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PRESCRIBING PATTERNS AND ASSESSMENT OF POTENTIAL DRUG - DRUG INTERACTIONS IN CHRONIC KIDNEY DISEASE IN A TERITIARY CARE HOSPITAL

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ABSTRACT

Chronic kidney disease, also called chronic kidney failure, involves a gradual loss of kidney function. Patients with chronic kidney disease are being administered with several drugs which have the potential to cause major drug drug interactions. Early noticing of these interactions will aid in close monitoring and prevention of adverse reactions thus in turn aiding to patient safety and efficacy.

INDEX TERMS: Chronic Kidney Disease, Drug- Drug Intearctions, Management.

INTRODUCTION

Chronic kidney disease (**CKD**) is a type of long-term kidney disease, in which either there is a gradual loss of kidney function occurs over a period of months to years, or abnormal kidney structure (with normal function).[1,2]

CAUSES

The three most common causes of CKD in order of frequency as of 2015 are diabetes mellitus, hypertension, and glomerulonephritis[3] the other causes include obstructed urine flow and there are drugs that cause Chronic kidney disease that include cocaine, NSAIDS, amphetamine and diuretics.

Signs and symptoms

CKD is initially without symptoms, and is usually detected on routine screening blood work by either an increase in serum creatinine, or protein in the urine.[4]

MANAGEMENT

Chronic kidney disease (CKD) is a serious condition often linked to diabetes and high blood pressure. There is no cure, but a combination of lifestyle changes and medications can help slow its progression. This might include a plant-dominant diet with less protein and salt, medications to control blood pressure and sugar, and potentially newer anti-inflammatory drugs.

A low-protein, low-salt diet may result in slower progression of CKD and reduction in proteinuria as well as controlling symptoms of advanced CKD to delay dialysis start.[5]

DRUG INTERACTIONS

Drug interactions occur when a drug's mechanism of action is affected by the concomitant administration of substances such as foods, beverages, or other drugs.

TYPES

• Drug -Drug
• Drug -Disease
• Drug – Food (inclusive of beverages)
• Drug – Herbal
• Drug – Laboratory Test
• Drug – Gene

DRUG – DRUG INTERACTIONS

A change in a drug’s effect on the body when the drug is taken together with a second drug. A drug-drug interaction can delay, decrease, or enhance absorption of either drug. This can decrease or increase the action of both drugs or cause adverse effects.The risk of a DDI increases with the number of drugs used.[6]

A large share of elderly people regularly use five or more medications or supplements, with a significant risk of side-effects from drug–drug interactions.[7]

Drug interactions can be of three kinds.

- additive (the result is what you expect when you add together the effect of each drug taken independently),
- synergistic (combining the drugs leads to a larger effect than expected), or
- antagonistic (combining the drugs leads to a smaller effect than expected).[8]

A **risk–benefit ratio** (or **benefit-risk ratio**) is the ratio of the risk of an action to its potential benefits.[9] It is important to analyse the risk and benefit before conducting an experiment so that the potential benefit of experimenting is larger than the risk. This is also an important criterion for a research project to be considered ethical.[10]

AIMS AND OBJECTIVES

AIMS: To assess the prescribing pattern and assessment of potential drug-drug interactions in chronic kidney disease.

OBJECTIVES

• To assess the prescribing patterns of medication in chronic kidney disease patients.

• To assess the potential drug-drug interactions in the prescribed medication.

• To assess the outcome and the management of the potential drug-drug Interactions

METHODOLOGY

STUDY SITE: This study was carried out at 'ESIC MEDICAL COLLEGE AND SUPER SPECIALITY HOSPITAL'

STUDY PERIOD: The study was carried out for a period of 6 months.

STUDY DURATION: The study duration was for a period of 4 months.

STUDY POPULATION: The sample size for the study was 200 participants.

STUDY DESIGN: Prospective, observational, cross-sectional study.

STUDY CRITERIA

A. INCLUSION CRITERIA

- All age groups above >18 years
- Both genders
- All the CKD paKents GFR < 60 mL/min/1.73 m2
- Hospital stay > 3 days
- All the patients willing to take part in the study.

B. EXCLUSION CRITERIA

ü Patient who had kidney transplant.

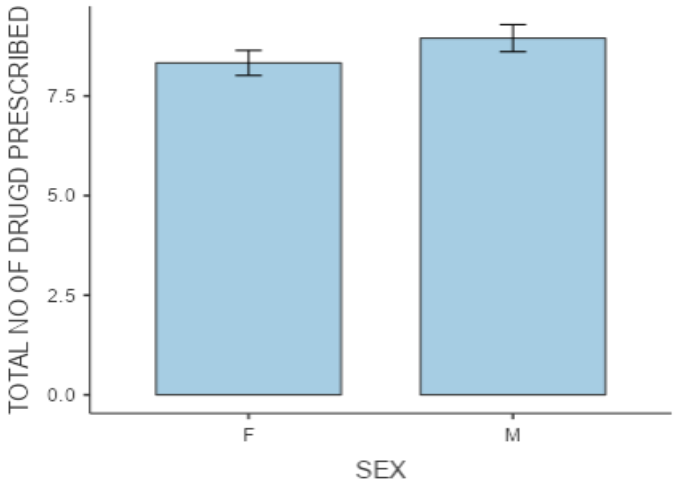
STUDY MATERIALS

o Data collection form

o Informed consent form

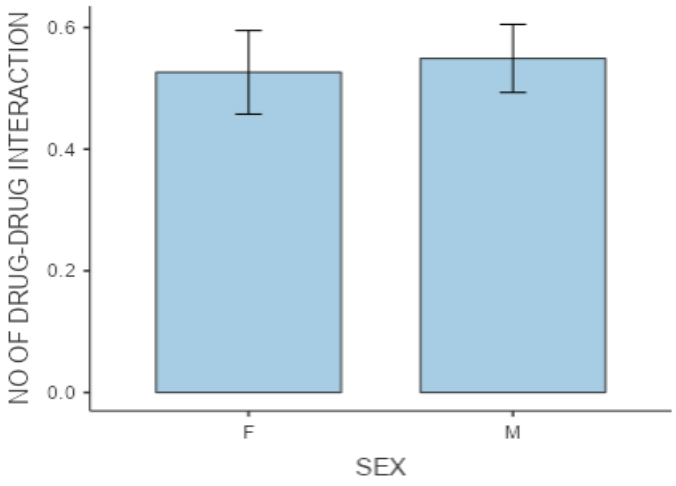
RESULTS AND DISCUSSION

Table 1: Total Number Of Drugs Prescribed Per Prescription According To Gender.



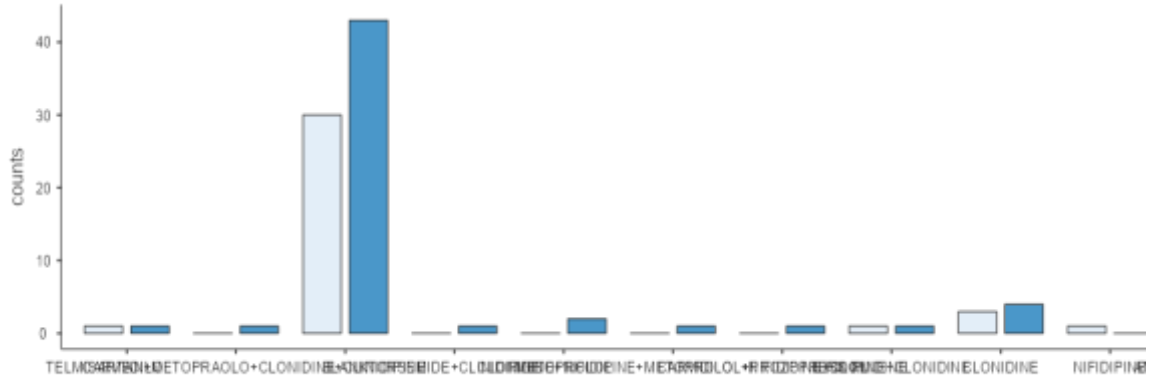
INFERENCE: it is observed that male patients are prescribed with more number of drugs.

Table 2: Prevelance of Potential Drug Drug Interactions Among The Population Based On Gender.



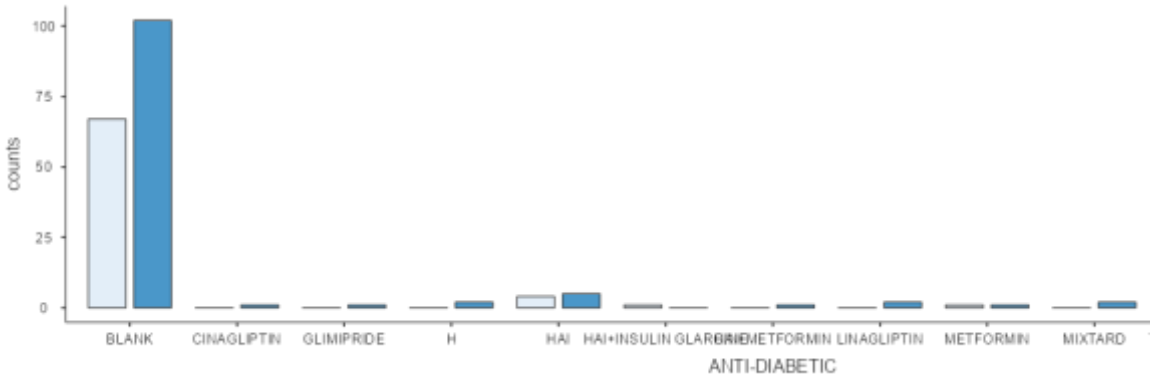
INFERENCE: It is observed that the prevalence of drug drug interactions is more in male patients when compared to female patients.

Table 3: Combination of Drugs Prescribed From the Class of Anti Hypertensives.



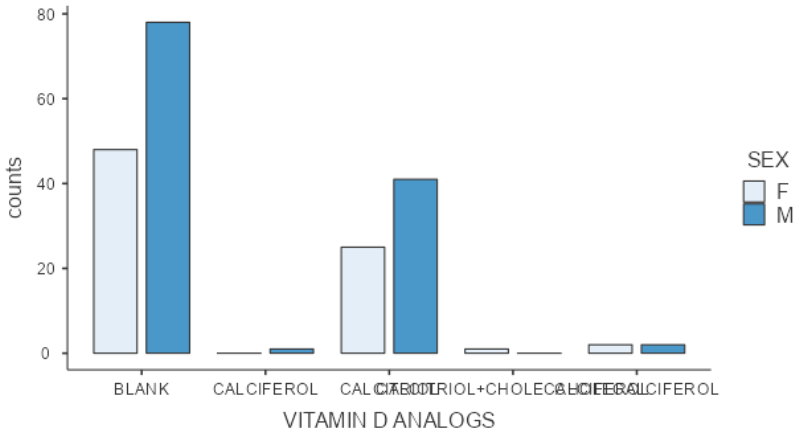
INFERENCE: Carvedilol, Clonidine, Nifedipine Are the anti Hypertensives That Are Prescribed Mostly Together.

Table 4: Combination of Drugs Prescribed From the Class of Anti Diabetics.



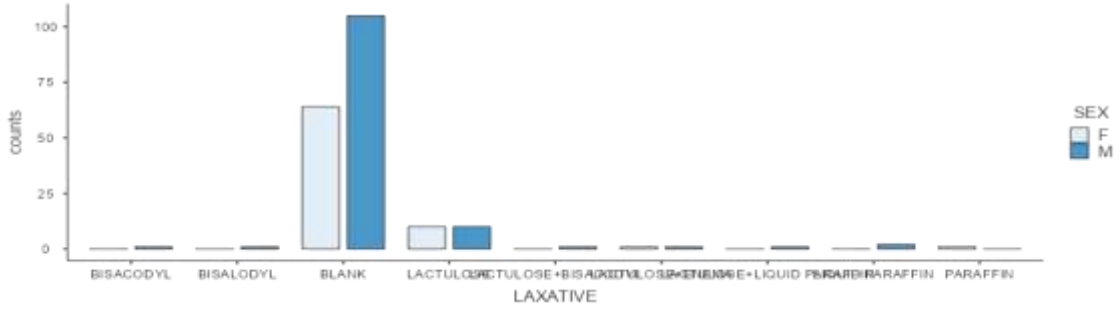
INFERENCE: Vildagliptin and Insulin Are The Drugs That Aremostly Prescribed Together.

Table 5: Combination of Drugs Prescribed from the Class of Vitamin D Analogs.



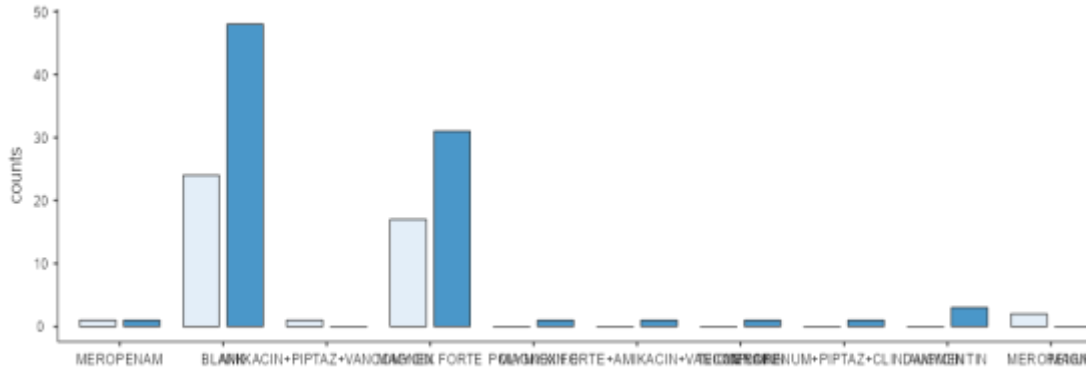
INFERENCE: Calcitriol And Cholecalciferol Are The Most Frequently Prescribed Drugs Together.

Table 6: Combination of Drugs Prescribed from the Class of Laxatives.



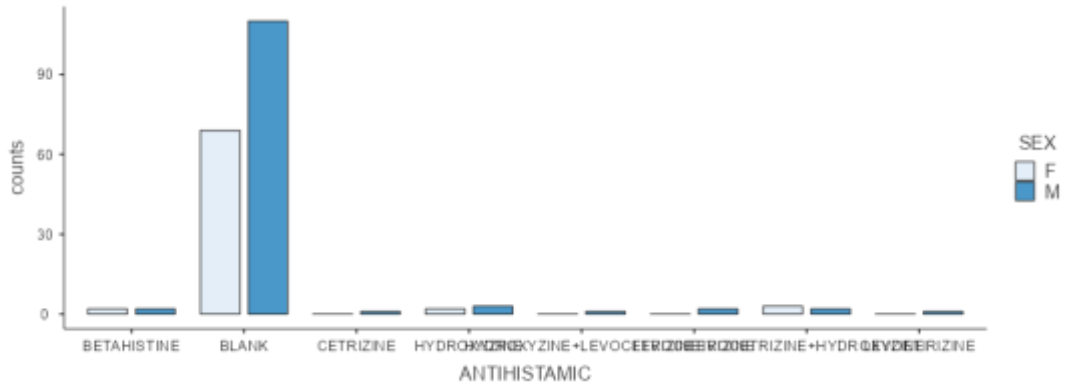
INFERENCE: Lactulose and Liquid Paraffin are the laxatives that are mostly prescribed together.

Table 7: Combination of Drugs Prescribed From the Class of Antibiotics.



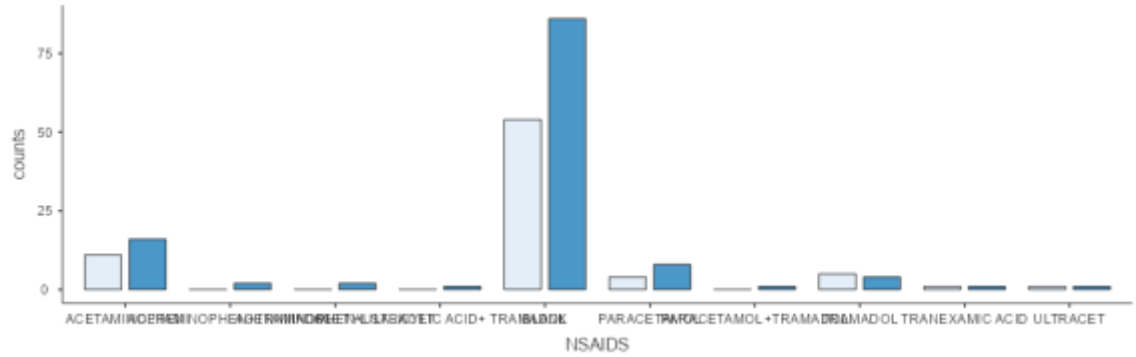
INFERENCE: MAGNEX FORTE AND DOXYCYCLINE are the antibiotics mostly prescribed together.

Table 8: Combination of the Drugs Prescribed from the class of anti Histamines.



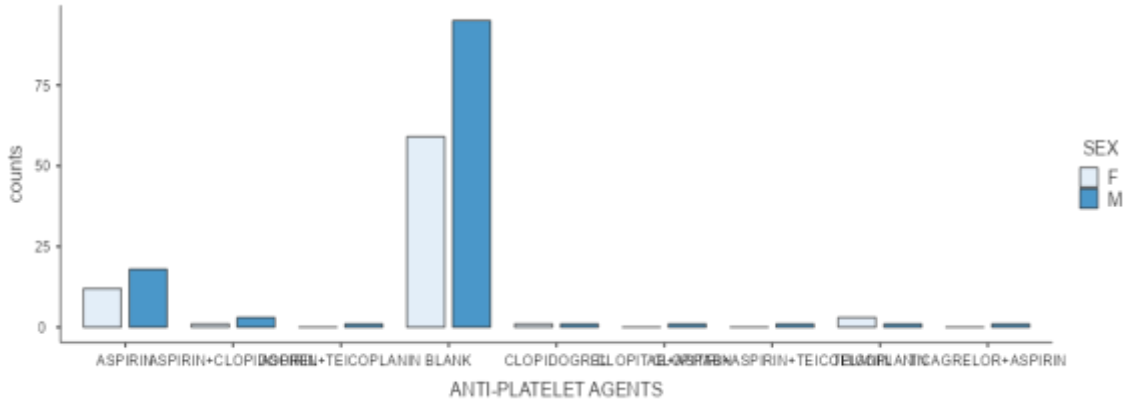
INFERENCE: LEVOCETRIZINE AND HYDROXYZINE are the drugs that are mostly prescribed together.

Table 9: Combination of Drugs Prescribed from the Class of Nsaids.



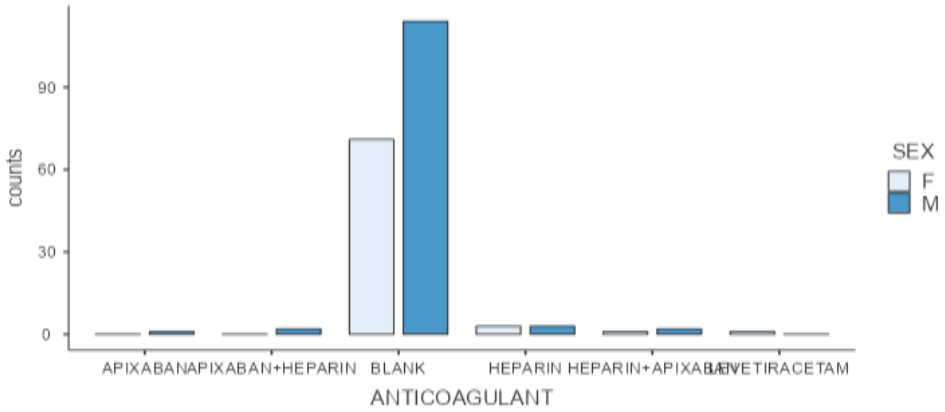
INFERNCE: ACETAMINOPHEN AND TRAMADOL are the drugs that are mostly prescribed together.

Table 10: Combination of Drugs Prescribed from the Class of Anti Platelet Agents.



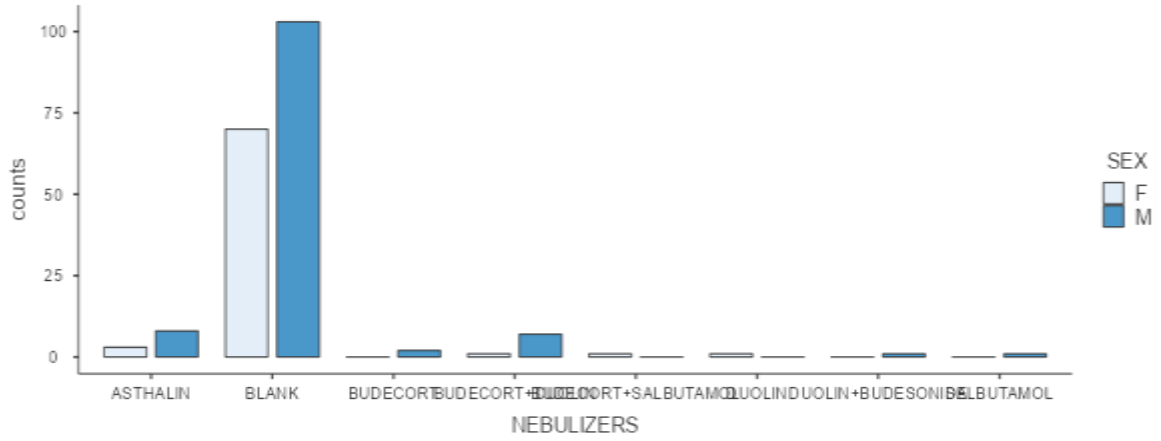
INFERENCE: ASPIRIN AND CLOPIDOGREL are the drugd that are mostly prescribed together.

Table 11: Combination of Drugs Prescribed From The Class of Anti Coagulants.



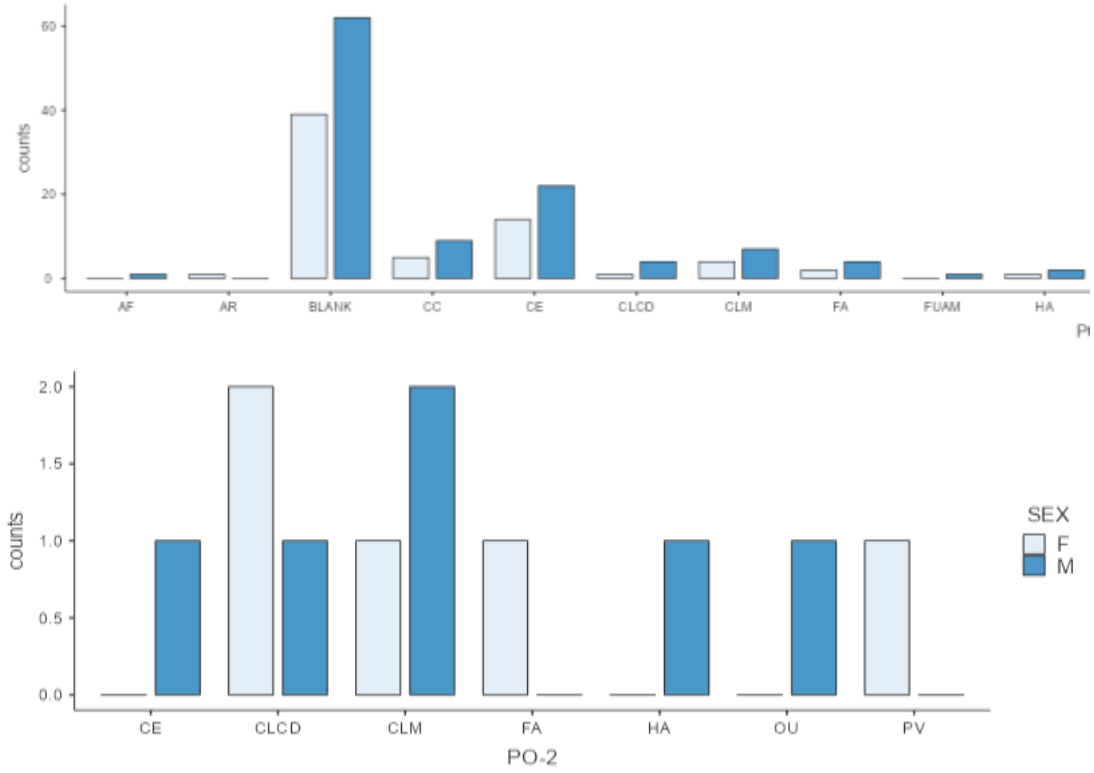
INFERENCE: HEPARIN AND APIXABAN are the drugs that are mostly prescribed together.

Table 12: Combination of Drugs Prescribed from the Class of Nebulizers.



INFERENCE: BUDECORT AND DUOLIN are the drugs that are mostly prescribed together.

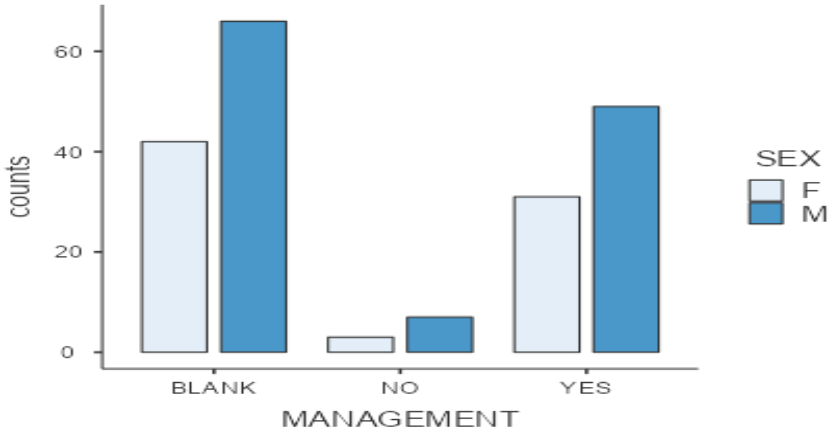
Table 13: Most Prevalent Drug Drug Interactions from the Prescribed Medications.



INFERENCE: CALCITRIOL AND ERGOCALCIFEROL are the drugs that are more prevalent to be shown drug drug interaction.

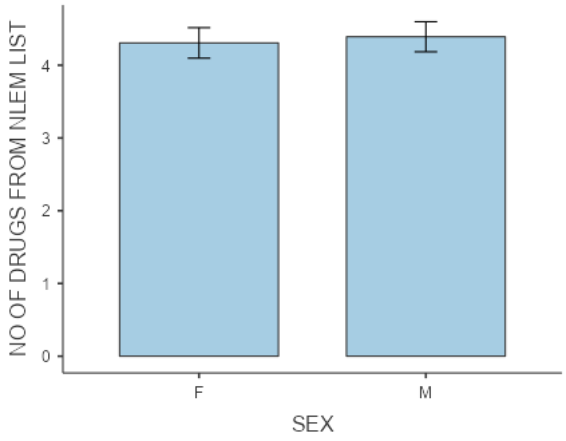
CLONIDINE <>CARVEDILOL, CLONIDINE <> METOPROLOL are the drug drug interactions that are mostly prevelant among the subjects after CALCITRIOL<>ERGOCALCIFEROL.

Table 14: Management of Drug Drug Interactions in A Teritiary Care Hospital.



INFERENCE: Most of the potential DRUG - DRUG interactions were monitored and managed.

Table 15: Drugs Prescribed to the Subjects from Nlem List.



INFERENCE: majority of the drugs prescribed to the subject are from NLEM list.

DISCUSSION AND CONCLUSION

The study has made insightful observations regarding the occurrence of potential drug - drug interactions in chronic kidney disease patients.

From the above results, it can be inferred that CKD patients have been prescribed various classes of medication based on their comorbid conditions.

The total number of drugs prescribed per prescription is shown to be higher in males than in females, with a difference of 21.9%.

Patients are prescribed various classes of medications, including antihypertensives, anti-diabetics, vitamin D analogs, laxatives, thyroid drugs, antibiotics, anticonvulsants, antihistamines, antiplatelet agents, anticoagulants, antacids, and nebulizers.

The prevalence of drug-drug interactions is higher in males than in females.

Regarding drug combinations that caused potential interactions, among the antihypertensives, the combination of carvedilol, clonidine, and nifedipine showed a frequency of 40.9%.

From vitamin D analogs, calcitriol and cholecalciferol showed major interactions with a percentage of 99.5%. Among laxatives, the combination of lactulose and liquid paraffin showed major potential interactions at 33.3%. Among various antibiotics prescribed, the combination of Magnex Forte and doxycycline was shown to be a potent interacting combination at 68.2%. From the class of antihistamines, levocetirizine and hydroxyzine have shown major drug-drug interactions (36.9%).

From the class of NSAIDs, acetaminophen and tramadol had a percentile of 56.6%.

From the class of anticoagulants, heparin and apixaban had a percentile of 98.5%.

From the class of nebulizers, budesonide (Budecort) and ipratropium bromide/salbutamol (Duolin) had a percentile of 94.4%.From the class of antiplatelet agents, aspirin and clopidogrel had a percentile of 96.5%.Other classes of medication that have been prescribed and did not show drug interactions include antiemetics, antispasmodics, and antihyperlipidemics.

Among various combinations of drug-drug interactions found based on cases, the potential interactions are.

1) Calcitriol > Ergocalciferol

2) Clonidine > Carvedilol > Metoprolol

Most of the drug-drug interactions identified were monitored closely and managed. The percentile of managed drug-drug interactions was 96.8%.Thus, we can conclude that it is highly essential to monitor potential drug-drug interactions to manage them timely and ensure patient safety.

STRENGTHS

The study findings highlight the need of early detection of potential drug drug interactions in CKD patients which aids in monitoring and management.

Moreover, the study demonstrates that early detection of drug interactions and their management plays a pivotal role in enhancing patient safety. The robustness of these conclusions is bolstered by the study's large population sample, ensuring the appropriateness and reliability of the results.

LIMITATIONS

Indeed, the study's short duration of six months presents a limitation as it precludes the monitoring of long-term adverse events.

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CONFLICT OF INTEREST: All authors declare that they have no conflicts of interest.

SOURCE OF FUNDING: Self funded, which is as per requirement of academic year.

ETHICAL CLEARENCE: Since the research is observational study with respect to the current guidelines of therapy, no subjects were prone to the administration of experimental substances. Indeed, the ethical committee of the institution had scrutinized the veracity of the project objectives and issued Ethics approval certificate which is enclosed herewith.

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