Assessment of knowledge and adherence to therapy among chronic kidney disease patients attending nephrology department of tertiary care hospital, Kurnool city, Andhra Pradesh

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ABSTRACT

Background: High level of adherence to prescribed medication is very essential to obtain the desired outcomes in chronic kidney disease (CKD) patients. Non-adherence to medication has been associated with increased morbidity, mortality, and higher costs of care. **Objectives:** The objectives of this study were as follows: (1) To assess adherence to medications in CKD patients, (2) to know the patient's knowledge regarding treatment, and (3) to study factors associated with non-adherence to medications in CKD patients. **Materials and Methods:** A cross-sectional study was conducted in the nephrology department of a tertiary care hospital. Patients ($n = 206$) aged >18 years, diagnosed with CKD and on treatment for >3 months were interviewed. Permission from ethical committee was taken and informed consent was obtained from the study subjects before start of the study. Morisky Medication Adherence Questionnaire (MMAQ) was used to assess overall adherence. A high score indicates poor adherence. **Results:** Of 206 patients, 1.46% (3) were Stage 1, 2.91% (6) were Stage 2, 11.17% (23) were Stage 3, 15.53% (32) were Stage 4, and 68.93% (142) were Stage 5 of CKD according to the National Kidney Foundation 2002 guidelines. Using the MMAQ, high, medium, and low adherence was reported in 23.30%, 42.23%, and 34.47% of patients, respectively. An average number of medicines taken in a day by each patient was 5.75 ± 0.707. Common causes of non-adherence were forgetfulness (71.51%), high cost of medicine (24.05%), and large pill burden (18.35%). **Conclusions:** Non-adherence remains a major obstacle in the effective management of CKD population. Periodic counseling about the importance of medication adherence to the patients and caregivers is essential to improve adherence.

KEY WORDS: Chronic Kidney Disease; Treatment Adherence, Morisky Medication Adherence Questionnaire; Score; Non-adherence

INTRODUCTION

Chronic kidney disease (CKD) is a non-communicable disease that affects 1 in 10 people worldwide. CKD is defined as kidney damage lasting for >3months characterized by structural or functional abnormalities of the kidney, with or without decreased glomerular filtration rate.[1] The prevalence of CKD in the population is a considerable social and economic problem worldwide, and one that is increasing. CKD is much more widespread than people realize. It often goes undetected and undiagnosed until their kidney function is down to 25% of normal.[2]

It is a prolonged illness usually coexisting with diseases such as hypertension and diabetes. Consequently, these patients

have to take a large pill burden on an average of around 8–10 tablets/day.[3] Hence, adherence is a major concern in the therapy of CKD.

Adherence to medication is defined as "the extent to which the patient's behavior matches agreed on recommendations from the prescriber."[4] Adherence to medication is a key component of effective disease management in CKD. The main goals of medication are to slow down the disease progression, monitor, and correct disease-associated complications and comorbidities while treating the underlying etiology.

Managing multiple medications and health-care appointments, along with dialysis for >2 times a week for some patients, are a challenging task. Not surprisingly, patients may miss medications, intentionally or unintentionally. This is a major obstacle to achieve treatment goals and increases the risk of morbidity, mortality, and hospitalization. High level of adherence to prescribed medication is very essential to obtain the desired outcomes in CKD patients. Hence, optimizing adherence to medicine is, therefore, a priority issue for health-care providers.

Assessment of medication adherence helps in identifying the various associated risk factors and developing the intervention to improve the adherence. Only a few studies on adherence to therapy among CKD patients have been carried out in India and Rayalaseema region. Hence, this study was planned to assess the adherence to therapy among CKD patients and study factors responsible for the non-adherence.

MATERIALS AND METHODS

Study Design

This was a cross-sectional study.

Study Period

The study was conducted from October 1, 2017, to March 31, 2018.

Study Setting

This study was conducted at the department of nephrology, tertiary care hospital of Kurnool City,

Andhra Pradesh, India.

Study Subjects

Patients aged >18 years, diagnosed with CKD and taking treatment for >3 months.

Ethical Issues

Ethical clearance was taken from the Ethical Committee of Kurnool Medical College before starting the study. Prior permission was obtained from the head of the department of nephrology unit and cooperation was sought. The purpose of the study was explained to all the study subjects in their local language and informed consent was taken.

Sample Size

All patients aged >18 years, diagnosed with CKD and on treatment for >3 months and given consent, attending to the Nephrology Department of Government General Hospital, Kurnool, from October 1, 2017, to March 31, 2018. This amounted to a total of 206 subjects.

Inclusion Criteria

Patients of either sex, aged >18 years diagnosed as CKD and on treatment for >3 months irrespective of the stage of CKD.

Exclusion Criteria

Patients who have not given consent to participate in the study.

Data Collection

Patients diagnosed with CKD and on treatment for >3 months, aged >18 years, of either gender, irrespective of the stage of CKD, whether on dialysis or not and irrespective of their co-morbid conditions were included. Briefing about the study and taking consent from the study participants was done prior to the start of study. Morisky Medication Adherence Questionnaire was used to calculate overall adherence. In addition to this, we have also used self-developed, pre-validated, semi-structured questionnaire. The questionnaire was designed to obtain information about demographic data, various issues concerned with medication non-adherence, dietary restriction, and fluid restrictions. Adherence was graded as high, medium, and low according to the Morisky Medication Adherence Scale (MMAS-8). Patients with non-adherence were evaluated for the cause.

Statistical Analysis

Data were entered into Microsoft Excel sheet, baseline characteristics of the study population were analyzed using descriptive statistics and their degree of adherence. Values are expressed as counts and percentage. Differences between categorical variables were tested using Chi-square test, *P*-value using statistical package EPI Info 7.2.2.2 version. MMAS-8 was used to calculate overall adherence. Scoring was done accordingly: High (score = 0), medium (score 1–2), and low (score >2).

RESULTS

A total of 206 patients aged >18 years, diagnosed with CKD and on treatment for >3 months were included in this study.

Of which, 144 were men and 62 were women. Majority of them, 194 (94.17%) were currently married. The mean age of the respondents was 49.78 ± 12.21 years and it ranged from 21 to 80 years. Among them, 40 (19.42%) were <40 years of age, 69 (33.49%) were in the age group of 40–50 years, 57 (27.67%) were 51–60 years of age, and 40 (19.42%) were >60 years. Hindus were 157 (76.21%) followed by Muslims - 37 (17.96%) and Christians 12 (5.83%).

Majority, 50.97% (105) were illiterates. Around 11% (23) completed primary education, 19.90% (41) completed secondary education, 7.28% (15) studied up to intermediate, and 10.68% (22) had graduation and above education.

Around one-third of the subjects, 68 (33%) were unskilled workers followed by semi-skilled workers 50 (24.27%), 48 (23.30%) unemployed, 19 (9.22%) skilled workers, 19 (9.22%) semi-professional workers, and 2 (0.96%) patients were professional workers by occupation. Of majority of them, 74% (153) belonged to below poverty line.

Most of them 68.93% (142) were in Stage 5, 15.53% (32) Stage 4, 11% (23) were Stage 3, 2.91% (6) were Stage 2, and 1.46% (3) were in Stage 1 of CKD according to the National Kidney Foundation 2002 guidelines [Figure 1]. Nearly 14% (28) were overweight and 3.40% (7) were obese. An average number of medicines taken by each patient in a day was 5.746 ± 0.707. Nearly 40% (82) of the patients were taking >5 drugs. Many (85%) of the patients were found to be on hemodialysis. Around 32% were habituated to smoking and alcohol. At least one comorbidity was found among 84% (173) of patients. The comorbidities were hypertension 114 (55.33%), diabetes mellitus 13 (6.31%), anemia/severe anemia 9 (4.36%), etc. Two or more than two comorbidities were found among 17.96% (37) CKD patients [Figure 2].

A significant association was noted between adherence score and stages of CKD, number of medications taken, duration of treatment, patients on dialysis, smoking, and alcohol intake.

Age, gender, religion, educational status, occupation, marital status, socioeconomic status, body mass index (BMI), and associated comorbidities have no significant association with adherence score in this study [Table 1].

Although most of the patient's 87% (179) self-reported that they were aware of following the medicine schedules strictly as prescribed, MMAS-8 score revealed that only 23% showed "high" medication adherence.

Nearly 3/4ths (150) of the patients reported that they know the importance of each medicine. Knowledge of when to take medicine is lacking among 15% of patients. Awareness about adverse effects is very less accounting to only 12% (25) around 33.5% (69) aware that stopping medicine makes them feel ill [Table 2].
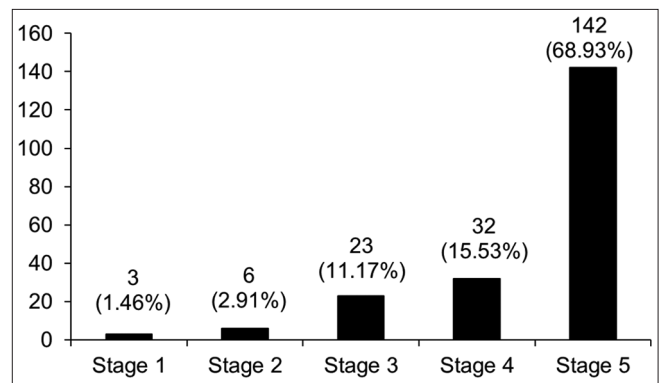
Figure 1: Distribution of study subjects according to the stage of chronic kidney disease
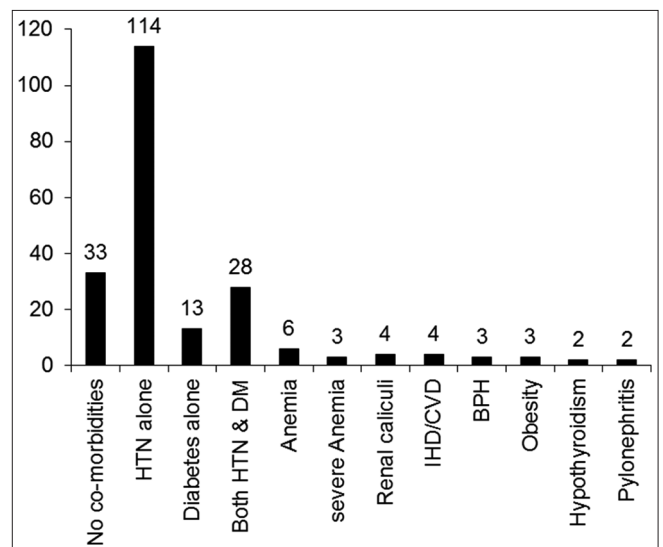
Figure 2: Comorbidities in patients with chronic kidney disease

The medication adherence was categorized into high, "medium," and "low" on the basis of MMAS-8 score. Lower the score in MMAS-8, better is the adherence to medication. Among all enrolled patients, 34.47% and 42.23% showed "low" and "medium" medication adherence, respectively; only 23% showed "high" medication adherence. Majority, 76.7% of the patients were "non-adherent" to the drug therapy [Figure 3 and Table 4].

The present study shows that 89.32% of patients followed fluid and diet restrictions as advised by treating physician. They were also following advice regarding physical activity and taking other nutritional supplements as prescribed.

Patients who were found non-adherent (158) were then evaluated for the cause. Multiple reasons were given. The most common reason stated was forgetfulness 71.51% (113), followed by high cost of the medication, large pill burden, and fear of adverse effects 24.05% (38), 18.35% (29), and 10.12% (16), respectively. The other reasons were missed appointments in 5.06% (8), depression in 4 (2.53%), and others [Table 4].

Table 1: Baseline characteristics of CKD patients and medication adherence status based on MMAS-8 score

Variable	Total n=206 (%)	Low adherence n=71 (%)	Moderate adherence n=87 (%)	High adherence n=48 (%)	χ^2-value	*P*-value
Age						
<40 years	40 (19.42)	14 (35)	15 (37.5)	11 (27.5)	4.22	0.64
40–50 years	69 (33.49)	21 (30.43)	29 (42.03)	19 (27.54)		
51–60 years	57 (27.67)	24 (42.11)	24 (42.10)	9 (15.79)		
>60 years	40 (19.42)	12 (30)	19 (47.5)	9 (22.5)		
Sex						
Male	144 (69.90)	54 (37.5)	55 (38.19)	35 (24.31)	3.33	0.18
Female	62 (30.10)	17 (27.42)	32 (51.61)	13 (20.97)		
Religion						
Hindu	157 (76.21)	55 (35.03)	66 (42.04)	36 (22.93)	Yates χ2-*0.177	0.99
Muslim	37 (17.96)	13 (35.14)	15 (40.54)	9 (24.32)		
Christians	12 (5.83)	3 (25)	6 (50)	3 (25)		
Educational status						
Illiterate	105 (50.97)	37 (35.24)	42 (40)	26 (24.76)	*10.774	0.2148
Primary	23 (11.17)	7 (30.43)	10 (43.48)	6 (26.09)		
Secondary	41 (19.90)	20 (48.78)	12 (29.27)	9 (21.95)		
Intermediate	15 (7.28)	5 (33.33)	9 (60)	1 (6.67)		
Graduate and above	22 (10.68)	2 (9.09)	14 (63.64)	6 (27.27)		
Occupation						
Professional	2 (0.96)	1 (50)	1 (50)	0 (0)	*6.738	0.74
Semi-professional	19 (9.22)	6 (31.58)	11 (57.89)	2 (10.53)		
Skilled worker	19 (9.22)	10 (52.63)	7 (36.84)	2 (10.53)		
Semi-skilled	50 (24.27)	18 (36)	19 (38)	13 (26)		
Unskilled worker	68 (33)	21 (30.89)	32 (47.06)	15 (22.05)		
Unemployed	48 (23.30)	15 (31.25)	17 (35.42)	16 (33.33)		
Marital status						
Not married	3 (1.46)	1 (25)	2 (75)	0 (0)	*0.723	0.948
Married and	194 (94.17)	67 (34.53)	80 (41.24)	47 (24.23)		
Widowed living with Spouse	9 (4.37)	3 (33.33)	5 (55.56)	1 (11.11)		
Socioeconomic status						
Below poverty line	153 (74.27)	52 (33.99)	63 (41.18)	38 (24.83)	0.798	0.670
Above poverty line	53 (25.73)	19 (35.85)	24 (45.28)	10 (18.87)		
BMI						
Underweight<18	9 (4.37)	4 (44.44)	4 (44.44)	1 (11.12)	*5.779	0.216
Normal range 18–24.9	162 (78.64)	49 (30.25)	70 (43.21)	43 (26.54)		
Overweight (>25) and obese>30	35 (16.99)	18 (51.43)	13 (37.14)	4 (11.43)		
CKD stages						
1–3	32 (15.53)	13 (40.62)	12 (37.50)	7 (21.88)	10.31	0.03
4	32 (15.53)	16 (50.00)	6 (18.75)	10 (31.25)		
5	142 (68.94)	42 (29.57)	69 (48.60)	31 (21.83)		
Number of medications						
≤5	113 (54.85)	45 (39.82)	49 (43.36)	19 (16.82)	6.67	0.03
>5	93 (45.15)	26 (27.96)	38 (40.86)	29 (31.18)		
Hemodialysis	175 (84.96)	58 (33.14)	80 (45.72)	37 (21.14)	6.25	0.043
No dialysis	31 (15.04)	13 (41.94)	7 (22.58)	11 (35.48)		

(Contd...)

Table 1: (*Continued*)

Variable	Total n=206 (%)	Low adherence n=71 (%)	Moderate adherence n=87 (%)	High adherence n=48 (%)	χ^2-value	*P*-value
Smoking and alcohol habits						
Present	66 (32.04)	29 (43.94)	28 (42.42)	9 (13.64)	6.42	0.04
Absent	140 (67.96)	42 (30)	59 (42.14)	39 (27.86)		
Comorbidities						
Absent	33 (16.02)	15 (45.46)	9 (27.27)	9 (27.27)	3.72	0.155
Present	173 (83.98)	56 (32.37)	78 (45.09)	39 (22.54)		
Duration of treatment						
<1 years	42 (20.39)	14 (33.33)	20 (47.62)	8 (19.05)	14.11	0.028
1–2 years	31 (15.05)	6 (19.36)	11 (35.48)	14 (45.16)		
2–5 years	88 (42.72)	29 (32.95)	40 (45.45)	19 (21.60)		
≥5 years	45 (21.84)	22 (48.89)	16 (35.56)	7 (15.55)		

*Yates χ^2, CKD: Chronic kidney disease, MMAS-8: Morisky Medication Adherence Scale-8, BMI: Body mass index

Table 2: Patients knowledge regarding treatment (*n*=206)

| Question	Number of respondents (%)	
	Yes	No
Are you aware that you should strictly follow medicine schedule as prescribed by doctor	179 (86.89)	27 (13.11)
Do you know the importance of each medicine	150 (72.82)	56 (27.18)
Aware about how to take each medicine they were taking	176 (85.44)	30 (14.56)
Are you aware of adverse effects	25 (12.14)	181 (87.86)
Are you aware that stopping medicine make you feel sick	69 (33.50)	137 (66.50)
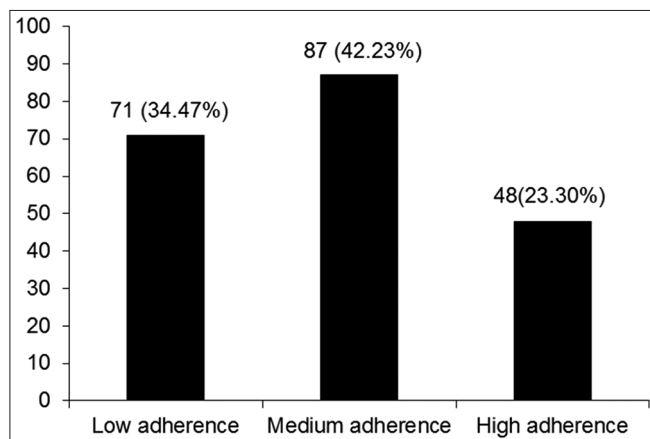
Figure 3: Adherence scale (Morisky Medication Adherence Questionnaire scale)

DISCUSSION

In this study, the medication adherence among the CKD patients using the MMAS-8 and various factors affecting it was evaluated. High, medium, and low adherence was reported by 23.30%, 42.23%, and 34.47% of patients, respectively. A significant association was noted between adherence score and stages of CKD, number of medications taken, duration of treatment, patients on dialysis, smoking, and alcohol intake. Average number of medicines taken in a day by each patient was 5.746 ± 0.707 (mean ± SD). More than 1/4th of study subjects reported that they do not know the importance of each medicine they were taking. Non-adherence was found to be associated with >5 medication ($P < 0.05$). This study finds forgetfulness as the most common factor responsible for non-adherence in 72%. High cost of medication was found as another cause of non-adherence to drug therapy (24.05%). Missed appointment was found to be responsible for non-adherence in 1.4%. This study shows that 89.32% of patients followed fluid and diet restrictions as told by treating physician. They were also following exercise and taking other nutritional supplements as prescribed.

A study was done by Ahlawat *et al.*[5] (*n* = 150) revealed that 22%, 23%, and 55% of the patients had high, medium, and low adherence which is nearly similar to our study. A study was done by Sontakke *et al.*[6] revealed high, medium, and low adherence to be 7.3%, 55.3%, and 37.3% of patients, respectively. The adherence was found lower than the present study. Kefale *et al.*[7] showed that 157 (61.3%), 51 (19.9%), and 48 (18.8%) patients exhibited high, medium, and poor adherence to the prescribed regimens, respectively. Adherence was found higher than the present study. The measure of adherence to drug therapy in different studies using different tools varies from 38 to 83%.[8-12] Ahlawat *et al.*[5] reported that the level of medication adherence was found to be significantly associated with sex, socioeconomic

Table 3: Response to the MMAS-8 questionnaire observed in therapeutic drug monitoring based on adherent and non-adherent patients

MMAS-8 adherence questions	Patient response (Yes/No)	
	Yes	No
1. Do you sometimes forget to take your medicine?	91 (41.175)	115 (55.83)
2. People sometimes miss taking their medicines for reasons other than forgetting. Thinking over the past 2 weeks, were there any days when you did not take your medicine?	27 (13.11)	179 (86.89)
3. Have you ever cut back or stopped taking your medicine without telling your doctor because you felt worse when you took it?	25 (12.14)	181 (87.86)
4. When you travel or leave home, do you sometimes forget to bring along your medicine?	51 (24.76)	155 (75.24)
5. Did you take all your medicines yesterday?	181 (87.86)	25 (12.14)
6. When you feel like your symptoms are under control, do you sometimes stop taking your medicine?	14 (6.80)	192 (93.20)
7.Taking medicine every day is a real inconvenience for some people. Do you ever feel hassled about sticking to your treatment plan?	49 (23.79)	157 (76.21)
8. How often do you have difficulty remembering to take all your medicine?		
A. Never/rarely	98 (47.57)	
B. Once in a while	93 (45.15)	
C. Sometimes	13 (6.31)	
D. Usually	2 (0.97)	
E. All the time	0	

MMAS-8: Morisky Medication Adherence Scale

Table 4: Reasons for non-adherence to medication in patients of CKD (*n*=158)

Reasons for non-adherence	Number of respondents (%)
Forgetfulness	113 (71.51)
High cost of medicine	38 (24.05)
Difficulty to take large number of pill	29 (18.35)
Fear of adverse effects	16 (10.12)
Missed appointments	8 (5.06)
Poor access to medication	5 (3.16)
Depression	4 (2.53)
Other illnesses	2 (1.26)

CKD: Chronic kidney disease

status, treatment funding, stages of CKD, dialysis, and among different stages of BMI. The present study shows that significant association was noted between adherence score and stages of CKD, number of medications taken, duration of treatment, patients on dialysis, smoking, and alcohol intake. A study was done by Ahlawat *et al.*,[5] Magacho *et al.*[11] also reported >5 pills as a major contributing factor for non-adherence (*n* = 149). According to Moreira *et al.*,[13] pill burden (≥4) was significantly associated with non-adherence which is similar to the present study. A study was done by Sontakke *et al.*[6] revealed that 68% of patients were not aware about the importance of each medicine they were taking, which is lower than the present study. Varleta *et al.*[14] reported forgetfulness as the most common factor responsible for non-adherence in 67% of the patients (*n* = 310) using Morisky–Green questionnaire; Frankenfield *et al.*[15] have also reported that cost is a major factor for non-adherence

in 23% of the end-stage renal disease patients. A study was done by Ahlawat *et al.*[5] revealed 4% non-adherence due to missed appointment. Van Servellen *et al.*[16] also reported similar findings. A study was done by Magar *et al.*[17] shows that 76% of patients followed fluid and diet restrictions as told by treating physician.

The strength of this study is that almost all the patients who are eligible for inclusion criteria and given consent were interviwed. Limitation of the study is that it is done for limited period.

Recommendations

Our results suggest that there is a need for periodic health checkups and counseling sessions for all the CKD patients. Addressing the possible conflicts between the patients' agenda and therapeutic targets should be a part of routine clinical practice if non-adherence is to be tackled effectively.

Creating awareness about the importance of taking each medicine regularly and possible side effects to the patients, and patient attendants and family members as well is necessary which would improve the adherence to therapy and also reduce the cost of care and adverse outcomes.

Affordability of treatment remains a major issue for these patients. This can be addressed by increasing the universal insurance coverage for CKD patients.

From the above findings, it appears that pill burden decreases the medication adherence. However, the number of

medications in CKD patients cannot be reduced. Therefore, other strategies have to be explored to increase the medication adherence. One can decrease the frequency of drug using the long-acting medications, long-acting insulin, and drug combinations if available.

CONCLUSIONS

This study shows that nearly three-fourths of the patients were non-adherent. A significant association was noted between adherence score and stages of CKD, number of medications taken, duration of treatment, patients on dialysis, habituated to smoking, and alcohol intake. More than a quarter of the patients do not know the importance of each medicine they were taking. Nearly 15% of patients were not aware about how to take each medicine they were taking. Among the reasons for non-adherence, forgetfulness, high cost of medicine, and large pill burden were found to be the most common causes.

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