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A prospective observational study on evaluation of the drug interactions in general medicine by a clinical pharmacist

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ABSTRACT

Background &objectives

A drug interaction is defined as the pharmalogical activity of one drug is altered by the concomitant use of another drug or by the presence of some other substance. These may result in the alteration of therapeutic effect and safety of either or both drugs. The main objective of this study to evaluate drug interactions in general medicine by a clinical pharmacist. Drug therapy becomes more complex with polypharmacy. Such prescriptions need to be evaluated thoroughly in order to avoid any chance of drug related problems (DRP'S).

Methodology

A prospective observational study using patient medical records and the necessary data were collected by using data collection forms and results were evaluated against the criteria prepared from the standard treatment guidelines.

Results

Prescription of 219 patients were studied and analysed. The demographic data revealed that there are 113(52%) male patients and 106(48%) female patients respectively. Majority of patients in the age group of 50 -59 years males (n=33) 29% and females (n=35) 30.5% were found.

Conclusion

In conclusion, our study was conducted to assess the DDIs in hospitalized patients of general medicine department of tertiary care hospital. The study concluded that DDIs are more prevalent in patients suffering from co-morbidities due to poly pharmacy. The frequency of DI would have been less with more judicial use of drugs. This study has been impacted the need for future studies to be conducted in order to improve the prescriber awareness on DDIs and their management in improving the clinical outcome. Potential DIs is frequent among in-patients prescribed with multiple medications. Regular monitoring of drug interactions helps in better patient care.

Keywords: Prospective observational study of DI, DDIs, DRP'S

INTRODUCTION

Objectives of the study

Primary objective

To evaluate drug interactions in general medicine by a clinical pharmacist [1].

Secondary objectives

- To identify various types of drug interactions depending on the severity of outcomes.
- To assess the potentiality of drug interactions.
- To evaluate the type and mechanism of drug interactions.
- To document the outcomes of drug interactions.
- To evaluate the pharmacokinetic and pharmacodynamic interactions.

METHODOLOGY

This is a prospective and observational study. A protocol was prepared and submitted, which was approved by Institutional Ethics Committee of Sunshine Hospitals, Secunderabad, which is a Multi-super specialty tertiary care hospital. In this study 219 patients were enrolled after obtaining the consent. The data collection form was prepared and used. This form mainly contains the demographic details of the patient, medication history, diagnosis and treatment of the patient [2].

This study was carried out in In-patient department (IPD) of Sunshine Hospitals, Secunderabad, which is a 500+ bedded Multi-super specialty tertiary care hospital. Patients from pregnant and lactating women, and pediatrics were excluded from our study. Randomly 219 patients were enrolled into the study based on study criteria. A self-designed patient data collection form was developed and used for this study. Patient records from the in- patients ward were obtained [3-5]. A total of 219 prescriptions prescribed with multiple drugs written by qualified medical doctors were collected from wards and analyzed. Latest edition of DRUG TODAY manual was used to decode brand names of drugs to generic names for the purpose of analysis. Data was analyzed using descriptive statistics namely total numbers, percentage and mean test wherever applicable. Microsoft word and Excel have been used to generate graphs, tables, etc. After data collection it was analyzed for statistical significant [6-11].

RESULTS

Table.1: Age wise distribution of data

Age Group (in years)	Male		Female		Total	
	N	n%	**N**	n%	**N**	n%
20-29	25	21	15	15	40	18
30-39	16	14	23	28	39	18
40-49	27	23	26	21.5	53	24
50-59	33	29	35	30.5	68	31
60-69	12	13	7	5	19	9
Total	**113**	**100**	**106**	**100**	**219**	**100**
Mean ±SD	**22.6 8.5**		**21.2 10.68**			

N= Number of patients, n= Percentage of number of patients

Table.2: Gender wise distribution of data

Gender	No. Of Patients	(%)
M	113	52
F	106	48
Total	219	100

Table.3: Gender wise distribution between types of interactions

TYPES OF INTERACTIONS	Male		Female		Total	
	N	n%	**N**	n%	**N**	n%
DRUG-DRUG	81	71	82	78	163	74
DRUG-FOOD	32	28	22	21	54	25
DRUG-CHEMICAL	1	1	1	1	2	1
Total	**113**	**100**	**106**	**100**	**219**	**100**

N= Number of patients, n= Percentage of number of patients

Table 4: Age distribution of drug-drug interactions:

Age Group (in years)	Male		Female		Total	
	N	n%	**N**	n%	**N**	n%
20-29	17	21	12	14.5	29	18
30-39	11	13.5	22	27	33	20.5
40-49	18	22	17	21	35	21
50-59	23	28.5	24	29	47	29
60-69	12	1	7	8.5	19	11.5
Total	**81**	**100**	**82**	**100**	**163**	**100**

N=Number of patients, n= Percentage of number of patients

Table.5: Age distribution of drug-food interactions

Age Group (in years)	Male		Female		Total	
	N	**n%**	**N**	**n%**	**N**	**n%**
20-29	7	22	3	14	10	18.5
30-39	5	16	1	4.5	6	11
40-49	8	25	7	32	15	28
50-59	10	31	8	36	18	33.5
60-69	2	6	3	13.5	5	9
Total	**32**	**100**	**22**	**100**	**54**	**100**

N=Number of patients, n=Percentage of number of patients

Table.6: Age distribution of drug chemical interactions

Age Group (in years)	Male		Female		Total	
	N	n%	**N**	n%	**N**	n%
20-29	0	0	0	0	0	0
30-39	0	0	0	0	0	0
40-49	0	0	0	0	0	0
50-59	1	100	1	00	2	100
60-69	0	0	0	0	0	0
Total	**1**	**100**	**1**	**100**	**2**	**100**

N= Number of patients, n=percentage of number of patients

Table.7: Therapeutic class of drugs

Class of drugs causing ADR	Gender n(%) n=111					
	Male		**Female**		**Total**	
	N	n%	**N**	n%	**N**	n%
Antimicrobials	13	11.5	11	10.5	24	11
NSAIDS	7	6	6	6	13	6
Anti-viral	4	3.5	1	1	5	2
Antihypertensive & diuretics	9	8	8	7.5	17	8
Antiepileptic	5	4.5	4	4	9	4
Corticosteroids	6	5.5	1	1	7	3
Bronchodilators	9	8	8	7.5	17	8
Opioid analgesics	9	8	9	8	18	8
Hypolipidemic agents	8	7	9	8	17	8
Anticancer agents	3	3	3	3	6	3
Anti-platelet anti-coagulant	7	6	10	9	17	8
Anti-ulcer	12	11	13	12.5	25	11.5
Antihistaminic	7	6	6	6	13	6
Anxiolytics	6	5	4	4	10	4
Hematinic	5	4	9	8	14	6.5
Others*	3	3	4	4	7	3
Total	**113**	**100**	**106**	**100**	**219**	**100**

N=Number of patients, n=Percentage of number of patients

Table.8: Severity of drug interactions

5Age Group (in years)	**Male**		**Female**		**Total**	
	N	n%	**N**	n%	**N**	n%
MILD	21	19	26	24.5	47	21
MODERATE	67	59	55	52	122	56
MAJOR	25	22	25	23.5	50	23
Total	**113**	**100**	**106**	**100**	**219**	**100**

N= Number of patients, n=Percentage of number of patients

Table.9: Gender wise comparison of pharmacodynamics drug interactions

PHARMACODYNAMIC	**Male**		**Female**		**Total**	
	N	n%	**N**	n%	**N**	n%
ADDITIVE	60	53	50	47447	110110	50550
ANTAGONIST	37	33	35	33333	72772	33333
SYNERGISTIC	16	14	21	20220	37337	17117T
Total	**113**	**100**	**106**	**100**	**219**	**100**
eMean ±SD						

N= Number of patients, n= Percentage of number of patients

Table.10: Gender wise comparison of pharmacokinetic interactions

PHARMACOKINETICS	Male		Female		Total	
	N	n%	**N**	n%	**N**	n%
ABSORPTION	54	48	62	58.5	116	53
DISTRIBUTION	13	11.5	8	7.5	21	9.5
METABOLISM	43	38	30	28	73	33.5
ELIMINATION	3	2.5	6	6	9	4
TTOTAL	**113**	**100**	**106**	**100**	**219**	**100**

N=Number of patients, n=Percentage of number of patients.

DISCUSSION

A total of 219 prescriptions of Drug interactions have been analyzed for the study. The study describes the types of drug interactions with demographic characteristics of patients. It was completely a prospective observational study conducted in a tertiary care Hospital for the duration of Six months. The main aim and objective of this study was to monitor the potentially serious and significant drug-drug interaction, to evaluate the nature and mechanism of action of these interactions, to identify the common and casual drug groups for these DDIs. By gender wise distribution, it was revealed that male predominance over female patients. Out of 219 patients, numbers of male patients were 113 (52%) and female patients were 106 (48%).

Age distribution of the study population revealed that maximum numbers of patients were between 50-59 (31%) and least number of patients was in the age group of 60-69 (09%). In our study, the minimum age of patients with drug interactions was 113 and maximum age of patient was 106. On correlating age and gender distribution in the study, it was concluded that maximum incidence rate was between the age group 50-59 years followed by 40-49 years, 30-39 years, 20-29 years and minimum incidence was between the age group of 60-69 years.

The average (Mean) age of onset of drug interactions in male patients was 50-59 years where as in female patients, it was found to be 50-59 years. The minimum age of onset of drug interactions in our study, in both genders was 20 years and maximum age of onset was 60 years. By assessing risk factors, it was revealed that age and gender are most common risk factor of drug interactions followed by idiopathic and polypharmacy.

The maximum number of patients were evaluated with drug-drug interactions are 163 (74%), followed by drug-food interactions 54 (25%), drug-chemical interactions 2 (1%).The prevalence of drug-drug interactions are more in both genders. The frequency of drug-drug interactions are more common among the patients of age group (50-59) years, n=47 (29%).

Dual therapy was most commonly prescribed type of therapy, followed by mono therapy, triple therapy and poly therapy. Among the mono therapy, antimicrobials are most frequently evaluated with drug interactions in males n=13 (11.5%), followed by females with anti-ulcerative therapy n=12 (11%). Most frequent drug-drug interaction were between Ondansetron+Tramadol (Major) and Methotrexate+Pantaprozole (Major), Cynacobalamin+Pantoprazole (Minor) and Ranitidine+Acetaminofen (Minor). The major interactions found between Clopidogrel and Proton pump inhibitors other than pantoprazole.

The severity assessment of drug interactions in our study reveals that most of the interactions were Major in both males (44.5%) and females (44.5%) and Moderate in males (54.5%) and females (45.5%) followed by Minor in both males (50%) and females (50%). Our study revealed that average number of interactions per patients increased as the number of drugs in the prescription increased.

In our study it is demonstrated that early identification of drug-drug interactions on day one could prevent undesired consequences majorly in viral infectious conditions and respiratory tract infections. As drug-drug interactions is an important factor that can be prevented if identify

early, clinicians should be vigilant regarding DDIs when more than two drugs are prescribed.

According to our study results the management strategies of drug interactions is of five types. Maintains of time gap between two drugs administration and avoid combination for long term use were shown in most of the drug interactions management. The most common management plan for most of the drug interactions was dose adjustment recommended.

Some of the interactions evaluated in our research study as follows

- Ondansetron and Tramadol leads to moderate risk of serotonin syndrome and decreases tramadol efficacy. Advised to avoid co administration of 5HT3 receptor antagonist with Tramadol.
- Hydroxyzine and Alcohol increases sedation. Advised to avoid or limit consumption of alcohol.
- Aspirin and Amlodipine increases the blood pressure. Advised to monitor the altered blood pressure.
- Paracetamol and Ethanol leads to Hepatotoxicity. Advised to limit or avoid Alcohol intake.
- Ranitidine and Metformin may lead to lactic acidosis. The co administration requires slow and cautions titration of Metformin.

CONCLUSION

In our study on the drug interaction in general medicine concluded that drug-drug interactions are more prevalent in patients suffering from co morbidities due to poly pharmacy. Potential drug interaction is frequent among In-patients prescribed with multiple medications. Prevalence of DIs increases by a linear mode according to number of drugs prescribed, number of therapeutic drug classes, patients, gender and age. Electronic prescriptions, bar codes, identification of patients and drugs, accurate system of drug news inside the hospital and prescription of less than seven drugs as well as careful selection of drug and active pharmaceutical care practices are sum of the suggestions strongly recommended to physicians and prescribers. The frequency of drug interaction would have been less with more judicial use of drugs.

Co morbidities have a significant effect on DDIs.

- The following classes of drugs have been majorly identified in our study:
- EX: PPIs, Anti-HTN, Analgesics, Anti emetics, Antibiotics, Multivitamins and OTC drugs.
- Accurate time of dose administration is very important to prevent DDIs and potential drug related problems. A clinical pharmacist will play a major role in identifying drug interactions and has greater impact on decreasing the drug interactions. Our study concluded that the regular monitoring of drug interactions helps in better patient care, decreases frequency of hospitalization and improves the patients quality of life with rational drug therapy.

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