International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

An Observational Study on Prescribing Pattern of Drugs and its Outcomes in Renal-Impaired Patients at Tertiary Care Hospital

Dr Divya Singh[1], Dr. Aziz Ahmed[2], Bhartendra Singh[3], Divya Yadav[4]

[1,2]Professor, Jaipur College of Pharmacy, Jaipur
[3]Assistant Professor, Jaipur College of Pharmacy, Jaipur
[4]Research Scholar, Jaipur College of Pharmacy, Jaipur

Abstract

Renal impairment is characterized by a progressive decline in glomerular filtration rate, a significant public health issue worldwide associated with high morbidity and mortality. In most cases, renal impairment is associated with comorbidities such as hypertension and diabetes, which require multiple drug therapy during a course of treatment, leading to polypharmacy.The objective of this study was to assess the prescribing pattern of drugs in renal-impaired patients at Hospital.A total of 150 patients with renal impairment were finally recruited after strictly obeying the selection criteria in this cross-sectional, observational study conducted over 6 months in a tertiary care hospital. Relevant data were extracted by interviewing the patients and from prescriptions, case records, and investigational reports. Of the total 150 patients, 94 (63%) were male and 56 (37%) female. The highest numbers of patients were in the age group >60 years (59 patients, 39.3%). Anemia was the most common comorbidity (143 patients, 95%) observed, followed by hypertension (129 patients, 86%) and diabetes mellitus (64 patients, 43%). A total of 1693 drugs were prescribed to 150 renal-impaired patients. Each patient received an average of 11.19 ± 3.51 (8%) drugs. Polypharmacy was seen in all patients. Drugs acting on the cardiovascular system constituted the bulk of the prescriptions (25.87%), followed by gastrointestinal (GI) drugs (18.72%), vitamins and minerals (14.94%), and antibiotics (8.33%). There is polypharmacy in patients with renal impairment due to associated comorbidities. The prevalence of polypharmacy was high in patients with kidney disease (KD). Antihypertensive drugs, drugs used for the GI system, antibiotics, and antidiabetic drugs were frequently used in KD patients.

Keywords: Kidney failure,drug utilization, polypharmacy, Prescription pattern, renal impaired

INTRODUCTION:

Drug utilization research is defined as “the marketing, distribution, prescription and use of drugs in society, with particular emphasis on resulting medical, social and economic consequences.[1] It is used to ensure the appropriate and rational use of drugs, i.e., according to the individual patient. It is an essential tool to study the clinical use of drugs in the population and its impact on the health-care system.[2] Renal hindrance or kidney failure is an ailment, wherein kidney capacities are impeded. This prompts failure in sufficiently filtering the metabolic wastes from the blood.[3] It is a common disease

worldwide and is associated with high rates of morbidity and mortality.[4] The two primary types of kidney disease are acute kidney injury (AKI) and chronic kidney disease (CKD). Acute kidney disease is often reversible with adequate treatment, whereas CKD is often not reversible. In both cases, there is usually an underlying cause.[3] A decrease in the glomerular filtration rate (GFR) can determine kidney failure.

Based on the GFR rate, renal impairment can be classified into five stages.[5]

- Stage 1: If the GFR is average or above 90 ml/min, which is associated with albuminuria, blood abnormalities, and abnormal urine tests
- Stage 2: If the GFR is slightly reduced, that is in kidney damage which can be studied by imaging, abnormality in urine and blood
- Stage 3: If the GFR is moderately reduced, that is in the range of 30 59 ml/min, which is associated with the need for screening and physician reference, and it is also divided into:
- Stage 3a: Moderate reduction in GFR of 45 ml/min/1.73 m2)
- Stage 3b: GFR of 30 ml/min/1.73 m2).
- Stage 4: If the GFR is highly reduced, that is in the range of 15–29 ml/min, requiring renal replacement therapy
- Stage 5: if the GFR is <15 ml/min, it is considered kidney failure and requires kidney transplantation, also called end-stage kidney disease.[6]

If the patient's state is severe and renal failure prompts end-stage renal disease (ESRD), renal substitution treatments incorporate dialysis, and renal transplant. A noteworthy part influencing renal disabled patients is polypharmacy. Polypharmacy is basic in patients with KD.[7] ESRD patients who are on hemodialysis have complex medication regimens and get numerous prescriptions with multiple doses every day. Visit prescription changes on dialysis versus nondialysis days, therapeutically temperamental nature of the ailment, and confined ways of life render these patients at high hazard for creating medication-related issues and nonadherence to treatment.[8]

MATERIAL AND METHODS

A prospective observational study with 150 patients was conducted. Data collection for this prospective observational study was conducted with intensive monitoring for 6 months in the department of nephrology in a tertiary care hospital. All patients admitted with a confirmed diagnosis of AKI in the nephrology ward were included. All the quantitative data were represented in mean ± standard deviation. Comparative statistical differences were calculated using an appropriate parametric test (t-test, Chi-square test). A graphical representative was used for a better understanding of the data. A $P \leq 0.05$ was considered statistically significant.

RESULTS AND DISCUSSION

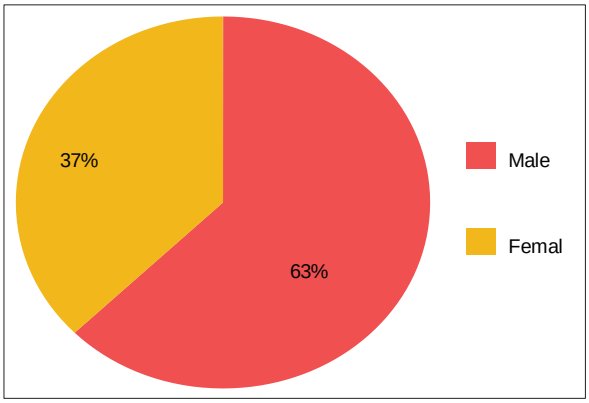

Figure 1: Gender distribution

In this study, 150 patients were recruited. Of these, 94 (63%) were male, and 56 (37%) were female. Therefore, male patients dominated female patients. The figure represents the gender distribution among CKD patients [Figure 1]

Comorbidity assessment

The most prevalent comorbidity was observed to be anemia trailed by hypertension, diabetes mellitus (DM), etc. The figure depicts the comorbidity assessment. Anemia was found to be the most common comorbidity (143 patients, 95%) observed in the study population, followed by hypertension (129 patients, 86%), DM (64 patients, 43%), IHD (10 patients, 7%), hypothyroidism, ascites, hepatitis (six patients each, 4%), COPD, cirrhosis, pleural effusion (three patients each, 2%), angina, benign prostatic hyperplasia (two patients each, 1%), and asthma (one patient, 1%) [Table 1].

Table: 1: Comorbidity assessment

Comorbidity	**Number of patients, *n* (%)**
Anemia	143 (95)
HTN	129 (86)
DM	64 (43)
IHD	10 (7)
Hypothyroidism	6 (4)
Ascites	6 (4)
Hepatitis	6 (4)
COPD	3 (2)
Cirrohsis	3 (2)
Pleural effusion	3 (2)

Angina	2 (1)
BPH	2 (1)
Asthma	1 (1)
HTN: Hypertension, DM: Diabetes mellitus, COPD: Chronic obstructive pulmonary disease, IHD: Ischemic Heart Disease, BPH: Benign prostate hypertrophy	

Number of drugs prescribed per patient

The number of drugs prescribed to the patient was associated with the number of comorbidities present. The P value was found to be 0.0005. The table shows the association between comorbidities and treatment [Table 2].

Table 2: Association between comorbidities andtreatment

Number of drugs prescribed	Number of comorbidities				*P*
	1	2	3	4	
Upto 9	9	27	14	1	0.000541
10 or more	5	32	50	12	

Polypharmacy assessment

Polypharmacy is the prescription of seven or more medications given to one patient at one time. In our study, more than five drugs (87%) were received by 131 patients to treat comorbid conditions and complications of CKD. Patients receiving more than five drugs have an increased risk of mortality. Nineteen patients required less than five drugs (13%). The average number of drugs per prescription was found to be 11.19 ± 3.51 (8%) [Figure 2].

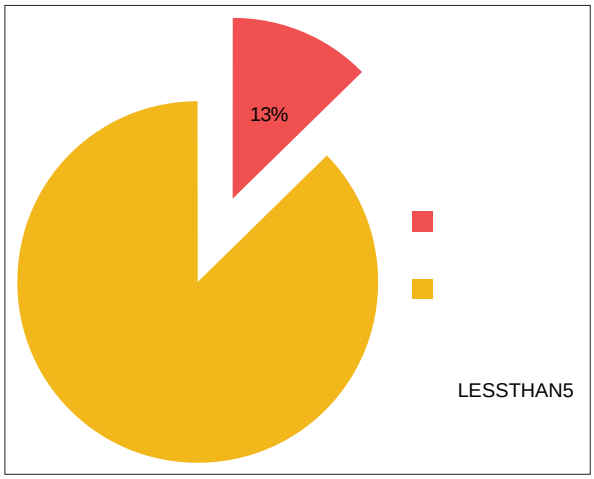

Figure 2: Polypharmacy assessment

Frequency of various classes of drugs

A total of 1693 drugs were analyzed. cardiovascular drugs were commonly prescribed (438 drugs, 25.87%) followed by gastrointestinal (GI) drugs (317 drugs, 18.72%), vitamins and minerals (253 drugs, 14.94%), antibiotics (141 drugs, 8.33%), hematopoietic agents (108 drugs, 6.38%), antidiabetic drugs (105 drugs, 6.20%), analgesics (81 drugs, 4.78%), anti-asthmatic drugs (35 drugs, 2.07%), and xanthine oxidase inhibitors (29 drugs, 1.71%).

Out of 332 antihypertensive drugs prescribed, calcium channel blockers (CCBs) (111 drugs, 33.43%) were the most commonly prescribed antihypertensive medications, followed by diuretics (109 drugs, 32.83%), alpha agonists (54 drugs, 16.27%), beta-blockers (30 drugs, 9.04%), alpha-blocker (16 drugs, 4.8%), angiotensin receptor blockers (ARB) (nine drugs, 2.71%), vasodilator (two drugs, 0.60%), and angiotensin-converting enzyme (ACE) inhibitor (one drug, 0.30%) were the least prescribed antihypertensive medications.

A total of 317 GI drugs were prescribed. Proton-pump inhibitors (99 drugs) were commonly prescribed GI medication, in which pantoprazole (90 drugs, 90.91%) was widely used, followed by rabeprazole (five drugs, 5.05%) and esomeprazole (four drugs, 4.04%) [Table 3].

Drug class	**Number of drugs, *n* (%)**
Cardiovascular drugs	438 (25.87)
Antihypertensive drugs	332 (19.61)
Antiplatelet drugs	38 (2.24)
Antianginal drugs	34 (2.01)
Antihyperlipidemic drugs	29 (1.71)
Antidysrhythmic drugs	5 (0.30)
Gastrointestinal drugs	317(18.72)
PPI	99 (5.85)
Antiemetic	86 (5.08)
Antacids	68 (4.02)
H2-blockers	44 (2.60)
Laxative	12 (0.71)
Antidiarrheal	5 (0.30)
Others	3 (0.18)
Vitaminsandminerals	253 (14.94)
Antibiotic	141 (8.33)
Hematopoietic agents	108 (6.38)

Antidiabetic	105 (6.20)
Analgesic	81 (4.78)
Antiasthmatic	35 (2.07)
Xanthine oxidase inhibitor	29 (1.71)
HepatitisBvaccine	15 (0.89)
Antiplatelet	12 (0.71)
Antihistamine	11(0.65)
Corticosteroids	11(0.65)
Anticoagulants	10 (0.59)
thyroid products	8 (0.47)
Anticonvulsants	8 (0.47)
Vasopressinanalogs	7 (0.41)
Antifungal	6 (0.35)
Miscellaneous	98 (6)
Total	1693 (100)
PPI: Proton-pump inhibitor	

Table 3: Frequency of various classes of drugs

Classification of antihypertensive drugs

Of the 332 antihypertensive drugs prescribed, CCBs (111 drugs, 33.43%) were the most commonly prescribed antihypertensive medications, followed by diuretics (109 drugs, 32.83%), alpha agonists (54 drugs, 16.27%), beta-blockers and vasodilator (two drugs, 0.60%), and ACE inhibitor (1 drug, 0.30%) were the least prescribed antihypertensive medications [Figure 3].

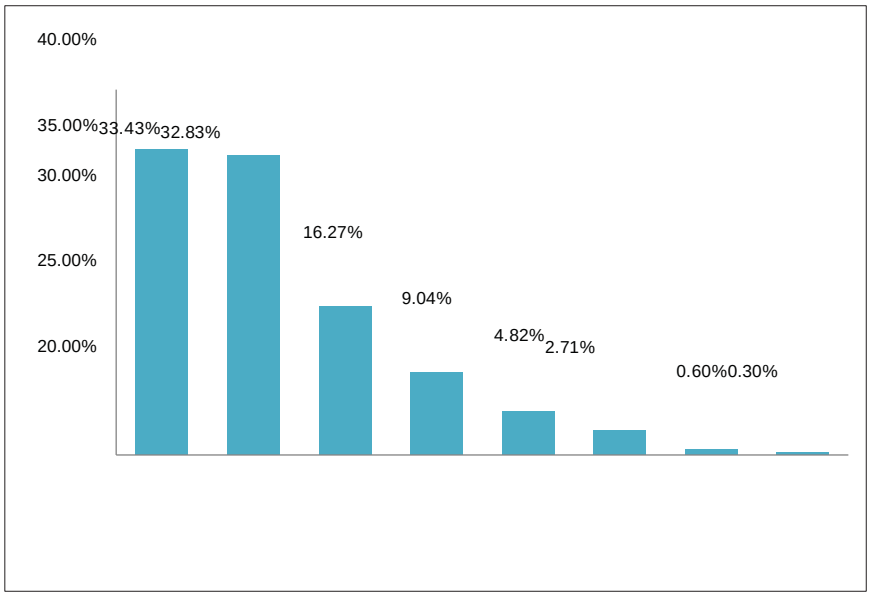

Figure 3: Antihypertensive drug classification

Adherenceto eachBMQ domain:

The Adherence score to each BMQ domain is given in the table below

Table 4: Adherence to each BMQ domain

BMQ domain	Adherent(score=0)	NonAdherent(score=1)
Regimen Screen	39	61
Belief Screen	68	32
RecallScreen	31	69

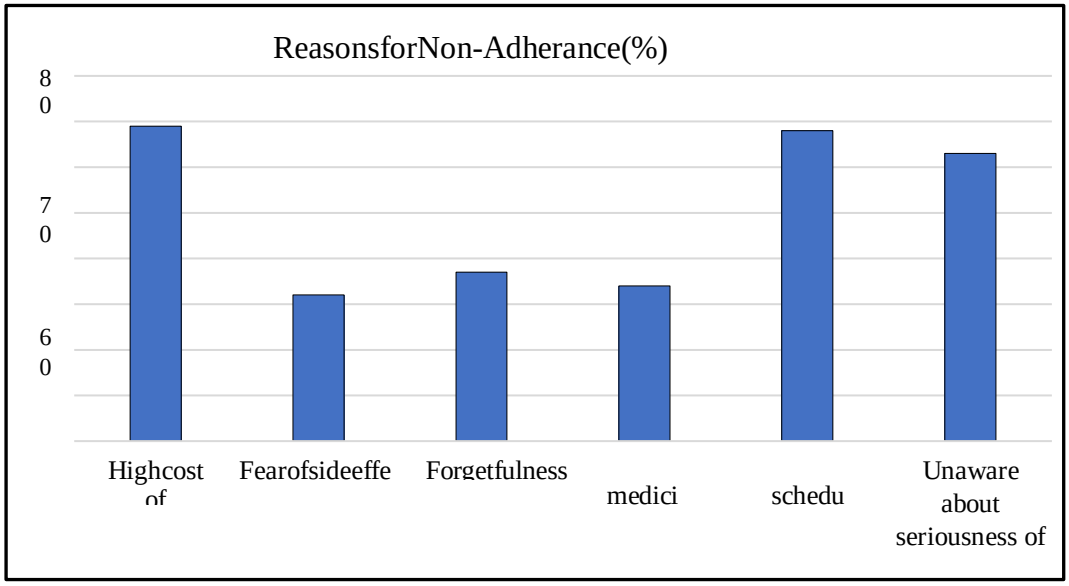

Figure 4: Reasons for Non-Adherence

Correlation between gender and KDQOL domains

In the present study, association between cognitive function, sleep, and energy/fatigue domain of KDQOL to gender was significant with a p value of 0.04746, 0.03074 and 0.00587 respectively.

Table 5: Dimensions of QOL

Dimensions of QOL	p value
Symptom or problem list	0.08851
Effect of kidney disease	0.16354
Burden of kidney disease	0.31207
Work status	0.40129
Cognitive function	0.04746
Quality of social interaction	0.36317

Sleep	0.03074
Social support	0.16602
Dialysis staff encouragement	0.34458
Patient satisfaction	0.25785
Physical function	0.22965
Role physical	0.39358
Pain	0.46017
General health	0.13567
Emotional wellbeing	0.14457
Role emotional	0.31918
Social function	0.121
Energy or fatigue	0.00587

Table 6: Correlation between BMQ and KDQOL by Mann Whitney test

Recall Screen			
Dimensions of QOL	**SCORE 0 n= 65**	**SCORE 1 n= 85**	**p value**
Symptom or problem list	85.41	75	0.0268
Effect of kidney disease	75	71.87	0.749
Burden of kidney disease	37.5	18.75	0.1313
work status	50	50	0.26109
Cognitive function	100	93.33	0.01463
Quality of social interaction	93.33	93.33	0.3707
Sleep	60	57.5	0.27093
Social Support	66.66	66.66	0.10749
Dialysis staff encouragement	100	100	0.22663
Patient satisfaction	83.33	83.33	0.40905
Physical function	30	25	0.4721

Role-physical	0	0	0.24196
Pain	45	45	0.3974
General health	40	25	0.02619
Emotional well being	60	52	0.03673
Role-emotional	0	0	0.38974
Social function	37.5	25	0.02743
Energy or fatigue	40	30	0.16109

Table 7: Correlation between BMQ and KDQOL by Spearman's correlation

Domains of QOL	**Domains of BMQ**					
	Regimen screen		**Belief screen**		**Recall screen**	
	rs	**p value**	**rs**	**p value**	**rs**	**p value**
Symptom or problem list	-0.17528	0.0811	-0.1026	0.30971	-0.22198	0.02644
Effect of kidney disease	-0.18737	0.06194	-0.02607	0.7968	-0.18737	0.06194
Burden of kidney disease	-0.28592	0.00393	-0.07521	0.45708	-0.11359	0.26046
Work status	-0.02788	0.78306	0.03727	0.71275	-0.08338	0.40951
Cognitive function	-0.24306	0.01482	0.03727	0.71275	-0.08338	0.40951
Quality of social interaction	-0.0568	0.57458	-0.11566	0.25185	-0.03507	0.72901
Sleep	-0.18638	0.06336	-0.01416	0.8888	-0.06239	0.53748
Social Support	-0.15495	0.12372	0.09101	0.36783	-0.13255	0.18863
Dialysis staff encouragement	-0.02843	0.7789	-0.23312	0.01959	-0.11874	0.23934
Patient satisfaction	0.02476	0.80681	-0.36982	0.00015	0.02476	0.80681
Physical function	-0.21654	0.03047	0.03991	0.69339	-0.00715	0.94373
Role-physical	-0.2163	0.03066	-0.01926	0.84912	-0.13601	0.17726
Pain	-0.19059	0.05751	-0.06958	0.49153	-0.02746	0.78623
General health	-0.20507	0.04069	0.07984	0.42972	-0.19736	0.04904

Variables	Domains of BMQ					
	Regimen screen		Belief screen		Recall screen	
	rs	p value	Rs	p value	rs	p value
Gender	0.18812	0.06089	0.18471	0.0658	0.06583	0.5152
Age	0.2039	0.04187	-0.13167	0.19159	-0.08339	0.40945
Education	-0.3287	0.00084	-0.13402	0.18373	-0.21031	0.03571
No. of drugs	0.20338	0.0424	-0.1503	0.13554	-0.09152	0.36514
Emotional wellbeing	-0.10759	0.28666	-0.0057	0.95511	0.18476	0.06572
Role-emotional	-0.07825	0.43904	-0.08409	0.40553	-0.04412	0.6629
Social function	-0.26466	0.00779	0.06333	0.53134	-0.20014	0.04588
Energy or fatigue	-0.16792	0.09492	-0.00708	0.94424	-0.10001	0.32215

Table 8: Correlation between BMQ and other variables

There was significant correlation (p value<0.05) between age (0.04187), education (0.00084), and no. of drugs (0.0424) with medication adherence.

DISCUSSION

Prescription pattern studies evaluate the quality of care given to patients in the health-care system. Proper determination of the medication treatment guarantees the most undue advantage to the patients. In this study, over a time of 6 months, we assessed medications given to 150 patients.

There were 94 (63%) male and 56 (37%) female. This is following the prevalence of CKD being more in men than in women worldwide and in India. The mean age of the patients in our study was 56.1 ± 15.2 years. This contrasts with the report of the Indian CKD registry, which showed a mean age of 45.22 ± 15.2 years. This could be coincidental as demographic variations are common. The table below shows the comparison between the present study with the previous studies.

Anemia was the most common comorbidity (143 patients, 95%) observed in our study subjects, followed by hypertension (129 patients, 86%). A study was done by Chakraborty et al.[10] report similar findings. In our study, we found that 43% of patients had type 2 diabetes. A study done by Kantanavar et al. report identical results for type 2 diabetes (43% of patients).[9] A total of 1693 drugs were prescribed to 150 patients who were part of our study. Each patient received an average of 11.19 drugs. A similar study was done by Kantanavar et al. which included 1436 drugs, received an average of 6.7 drugs.[9] None of the patients received monotherapy. Thus, polypharmacy was evident. Polypharmacy has been variously defined. It has been described as the concurrent use of multiple drugs, and some researchers have discriminated between minor (two drugs) and major (more than four drugs) polypharmacy. Others have defined it as using more than five drugs that are clinically indicated or too inappropriate many

medicines to treat the same condition or have other comorbidities. Polypharmacy is inevitable in CKD patients due to the prevalence of a large number of comorbidities. In our study, antihypertensive medications were the most commonly used cardiovascular agents. CCBs (33.4%) were the most frequently prescribed antihypertensive drugs, followed by diuretics (32.8%), alpha agonists (16.2%), beta-blockers (9.04%), alpha-blockers (4.8%), ARB (92.71%), vasodilator (0.60%), and ACE inhibitor (0.30%) were the least prescribed antihypertensive medications. In a study done by Chakraborty et al., drugs acting on the cardiovascular system were the most frequently prescribed drugs in CKD, the same as our study.[10]

CONCLUSION

150 patients experiencing renal disability were investigated. This examination outlines the recommended example of the medications. CKD was more pervasive in males than in females. The prevalence of polypharmacy was high in patients. In addition, various classes of medications prescribed were investigated. The examination assessed the particular medication classes recommended.

Antihypertensive agents were the commonly prescribed medications followed by drugs acting on the GI system, nutritional supplements, antibiotics, haematinics, and antidiabetic agents. Calcium channel blockers were the most common drug class prescribed. Insulin was the common antidiabetic prescribed. erythropoietin was the most common hematinic prescribed. Ceftriaxone was a highly prescribed antibiotic drug. HTN and anemia were the most common comorbidities observed, followed by DM. The association between the number of drugs prescribed and comorbidities was done. Moreover, drug utilization patterns must be evaluated from time to time to improve management strategies and the quality of life of patients.

Theseresultsindicatethatnonadherencetomedicationsleadstodeterioratingqualityoflifeandhightherapeuticcomplexity.Identifying the factors that influence the patient's lack ofadherence to treatment can be applied to foster the quality oflife in these patients.

REFERENCES:

1) Kaushal R, Bates DW. . The Clinical Pharmacist's Role in Preventing Adverse Drug Events. Making Health care Safer: a critical analysis of patient safety practices. 2001 Jul:71.
2) Reis WC, Scopel CT, Correr CJ, Andrzejevski VM. nal sis of clinical pharmacist interventions in a tertiar teaching hospital in Bra il. Einstein o Paulo . un -6.
3) Gallagher J, Byrne S, Woods N, Lynch D, McCarthy S. Cost-outcome description of clinical pharmacist interventions in a university teaching hospital. BMC health services research. 2014 Apr 17;14(1):177.
4) Anees M, Hameed F, Mumtaz A, Ibrahim M, Saeed Khan MN. Dialysis related factors affecting quality of life in patients on hemodialysis. Iran J Kidney Dis. 2011 Jan;5(1):9-14
5) Zimbudzi E, Lo C, Ranasinha S, Gallagher M, Fulcher G, Kerr P.G, et al.Predictors of health-related quality of life in patients with co-morbid diabetes and chronic kidney disease. PLoS One 2016;11(12):1–12.
6) Varghese C, Naik H, Sangeetha R, Srinivasan R. A Study on Medication Adherence and Quality of Life in Patients with Chronic Kidney Disease. JDDT. 2020;10(3-s):52-60.

7) Juergensen E, Wuerth D, Finkelstein SH, Juergensen PH, Bekui A, Finkelstein FO. Hemodialysis and peritoneal dialysis: Patients assessment of their satisfaction with therapy and the impact of the therapy on their lives. J Am Soc Nephrol 2006;1:1191-6
8) Chiu Y. W, Teitelbaum I, Misra M, De Leon E. M, Adzize T, Mehrotra R.Pill burden, adherence, hyperphosphatemia, and quality of life in maintenance dialysis patients.Clin J Am Soc Nephrol 2009;4(6):1089–96
9) Kefale B, Alebachew M, Tadesse YT, Engidawork E. Quality of life and its predictors among patients with chronic kidney disease: A hospital-based cross sectional study Plos One February 2019
10) Chen C, Hsiao FY, Shen LJ, Wu CC. Cost saving effect and prevention of medication errors by pharmacist intervention in a nephrology unit. Medicine (Baltimore) 2017 10.1097/MD.0000000000007883,