

Evaluation of Drugs Used in the Management of Chronic Kidney Disease in a Tertiary Care Teaching Hospital

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Abstract: Chronic kidney disease, a global health problem with possible complications and risk factors besides showing a remarkable negative effect in quality of life. The present study is concerned to evaluate the drugs used in management of Chronic Kidney Disease and to identify the side effects associated with treatment. A prospective observational study carried out in SVRR Govt. General Hospital during March to September 2014 (6months). A total of 65 patients were included in the study with the patient consent. A specially designed proforma was used to collect patient data. Prescriptions were evaluated and pharmacokinetic profiles of the prescribed drugs were studied. 658 drugs (27 different categories) were prescribed for 65 CKD patients. We observed 29 prescriptions with more than 10 drugs and 294 (44%) drugs were extensively excreted through kidneys. 83 drugs are contraindicated in CKD patients and 17 drugs have narrow therapeutic index. ADRs were observed in 31 (a total of 51 ADRs) prescriptions. 45% of patients experienced ADRs, which indicates the need for clinical pharmacist intervention in the treatment of CKD patients. Further studies are needed to be performed to check the health outcomes in CKD patients after implementing the intervention recommended in our study.

Keywords: Chronic kidney disease, contraindications, Pharmacokinetic profile, Narrow therapeutic index drugs

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I. Introduction

Chronic Kidney Disease (CKD) is one of the most worldwide known public health problems with an elevating incidence and prevalence, poor outcomes and high cost. Outcome measures of CKD include kidney failure and complications of decreased kidney function and cardiovascular disease. Complications of CKD result in decreased elimination which leads to accumulation of drugs and precipitation of adverse drug reactions. Some of these adverse events can be prevented by early detection and prophylaxis. But in practical concern, CKD is under-diagnosed and un-treated as a result of lack of agreement on a definition and classification of its stages of progression [1]. According to National Health and Nutrition Examination Survey (NHANES) studies between 1988-1994 and 2003-06 the prevalence of CKD is growing rapidly in people of ages 60 and older with a growing range from 18.8 to 24.5 percent whereas in people between the ages of 20 and 39 stayed consistently below 0.5% [2]. Alan S carried out a prospective study which concentrated on the mortality due to higher phosphate level in 1203 CKD patients. Eddington et al. stated in their study, Cox multivariate adjusted regression in CKD stages 3 to 4 patients showed an increased risk of all-cause and cardiovascular mortality in the highest quartile compared with that in the lowest quartile of phosphate. No association was found in CKD stage 5 patients [3]. In renally impaired patients, Drug dosage regimen errors are common and frequent which lead to adverse effects and poor compliance towards therapy either by causing toxicity or by ineffective therapy. Physicians should pay attention when prescribing therapies with such drugs of having long half lives, toxic or active metabolites, renal excretion which can accumulate and contribute to exaggerated pharmacologic effects or adverse drug reactions in patients [4-6]. Henceforth our present research work is to evaluate the drugs used in management of CKD in a tertiary care hospital not only by collecting and categorizing the drugs used in CKD patient prescription with their pharmacokinetic profiles but also by suggesting alternative drugs which have low renal clearance and observing the Adverse drug reactions in patients.

II. Methodology

2.1 Study design and site: The six months prospective observational study was carried out in SVRRGG tertiary care hospital of Andhra Pradesh, India, from may 2014 to October 2014.

2.2 Study sample: A total of 65 patients who admitted in general medicine department (male and female) and who provide informed consent form were enrolled in the study. The study criteria included Patients with chronic kidney disease and who were willing to participate in the study.

2.3 Design of Proforma and data collection: A specially designed proforma was used to collect patient data which contains patient demographics, patient complaints, past history, lab investigations, and some questions about their health understanding. Three pharmacy lecturers with experience in drug use research and ADR reporting studies were asked to evaluate the clarity, relevance and conciseness of items included in the proforma. The observations and comments of the lecturers were taken in to the account. Prescriptions were evaluated and pharmacokinetic profiles of the prescribed drugs were studied. The collected data was analysed on categorical basis and the obtained results evaluated using Microsoft Excel.

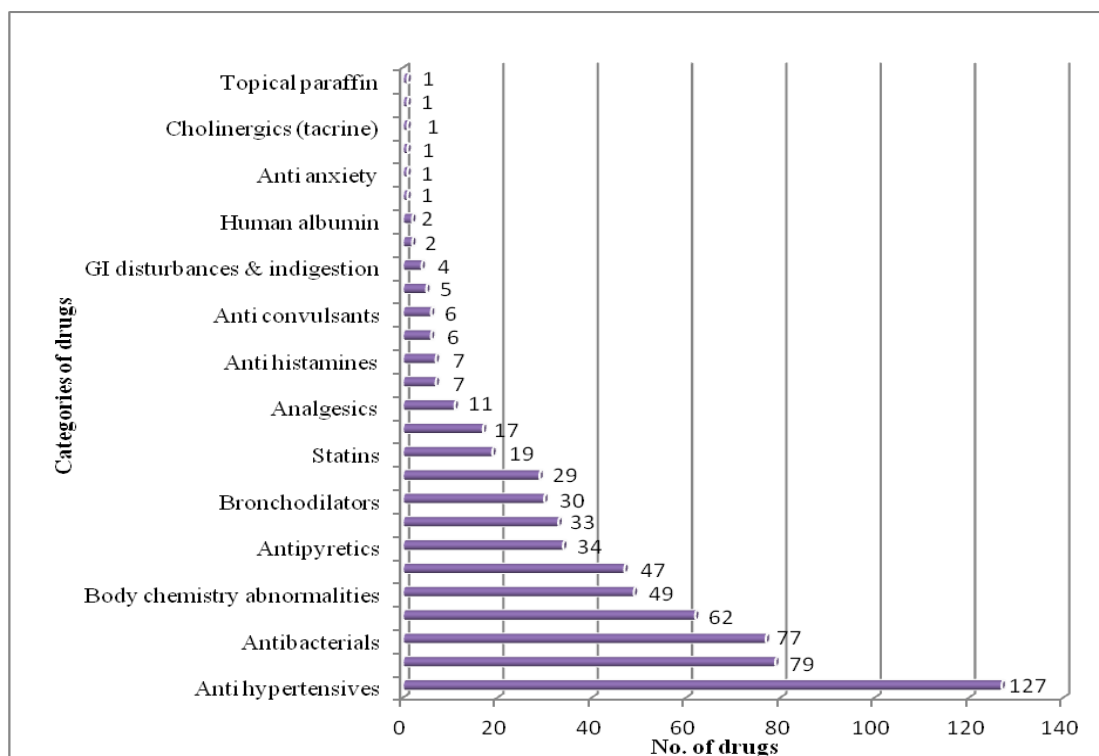
III. Results

Out of 65 patients, all 65 consented for the participation in study. Out of 65 prescriptions, we observed 27 categories of drugs. Categories of drugs prescribed for CKD patients with different co-morbidities are antihypertensives (127, 19.3%), vitamin supplements (79, 12%), antibacterials (77, 11.7%), antiulcers (62, 9.42%), body chemistry abnormalities (49, 7.44%), iron supplements & erythropoietin (47, 7.14%), antipyretics (34, 5.16%), hypoglycemics (33, 5.01%), Bronchodilators (30, 4.55%), antiplatelets (29, 4.4%), statins (19, 2.88%), antiemetics (17, 2.58%), analgesics (11, 1.67%), antispasmodics (7, 1.06%), antihistamines (7, 1.06%), cardiovascular drugs (6, 0.91%), anticonvulsants (6, 0.91%), laxatives (5, 0.75%), GI disturbances & indigestion (4, 0.6%), corticosteroids (2, 0.3%), human albumin (2, 0.3%), NSAIDs (1, 0.15%), antianxiety (1, 0.15%), anticholinergics (1, 0.15%), cholinergics (1, 0.15%), antithyroid (1, 0.15%), topical paraffin (1, 0.15%).

Drugs per prescription	No. of prescriptions	Percentage
1-5	3	4.61%
6-10	33	50.76%
11-15	26	40%
>15	3	4.16%

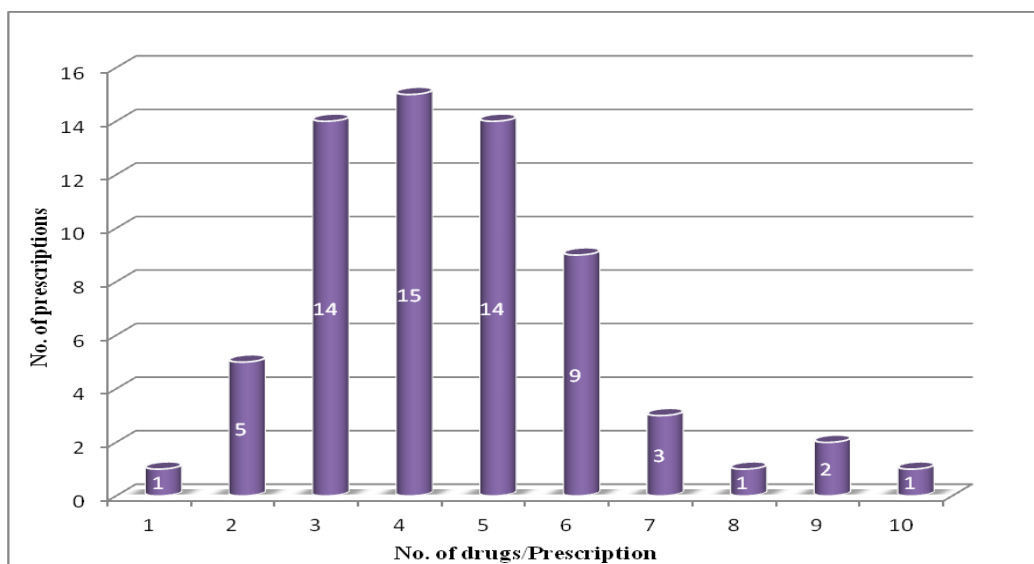
Table 1. Number of drugs per prescription

Our study contains 65 prescriptions. Total number of drugs present is 658. Average number of drugs per prescription is 10.12. Number of prescriptions that contain 1-5 drugs are 3 (4.61%). Number of prescriptions that contain 6-10 drugs are 33 (50.76%). Number of prescriptions that contain 11-15 drugs are 26 (40%). Number of prescriptions that contain >15 drugs are 3 (4.16%)



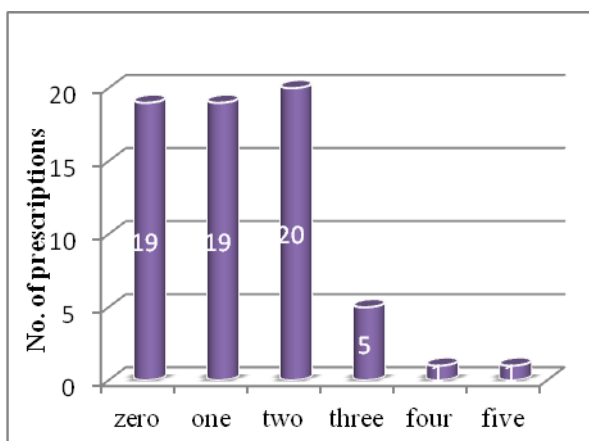
Graph 1. Categories of drug prescribed

Total number of drugs excreted extensively through kidneys is 294. Average number of drugs that are mainly excreted through kidneys per prescription is 4.52. Number of prescriptions containing 1 renally excreted drug is 1 (1.54%). Number of prescriptions containing 2 renally excreted drug are 5 (7.69%). Number of prescriptions containing 3 renally excreted drug are 14 (21.54%). Number of prescriptions containing 4 renally excreted drug are 15 (23.07%). Number of prescriptions containing 5 renally excreted drug are 14 (21.54%). Number of prescriptions containing 6 renally excreted drug are 9 (13.85%). Number of prescriptions containing 7 renally excreted drug are 3 (4.61%). Number of prescriptions containing 8 renally excreted drug are 1 (1.54%). Number of prescriptions containing 9 renally excreted drug are 2 (3.08%). Number of prescriptions containing 10 renally excreted drug are 1 (1.54%)

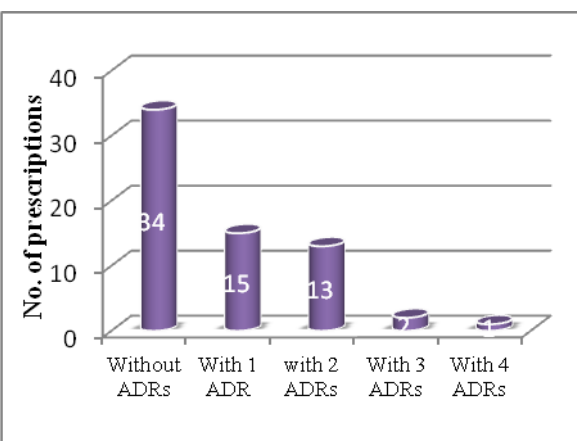


Graph 2. Number of Renally excreted drugs

Total number of drugs prescribed that are contraindicated in CKD is 83. Average number of drugs prescribed that are contraindicated in CKD per prescription is 1.27. Number of prescriptions containing zero contraindicated drug is 19 (29.23%). Number of prescriptions containing one contraindicated drug is 19 (29.23%). Number of prescriptions containing 2 contraindicated drugs are 20 (30.7%). Number of prescriptions containing 3 contraindicated drugs are 5 (7.69%). Number of prescriptions containing 4 contraindicated drugs are 1 (1.54%). Number of prescriptions containing 5 contraindicated drugs are 1 (1.54%).



Graph 3. Contraindications per Prescription



Graph 4. ADRs per Prescription

A total number of ADRs seen in 65 prescriptions is 51. Average number of ADRs seen per prescription is 0.78. Number of prescriptions without ADRs are 34 (52.3%). Number of prescriptions with 1 ADR are 15 (23.07%). Number of prescriptions with 2 ADRs are 13 (20%). Number of prescriptions with 3 ADRs are 2 (3.08%). Number of prescription with 4 ADRs is 1 (1.54%).

IV. Discussion

Chronic kidney disease decreases kidney function, resulting in decreased elimination of drugs, which in-turn leads to accumulation of drugs and precipitation of adverse drug events. Drug dosing errors are frequent in patients with renal impairment and can cause adverse effects and poor compliance to therapy [4]. Our study contains 65 prescriptions. Total number of drugs present is 655. Average number of drugs per prescription is 10.08. Number of prescriptions that contain 1-5 drugs are 3 (4.61%). Number of prescriptions that contain 6-10 drugs are 33 (50.76%). Number of prescriptions that contain 11-15 drugs are 26 (40%). Number of prescriptions that contain >15 drugs are 3 (4.16%). Number of drugs prescribed in case of renal impairment patients should be decreased as this may cause co-morbidities or adverse drug reactions. Total number of drugs excreted extensively through kidneys is 294. Average number of drugs that are mainly excreted through kidneys per prescription is 4.52. Number of prescriptions containing 1 renally excreted drug is 1 (1.54%). Number of prescriptions containing 2 renally excreted drug are 5 (7.69%). Number of prescriptions containing 3 renally excreted drug are 14 (21.54%). Number of prescriptions containing 4 renally excreted drug are 15 (23.07%). Number of prescriptions containing 5 renally excreted drug are 14 (21.54%). Number of prescriptions containing 6 renally excreted drug are 9 (13.85%). Number of prescriptions containing 7 renally excreted drug are 3 (4.61%). Number of prescriptions containing 8 renally excreted drug are 1 (1.54%). Number of prescriptions containing 9 renally excreted drug are 2 (3.08%). Number of prescriptions containing 10 renally excreted drug are 1 (1.54%). The drugs which are excreted through kidney should be given with caution and drugs which are excreted through other routes should be prescribed. Total number of drugs prescribed that are contraindicated in CKD is 83. Average number of drugs prescribed that are contraindicated in CKD per prescription is 1.27. In anti-hypertensive's class of drugs diuretics are recommended. In early kidney disease, ACE inhibitors or ARBs are recommended. Clonidine, α -blockers, calcium channel blockers, propranolol, metoprolol and labetalol are recommended. Hydrophilic β -blockers need dose adjustments. In case of hypoglycemic agents Glipizide is safe. In case of antimicrobials, Doxycycline is the recommended drug. In analgesic agents, Meperidine, Dextropropoxyphene, morphine, tramadol and codeine metabolites are used in stage I to III CKD patients. Atorvastatin is the only drug recommended in the class of statins.

V. Conclusion

Major reasons for the occurrence of adverse drug reactions and development of co-morbidities in the Chronic kidney disease patients are use of drugs with kidney as major route of elimination, contraindicated drugs, polypharmacy, narrow therapeutic index drugs. Hence, there is a need for pharmacist intervention in the treatment of CKD patients. Further studies are needed to be performed to improve the treatment pattern in patients with chronic kidney disease.

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