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Research Article

A Prospective Observational Study to Assess Medication Adherence and Health Related Quality of Life in Chronic Kidney Disease Patients in a Tertiary Care Hospital

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Abstract

Background: Chronic Kidney Disease patients belong to the group of subjects with large burden of daily pill intake. Failure of adherence to these medications can lead to increased morbidity, mortality, cost, and burden on health care system. CKD leads to decreased quality of life by increasing the risk of death during the progression of its pathogenesis. Therefore, good medication adherence is important to obtain desired therapeutic outcome which in turn improves the quality of life.

Objective: The objective of this study is to assess medication adherence and health related quality of life in chronic kidney disease patients in a tertiary care hospital.

Methods: A prospective observational study was conducted for a period of six months at Indiana Hospital and Heart Institute, Mangalore. A total of 100 participants diagnosed with chronic kidney disease were enrolled for the study. Permission from the Ethical Committee was taken and informed consent was obtained from the study subjects before initiating the study. Demographic, clinical and treatment details were collected in a specially designed data collection forms. Patient's adherence to the medication was assessed with the help of Brief Medication Questionnaire (BMQ) and patient's quality of life was assessed using Kidney Disease Quality of Life Short Form (KDQOL-SF). The data was expressed using descriptive statistics and analyzed using Chi square test, Mann Whitney test, and Spearman Correlation Statistics.

Results: Out of 100 patients enrolled in the study, 63 were male and 37 were female. The average number of medicines taken in a day by each patient was 10. 12% of the study population was completely adherent to the drug therapy. BMQ had 3 domains in which 39% of the patients were adherent and 61% were non adherent to the Regimen screen, 68% were adherent and 32% were non adherent to the Belief screen, and 31% were adherent and 69% were non adherent to the Recall screen. High cost of medicine (69%), Complex dosing schedule (68%), and Unaware about seriousness of condition or use of medicine (63%) were most common reasons for Non-adherence. Using KDQOL questionnaire, the mean scores for Dialysis staff encouragement (96.25±9.31) and Quality of social interaction (87.86±17.48) were high whereas Physical role (4.75±16.92) and Emotional role (13.03±31.44) were found to be low.

Conclusion: These results indicate that non adherence to medications leads to deteriorating quality of life and high therapeutic complexity. Identifying the factors that influence the patient's lack of adherence to treatment can be applied to foster the quality of life in these patients.

Keywords: Chronic kidney disease, Health related quality of life, Hemodialysis, Medication adherence

INTRODUCTION

Chronic kidney disease, as defined by the Kidney Disease: Improving Global Outcomes (KDIGO) international guidelines, is an abnormality of kidney structure or function that is present for more than 3 months, with implications for health. Criteria required to make a diagnosis of CKD include a persistent reduction in eGFR of less than 60 mL/min per 1.73 m^2 or 1 or more markers of kidney injury (e.g., albuminuria, abnormal urine sediment).[1] Chronic kidney disease (CKD) is a worldwide health problem, which has a high global prevalence estimated between 11 and 13% [2]. Similarly, albuminuria and GFR less than 60 ml/min/1.73 m^2 have a prevalence of 7% and 3% to 5%, respectively. Worldwide, CKD accounted for 2,968,600 (1%) of disability-adjusted life-years and 2,546,700 (1% to 3%) of life-years lost in 2012.[3]

According to the CDC, 1 in 3 adults with diabetes and 1 in 5 adults with hypertension may have CKD.[4] Patients with chronic kidney disease also exhibit an elevated cardiovascular risk manifesting as coronary artery disease, heart failure, arrhythmias, and sudden cardiac death.[5] CKD is more common in people aged 65 years or older (38%) than in people aged 45-64 years (13%) or 18-44 years (7%), and is slightly more

common in women (15%) than men (12%); moreover, African Americans are about 3 times more likely than Caucasians to develop ESKD.[4] CKD is of diverse aetiology like diabetic nephropathy, hypertensive nephrosclerosis, glomerulonephritis, chronic interstitial nephritis, obstructive uropathy, Reno vascular, polycystic kidney, genetic mediated and urinary tract infection.[6]

The symptom burden of a disease plays a central role in the patient's experience of the disease and troublesome physical and psychological symptoms are among the main manifestations of CKD.[7] Uremic symptoms, as well as itching, cold intolerance, weight gain, and peripheral neuropathies are common in patients with stage 5 disease[8]. An assessment of the symptom burden of all CKD patients is very important in clinical management.[7] Because CKD can progress to advanced renal failure, end-stage renal disease, and even death, early detection is critical for initiating timely therapeutic interventions, limiting nephrotoxic exposure, preventing further reduction in GFR, and preparing for renal replacement therapy. Nephrology consultation is indicated for patients with an estimated glomerular filtration rate less than 30 mL per minute per 1.73 m^2, persistent urine albumin/creatinine ratio greater than 300 mg per g or urine protein/creatinine ratio greater than 500 mg per g, or if there is evidence of a rapid loss of kidney function.[9]

Progression of CKD is associated with several serious complications, including increased incidence of cardiovascular disease, hyperlipidaemia, anaemia, and metabolic bone disease.[10]

Medication adherence can be defined as the extent to which a patient's behavior corresponds with the prescribed medication dosing regimen, including time, dosing, and interval of medication intake.[11] Adherence to medication is an essential component of health outcome, so by increasing medication adherence we can also improve patient outcomes. WHO stated in 2003 that adherence to long-term therapies was as low as 50% in the general population, and even much lower in low/middle-income countries. Even the most carefully chosen and optimal medication can be rendered ineffective by insufficient adherence. Failure of medication adherence leads to substantial worsening of disease, death and increased healthcare costs. In other words, non-adherence affects both the individual patients and the healthcare system.[12]

Adherence is a multifactorial phenomenon that can be influenced by various factors. These factors can be divided into five different dimensions: social and economic factors, therapy-related factors, disease-related factors, patient-related factors and health care system-related factors. Some factors can have an influence on intentional non-adherence (conscious decision not to take the medication; e.g., because of high co-payments), while others can have an influence on non-intentional (forgetting) non-adherence (e.g., forgetfulness because of mental comorbidity).[11] The presence of beliefs about the necessity of taking medicine is associated with higher adherence. In contrast, the presence of concern about the adverse consequences of medication is more likely to lead to failure to comply with taking prescribed medication. [13]

Brief Medication Questionnaire and Kidney Disease Quality of Life:

The Brief Medication Questionnaire (BMQ), a new self-report tool for screening adherence and barriers to adherence includes a 5-item Regimen Screen that asks patients how they took each medication in the past week, a 2-item Belief Screen that asks about drug effects and bothersome features, and a 2-item Recall Screen about potential difficulties remembering.[14] The BMQ-Specific scale is widely used to evaluate the psychometric properties of medication beliefs in patients with chronic diseases, but it has not been applied to non-dialysis CKD patients who take multiple medicines.[13]

Non-adherence to medication will result in worsening of the disease which will affect the quality of life. World Health Organization (WHO) defines quality of life (QOL) as an individual's perception of their position in life within the context of the culture they live and in relation to their goals, standards and concerns. It is affected by the person's physical health condition, personal belief, social relationship, and their relationship to the environment.[15] Health-related quality of life is defined as those aspects of quality of life (QOL) that directly or indirectly relate to health.[16] Most conceptualizations of QOL emphasize the results of illness on physical, social/role, psychological/emotional, and psychological feature functioning. Symptoms, health perceptions, and overall quality of life are typically enclosed within the domain of QOL. [15]

Health-related quality of life is substantially lower for people with CKD than for the general population, and falls as GFR declines.[17] The patients affected with chronic kidney disease undergo haemodialysis. Haemodialysis is not able to treat the disorder and compensate for all the impaired metabolic or endocrine functions of the kidney. Additionally, it is associated with the incidence of acute complications (hypotension and/or muscular spasm) and chronic disorders (anemia and viral hepatitis B and C). In addition, the haemodialysis patients often suffer from feelings of having no freedom, dependence on relatives, impaired familial and social life, and reduced or no income. Fatigue, lethargy, disability, diminished sexual desire, and even major depression associated with time-consuming and difficult haemodialysis can decrease patients' feeling of well-being and disturb their quality of life.[18] Prior studies have shown that poor HRQOL is associated with higher risk for cardiovascular events and death among individuals with CKD, and that individuals with depression before starting dialysis are more likely to be hospitalized and die after starting dialysis.[19] The goal of dialysis care is to prolong life while maintaining a patient's quality of life. Therefore, a valid and reliable tool for measuring quality of life specific to patients with of kidney disease is needed as an outcome measure to monitor treatment effectiveness and to help assess the value of other interventions tailored to improve patient care.[20] Health-related quality of life surveys, such as the Short Form (SF)-12 and SF-36, have been shown to be independent predictors of hospitalization and mortality. These self-reported surveys provide specific feedback on patients' physical and mental performance; a decline in these performances has been linked to a change in health status and predicts future adverse events.[21] The health-related quality of life is assessed by using the Kidney Disease Quality of Life 36 item questionnaire (KDQOL-36).[22] The KDQOL™-36 contains 5 subscales: The Physical Component Summary (PCS), Mental Component Summary (MCS), Burden of Kidney Disease (BKD), Symptoms and Problems of Kidney Disease (SPKD), and Effects of Kidney Disease (EKD). The PCS is a measure of functional status that includes items about physical well-being, including activity limits and the ability to accomplish physical tasks. The MCS includes items that rate respondents' emotional well-being, including levels of depression, anxiety, energy, and desire to participate in social activities. The Burden scale includes items about the extent to which CKD interferes with life and makes respondents feel like a burden on others. The Symptoms scale rates how bothered respondents are by symptoms of CKD (e.g., nausea and shortness of breath). Finally, the Effects scale asks respondents how bothered they are by restrictions of CKD, including dependence on caregivers and the ability to travel.[19] The first 2 subscales are a generic measure of HRQOL (and are identical to the SF-12), whereas the last 3 assess issues specific

to patients with ESRD or earlier stages of chronic kidney disease.[23] Knowledge of the contributing factors that negatively influence health-related QoL (HR-QoL) is important because those factors will inform the development and delivery of interventions targeting modifiable factors in patients with CKD.[24]

OBJECTIVE

To assess medication adherence and health related quality of life in chronic kidney disease patients in a tertiary care hospital.

MATERIALS AND METHODOLOGY

Study Design: The study was a hospital based Prospective Observational Study.

Study Site: The study was conducted in the General Medicine and Nephrology Department of Indiana Hospital and Heart Institute, Pumpwell, Mangalore, Karnataka.

Study Duration: The study was carried out for a period of 6 months.

Study Criteria: The study was carried out by considering the following criteria:

Inclusion Criteria:

- Patients above the age of 18 years.
- Patients who are diagnosed with CKD.
- Patients who provide consent to participate.
- Both inpatients and outpatients.

Exclusion Criteria:

- Patient below the age of 18 years.
- Patients who do not provide the consent
- Pregnant and lactating women.
- Immunocompromised patients.
- Patients in Intensive Care Unit.

Ethical Approval: The study was approved by Shree Devi College of Pharmacy.

Sources of Data: Patient case sheet, Prescriptions, Patient Interview, Brief Medication Questionnaire (BMQ) and Kidney Disease Quality of Life Questionnaire (KDQOL).

Sample size: Based on the study conducted by Christeena S Varghese et al., the sample size estimated for the study was 100 at 95% confidence interval. The formula used to estimate sample size was:

$$n \geq \frac{Z_{\alpha}^{2} P(1-P)}{d^{2}}$$

Sampling technique: Purposive sampling

Study Procedure: The study was conducted in the Department of Nephrology and General Medicine of Indiana Hospital and Heart Institute, Pumpwell, Mangalore. Considering the inclusion and exclusion criteria, the patients were enrolled after taking written consent from each patient for the study. A suitably designed data collection form was used to collect all the necessary information. Brief Medication Questionnaire (BMQ) and Kidney Disease Quality of Life Questionnaire (KDQOL) were used to evaluate medication adherence and quality of life respectively. All patient information collected during study was kept confidential.

Statistical Analysis: The collected data were tabulated and analyzed using Microsoft Excel 2016 and SPSS Version 26. The data was expressed using descriptive statistics and analyzed using Chi square test, Mann Whitney test, and Spearman Correlation Statistics,

RESULTS

A Prospective Observational study was conducted for 6 months at Indiana Hospital and Heart Institute, Mangalore. A total of 100 patients who were diagnosed with CKD participated in the study.

Table 1: Age wise distribution of study participants.

Age group	Frequency (f)	Percentage (%)
21-30	5	5
31-40	5	5
41-50	17	17
51-60	34	34
61-70	23	23
71-80	16	16
Total	**100**	**100**

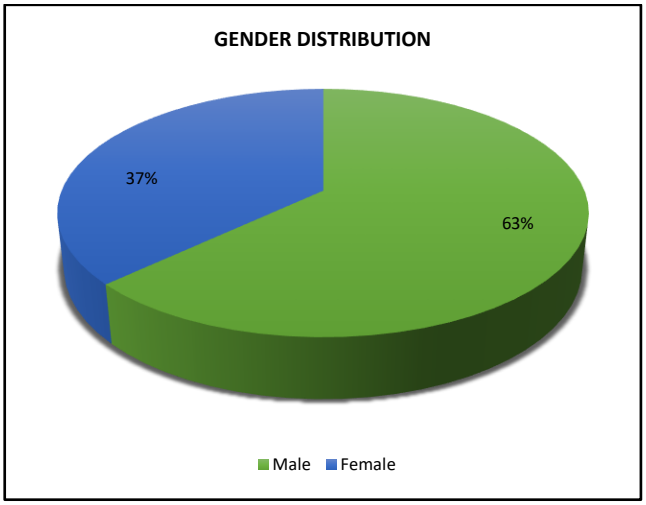

Figure 1: Gender wise distribution of study participants.

Table 2: Duration of Stay in the hospital

No. of days	No. of patients
1 to 5	51
6 to 10	32
11 and more	17
Total	**100**

Table 3: Distribution of Grade of Chronic Kidney Disease

Distribution of grade of CKD	Percentage (%)
AKI on CKD	6
CKD stage 5	94

Table 4: Distribution based on Domiciliary Status

Category	Frequency	Percentage (%)
Cities	34	34
Towns and semi dense areas	50	50
Rural areas	16	16
TOTAL	100	100

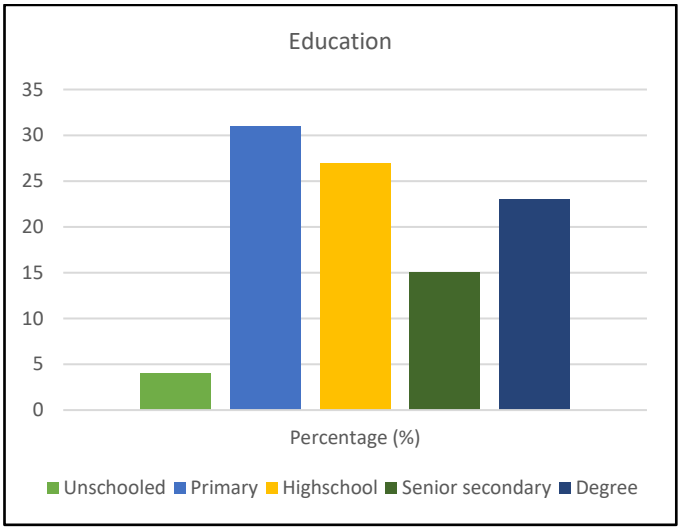

Figure 2: Distribution of patients based on education

Table 5: Distribution of patients based on their Profession

Category	Frequency	Percentage (%)
Business	29	29
Housewife	31	31
Daily wage worker	17	17
Agriculture	7	7
Others	16	16
TOTAL	**100**	**100**

Table 6: Distribution of the patients based on smoking and alcohol consumption

Category	Percentage (%)
Smoker	8
Non smoker	92
Alcoholic	7
Non Alcoholic	93

Distribution of comorbidities among patients with Chronic Kidney Disease:

Among 100 patients, Hypertension was the most common comorbidity (32.8%) followed by Diabetes Mellitus (20.6%), CAD (7.4%), Cardiac Failure (7.1%), and Stroke (4.4%) and other comorbidities figure 3.

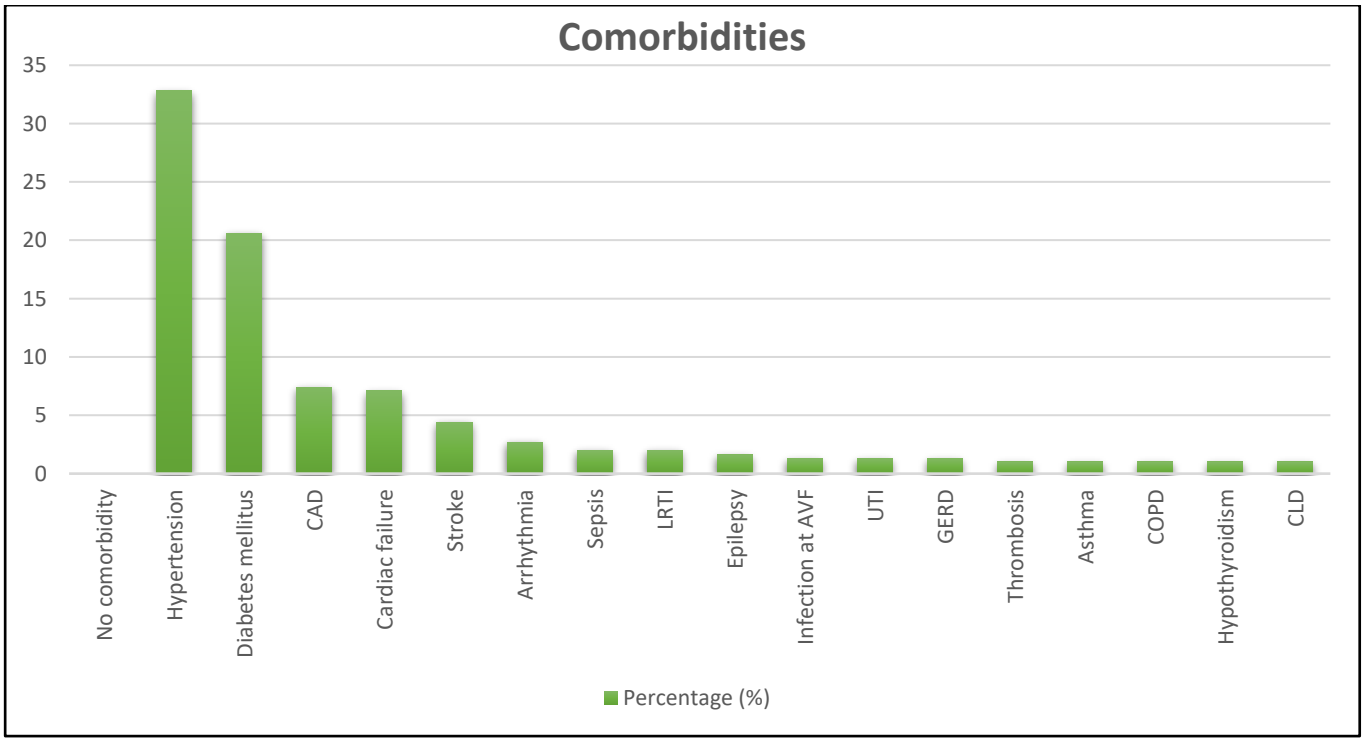

Figure 3: Distribution of comorbidities among patients with chronic kidney disease

Number of comorbidities per patient:

Average number of comorbidities per patient was found to be 3.

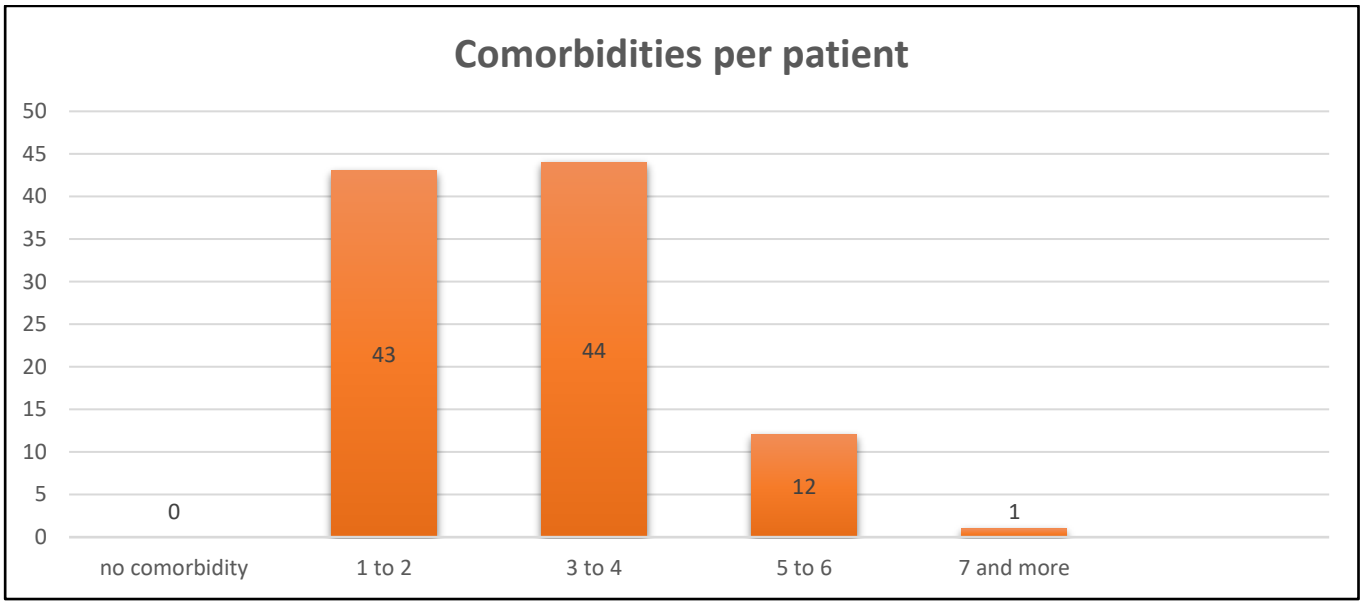

Figure 4: Number of comorbidities per patient

Age wise comorbidities distribution:

Among 100 patients, Hypertension, Cardiac Failure and Diabetes Mellitus were most common in the age group of 51-60 years whereas Stroke was most common in the age group of 61-70 years and Arrhythmia was most common in the age group of 41- 50 years.

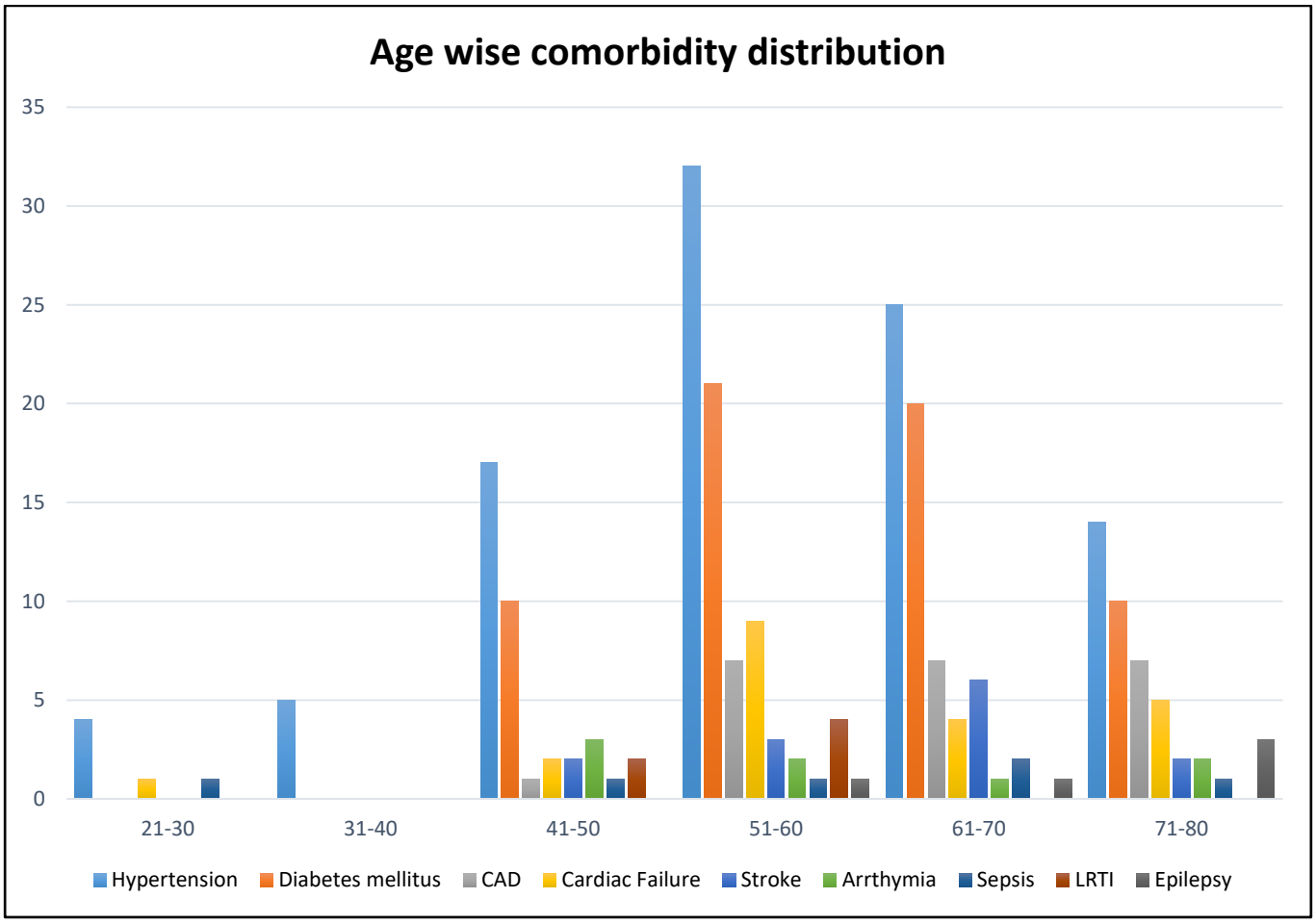

Figure 5: Age wise comorbidities distribution

Gender wise comorbidities distribution:

Out of 100 patients, the prevalence of Hypertension, Diabetes and Cardiac failure was more in male whereas the prevalence of CAD and stroke was more in female.

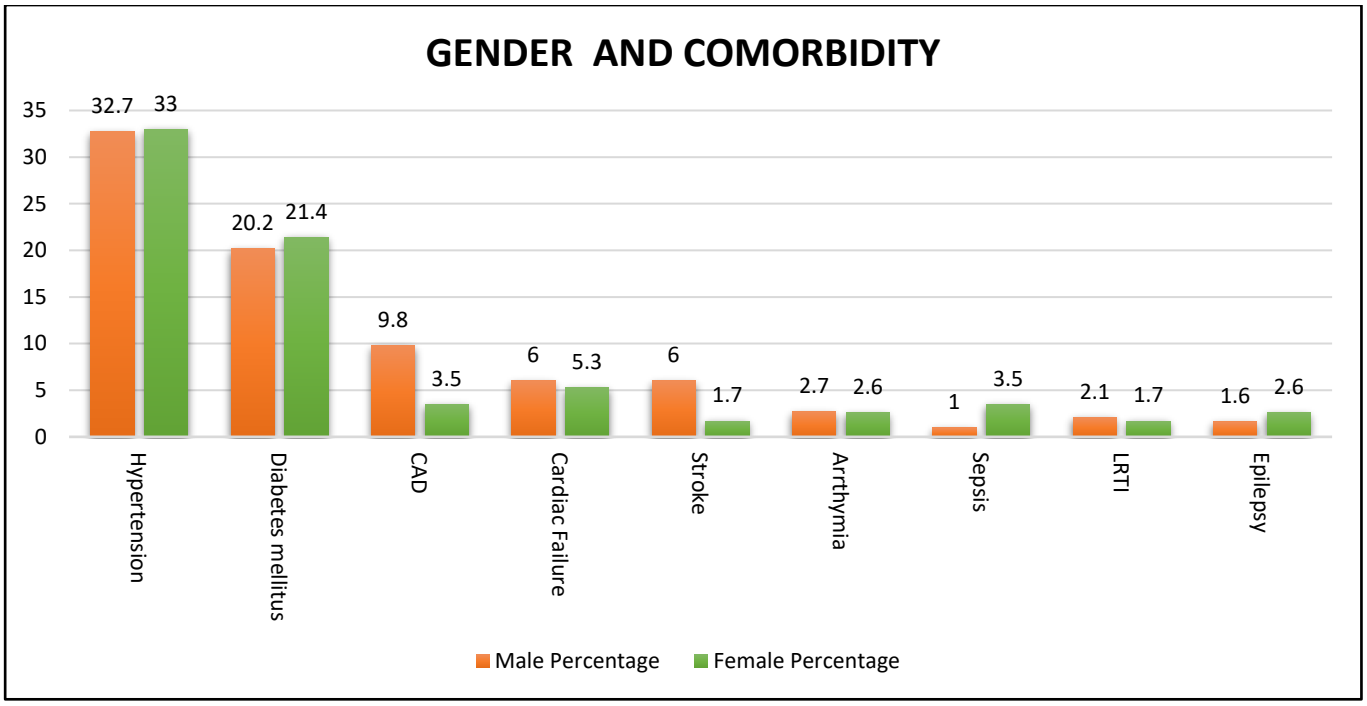

Figure 6: Gender wise comorbidities distribution

Distribution based on the Complications:

Among 100 patients, Anemia was the most common complication (21.4%) followed by uremia/azotemia (19%) and other complications

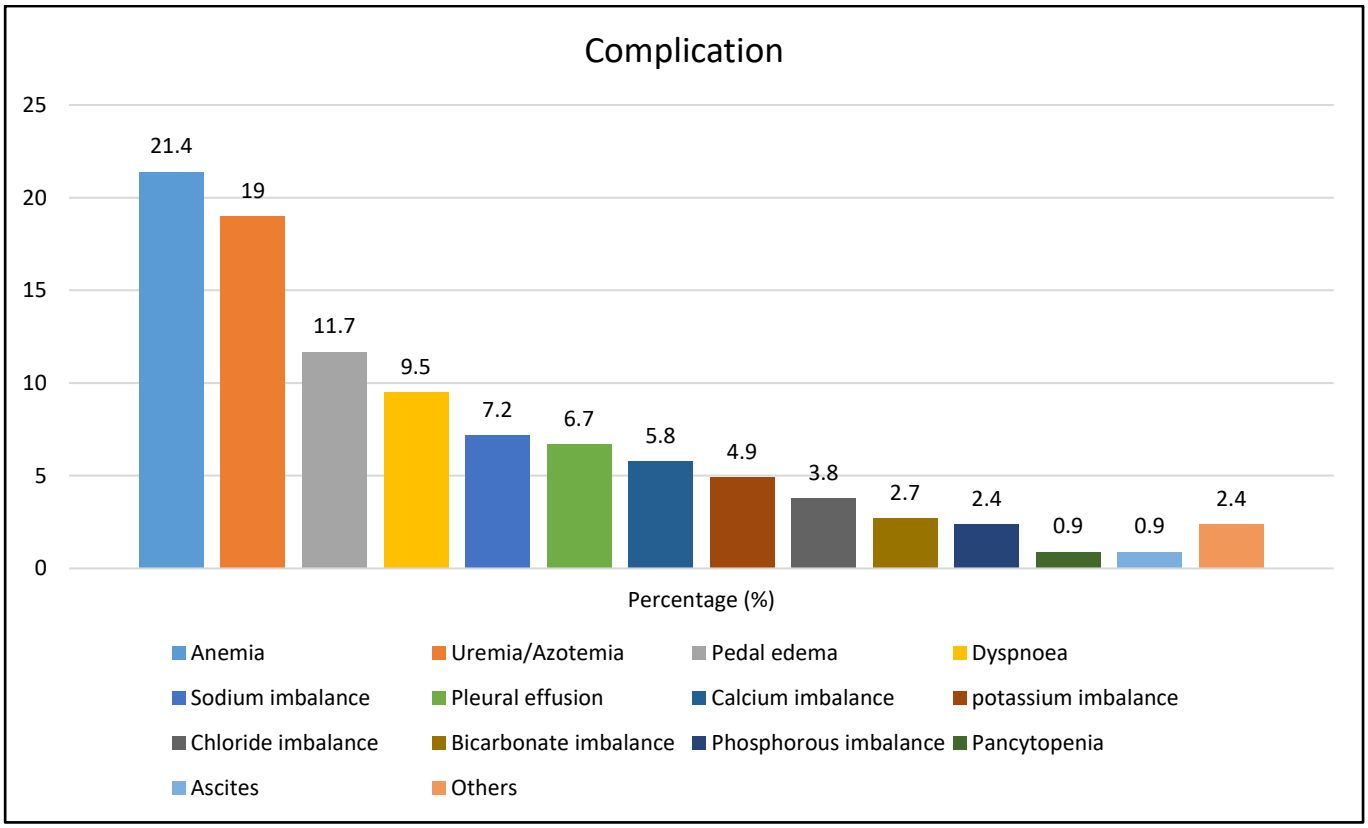

Figure 7: Distribution based on the Complications

Distribution of number of drugs received per patient:

The average number of drugs received by each patient is 10.

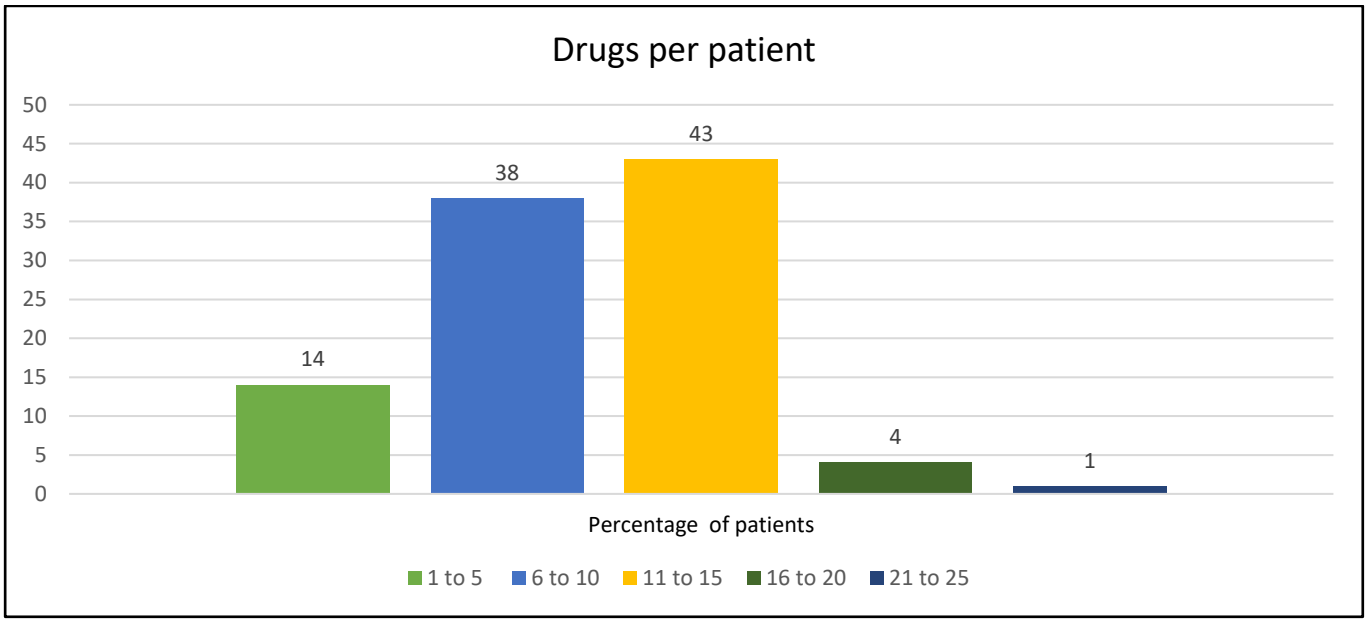

Figure 8: Distribution of number of drugs received per patient

Adherence to each BMQ domain:

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

Table 7: Adherence to each BMQ domain

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

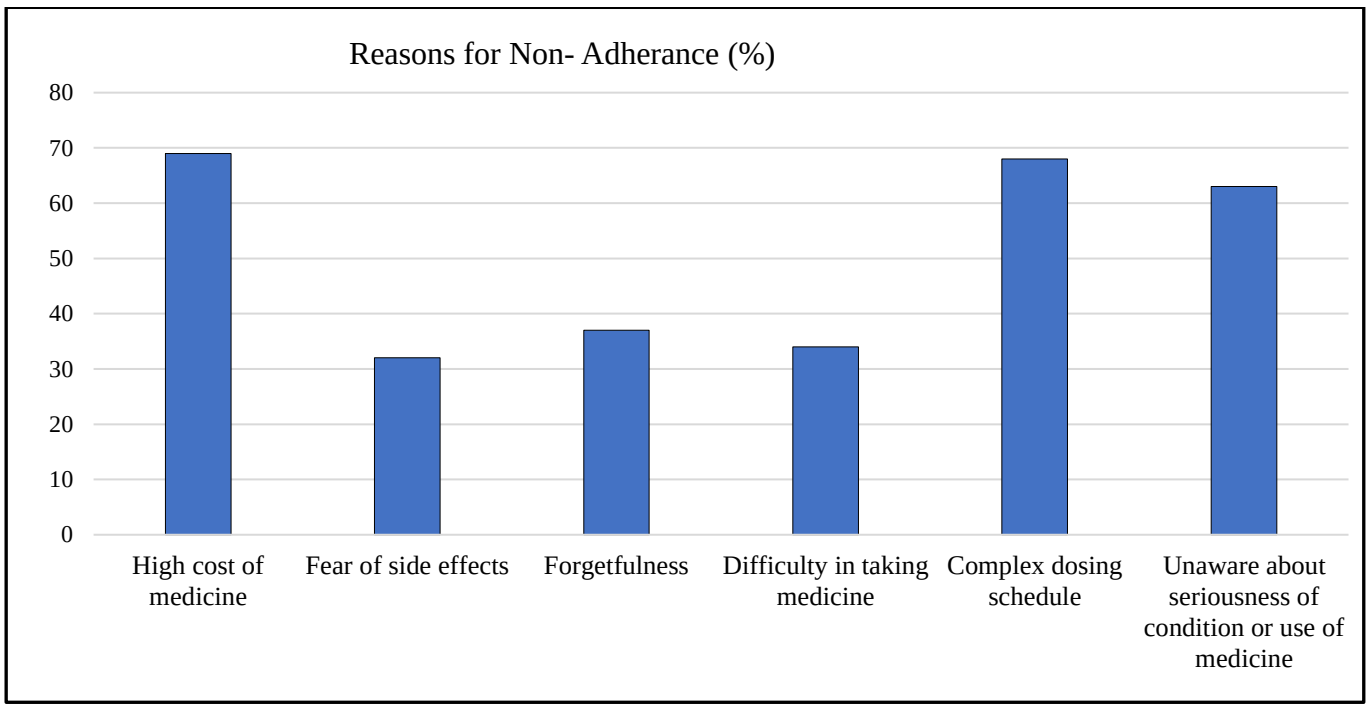

Figure 9: Reasons for Non-Adherence

Table 8: Correlation between Gender and Comorbidity

Male		
Comorbidity	**Frequency**	**p value**
Hypertension	60	0.99
Diabetes mellitus	37	0.99
CAD	18	0.92
Cardiac Failure	11	1
Stroke	11	0.94
Female		
Comorbidity	**Frequency**	**p value**
Hypertension	37	0.98
Diabetes mellitus	24	0.98
CAD	4	0.78
Cardiac Failure	6	1
Stroke	2	0.84

Table 9: 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.

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 10: Correlation between BMQ and KDQOL by Mann Whitney test

Regimen Screen			
Dimensions of QOL	**Score 0 n= 39**	**Score 1 n= 61**	**p value**
Symptom or problem list	81.25	75	**0.04093**
Effect of kidney disease	81.25	71.85	**0.03144**
Burden of kidney disease	37.5	18.75	**0.0024**
work status	50	50	0.45224
Cognitive function	100	93.33	**0.01426**
Quality of social interaction	100	93.33	0.29806
Sleep	62.5	57.5	**0.03288**
Social Support	66.66	66.66	0.07215
Dialysis staff encouragement	100	100	0.42858
Patient satisfaction	83.33	83.33	0.27093
Physical function	30	25	**0.01618**
Role-physical	0	0	0.13136
Pain	62.5	45	**0.03144**
General health	34	20	**0.02169**
Emotional wellbeing	52	52	0.14917
Role-emotional	0	0	0.30503
Social function	37.5	25	**0.00554**
Energy or fatigue	35	30	**0.04846**
Belief Screen			
Dimensions of QOL	**SCORE 0 n= 68**	**SCORE 1 n= 31**	**p value**
Symptom or problem list	79.16	70.83	0.15386
Effect of kidney disease	73.43	73.43	0.40129
Burden of kidney disease	31.25	31.25	0.22965
work status	50	50	0.38974
Cognitive function	100	100	0.4562
Quality of social interaction	96.66	93.33	0.13786
Sleep	60	56.25	0.44433
Social Support	66.66	66.66	0.19766
Dialysis staff encouragement	100	100	0.07078
Patient satisfaction	83.33	83.33	**0.00023**
Physical function	25	25	0.34827
Role-physical	0	0	0.46017
Pain	45	43.75	0.24825
General health	25	30	0.2177
Emotional wellbeing	52	54	0.48006
Role-emotional	0	0	0.54311
Social function	25	37.5	0.27093
Energy or fatigue	30	35	0.4721

Recall Screen			
Dimensions of QOL	**SCORE 0 n= 31**	**SCORE 1 n= 69**	**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 11: Correlation between BMQ and KDQOL by Spearman's correlation

Domains of QOL	**Domains of BMQ**					
	Regimen screen		**Belief screen**		**Recall screen**	
	r_s	**p value**	**r_s**	**p value**	**r_s**	**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
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 12: 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.

Variables	Domains of BMQ					
	Regimen screen		Belief screen		Recall screen	
	r_s	p value	r_s	p value	r_s	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

DISCUSSION

Chronic kidney disease (CKD) otherwise called as Progressive Kidney Disease, Chronic Renal Insufficiency or Nephropathy is the presence of Kidney damage or decreased glomerular filtration rate (GFR) for 3 months or more. End Stage Renal Disease (ESRD) is the result of advanced CKD. These patients belong to the group of subjects with large burden of daily pill intake. Failure of adherence to these medications can lead to increased morbidity, mortality, cost, and burden on health care system. CKD leads to decreased quality of life by increasing the risk of death during the progression of its pathogenesis. Therefore, good medication adherence is important to obtain desired therapeutic outcome which in turn improves the quality of life.

The aim of our study was to assess medication adherence and health related quality of life in chronic kidney disease patients in a tertiary care hospital. The study was carried out at Indiana hospital and Heart institute, Mangalore, Karnataka for a period of 6 months from March 2022 to September 2022.

A total of 100 patients participated in our study, of which majority were males (63%). Similarly, in the study conducted by **Deepak Jain *et.al*,**[25] male subjects (62%) predominated the female subjects (38%)[16]. In our study, majority of the patients belong to the age group 51-60 years and this is consistent with study conducted by **Ahmed Al-Jumaih *et.al*,**[26] Among the patients of age group 51-60 years 43.2% were female patients and 26.9% were male patients. In the current study, it was found that 51% of the patients were admitted for around 1-5 days, 32% of the patients were admitted for 6-10 days and 17% of patients were admitted for 11 or more days. In the study conducted by **Olumuyiwa John Fasipe *et.al*,**[27] it was found that 86% were CKD stage 5 patients that is comparable to our study which shows 94% of the study population were CKD stage 5 patients.

Most of the patients in our study were from urban population (74%) and 16% of patients were from rural population. We also found that 31% of patients in our study were unemployed and 69% of patients were employed. This statistic was supported by the study carried out by **Siva Kala T *et.al*,**[28] where 76.67% were employed and 23% were unemployed. In our study we observed that 31% of patients completed their primary education and 23% completed their graduation. This data was consistent with the study conducted by **Deepak Jain *et.al*,**[25] where 28% patients completed primary education and 18% completed graduation. Out of 100 CKD patients in our study 8% of patients were smokers and 7% were alcoholics which are is similar to the study conducted by **Wen- Chin-Lee *et.al*,**[29] where 11% of the patients were smokers.

According to our study Hypertension (32.8%) was the most common comorbidity followed by Type-2 Diabetes mellitus (20.6%) and CAD (7.4%) which is supported by the findings from the study conducted by **Purna Atray *et.al*,** [30] in which hypertension (33.1%) was the most common comorbidity followed by Type-2 diabetes mellitus (26.6%), and CAD (7%). In the study conducted by **Clare Mac Rae *et.al*,**[31] 47% of patients had 1-3 comorbidities, 39% had 4-6 comorbidities, 11.7% had more than 7 comorbidities. This data is analogous with our study where 67% of patients had 1-3 comorbidities and 32% of patients had 4-6 comorbidities and 1% had 7 comorbidities.

Among CKD patients in our study, Hypertension, Cardiac Failure and Type-2 Diabetes Mellitus were most common comorbidities in the age group of 51-60 years, whereas Stroke was most common in the age group of 61-70 years and Arrhythmia was most common in the age group of 41- 50 years. We also found that the prevalence of Hypertension, Diabetes and Cardiac failure was more in male whereas the prevalence of CAD and stroke was more in female. Furthermore, Anemia was the most common complication (21.4%) followed by uremia/azotemia (19%), pedal edema (11.7%), Dyspnea (9.5%), sodium imbalance (7.2%) and other complications.

The average number of drugs received by each patient in our study is 10. This figure is consistent with a study conducted by **Sourav Chakraborty *et.al*,**[32] As per our study 14% of the patients received 1- 5 drugs, 38% of patients received 6-10 drugs, 43% of patients received 11-15 drugs and 5% of patients received more than 15 drugs. These statistics were similar to study conducted by **Christeena S Varghese *et.al*,**[24] where 15% of the patients received 1-5 drugs, 49% received 6-10 drugs, 32% received 11-15 drugs and 4% received more than 15 drugs.

High cost of medicine (69%) was the most common reason for non-adherence followed by complex dosing regimen (68%) in our study, which is similar to the findings by **Deepak Jain *et.al*,**[25] where high cost of medicine (58%) followed by complex dosing schedule (49%) were the most common reasons for medication non adherence. A study conducted by **Yoke Mun Chan *et.al*,**[33] on "Determinants of compliance behavior among patients undergoing haemodialysis", it was found that there was no significant difference between male and female subjects on medication compliance which was consistent with our study. Results of our study showed that there was very significant (p =0.00084) association between education level and medication adherence of CKD patients. This association was supported by the results from the study conducted by **Deepak Jain *et.al*,**[25] There was notable (p =0.041) association between age and medication adherence in our study, this finding was consistent with the study conducted by **Anis A'lliya Abdul Latif *et.al*,**[34] We also found that there was notable (p =0.0474) association between number of drugs and medication

adherence which is supported by the study carried out by **Smita Sontakke *et.al*,**[35]

Mean and standard deviations of KDQOL domains were similar to the study conducted by **Dena E. Cohen *et.al*,**[23] In a study conducted by **Al-Jumaih A *et al*,**[26] KDC, MCS and PCS scores were all significantly higher in males compared to females. These findings are in accordance with the findings of our study. In the present study association between cognitive function and energy/fatigue domain of KDQOL to gender was significant with a p value of 0.04746 and 0.00587 respectively. This data was consistent with the study carried out by **Keila Batista Alves *et.al*,**[36] where association between vitality, mental health domain of QOL to gender were significant with the P value of 0.033 and 0.017 respectively. The association between regimen domain of BMQ to physical functioning (p= 0.01618) and general health (p=0.02169) domains of KDQOL was significant. This was also similar to the finding by **Keila Batista Alves *et.al*,**[36] where association between regimen domain and physical functions was very significant with the P value of 0.006 and association between regimen domain and general health was also significant with the P value of 0.046. There was also significant association between medication adherence to symptom or problem list (p =0.02), burden of kidney disease (p =0.0024), cognitive function (p =0.01), sleep (p =0.03), physical functioning (p =0.01), role physical (p =0.02), pain (p =0.03), general health (p =0.02), emotional well-being (p =0.03) and social function (p =0.02). These findings were similar to the study carried out by **Salim K Mujais *et.al*,**[37] where there was significant association between medication adherence to symptom or problem list (p <0.001), burden of kidney disease (p<0.001), cognitive function (p =0.020), sleep (p = 0.001), physical functioning (p =0.006), role physical (p<0.001), general health (<0.001), emotional well-being (p<0.001) and social function (p<0.001).

CONCLUSION

The present study demonstrated that around half of the study population were Non-adherent to medications, which affected their quality of life significantly. The mean KDQOL domain scores for Dialysis staff encouragement and Quality of social interaction were high whereas Physical functioning and Emotional wellbeing were found to be low.There was significant association between medication adherence to number of drugs, age and educational level of the patients. There was also significant association between medication adherence to symptom/problem list, burden of kidney disease, cognitive function, sleep, physical functioning, pain, general health, emotional well-being and social functioning.

These results indicate that non adherence to medications leads to deteriorating quality of life and high therapeutic complexity. Identifying the factors that influence the patient's lack of adherence to treatment can be applied to foster the quality of life in these patients.

LIMITATIONS

- The sample size may not be adequate to reflect the exact association of Chronic Kidney Disease.
- It is a single center study validity of findings would increase if it is a many centered studies.
- Study was carried out for a short duration. More valid results could have been obtained if the study was conducted at least for a period of one year with more patients.
- The results could not be applied for special populations like pediatric patients and lactating women.
- Patients were not randomly selected, but were enrolled in the study due to their participation in nephrology and haemodialysis department and their willingness to give written informed consent.

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Author Contributions

All the authors contributed to the study design. All the authors participated in collecting, interpreting, analyzing the data, and finalizing the manuscript.

Conflict of Interest

The authors declares that there is no conflict of interest to disclose.

REFERENCES

1. Grill AK, Brimble S. Approach to the detection and management of chronic kidney disease: What primary care providers need to know. Can Fam Physician. 2018;64(10):728-735.

2. Tsuchida-Nishiwaki, M., Uchida, H.A., Takeuchi, H. et al. Association of blood pressure and renal outcome in patients with chronic kidney disease; a post hoc analysis of FROM-J study. Sci Rep 2021 Jul 22;11(1):14990. https://doi.org/10.1038/s41598-021-94467-z PMid:34294784 PMCid:PMC8298520

3. Vaidya SR, Aeddula NR. Chronic Renal Failure. [Updated 2021 Oct 29]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan

4. Wilson S, Mone P, Jankauskas SS, Gambardella J, Santulli G. Chronic kidney disease: Definition, updated epidemiology, staging, and mechanisms of increased cardiovascular risk. J Clin Hypertens (Greenwich). 2021 Apr;23(4):831-834. https://doi.org/10.1111/jch.14186 PMid:33455061 PMCid:PMC8035205

5. Jankowski J, Floege J, Fliser D, Böhm M, Marx N. Cardiovascular Disease in Chronic Kidney Disease. Circulation. 2021;143(11):1157-1172. https://doi.org/10.1161/CIRCULATIONAHA.120.050686 PMid:33720773 PMCid:PMC7969169

6. Rajasekar P, Sameeraja V, Poornima B. Etiological Spectrum of Chronic Kidney Disease in Young: A Single Center Study from South India. J Integr Nephrol Androl 2015; 2:55-60 https://doi.org/10.4103/2225-1243.155776

7. Senanayake S., Gunawardena, N., Palihawadana, P. et al. Symptom burden in chronic kidney disease; a population based cross sectional study. BMC Nephrol 2017 Jul 10;18(1):228. https://doi.org/10.1186/s12882-017-0638-y PMid:28693434 PMCid:PMC5504715

8. Dipiro JT, Talbert RL, Yee GC, Matzke GR, Wells BG, Posey LM. Pharmacotherapy: A Pathophysiologic Approach. 8th ed. USA: McGraw-Hill Medical. 2011.P. 771-792.

9. Gaitonde DY, Cook DL, Rivera IM. Chronic Kidney Disease: Detection and Evaluation. Am Fam Physician. 2017 Dec 15;96(12):776-783.

10. Thomas R, Kanso A, Sedor JR. Chronic kidney disease and its complications. Prim Care. 2008 Jun;35(2):329-44, vii. https://doi.org/10.1016/j.pop.2008.01.008 PMid:18486718 PMCid:PMC2474786

11. Gast, A., Mathes, T. Medication adherence influencing factors-an (updated) overview of systematic reviews. Syst Rev. 2019 May 10;8(1):112. https://doi.org/10.1186/s13643-019-1014-8 PMid:31077247 PMCid:PMC6511120

12. Wilhelmsen NC, Eriksson T. Medication adherence interventions and outcomes: an overview of systematic reviews. EJHP 2019; 26:187-192. https://doi.org/10.1136/ejhpharm-2018-001725 PMid:31338165 PMCid:PMC6613929

13. Bai HH, Nie XJ, Chen XL, Liang NJ, Peng LR, Yao YQ. Beliefs about medication and their association with adherence in Chinese patients with non-dialysis chronic kidney disease stages 3-5. Medicine (Baltimore). 2022 Jan 14;101(2):e28491. https://doi.org/10.1097/MD.0000000000028491 PMid:35029199 PMCid:PMC8757969

14. Brown M, Bussell J, Dutta S, Davis K, Strong S, Mathew S. Medication Adherence: Truth and Consequences. Am J Med Sci. 2016;351(4):387-399. https://doi.org/10.1016/j.amjms.2016.01.010 PMid:27079345

15. 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. https://doi.org/10.22270/jddt.v10i3-s.4083

16. Hand C. Measuring health-related quality of life in adults with chronic conditions in primary care settings: Critical review of concepts and 3 tools. Can Fam Physician. 2016 Jul;62(7):e375-383.

17. Webster AC, Nagler EV, Morton RL, Masson P. Chronic Kidney Disease. Lancet. 2017 Mar 25;389(10075):1238-1252. https://doi.org/10.1016/S0140-6736(16)32064-5 PMid:27887750

18. Naderifar M, Zagheri Tafreshi M, Ilkhani M, Akbarizadeh M, Ghaljaei F. Correlation between quality of life and adherence to treatment in hemodialysis patients. J. Renal Inj Prev. 2018;8(1):22-27. https://doi.org/10.15171/jrip.2019.05

19. Harhay MN, Yang W, Sha D, et al; CRIC Study Investigators. Health-Related Quality of Life, Depressive Symptoms, and Kidney Transplant Access in Advanced CKD: Findings from the Chronic Renal Insufficiency Cohort (CRIC) Study. Kidney Med. 2020 Aug 11;2(5):600-609. https://doi.org/10.1016/j.xkme.2020.06.010 PMid:33089138 PMCid:PMC7568061

20. Chen J, Choi E, Wan E, Chan A, Tsang J, Chan K et al. Validation of the Disease-Specific Components of the Kidney Disease Quality of Life-36 (KDQOL-36) in Chinese Patients Undergoing Maintenance Dialysis. PLOS ONE. 2016;11(5):e0155188. https://doi.org/10.1371/journal.pone.0155188 PMid:27148742 PMCid:PMC4858254

21. Harlow C, Hanna C, Eckmann L, Gokun Y, et al. Quality of Life and Medication Adherence of Independently Living Older Adults Enrolled in a Pharmacist-Based Medication Management Program. Pharmacy (Basel). 2017 Apr 6;5(2):20. https://doi.org/10.3390/pharmacy5020020 PMid:28970432 PMCid:PMC5597145

22. Modi GK, Yadav AK, Ghosh A, et al. Nonmedical Factors and Health-Related Quality of Life in CKD in India. Clin J Am Soc Nephrol. 2020 Feb 7;15(2):191-199. https://doi.org/10.2215/CJN.06510619 PMid:32001488 PMCid:PMC7015100

23. Cohen, D.E., Lee, A., Sibbel, S. et al. Use of the KDQOL-36™ for assessment of health-related quality of life among dialysis patients in the United States. BMC Nephrol 2019 Dec 10;20(1):461 https://doi.org/10.1186/s12882-019-1295-0 PMid:30935377 PMCid:PMC6444438

24. Krishnan A, Teixeira-Pinto A, Lim W, Howard K, Chapman J, Castells A Et al. Health-Related Quality of Life in People Across the Spectrum of CKD. Kidney Int. Rep. 2020;5(12):2264-2274. https://doi.org/10.1016/j.ekir.2020.09.028 PMid:33305120 PMCid:PMC7710842

25. Jain D, Aggarwal HK, Meel S. Assessment of medication adherence in chronic kidney disease patients: a tertiary care experience. Int J Health Sci Res. 2018; 8(11):20-30.

26. Al-Sayyari A, AL-Jumaih A, Al-Onazi K, Binsalih S, Hejaili F. A Study of Quality of Life and its Determinants among Hemodialysis Patients Using the KDQOL-SF Instrument in One Center in Saudi Arabia. AJNT. 2011;4(3). https://doi.org/10.4314/ajnt.v4i3.71024

27. Fasipe O, Akhideno P, Owhin S, Ilukho F, Ibiyemi-Fasipe O. The comorbidity profile among chronic kidney disease patients in clinical practice: A prospective study. International Archives of Health Sciences. 2019;6(1):46. https://doi.org/10.4103/iahs.iahs_21_18

28. Kala TS, Sreedevi A, Prasad MVH, Jikki PN. Assessment of knowledge and adherence to therapy among chronic kidney disease patients attending nephrology department of tertiary care hospital, Kurnool city, Andhra Pradesh. Int J Med Sci Public Health 2019;8(3):223-229.

29. Lee W, Lee Y, Li L, Ng H, Kuo W, Lin P et al. The Number of Comorbidities Predicts Renal Outcomes in Patients with Stage 3-5 chronic kidney disease. Journal of Clinical Medicine. 2018;7(12):493. https://doi.org/10.3390/jcm7120493 PMid:30486496 PMCid:PMC6306906

30. Atray P. Evaluation of Drug Prescribing Pattern in Chronic Kidney Disease Patients at Tertiary Care Hospital in Northern India -an Observational Study. WJPPS. 2021;10(2):1222-1232

31. MacRae C, Mercer SW, Guthrie B, Henderson D. Comorbidity in chronic kidney disease: a large cross-sectional study of prevalence in Scottish primary care. Br J Gen Pract. 2021 Feb 25;71(704):e243-e249. https://doi.org/10.3399/bjgp20X714125 PMid:33558333 PMCid:PMC7888754

32. Chakraborty S, Ghosh S, Banerjea A, De R, Hazra A, Mandal S. Prescribing patterns of medicines in chronic kidney disease patients on maintenance hemodialysis. Indian J. Pharmacol. 2016;48(5):586-590 https://doi.org/10.4103/0253-7613.190760 PMid:27721548 PMCid:PMC5051256

33. Chan Y, Zalilah M, Hii S. Determinants of Compliance Behaviours among Patients Undergoing Hemodialysis in Malaysia. PLoS ONE. 2012;7(8):e41362. https://doi.org/10.1371/journal.pone.0041362 PMid:22870215 PMCid:PMC3411710

34. Latif AA, Lee KW, Phang K, Rashid AA, Chan NN, Peh SC, Thilaganathan T, Ooi PB. Patient-related factors associated with medication adherence behavior in patients with end-stage renal disease: A systematic review. Tzu Chi Med J. 2022 Jun 27;34(4):473-484. https://doi.org/10.4103/tcmj.tcmj_212_21 PMid:36578649 PMCid:PMC9791854

35. Sontakke S, Budania R, Bajait C, Jaiswal K, Pimpalkhute S. Evaluation of adherence to therapy in patients of chronic kidney disease. Indian J. Pharmacol. 2015;47(6):668. https://doi.org/10.4103/0253-7613.169597 PMid:26729961 PMCid:PMC4689023

36. Alves K, Guilarducci N, Santos T, Baldoni A, Otoni A, Pinto S et al. Is quality of life associated with compliance to pharmacotherapy in patients with chronic kidney disease undergoing maintenance hemodialysis?. Einstein (São Paulo). 2018;16(1). https://doi.org/10.1590/s1679-45082018ao4036 PMCid:PMC5968805

37. Mujais SK, Story K, Brouillette J, et al. Health-related quality of life in CKD Patients: correlates and evolution over time. Clin J Am Soc Nephrol. 2009;4(8):1293-1301. https://doi.org/10.2215/CJN.05541008 PMid:19643926 PMCid:PMC2723973