



# IJPPR

INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH  
An official Publication of Human Journals

ISSN 2349-7203




Human Journals

**Research Article**


June 2018 Vol.:12, Issue:3

© All rights are reserved by Harikrishna.Kommanaboina et al.

## Prescribing Patterns of Medicines and Medication Adherence in CKD Patients on Maintenance of Hemodialysis



**IJPPR**  
INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH  
An official Publication of Human Journals



ISSN 2349-7203

**Sailaja.Chundu<sup>1</sup>, Harika.Kaki<sup>1</sup>, Deepti.Karyamsetty<sup>1</sup>,  
Shyamili.Midathana<sup>1</sup>, Rama Krishna C.H.V<sup>2</sup>,  
Harikrishna.Kommanaboina<sup>3\*</sup>, Suresh Kumar J.N<sup>4</sup>.**

1. *V Pharm.D students, Narasaraopeta Institute of Pharmaceutical sciences, Narasaraopeta, Andhra Pradesh, India.*
2. *Nephrologist, Vedanta hospitals, Guntur, Andhra Pradesh, India.*
- 3\*: *Assistant Professor, Department of Pharmacy Practice, Narasaraopeta Institute of Pharmaceutical Sciences, Narasaraopeta, Andhra Pradesh, India.*
- 4.*Professor cum Principal, Department of Pharmaceutics, Narasaraopeta Institute of Pharmaceutical Sciences, Narasaraopeta, Andhra Pradesh, India.*

**Submission:** 27 May 2018  
**Accepted:** 2 June 2018  
**Published:** 30 June 2018

**Keywords:** Prescribing pattern, Medication adherence, Hospital, Rationality, Clinical Pharmacy

### ABSTRACT

**Background:** CKD is the general term for heterogeneous disorders affecting kidney structure and its functions. Dialysis is the most preferred option for CKD that prolongs survival. Patients undergoing hemodialysis are prescribed with multiple complex regimens and are predisposed to high risk of medication nonadherence which is a major threat to public health. **Objective:** The main objective is to evaluate the prescribing patterns of medicines and medication adherence in CKD patients on maintenance of haemodialysis to investigate the rationality and to examine the differential perspective on medication taking behaviour shown by adherent and non-adherent haemodialysis patient. **Methodology:** A prospective observational study was conducted in the Department of Nephrology in Vedanta hospital, Guntur for a period of 6 months. The records of all the patients within given period were isolated and screened and relevant data was extracted and analysed. **Results:** A total of 100 patients consisting of 70 males (70%) and 30 females (30%) were enrolled with mean age of 50.9yrs. The most commonly prescribed drugs are Antibiotics 14.34% (108), Diuretics 9.16% (69), CCB 8.36% (63), Bronchodilators 5.04% (38), Beta blockers 4.91% (37), Antiplatelets 4.91% (38). 48% of patients were medium adherent, 31% were highly adherent and 21% were low adherent. **Conclusion:** Of the 100 patients analysed, it was observed that the majority of the patients were medium adherent, followed by high & low. Physician prescribed medicines more rationally with no banned drugs and less newer drugs. This study recommends that need of developing clinical pharmacy services to improve the rational prescribing of medicines.



HUMAN JOURNALS

[www.ijppr.humanjournals.com](http://www.ijppr.humanjournals.com)

## INTRODUCTION

Chronic kidney disease (CKD) is defined as either kidney damage or  $GFR < 60 \text{ ml/min/1.73m}^2$  for  $\geq 3$  months, irrespective of cause<sup>1</sup>.

**TABLE 1: STAGES OF CKD**

STAGE	GFR (ml/min/1.73m <sup>2</sup> )
I	$\geq 90$
II	60-89
III	30-59
IV	15-29
V	$\leq 15$

According to the 2010 Global Burden of Disease study, chronic kidney disease was ranked 27th in the list of causes of total number of deaths worldwide in 1990 but rose to 18th in 2010. This degree of movement up the list was second only to that for HIV and AIDs<sup>2</sup>. There are so many factors associated with CKD which include susceptibility factors (advanced age, reduced kidney mass, racial or ethnic minority, family history), initiation factors (Diabetes mellitus, Hypertension, Glomerulonephritis) and progression factors (glycemia in Diabetics, Hypertension, Proteinuria, Hyperlipidemia, Obesity and Smoking)<sup>3</sup>. CKD development and progression are insidious. Patients with stage 1 or stage 2 of CKD usually do not have symptoms or metabolic derangements seen with stages 3 to 5, such as Anemia, Secondary Hyperparathyroidism, Cardiovascular disease (CVD), Malnutrition, and Fluid and Electrolyte abnormalities that are common as kidney function deteriorates<sup>4</sup>. Uremic symptoms (fatigue, weakness, shortness of breath, mental confusion, nausea, vomiting, bleeding, and anorexia) are generally absent. But these symptoms indicate severity of disease.

Renal Replacement Therapy (RRT) is the mainstay of care for patients with end stage renal disease (ESRD). Dialysis as an option of RRT prolongs survival, reduces morbidities and improves quality of life<sup>5</sup>. Dialysis is preferred when kidney function lost about 85-90% or have a GFR of  $< 15 \text{ ml/min/1.73m}^2$ <sup>6</sup>. There are two main forms of dialysis, Hemodialysis and Peritoneal Dialysis, both of which are life support treatments; but dialysis does not treat kidney diseases<sup>7</sup>.

**TABLE 2: INDICATIONS OF DIALYSIS:<sup>8</sup>**

TYPE OF KIDNEY DISEASE	INDICATIONS OF DIALYSIS
<b>Acute or sudden illness</b>	Metabolic acidosis or a change of the blood pH to acidic, Electrolyte imbalance, Overload of fluid, Acute poisoning, Uremia.
<b>Chronic or long term illness</b>	GFR $\leq$ 15ml/minute/1.73m <sup>2</sup>

For patients with chronic kidney disease (CKD), the decision of when to start chronic dialysis is a difficult one that is made in collaboration between the nephrologist and patient. The decision is difficult because, although dialysis effectively treats the signs and symptoms of uremia and fluid overload (some of which may be life threatening), it is a lifelong therapy that is associated with discomfort, inconvenience, and some risk for the patient. As a result, dialysis should be started when the benefit from relieving uremic signs and symptoms is thought to outweigh its risk and associated effect on quality of life, but not before this time<sup>9</sup>. The drugs that are commonly prescribed to CKD patients on maintenance of Hemodialysis include Anti-hypertensives, Anti-diabetics, Erythropoietin, Iron, Active vitamin D, Phosphorous binders, Hemopoetics, Vitamin Supplements, Antibiotics, others- Sorbitrates, Anti-platelets, Heparin, topical creams, antihistamines<sup>10,11,12</sup>.

Medication adherence is defined by the World Health Organization as "the degree to which the person's behaviour corresponds with the agreed recommendations from a health care provider."<sup>13</sup>. The adherence of ESRD patients correlates with morbidity and mortality<sup>14</sup>. Specifically, skipping treatment and poor dietary adherence are strongly associated with greater risk for death<sup>15</sup>. There are several factors associated with medication nonadherence in CKD patients<sup>16</sup>.

**TABLE 3: FACTORS ASSOCIATED WITH NON ADHERENCE IN HEMODIALYSIS PATIENTS<sup>16</sup>**

TYPE OF FACTORS	FACTORS
<b>DEMOGRAPHIC FACTORS</b>	Age Gender Educational level Marital status or living arrangements Race or ethnicity Income or employment status Cost or payment or insurance or Socioeconomic situation Smoking or drinking or drug abuse
<b>CLINICAL FACTORS</b>	Length of time on hemodialysis Chronicity or chronic condition Diabetic status Former transplant history Treatment regimen complexity High tablet burden Tablet size and taste Treatment side effects
<b>PSYCHOLOGICAL FACTORS</b>	Health beliefs or knowledge or motivation Self esteem Cognitive behaviour or function Health locus of control Social support and family dynamics Psychiatric illness anxiety/depression Coping style, Patient physician relation

No.of strategies can be used to improve the medication adherence in CKD patients which may include<sup>16</sup>

- ✓ Promoting interaction with the attending physicians and nursing staff

- ✓ Maintenance of contact with the patient and the patient's family (empathy on adherence, trust)
- ✓ Continuous education of the patient about the disease and its treatment
- ✓ Establishment of the goals of therapy
- ✓ Improvement of patient motivation
- ✓ Awareness of medication taking behaviour
- ✓ Reduced complexity of treatment regimens (once in a day formulations)
- ✓ Early diagnosis of cognitive impairment

There are a number of approaches to studying medication-taking behaviour. The most precise methods are directly observed therapy, biological methods and measurement of the level of medicine or metabolite (such as blood or urine drug concentrations). Numerous other methods include clinician reports, pill counts, rates of prescription refills, electronic medication monitors, patient diaries, and patient self-report measures<sup>16</sup>.

**TABLE 4: EVALUATION OF ADHERENCE IN THE HEMODIALYSIS PATIENTS<sup>16</sup>**

<b>DIRECT MONITORING METHODS</b>	<b>INDIRECT MONITORING METHODS</b>
<b>Assays of drug concentrations in biological fluids</b>	structured interviews questionnaire
<b>Use of markers incorporated into pills</b>	Compliance ratings by nurses
<b>Direct observation of pill taking</b>	Prescription refills
	Pill counts
	Microelectronic monitoring devices

Among these patient, self-report measures are mostly used for evaluation of medication adherence as it has some benefits like Being cheap, Brief, Acceptable to patients, Valid, Reliable, Have the ability to distinguish between different types of non-adherence, Easy to administer, Non-intrusive, Able to provide information on attitudes and beliefs about medication.



If the Total score is  $>2$  it indicates Low adherence if it is 1 or 2 indicates Medium adherence if 0 it indicates High adherence.

The aim of our study is to evaluate the Prescribing Patterns of Medicines and Medication Adherence in CKD patients on maintenance of hemodialysis. The objectives of our study is to study the drug utilisation pattern in CKD patients undergoing hemodialysis, to examine the differential perspective on medication taking behaviour shown by adherent and non-adherent hemodialysis patients, to assess the direct relationship between number of medicines and medication adherence, and to describe strategies that may be used to improve adherence to prescribed Pharmacotherapy.

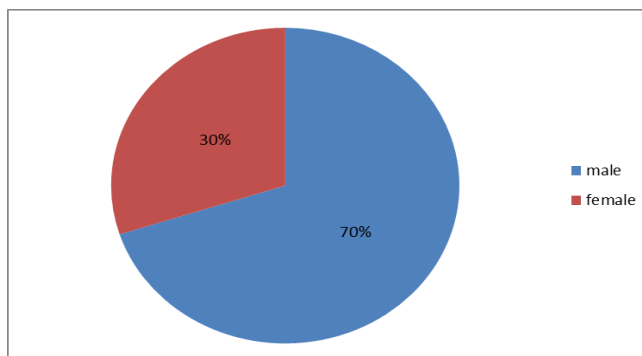
### **METHODOLOGY:**

It is a prospective observational study conducted at Nephrology department in Vedanta hospital, Guntur for a period of six months from September 2017 to February 2018 taking sample size as 100. We included all CKD patients undergoing hemodialysis aged above 18 years, Patients of either sex, Patients who are in ICU department, Patients with co-morbid conditions, Patients who are willing to participate. And we excluded all paediatric patients, Patients who were pregnant and lactating, Patients on hemodialysis with ARF, Patients who are not willing to participate.

We used the Patient case sheet for collecting the various data for the project and the data collection form contains Patient demographic details, Chief complaints, past medical history, past medication history, Social history, Laboratory investigations, Diagnosis, Dialysis chart, Medication chart, Morisky 8 item medication adherence questionnaire. Data collection form enclosed. MS Excel format is used for collecting data. Strict privacy and confidentiality is maintained during data collection.

### **RESULTS:**

The study involved 100 CKD patients undergoing Hemodialysis. Among these 70% were males and 30% were females with patients were more from age group of 51-60 yrs.



**FIGURE 1: GENDER DISTRIBUTION IN CKD PATIENTS**

CKD staging is done based on GFR rate of the patients which is calculated using MDRD (Modification of Diet in Renal Disease). In our study, most of the patients are in stage 5 of CKD (81%) followed by stage 4(11%)

**MDRD EQUATION:**

$$\text{GFR (mL/min/1.73 m}^2\text{)} = 175 \times (\text{Scr})^{-1.154} \times (\text{Age})^{-0.203} \times (0.742 \text{ if female}) \times (1.212 \text{ if black})$$

**TABLE 5: PRESCRIPTION ANALYSIS**

Details of prescription	No.of patients
Male	70
Female	30
Mean average age	50±1
Prescriptions analysed	100
Total no.of drugs prescribed	753
Total no.of drugs prescribed by generic name	0
No.of drugs from WHO essential drugs list	43

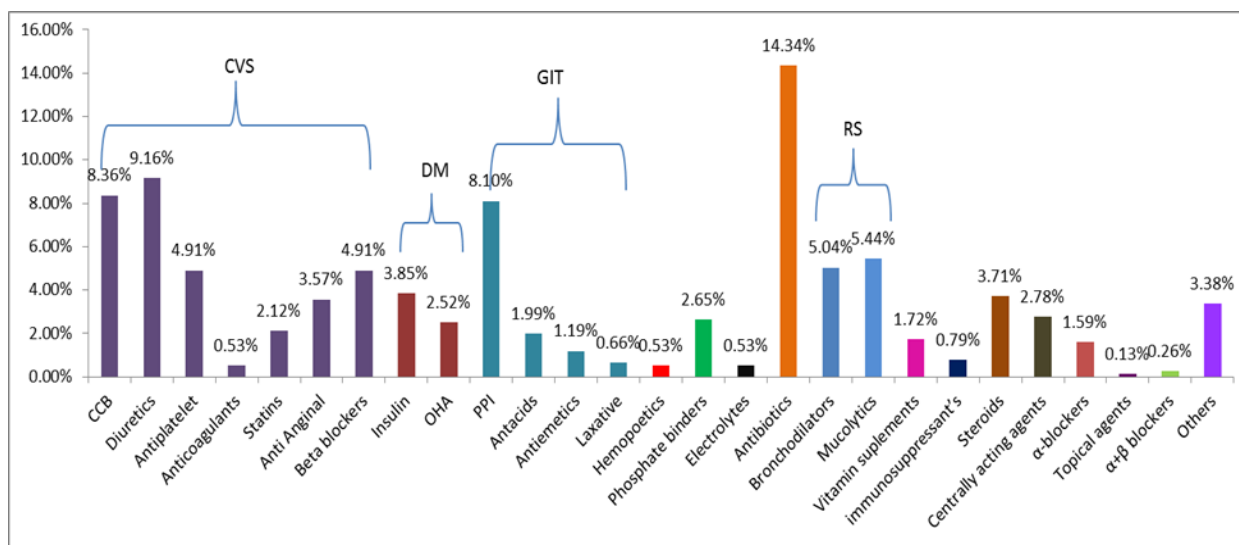
Totally 753 drugs, as 7.53 drugs per prescription, prescribed in this study and in these drugs about 43 drugs only prescribed from WHO essential drug list and all 119 drugs prescribed were FDA approved.

Most common Risk and Comorbid condition associated with CKD are Hypertension, Diabetes mellitus, Coronary artery disease etc. In our study Hypertension (91%) is the most common comorbid condition associated with CKD patients followed by Diabetes mellitus



(48%). The presence of comorbidities has a twofold impact first, it increases the cost of treatment and secondly, it poses a challenge for the treatment of CKD patients. Because of the multiple medications, CKD patients are at higher risk of developing drug-related problems.

In our study we observed the no.of classes of drugs prescribed to CKD patients, in those most commonly prescribed were CVS (Cardio Vascular System) drugs 38.38%(289), Gastrointestinal tract drugs 11.95% (90), Respiratory system 10.49% (79), Diabetes mellitus 6.37% (48).



**FIGURE 2: PERCENTAGE OF DIFFERENT DRUGS USED IN CKD PATIENTS**

The five most commonly prescribed drugs were antibiotics 14.34, Diuretics 9.16%, calcium channel blockers 8.36%, Bronchodilators 5.04%, beta blockers 4.91%, anti-platelets 4.91%. No drugs were prescribed by generic names

Measuring and assessing medication adherence in patients on Hemodialysis is complex and requires certain criteria to obtain accurate results. We used Morisky 8 Item Medication Adherence Questionnaire to measure the medication adherence in patients and we found that most of the patients were medium adherent i.e., 48 patients, 31 patients were high adherent and low adherence is seen in 21 patients.

**TABLE 6: COMPARISON OF MEDICATION ADHERENCE IN MALE AND FEMALE PATIENTS**

ADHERENCE	MALE (%)	FEMALE (%)
High	28.57	36.66
Medium	48.57	46.66
Low	22.85	16.66

This shows that female patients were more adherent to medication compared to male



**FIGURE 3: NO.OF DRUGS PRESCRIBED TO CKD PATIENTS ON MAINTENANCE OF HEMODIALYSIS**

There is no much difference in no.of drugs prescribed to patients and the no.of drugs used was based on Co-morbid condition associated and the stage of CKD. Approximately 7-9 drugs were prescribed to each patient.

Polypharmacy is common in CKD patients due to presence of comorbid conditions associated with CKD. This is unavoidable Polypharmacy. Generally, polypharmacy can be explained in two ways major polypharmacy and minor polypharmacy. In our study out of 100 patients, Major polypharmacy was seen in 57 patients and Minor polypharmacy was seen in 43 patients.

**TABLE 7: MEDICATION ADHERENCE BASED ON POLYPHARMACY**

No. of drugs	With High adherence	With Medium adherence	With Low adherence	Total no and percentage of patients
≤3	7 (33.33%)	10 (47.61%)	4 (19.05%)	21 (100%)
4-5	9 (40.9%)	10 (45.45)	3 (13.63)	22 (100%)
≥6	15 (26.31%)	28 (49.12%)	14 (24.56%)	57 (100%)

This shows that there was no direct relation between the number of drugs used and the Medication adherence. Here no decrease in adherence was found as the number of drugs increased. No adverse drug reactions observed during the study period. Good adherence in majority of the patients is because of the achievement in the patient care in the Nephrology department.

Here patients were well acknowledged about the disease and the importance of medication taking. There are several factors other than number of drugs which affect the medication adherence. The study found that factors which influence the medication adherence were age, financial condition of the patient and forgetfulness.

#### **DISCUSSION:**

Changing lifestyle in developing countries has increased risk of occurrence of diseases like Hypertension, Diabetes mellitus etc, whose progression may result in CKD. Due to lack awareness about the disease and its management results in progression of CKD to ESRD. The present study on CKD specifies the patients undergoing hemodialysis revealed that majority of patients were males 70% (70) showing the similar gender distribution in earlier studies done by Narayana murthy B.V. et al. most of these patients aged between 51-60 with a mean age of 50±1.

Several comorbidities were found to be associated among these CKD patients. Most of these patients are with Hypertension (91%) followed by Diabetes mellitus (48%) similar to that of most of earlier studies.

In present study 753 drugs were prescribed, with 7.53 drugs per prescription which indicates polypharmacy which is unavoidable in CKD patients undergoing Hemodialysis, no drugs

were prescribed by generic name. We suggest that writing prescription by generic name which is recommended by various national and international bodies. 36% of the prescribed drugs were from the WHO essential medicines list showing similarities with studies of B.V.Narayanamurthy *et al.*<sup>18</sup>, Bajait *et al.*<sup>19</sup>.

The patients who are on dialysis were prone to infections. So in our study Antibiotics were most commonly prescribed drugs but irrational use of Antibiotics should be discouraged and most of the medications used in this study were based on the comorbid condition and complication involved. For Hypertension diuretics were most commonly prescribed drugs followed by CCB. For DM insulin was mostly prescribed compared to OHA. In our study Calcium carbonate, calcium gluconate, sevelamer were used as Phosphate binders (2.65%).

Due to presence of multiple comorbid conditions CKD patients were more prone to drug related problems and medication nonadherence. Medication adherence plays an important role in management of CKD. In our study, we assessed the medication adherence in patients using Morisky 8 Item Medication Adherence Questionnaire. Most of the patients were medium adherent (48%) and female were more adherent than males. In our study, we observed that there is no direct relationship between no.of drugs and medication adherence. And all the patients were well aware about disease and medication.

## **CONCLUSION:**

Appropriate treatment is associated with a better survival and shortened duration of hospital stay in medical patients with CKD. In this study, prescriptions were collected from Inpatients. The most commonly prescribed drugs were antibiotics, diuretics, calcium channel blocker, Bronchodilators, Beta blockers, Antiplatelets. HTN is the commonly associated co-morbidity seen with these patients. Diuretics and CCB were most commonly used antihypertensive drugs. DM is the second leading co-morbidity. Insulin has been used in majority of the patients and also OHA in few patients. Of the 100 patients analysed, it was observed that the hospital physician prescribed more rationally with no banned drugs and lesser newer drugs. A work assessed Medication Adherence among Hemodialysis patients. 48% of patients were medium adherent, 31% were high adherent and only 21% were low adherent. It was concluded that majority of the patients were medium adherent.

This study could not establish the hypothesis that medication adherence decreases with increase in no. of medications prescribed. Certain factors other than no. of drugs prescribed

will also affect the medication adherence. A no. of patient, disease, medication related factors are associated with medication nonadherence in hemodialysis patients. Clinicians should be aware of such factors so that adherence to medications can be optimised in haemodialysis patients and they should implement some strategies like Improvement of patient motivation, Awareness of medication taking behaviour to enhance medication adherence of patients. This study states that development of clinical pharmacy services is also necessary to improve the rational prescribing of medications. Utilizing of clinical pharmacy services shows benefit on patient health related outcomes and also improves the economic status of the patient.

## REFERENCES:

1. Levey A, Eckardt K, Tsukamoto Y, Levin A, Coresh J, Rossert J et al. Definition and Classification of chronic kidney disease: A position statement from Kidney Disease: Improving Global Outcomes (KDIGO). *Kidney International*. 2005;67(6):2089-2100.
2. Jha V, Garcia-Garcia G, Iseki K, et al. Chronic kidney disease: global dimension and perspectives. *Lancet*. Jul 20 2013;382(9888):260-272.
3. DiPiro J. *Pharmacotherapy-- a pathophysiologic approach*. 6th ed. New York: Mc Graw Hill; page no 768-770.
4. Schlanger L, Bailey J, Sands J. Electrolytes in the Aging. *Advances in Chronic Kidney Disease*. 2010;17(4):308-319.
5. Shibiru T, Gudina E, Habte B, Deribew A, Agonafer T. Survival patterns of patients on maintenance hemodialysis for end stage renal disease in Ethiopia: summary of 91 cases. *BMC Nephrology*. 2013;14(1).
6. Tattersall J, Dekker F, Heimbürger O, Jager K, Lameire N, Lindley E et al. When to start dialysis: updated guidance following publication of the Initiating Dialysis Early and Late (IDEAL) study. *Nephrology Dialysis Transplantation*. 2011;26(7):2082-2086.
7. Yang F, Khin L, Lau T, Chua H, Vathsala A, Lee E et al. Hemodialysis versus Peritoneal Dialysis: A Comparison of Survival Outcomes in South-East Asian Patients with End-Stage Renal Disease. *PLOS ONE*. 2015;10(10):e0140195.
8. Dr. Ananya Mandal M. Indications for Dialysis [Internet]. *News-Medical.net*. 2018 [cited 22 March 2018]. Available from: <https://www.news-medical.net/health/Indications-for-Dialysis.aspx>
9. Bleyer A. UpToDate [Internet]. *Uptodate.com*. 2018 [cited 22 March 2018]. Available from: <https://www.uptodate.com/contents/indications-for-initiation-of-dialysis-in-chronic-kidney-disease>
10. Mason NA (2011) Polypharmacy and medication-related complications in the chronic kidney disease patient. *Curr Opin Nephrol Hypertens* 20: 492–497. pmid:21788893
11. Manley HJ, Garvin CG, Drayer DK, Reid GM, Bender WL, Neufeld TK, et al. (2004) Medication prescribing patterns in ambulatory haemodialysis patients: comparisons of USRDS to a large not-for-profit dialysis provider. *Nephrol Dial Transplant* 19: 1842–1848. pmid:15128886
12. Lynn R. Common Drugs Prescribed for Dialysis Patients - DaVita [Internet]. *Davita.com*. 2018 [cited 22 March 2018]. Available from: <http://www.davita.com/kidney-disease/dialysis/treatment-options/common-drugs-prescribed-for-dialysis-patients/e/5271>
13. Dobbels F, Van Damme-Lombaert R, Vanhaecke J, De Geest S. Growing pains: non-adherence with the immunosuppressive regimen in adolescent transplant recipients. *Pediatr Transplant* 2005. Jun;9(3):381-390 10.1111/j.1399-3046.2005.00356.x
14. ME O'Brien. Compliance behavior and long-term maintenance dialysis. *Am J Kid Dis*. 1990;15(3):209–214
15. Unruh ML, Evans IV, Fink NE, Powe NR, Meyer KB. Choices for Healthy Outcomes in Caring for End-Stage Renal Disease (CHOICE) Study. Skipped treatments, markers of nutritional nonadherence, and survival among incident hemodialysis patients. *Am J Kidney Dis*. 2005;46(6):1107–1116. doi: 10.1053/j.ajkd.2005.09.002

16. Schmid H, Hartmann B, Schiff H. Adherence to prescribed oral medication in adult patients undergoing chronic hemodialysis: A critical review of the literature. *European Journal of Medical Research*. 2009;14(5):185.
17. J. culig and M. Leppee: Scales for Measuring Adherence, *Coll. Antropol*. 38 (2014) 1: 55–62.
18. Murthy B. V. N, V. S. Prescribing pattern of drugs in chronic kidney disease patients on hemodialysis at a tertiary care hospital. *International Journal of Basic & Clinical Pharmacology*. 2017; 6(4):928.
19. Bajait C, Pimpalkhute S, Sontakke S, Jaiswal K, Dawri A. Prescribing pattern of medicines in chronic kidney disease with emphasis on phosphate binders. *Indian Journal of Pharmacology*. 2014; 46(1):35.

