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Analysis of potential drug-drug-interactions in outpatient department of a tertiary care hospital: A cross-sectional study

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Abstract

Potential Drug-Drug Interactions (pDDIs) possess a great risk in altering the therapeutic outcome in patients receiving multiple therapy. Monitoring the prescription and analyzing it for pDDIs before the start of therapy is the need of the hour in current clinical scenario. The present study aims to determine the prevalence of drug interactions in an outpatient department of a tertiary care hospital and also to prepare a list of common drug interactions in the study setting. A cross sectional prospective prescription chart review for 330 prescriptions was conducted at the outpatient pharmacy department of Daya General Hospital Ltd and Speciality Surgical Centre, Thrissur. Demographic variables like age, gender, number of drugs prescribed was extracted. Potential drug-drug interactions were determined using web-based drug interaction checkers. Out of 330 prescriptions screened, 286 pDDIs were observed. Out of 286 pDDIs, 54.2 % interactions should be monitored closely for any untoward effect. 22.4 % of pDDIs are of moderate severity, 18.5 % represented minor interactions, 3.5 % were major interactions and 3.5 % were of serious grade. Prevalence of pDDIs was found to be 86.7 % which is relatively high compared to a similar study (83.42 %) conducted in a tertiary care teaching hospital.

Keywords: PDDIs; Outpatient department; Polypharmacy; Prevalence; Clinical pharmacy

1. Introduction

A drug is any chemical substance that causes alteration in an organism's physiology or psychology when consumed.[1] Whenever two or more drugs are being taken, there is a chance that there will be an interaction among the drugs. The interaction may alter the effectiveness or the side effects of the drugs. The possibility of drug interactions is greater as the patient takes a greater number of drugs. Therefore, people who take several drugs are at the greatest risk for interactions. Drug interactions can be pharmacodynamics or pharmacokinetic in nature. Pharmacodynamic interaction, involves receptor effects of different agents which interact to produce synergy or antagonism of drug effects. In pharmacokinetic interaction, the bloodlevels of given agents may be raised or lowered based on the type of interaction. When atherapeutic combination of drug could lead to an unexpected change in the condition of thepatient, this would be described as an interaction of potential clinical significance [2]. The clinical effects of any interactions, no matter how well documented, do not occur in every patient or at the same degree of intensity. The incidence and degree of severity of aninteraction depend on both patient related factors. The information about the effects of the interaction like dose-dependency, route, patient related factors like disease process, impairment of organ function etc. must be individually assessed [3,4]. Drug-drug interactions are often caused by errors that have occurred in prescription phase and can have devastating consequences for patients. Studies have shown that 2%-3% of hospital admissions are due to drug- drug interactions and about 11% of patients experienceadverse effects caused by drug- drug interactions [4].

Potential Drug-Drug Interactions (pDDIs) possess a great risk in altering the therapeutic outcome in patients receiving multiple therapy. It is significant in case of chronic diseases,where patient would be on long term drug therapy e.g.,

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Diabetes mellitus, Systemic Hypertension. In a tertiary care hospital where there is an established clinical pharmacy department, the monitoring of drug interaction is quite easy especially in In-Patient drug orders. But when it comes to Out Patient services, it is usually a tedious and time-consuming task. The main challenge is the man power, technical assistance like software and patient cooperation. Monitoring the prescription and analyzing it for any potential and harmful drug interaction before the start of therapy is the need of the hour in current clinical scenario.

The present study aimed to determine the prevalence of pDDIs in outpatient department of a tertiary care hospital and also to prepare a list of common drug interactions that would be helpful to health care professionals in the future.

2. Material and methods

This cross-sectional study was performed in the OPD pharmacy of Daya General Hospital Ltd and Speciality surgical center which is a tertiary care hospital in Thrissur. It is one of the major referral hospitals in Thrissur providing multi-speciality health care services to the adjacent local population as well as referred patients from other districts. Patients in OPD of tertiary care hospital are checked or examined by physicians and prescriptions are written manually. The prescriptions are filled by the OPD pharmacy in the hospital. The permission for the study was obtained from the hospital management. The sample size was calculated using web based sample size calculator and found out to be 267. Data collection was started based on the inclusion criteria.

A total of 360 prescriptions were collected and screened for potential drug-drug interaction using Medscape and drug bank online drug interaction checker. The severity of pDDIs were described in the following ranges: Minor, Monitor Closely, Moderate, Major and Serious. Then it was entered into MS Excel spreadsheet V.21 and analyzed for frequency. An association between age and polypharmacy was also established using MS Excel. The interpreted data is presented in the form of tables and graphs. A list of commonly interacting pairs of drugs were also found out and tabulated.

3. Results and discussion

Out of 360 prescriptions collected, 330 prescriptions were included in the study that matched inclusion criteria. The drugs in the prescriptions were analysed for drug interaction using Medscape and Drug.com. A total of 286 drug combinations were observed to potentially interact with each other. The prevalence of drug interaction in the sample is thus found to be 86.7 %. Out of 286 pDDIs, there were 4 major, 53 minor, 64 moderate and 10 serious interactions. 155 interactions are in the grade of monitor closely. Figure 1 shows the frequency of drug interactions according to its severity.

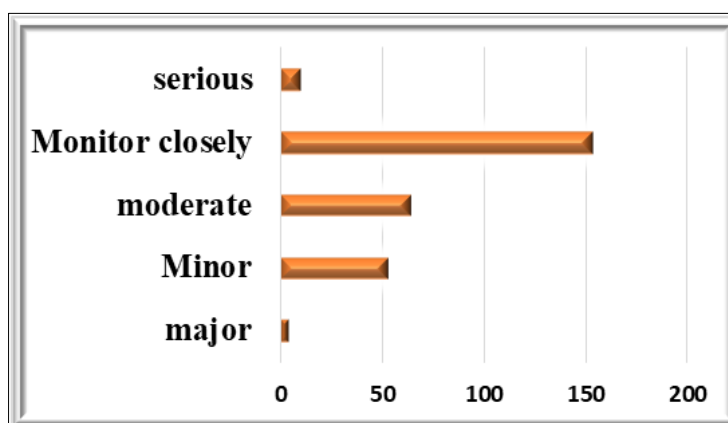


Figure 1 Frequency of drug interactions

Table 1 demonstrates exposure to all types of pDDIs, stratified against patient's characteristics. In females, the prevalence of pDDIs was greater as compared with males. The prevalence of all types-pDDIs were more among patients aged 61 to 70 years. Out of all specialities, general medicine represents greater prevalence of pDDIs (34.3 %) followed by neurology (14.6 %) and urology (13.6 %).

Table 1 Exposure of patient demographics against drug interactions

Characteristics	All type of interactions (n=286)
Gender	
Male	88 (30.7 %)
Female	198 (69.3%)
Age	
1-10	6 (2 %)
11-20	14 (4.8%)
21-30	23 (8%)
31-40	49 (17%)
41-50	52(18%)
51-60	47(16.4%)
61-70	64 (22.3%)
71-80	31 (10.8%)
Clinical specialities	
General medicines	98 (34.3 %)
Paediatrics	12 (4.1%)
ENT Drugs	6 (2 %)
Gynaecologic medicine	3 (1 %)
Urology medicines	39 (13.6 %)
Neurology medicines	42 (14.6 %)
Cardiologic medicines	23 (8 %)
Nephrology medicines	19 (6.6%)
Orthopaedic medicines	35 (12.2 %)
Pulmonology medicines	9 (3.1 %)

Figure 2 represents the relationship between age group of patients in the prescriptions and average number of drugs prescribed for each group. Of 360 prescriptions collected, Pediatric population receives minimum number of drugs (avg=2), whereas, Geriatric population that is age group between 60 to 80 receives a greater number of drugs (avg= 7). It is clear from the study that the patient belonging to the age group 60-80 receives higher number of drugs which can be extrapolated to increased incidence of pDDIs. This finding has a strong agreement with a study conducted in similar setting.[5]

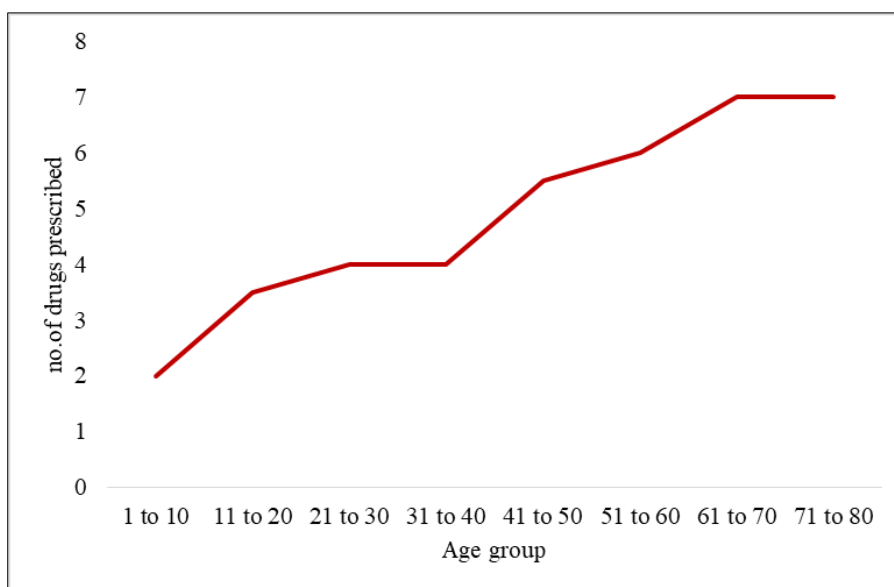


Figure 2 Relationship between age and no. of drugs received

Table 2 shows the list of commonly observed interactions in the collected sample. Aspirin and clopidogrel shows the greater frequency and digoxin-furosemide, digoxin-amiodarone shows the least frequency out of all repetitive interactions.

Table 2 List of common drug interactions

Sl no	Drug combinations	Frequency
1.	Aspirin + Clopidogrel	11
2.	Telmisartan + Clopidogrel	9
3.	Trihexyphenidyl + Amantadine	7
4.	Atorvastatin + Sacubitril-Valsartan	7
5.	Lithium + Escitalopram	6
6.	Aspirin + Glimepiride	4
7.	Pregabalin + Duloxetine	4
8.	Quetiapine + Trihexyphenidyl	4
9.	Digoxin + Amiodarone	2
10.	Digoxin + Furosemide	2

The prevalence of pDDIs was found to be 86.7 % which is relatively high compared to similar studies (83.42 %) conducted in a tertiary care teaching hospital. [5],[6]. Out of the patient characteristics stratified against exposure to all types of drug interactions, female population exhibited a greater fraction (69.3 %) of drug interactions out of total pDDIs. This may be because of the fact that greater number of prescriptions belongs to female patients in the day of data collection.

The prevalence of pDDIs was highest among general medicine (34.3 %) followed by neurology (14.6 %) and urology (13.6 %) which has minor dissimilarities with the findings of a study conducted in OPD of a tertiary care hospital in Pakistan-where majority of pDDIs observed in general medicine (9.2%) followed by cardiology OPD (2.6%). This might be due to varied conditions of data collection, patient population and geographical factors.[7]

4. Conclusion

A considerable prevalence of pDDIs was observed in our study (86.7%). Interactions of monitor closely-pDDIs were more common, however, major- and moderate pDDIs were also observed in considerable number. List of most frequently identified interactions will efficiently support the selective screening and monitoring of patients for pDDIs and associated negative consequences. In developing countries like India, OPD patients are at risk to DDIs and corresponding adverse events. Reasons may be overworked healthcare professionals; lack of proper treatment follow up and non-existing pDDIs screening facilities. To improve patient's safety and outcomes of therapy, some strategies are essential such as software-based screening of pDDIs, patient education and counselling, and regular monitoring/ follow-up. The relevance of our study is to point out the significance of analysis of drug interaction in an outpatient setting. It is most effective in reducing unwanted effects especially in chronic diseases, decreasing the economic burden of therapeutic failures and ADRs. It also ensures the patients safety and improve therapeutic outcome.

Compliance with ethical standards

Acknowledgments

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Disclosure of conflict of interest

This study has no conflict of interest with any party.

References

- [1] Satoskar R S, Rege N N, Bhandarkar S D, Pharmacology and pharmacotherapeutics. IJPhS. 2015 Sep 6; 24(1): 1-3.
- [2] Juurlink DN, Mamdani M, Kopp A, Laupacis A, Redelmeier DA. Drug-drug interactions among elderly patients hospitalized for drug toxicity. JAMA. 2003;289: 1652–8.
- [3] Tatro T D, Drug interaction facts. Wolters Kluwer Health/Facts & Comparisons, St. Louis, Missouri, 1996 Mar 12; 5(0899):13-18.
- [4] Pedros C, Quintana B, Rebolledo M, Porta N, Vallano A, Arnau JM. Prevalence, risk factors and main features of adverse drug reactions leading to hospital admission. Eur J Clin Pharmacol. 2014; 70:361–7.
- [5] Patel P S, Rana D A, Suthar J V, Malhotra S D, Patel V J, A study of potential adverse drug-drug interactions among prescribed drugs in medicine outpatient department of a tertiary care teaching hospital. JBCP. 2014 Mar 28; 5(2):44-48.
- [6] Nabovati E, Arki H V, Saberi M R, Hanna A A, Eslami S, Incidence rate and pattern of clinically relevant potential drug-drug interactions in a large outpatient population of a developing country. RPS. 2016 May 8; 11(3): 233-242
- [7] Ismail M, Noor S, Harram U, Haq I, Kadim F, Khan Q, Potential drug-drug interactions in outpatient department of a tertiary care hospital in Pakistan: a cross-sectional study. BMC Health Services Research. 2018 Aug 19; 18(762):1-7.