42.4%) followed by psychiatry (29.6%).

Table 6 represents the most commonly observed DDIs in this study. The drug combinations clozapine + lorazepam, haloperidol + trihexyphenidyl Hcl and lorazepam + olanzapine were the most commonly observed possible DDIs of minor, moderate and major severities respectively in the psychiatry.

In gynecology & obstetrics, calcium + iron, ciprofloxacin + diclofenac and ondansetron + metronidazole were found to be the most commonly observed possible DDIs of minor, moderate and major severities respectively. Glimipride + rifampicin, isoniazid + phenytoin and rifampicin +

Table 1: Categorization of cases based on gender

Gender	Cases with possible DDIs (%)	Cases without possible DDIs(%)	Total (%)	χ^2 -value	p-value
Male	45 (37.5)	39 (45.9)	84 (41)	1.44	0.22
Female	75 (62.5)	46 (54.1)	121 (59)		
Total	120 (100)	85 (100)	205 (100)		

Table 2: Age wise categorization of cases with possible DDIs

Age	Male (%)	Female (%)	Total (%)
11-20	4 (8.9)	12 (16)	16 (13.3)
21-30	10 (22.2)	24 (32)	34 (28.4)
31-40	6 (13.4)	15 (20)	21 (17.5)
41-50	11 (24.4)	13 (17.4)	24 (20)
51-60	9 (20)	6 (8)	15 (12.5)
61-70	3 (6.7)	4 (5.3)	7 (5.8)
71-80	2 (4.4)	1 (1.3)	3 (2.5)
Total	45 (100)	75 (100)	120 (100)

Table 3: Department wise categorization of cases with possible DDIs

Department	Male	Female	Total
Psychiatry	22 (48.9)	25 (33.4)	47 (39.2)
Gynecology & Obstetrics	N/A	36 (48)	36 (30)
Chest & TB	15 (33.3)	7 (9.3)	22 (18.3)
Orthopedics	8 (17.8)	7 (9.3)	15 (12.5)
Total	45 (100)	75 (100)	120 (100)

Table 4: Gender wise categorization of the possible DDIs based on their severity

Gender	Minor	Moderate	Major	Total	p- value
Male	6 (12.8)	66 (32.8)	22 (33.3)	94 (29.9)	0.02*
Female	41 (87.2)	135 (67.2)	44 (66.7)	220 (70.1)	
Total	47 (100)	201 (100)	66 (100)	314 (100)	

*indicates statistically significant

Table 5: Department wise categorization of the possible DDIs based on their severity

Department	Minor	Moderate	Major	Total	p- value
Psychiatry	1 (2.1)	58 (28.9)	34 (51.5)	93 (29.6)	0.03*
Gynecology & Obstetrics	30 (63.8)	83 (41.3)	20 (30.3)	133 (42.4)	
Chest & TB	11 (23.4)	36 (17.9)	7 (10.6)	54 (17.2)	
Orthopedics	5 (10.7)	24 (11.9)	5 (7.6)	34 (10.8)	
Total	47 (100)	201 (100)	66 (100)	314 (100)	

*indicates statistically significant

Table 6: Most commonly observed possible DDIs in the study

Drug combination	Warning	Severity
Clozapine + Lorazepam	CNS depression	Minor
Calcium + Iron	Decreased iron effectiveness	Minor
Glimepiride + Rifampicin	Decreased plasma concentrations of glimepiride	Minor
Calcium carbonate + Folic acid	Decreased iron effectiveness	Minor
Haloperidol + Trihexyphenidyl	Excessive anticholinergic effects	Moderate
Ciprofloxacin + Diclofenac	Increased plasma concentrations of ciprofloxacin	Moderate
Isoniazid + Phenytoin	High risk of phenytoin toxicity	Moderate
Diclofenac + Telmisartan	Risk of renal dysfunction	Moderate
Lorazepam + Olanzapine	Cardiorespiratory depression	Major
Ondansetron + Metronidazole	Increased risk of QT-interval prolongation and arrhythmias	Major
Rifampicin + Phenytoin	Decreased phenytoin and/ or rifampicin exposure.	Major
Atorvastatin + Colchicine	Increased risk of rhabdomyolysis or myopathy.	Major

phenytoin were the most commonly observed possible DDIs of minor, moderate and major severities respectively in the department of chest & TB while, the drug combinations calcium carbonate + folic acid, diclofenac + telmisartan and atorvastatin + colchicine were the most commonly observed possible DDIs of minor, moderate and major severities respectively in the orthopedics department.

CONCLUSIONS

The prevalence of possible DDIs in this study was found to be 58.5%. Among all the departments, moderate polypharmacy was observed to be more in the prescriptions. A total of 314 possible DDIs were observed where most of the possible DDIs were of moderate severity. The drug combinations lorazepam + olanzapine, ondansetron + metronidazole, rifampicin + phenytoin and atorvastatin + colchicine were found to be the most commonly observed possible DDIs of major severity in the departments of psychiatry, gynecology & obstetrics, chest & TB and orthopedics respectively. In order to reduce the DDIs, rationale prescriptions must be prescribed by considering the risk benefit ratio. Clinical pharmacists should take the responsibility in assisting the prescribers for screening the possible DDIs in the prescriptions there by preventing them and providing a better pharmaceutical care in various specialties.

Conflict of Interest

None.

Funding Support

None.

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