



IDENTIFICATION OF DRUG-RELATED PROBLEMS IN PATIENTS WITH CHRONIC KIDNEY DISEASE MAINTAINED ON HEMODIALYSIS IN SULAIMANI CITY

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DOI: 10.7897/2277-4572.04338

Received on: 15/05/15 Revised on: 08/06/15 Accepted on: 24/06/15

ABSTRACT

End stage Renal disease is a lifelong disease, patients with this disease and on continuous hemodialysis often require several medications to treat five to six comorbid conditions, Hence those patients may be at high risk for drug related problems, drug-drug interactions and noncompliance. Drug related problems (DRPs) are significant challenge to health care providers. Investigating DRPs is the core for providing patient care. For this purpose the current study has designed to investigate DRPs in patients with end stage renal disease in Sulaimani hemodialysis center. Fifty patients with end stage renal failure, on long-term hemodialysis at the hemodialysis center in Sulaimani city were enrolled in the study between February 20th to July 15th 2013. Observation has done for all medications prescribed for the patients in hemodialysis treatment chart, data for the most frequently prescribed medications were analyzed. The results revealed that under dose (29%) and treatment failure (27.7%) were the most common DRPs in the present study and 68% of the patients presented with hyperphosphatemia, while 32% of them show normal phosphate levels. 53% of those hyperphosphatemic patients receive treatment, while 47% are not effectively managed in this respect. In conclusion many DRPs have been identified in the hemodialysis center; including untreated conditions, treatment failure, inappropriate dosage form, under dose, over dose, incorrect administration and patient non-adherence which might be attributed to the lack of multidisciplinary services, providing such services by a teams of physicians, nurses, dieticians, and clinical pharmacists share the goal of preventing DRP.

Keywords: End Stage Renal disease, Drug related problems, hyperphosphatemia.

INTRODUCTION

Although there is no precise study about the epidemiology and prevalence of chronic renal failure in Sulaimani and other cities in Iraq¹. Many researchers reported that hemodialysis patients often require about 12 medications to treat 5 to 6 comorbid conditions^{2,3}. Besides, End stage Renal Disease (ESRD) is a lifelong disease and rates of compliance may diminish overtime. Thus, hemodialyzed patients may be at particular risk for drug related problems, drug-drug interactions and noncompliance⁴. A drug-related problem (DRP) is defined as an undesirable event, risk or circumstance involving drug treatment that interferes or potentially interferes with the patient achieving an optimum outcome of medical care⁵. Untreated indication, improper drug selection, sub therapeutic dosage, failure to receive drugs, over dose, adverse drug reaction, drug interaction, drug use without indication are types of drug related problem⁶. A high number of prescribed medications, poor medication adherence, and frequent dosage changes may also contribute to drug-related morbidity and related problems⁴. The identification, prevention, and solution of drug-related problems (DRPs), are the core processes of pharmaceutical care. Several studies have shown that patients with end stage renal disease (ESRD) are among those at high risk for drug-related problems⁷. The medical management of pre-dialysis and dialysis patients involves complex and highly variable pharmacotherapy, including frequent monitoring and evaluation to ensure optimal pharmacotherapy, adherence to medication, and control of comorbidities and other risk factors. The occurrence of a DRP could prevent or delay patients from achieving desired therapeutic goals. An actual DRP is an event that has already occurred in a patient, whereas a potential DRP is an event that is likely to develop if pharmacists do not make any appropriate interventions; DRPs are significant challenge to health care providers and may

affect morbidity, mortality and a patient's quality of life. Patients in ESRD on continuous hemodialysis need more care in the center due to multiple medications and investigating medication related problem is the core for providing patient care. For this purpose the current study has designed to investigate drug-related problems in patients with end stage renal disease (ESRD) in Sulaimani hemodialysis center.

MATERIALS AND METHODS

Patient selection and enrollment

Fifty patients with end stage renal failure (22 male, 28 female), the average age of the patients was 51.7, S.D \pm 14.47 years, maintained on long-term hemodialysis at the hemodialysis center in Sulaimani city were enrolled in the present study. All patients provided a written informed consent. The study protocol was approved by ethical committee of University of Sulaimani- Faculty of medical sciences- School of medicine.

Study Protocol

An observational prospective study conducted on fifty hemodialysis patients during their treatment sessions in Sulaimani Dialysis Center in the period between February 20th 2013 and July 15th 2013 to investigate drug-related problems among those patients.

Data collection

A suitable data collection form was designed to collect demographic details and medication history. Data collection was based on face-to-face interview with the patients and their caregivers, as well as

reviewing the hemodialysis treatment charts in the dialysis center; the details were recorded in another form, which has designed for categorization and identification of DRPs.

Drugs involved

Observation has done for all medications prescribed for the patients in hemodialysis treatment chart, and then the data for the most frequently prescribed medications were analyzed. The results were expressed as numbers, averages, percentages and range.

RESULTS

Demographic data

The demographic data and baseline characteristics for the patients included in the current study are shown in Table 1.

Frequency of drug related problem in hemodialysis center

Table 2,3 show the frequency and the percentage of drug related problems in the hemodialysis center for the selected studied medications including calcium tablet, iron supplement capsule, sevelamer tablet, alfacalcidol capsule, antihistamine tablet, antihypertensive drugs and erythropoietin respectively. The table displays various DRPs among the selected drugs and most common DRP in the recent study were under dose (29%) and treatment failure (27.7%).

Untreated hyperphosphatemia conditions in Sulaimani hemodialysis center

Figure 1 shows that 68% of the patients who are maintained on hemodialysis presented with hyperphosphatemia, while 32% of dialyzed patients show normal phosphate levels. Additionally figure 2 indicates that only 53% of those hyperphosphatemic patients receive treatment for such condition, while the other 47% are not effectively managed in this respect.

Table 1: Demographic data and baseline characteristics (n= 50)

Variables	Minim	Maxim	Mean	±S.D
Age (year)	15	78	51.74	14.47
Weight in kg pre HD	32	105	61.30	13.00
Weight in kg post HD	29	100	57.79	12.72
Duration of each session of hemodialysis/min	128	180	167.48	12.53
Number of session of hemodialysis per week	1	3	2.42	0.642
Hemoglobin mg/dl (mean level)	8.07			
Erythropoietin (Epoetin)	4000 IU/ session			

Table 2: Frequency of Drug Related Problem in the Hemodialysis Treatment Sheets

Types of Drugs	Frequency of prescription	Untreated condition	Treatment failure	Inappropriate dosage form	Under dose	Over dose	Incorrect administration	Patient non-adherence	Total DRPs
Calcium tablet	46	4	7	13	14	4	18	18	78
Iron supplement	48	4	48	13	25	0	17	9	116
Sevelamer tablet	18	13	7	6	7	0	9	3	45
Alfacalcidol capsule	48	0	0	0	23	0	9	3	35
Antihistamine tablet	17	17	8	7	6	0	7	4	49
Antihypertensive drug	42	5	12	5	13	0	9	6	50
Erythropoiten	48	0	48	0	48	0	0	0	96
Total	267	43	130	44	136	4	69	43	469

Table 3: Types and Percent of DRPs in Sulaimani Hemodialysis Center

Types of DRPs	% DRPs
Untreated conditions	9.2
Treatment failure	27.7
Inappropriate dosage form	9.3
Under dose	29
Over dose	0.8
Incorrect administration	14.7
Patient non- adherence	9.2

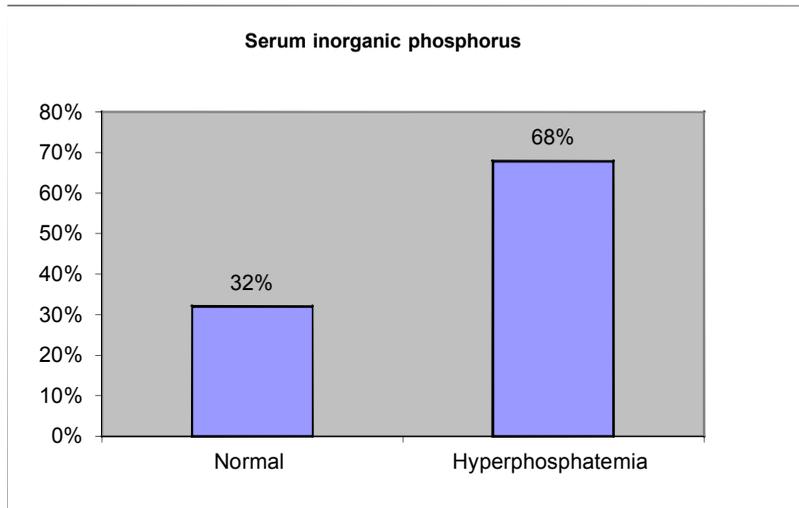


Figure 1: Frequency of Hyperphosphatemia in Patients Maintained on Regular Hemodialysis in the Center.

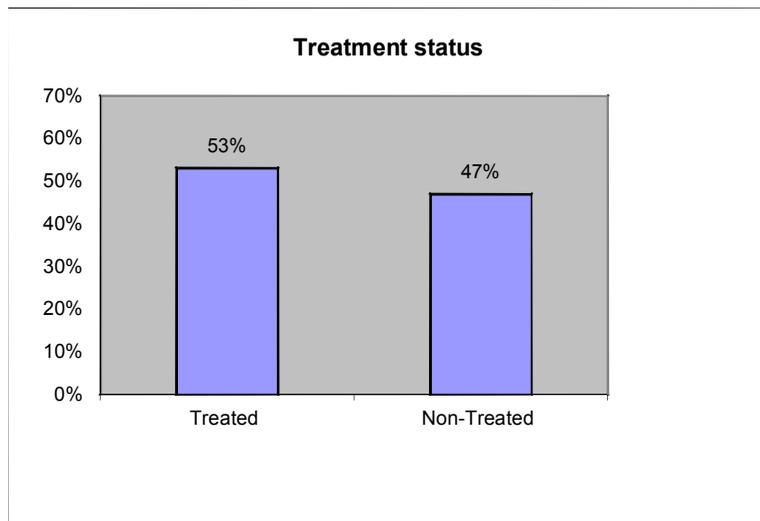


Figure 2: Frequency of Treated and Non-Treated Cases of Hyperphosphatemia in Chronic Kidney Disease Patients Maintained on Regular Hemodialysis in the Center

DISCUSSION

Drug-related problems are common in patients with renal insufficiency maintained on hemodialysis⁴. Such patients are at higher risk, as they require complex therapeutic regimens with 5 or more medications and 12 or more medication doses per day that require frequent monitoring and dosage adjustment; they usually have other concurrent diseases including diabetes mellitus, hypertension, coronary artery diseases and infections. They are usually non-compliant with medications. In the present study, many DRPs have been identified in the hemodialysis center; the types of the identified DRPs include untreated conditions, treatment failure, inappropriate dosage form, under dose, over dose, incorrect administration and patient non-adherence. The most common DRPs that has been observed in the center was the under dose (29%); the result of the current study is consistent with that reported by Manley et al. who reported that one of the most important drug-related problems in patients with renal impairment is medication dosing errors⁷. The proper dosing of medications for patients with renal impairment can maximize therapeutic efficacy and minimizes toxicity⁸. Proper dosing can also have an economic impact on the health system.

Dosage adjustment can result in avoidance of costs associated with drug-related toxicity and in cost savings in terms of drug costs⁹. Moreover, despite the importance of dosage adjustment among patients with renal impairment, such adjustments is rarely precisely performed¹⁰. A major reason for inappropriate dosage adjustment is the underestimation of potential adverse consequences. Additionally, the less high percentage of DRPs identified in the current study was treatment failure (27.7%), while hyperphosphatemia and uremic pruritis appeared with high percentage (47%) among the untreated cases. Uremic pruritis is one of the most common and frustrating symptom experienced by patients with end-stage renal disease. Approximately 60% of dialysis patients experience pruritis, sometimes worsened during the dialysis session¹¹. The clearance of phosphorus varies among the different modalities of dialysis. Ideally, adequate dialysis in any form would remove adequate amounts of all uremic toxins, including phosphorus. Unfortunately, conventional, thrice-weekly hemodialysis (4 hrs duration) removes approximately 900 mg of phosphorus at each session (an average of only 300 mg/d)¹². Therefore, compliance with dietary restriction and phosphate-binding therapy, such as sevelamer hydrochloride which is non-aluminum, non-calcium-containing hydrogel that binds phosphate

anions through ionic exchange with chloride, should be encouraged¹³. The reported frequency of DRPs in the present study might be attributed to the lack of multidisciplinary services for those patients, because multidisciplinary health care teams of physicians, nurses, dieticians, and clinical pharmacists share the goal of preventing disease progression and managing comorbid conditions in chronic kidney disease and ESRD patients. As specialists in pharmacotherapy, clinical pharmacists are routinely involved in patient care and interact with other health care professionals, addressing multiple pharmacotherapy optimizations. Ideally, this happens through a preventive, rather than a reactive approach. Evidence from the literature supports the involvement of clinical pharmacists in several disease areas and underlines the positive patient outcomes and improvement of afforded health care^{14,15}. In conclusion many DRPs have been identified in the hemodialysis center; including untreated conditions, treatment failure, inappropriate dosage form, under dose, over dose, incorrect administration and patient non-adherence which might be attributed to the lack of multidisciplinary services, providing such services by a teams of physicians, nurses, dieticians, and clinical pharmacists share the goal of preventing DRP.

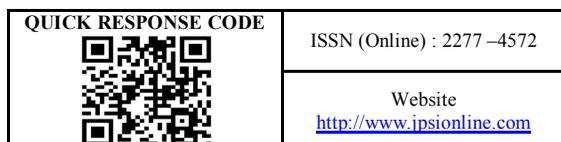
ACKNOWLEDGEMENT

The study protocol was approved by the local committee of clinical research ethics in the University of Sulaimani with registration number 7/29/2232. The authors thank the University of Sulaimani and Sulaimani Dialysis Center for supporting the project.

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Source of support: University of Sulaimani, Conflict of interest: None Declared



How to cite this article:

Dlear Hassan Ossman, Bushra Hassan Marouf, Kawa Hussein Ameen. Identification of drug-related problems in patients with chronic kidney disease maintained on hemodialysis in Sulaimani city. J Pharm Sci Innov. 2015;4(3):172-175 <http://dx.doi.org/10.7897/2277-4572.04338>

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