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PREVALENCE AND CLINICAL SIGNIFICANCE OF POTENTIAL DRUG-DRUG INTERACTIONS AT A TERTIARY CARE TEACHING HOSITAL

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ABSTRACT

Introduction: Clinically significant drug-drug interactions reduce effectiveness of drugs or cause fatal adverse events. Although harmful drug interactions are preventable, clinicians' recognition and detection of drug interactions is not optimal. **Objective:** To assess prevalence of potential drug-drug interactions at medical ward of tertiary care teaching Hospital. **Methods:** A retrospective observational study was conducted to determine potential drug-drug interactions. A total of 200 patients' medical records were analyzed for drug-drug interaction using Micromedex drug interaction software. Data were analyzed using SPSS. **Results:** We identified 169 interacting-combinations in a total of 200 potential drug-drug interactions (pDDIs). Of these, 46.7% and 53.3% of patients had major and moderate pDDIs respectively. The most common pDDIs involved were concurrent use of Aspirin with Digoxin, aspirin with furosemide and furosemide. The second most common interaction was among Amlodipine and Clopidogrel which have major and moderate severity respectively. There was significant association of occurrence of pDDIs with polypharmacy. **Conclusion:** Potential drug-drug interactions were common at the medical ward of our hospital.

KEYWORDS: Clinicians, potential drug, pDDIs, Clopidogrel, polypharmacy.

INTRODUCTION

Drug interactions alter the intensity of pharmacological eff esaercni ecneh dna yltnerrucnoc nevig sgurd fo stce or reduce their therapeutic or toxic effects.[1,2] Clinically significant interactions pose potential harm to patients by reducing effectiveness of drugs or causing potentially dangerous and fatal adverse events. They also increase treatment cost.[3-7]

Factors that have shown significant association with occurrence of potential drug-drug interactions (pDDIs) include poly pharmacotherapy, age, gender, genetics, alcohol consumption, smoking, renal and hepatic function, main diagnosis and medication and the number of physicians a patient visits.[8-10] Harmful drug interactions are largely preventable since for most drugs a number of therapeutic alternatives are available. However, clinicians' recognition and detection of drug interactions is not optimal. The continually increasing number of drugs makes it virtually impossible for healthcare practitioners to keep up with new knowledge and heightens the risk that significant drug interactions will be overlooked.[11]

A number of studies conducted at differenteht fo trap globe[12-23] showed that the prevalence of drug- drug interaction as well as its clinical significance (severity of interaction) varies from place to place depending on the presence of alternative drugs, variation in disease epidemiology and composition and level of health care professionals.

In order to design feasible preventive strategies, it is imperative first to determine the magnitude of the problem and the common drugs implicated in clinically significant DDIs in our context. Because the clinical conditions and types of drugs we use may vary from developed countries it will not be appropriate to extrapolate findings of developed nations to our set up. So, we undertook this study to determine the prevalence, clinical significance and factors associated with pDDI in our hospital.

Epidemiology

- In Harvard medical practice study of adverse event 8% were consider to be due to drug interactions.
- US community pharmacy study revealed 4.1% incidence of drug interaction in hospitalized patients.

- Australian study found that 4.4% of all ADR, which resulted in hospital due to interaction.

Risk factors

- Poly pharmacy,
- Multiple prescribers,
- Multiple pharmacies,
- Genetic makeup,
- Specific population like Eg: female, elderly, obese, malnourished, critically ill patients, transplant recipient.
- Specific illness Eg: hepatic disease, Renal dysfunction.
- Narrow therapeutic index drugs like Cyclosporine, Digoxin, Insulin, Warfarin.

Outcomes of drug interactions

- Loss of therapeutic effect
- Toxicity
- Unexpected increase in pharmaceutical activity
- Beneficial effects Eg: additive effect and potentiation or antagonism
- Chemical or physical interaction.

Consequences of drug interactions:

- The consequences of drug interaction may be.
- Major- life-threatening
- Moderate- deterioration of patient status
- Minor- little effect.

METHODS

The study was conducted at general medicine department from Novemer 14 to April 14, 2017- 2018. The hospital has 1000 beds and it is used as a teaching hospital for the College of S.V. Medical College, S.V.University.

Study design

A Retrospective Observational study design was used.

Data collection tools and screening of pDDIs

Data were collected from patients' medical records by pharmacists using data abstraction checklist. Then screening for pDDIs was carried out by the authors using drug interaction software Micromedex.

Data processing and analysis

Data were analyzed using SPSS.

RESULTS

In our study we identified patients with interactions are of about 169 and patients without interaction are of about 31 and their percentages are 84.5% and 15.5% respectively.

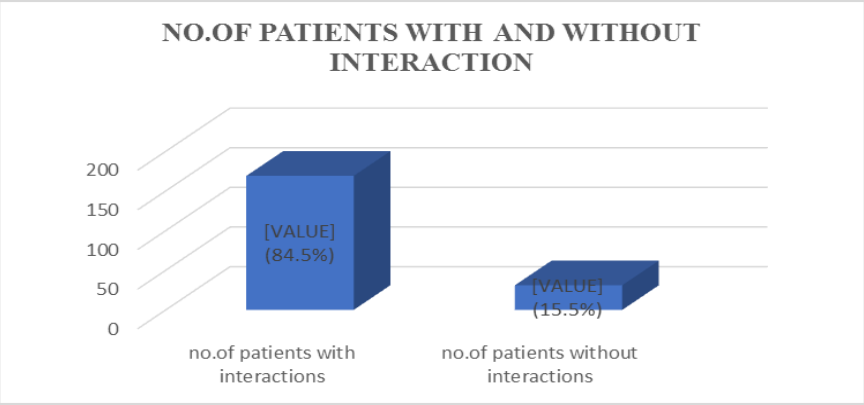

Fig 1: Patients with and without drug-drug interactions.

Gender wise distribution of patients

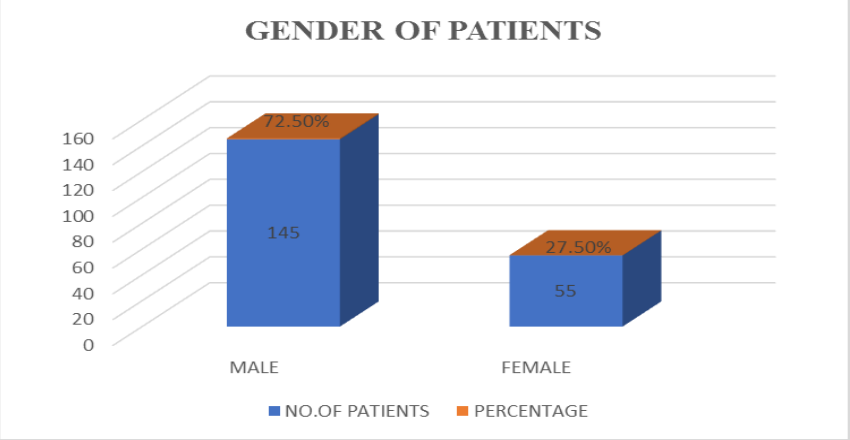

Fig 2: Gender category of patients.

Age wise distribution of patients

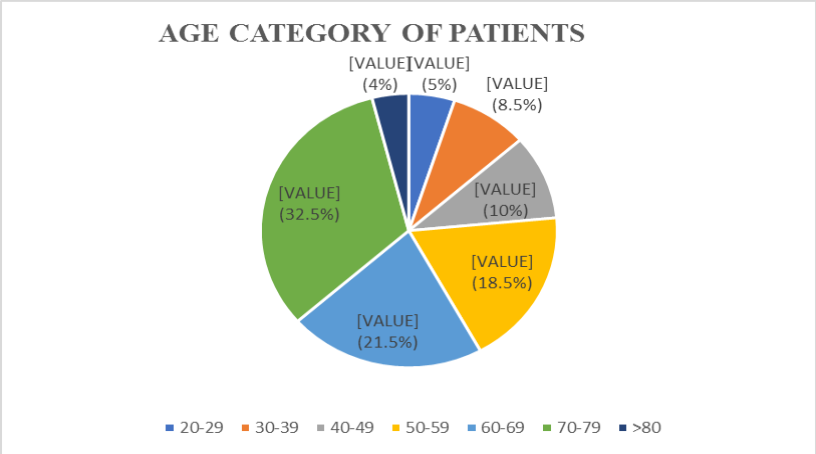

Fig 3: Age category of patients.

Severity of interactions

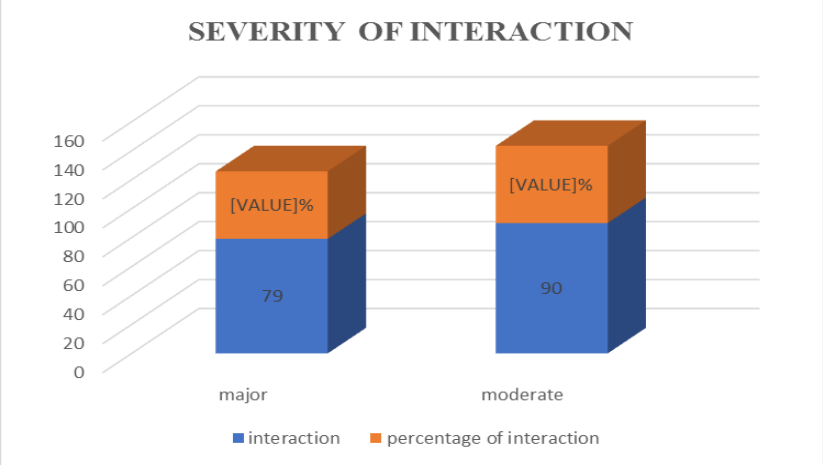

Fig 4: Severity of pDDIs.

Prevalence of pDDIs

Overall, 169 (84.5%) patients had at least one pDDIs regardless of type of severity.

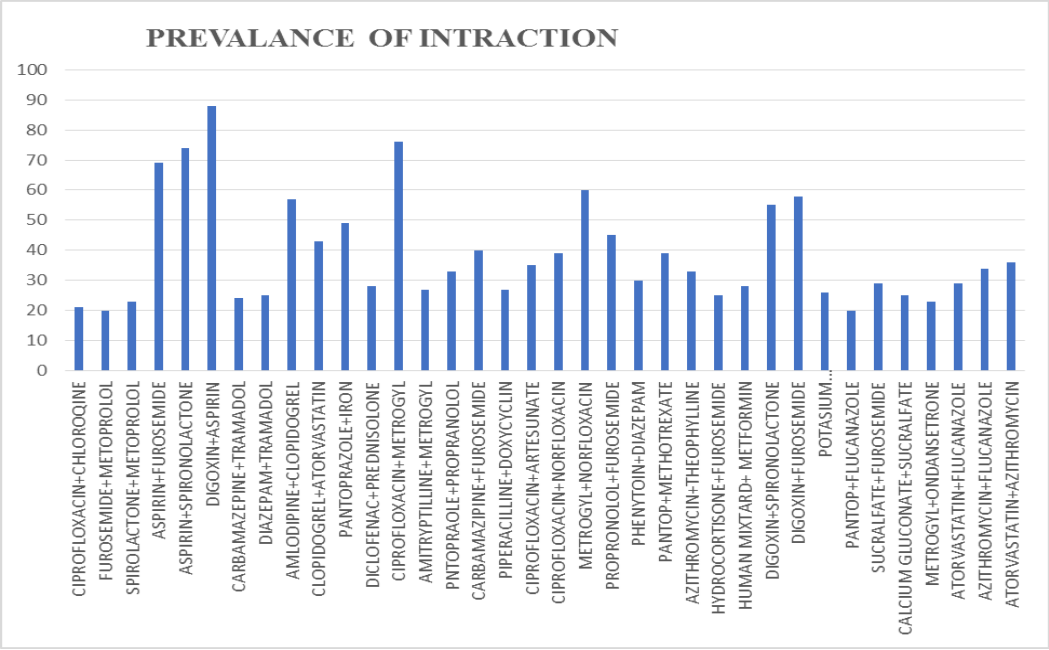

Fig 5: Prevalence of pDDIs.

DISCUSSION

In this study the prevalence of pDDIs was 53.4% per 100 hospitalization episodes. This is a relatively high figure that highlights the importance of this previously unstudied problem in our hospital. A prospective study conducted in India has shown that 52.17% (n=230) of hospitalized patients were exposed to 330 pDDIs.[16] While another study done in the same country found 66% (n=250) pDDIs.[23]

In this study we consider 200 patients among which 169 patients were found to be prone for drug drug interaction with a percentage of 84.5% and 31 patients were found to be without interactions and their percentage was 15.5%. This may be due to polypharmacy, co-morbidities of the patients which may lead to ingestion of two different medications at a time, finally results to drug drug interactions.

In our study we identified majority of interactions are among male than female with a percentage of 72.5% and 27.5% respectively, which may be due to smoking, alcohol consumption. They cause liver disorders and other co-morbidities.

In this study majority of interactions were seen among age group of 70-79 and 60-69 with percentage of 32.5% and 21.5% respectively followed by 50-59 with percentage of 18.5%. This is due poly pharmacy and administration of medications at a time. This can occur when the patient was not educated about usage of drugs by their medical staff.

In our study, the most common potential DDI involved were concurrent use of Aspirin with Spironolactone, Furosemide and Digoxin which may lead to causes nephrotoxicity, reduce effectiveness of furosemide, and prolongs Digoxin half life. Ciprofloxacin and Metrogyl was also a major interaction which causes QT interval prolongation.

The second most common interaction identified in our study was between Amlodipine and Clopidogrel. Concomitant use of Amlodipine and Clopidogrel can increase risk of thrombotic events. Concomitant use of Digoxin and Spironolactone causes increased Digoxin exposure.

Thus, cautious use with closely monitoring of outcome after usage of medication should be followed, so that the negative outcome can be ruled out.

CONCLUSION

Potential DDIs were common at the medical ward. Nearly one third of pDDIs were clinically significant. These DDIs have a potential to increase or decrease the therapeutic effect or to increase the risk of adverse drug reactions. So increasing awareness of pDDIs, rational prescribing of drugs and close monitoring of patients in whom these drugs are prescribed, participation of pharmacists in the multidisciplinary team round is recommended.

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