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Engagement with Fluid and Dietary Restriction among Chronic Kidney Disease (CKD) Patients in Selected Public Hospitals of KwaZulu-Natal (KZN) Province, South Africa

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Abstract

Background: Chronic Kidney Disease (CKD) is a slow, progressive irreversible deterioration in renal function. Effective management of CKD depends largely on patients engaging with their fluid and dietary restriction. However, limited engagement is a significant barrier.

Objectives: The aim of the study was to determine the level of engagement with fluid and dietary restriction among CKD patients at selected two public hospitals in KwaZulu-Natal province, South Africa.

Methods: A descriptive cross-sectional study design was used. A random sampling method was used to select the participants. Data was collected through a structured interview schedule developed from literature. Data was analyzed using Statistical Package for Social Sciences (SPSS) software version 23, 2015.

Results: None of the participants achieved high levels of engagement with fluid restriction. Eleven percent (11%) had moderate levels and the majority, (88.9%) had low levels of engagement with fluid restriction. There were only 16% of the participants with high levels and equal numbers (42.2%) had moderate and low levels of engagement with dietary restriction. CKD participants showed better engagement with dietary compared to fluid restriction. Engagement with dietary restriction was significantly associated with monthly income (Chi square value=25.916, df=74, p<0.027) and educational level (Chi square value=28.219, df=74, p<0.013). Engagement with fluid restriction was not associated with any biographical characteristics.

Conclusion: CKD participants showed better engagement with dietary compared to fluid restriction. Despite this, engagement with fluid and dietary restriction was low among CKD patients. Managing detrimental effects of CKD is the primary goal since there is no cure for the disease. Therefore, strategies that foster engagement with fluid and dietary restriction must be devised to promote effective management of CKD population.

Keywords: Engagement; Fluid restriction; Dietary restriction; Engagement with fluid and dietary restriction; Chronic kidney disease; Adherence and non-adherence

Introduction

Chronic Kidney Disease (CKD) is a slow, progressive irreversible deterioration in renal function and the prevalence is estimated at 8-16% around all continents [1]. In Africa, studies available report a prevalence of about 10% [2,3]. The magnitude of CKD in developing African Countries especially of sub-Saharan Africa is less known. However, there are suggestions that prevalence rates in this setting could even be much higher at least 3-4 times frequent than those in developed countries. Assounga reveals the approximately number of CKD in South Africa to be 4900-9800 patients per year while in KwaZulu-Natal (KZN) alone ranges from 1000-2000 patients per year [4]. Successful treatment of CKD depends largely on patients engaging with their recommended fluid and dietary restriction yet this is a pervasive problem and significant barrier to effective management of the population. Patient engagement refers to a patient's knowledge, ability and willingness to manage his or her own health care, paired with interventions which promote positive adherent behaviour [5]. In this context, engagement is conceptualized as ability, willingness and active participation of CKD patients with their dietary and fluid restriction to promote highest levels of adherent behaviours. Carman et al. further highlighted that patient engagement is required for successful treatment of CKD as involvement has been shown to promote less frequent and shorter hospital stays, lower morbidity, improve survival and clinical outcomes [5]. Consistent findings reported that engagement is strongly associated with improved adherence with treatment [6]. Therefore, engagement with fluid and dietary restriction is of importance to improve documented poor adherence to these management modalities [7-9] among CKD patients. Removal and control of excess fluid is the cornerstone of volume management in CKD patients [10]. Furthermore, low rates of adherence to fluid restriction have been evident from previous studies [8] as they range from 9.7% to 72%. Fluid restriction is considered the most difficult to accomplish [9] and this remains a major clinical problem in individuals with CKD [9] contributing to severe complications

which include intradialytic cramping and hypotensive episodes, treatment related fatigue and dizziness, lower-extremity oedema, ascites, left ventricular hypertrophy and congestive heart failure, hypertension, shortness of breath, and pulmonary vascular congestion or acute pulmonary oedema [9,11]. Excessive fluid overload contributes to an increased morbidity [12] and high mortality [9] in CKD patients. Similarly, dietary restriction in CKD forms part of the management of the condition and its goal is to minimize uremic and anaemia symptoms, reduce the incidence of fluid, electrolyte and acid base imbalances, decrease patient's vulnerability to infections and limit catabolism [13]. Again, documented poor adherence to dietary restriction has been documented to be in the ranges of 2% to 81% [7] among CKD patients. In this regard, fluid and diet engagement plays a pivotal role in the effective management of CKD as it lowers morbidity, improve rehabilitation, survival and clinical outcomes [5].

Despite evidence that has been compiled to date of the importance of patient engagement, more research is needed to determine best practices for engaging patients with their fluid and dietary restrictions. Furthermore, there are no studies that examined the concept of fluid and dietary restriction engagement among CKD patients in KwaZulu-Natal, province, South Africa. Therefore, the investigator sought to determine the level of engagement with fluid and dietary restriction among CKD patients. Findings from this study may add important information to the literature regarding patients' engagement with fluid and dietary restriction. The results can be used to inform future interventions that promote highest positive adherent behaviours among CKD population.

Purpose of the Study

The aim of the study was determine the level of engagement with fluid and dietary restriction among Chronic Kidney Disease (CKD) patients in KZN province, South Africa.

Methodology

Study design

A cross sectional descriptive study to determine the level of engagement with fluid and dietary restriction of CKD patients' was carried out at two major referral hospitals in KZN, South Africa. These referral hospitals serve the population of the whole KwaZulu-Natal province including neighbouring provinces like Eastern Cape and Mpumalanga. Therefore focusing on these centres posed the likelihood of capturing all CKD patients from all three provinces of South Africa.

Sample size

A sample of 90 consenting CKD participants was drawn using simple random sampling method. The exact number of patients with CKD in KwaZulu-Natal province was unknown due to lack of renal registries. However, Assounga et al revealed the approximate population of CKD patients on CKD

programme as 2000 which was infinite [4]. Therefore, the necessary Sample Size (SS) was calculated according to the approximate number of CKD patients on the programme using the standard formula and the finite population adjustment model as illustrated in Katzenellenbogen et al. [14].

Inclusion and exclusion criteria

All male and female CKD patients who could communicate verbally and attending the renal unit or renal clinic were eligible for selection into the study. The patients had to have been on CKD programme for at least three months in order to be able to estimate a realistic engagement with their fluid and dietary restriction. All CKD patients aged 18 years and over were eligible for selection and this ensured coverage of all ages in which CKD occurs. Excluded were all critically ill patients, minors, and all those who have been attending renal unit or clinic for less than three months. Critically ill patients were excluded because they lacked the ability to comprehend information about a study, to make decisions regarding participation or withdrawal from the study and to communicate effectively. Minors were excluded because they were not capable of giving informed consent.

Data collection instruments

The tool used for this study was the structured interview guide which was developed from in depth literature review [15,16]. The interview schedule consisted of 3 sections namely: Demographics (Section A), Engagement with fluid restriction (Section B), Engagement with dietary restriction (Section C) of the CKD participants. The instrument for engagement with fluid restriction consisted of ten items. Respondents were asked on how often the health care worker talked to them about the importance of fluid restriction, amount of daily expected fluid intake, how often they have followed fluid restriction in the past week, the level of importance to follow fluid restriction, importance of limiting fluid restriction, difficulties with fluid restriction and types of difficulties, level of difficulties with fluid restriction, number of times weighed at home, level of importance on weighing and reasons for missing and weight gain or loss.

The instrument for engagement with dietary restriction consisted of seven items. Respondents were asked on how often the health care worker talked to them about dietary restriction, expected renal diet, the level of importance to follow dietary restriction, importance of following dietary restrictions, difficulties with dietary restriction and types of difficulties, level of difficulties with fluid restriction and number of times of missed dietary restriction in the past week.

Face-to-face interview was used to collect data. The content validity of the structured interview schedule was ensured by submitting the tool to the experts in the field of nephrology namely experts in school of nursing and public health, nephrologist and renal specialists in the clinical area. A pilot study was conducted on adult CKD patients who met the inclusion criteria at a major referral hospital and no changes were made to the instrument after expert review and pilot

study. Cronbach's alpha was the psychometric test applied to measure the internal consistency of the instrument. The reliability of the instrument was 0.77 (Cronbach's $\alpha=0.77$).

Data analysis

Data analysis was performed using the Statistical Package for Social Sciences (SPSS) version 23, 2015. Responses to individual dietary and fluid restriction plan was analysed using descriptive statistics namely frequencies and percentages. Engagement with dietary and fluid restriction was analysed using descriptive statistics namely frequencies and percentages. Engagement with fluid and dietary restriction of 90% to 100% was classified as high, 80% to 89% was classified as moderate and engagement of below 80% was considered as low. The investigator developed the scale because no scale was found in literature. The Chi square test was used to test whether a statistically significant relationship existed between two categorical variables. The selected independent biographical categorical variables were gender, marital status, and level of income, level of education, duration of CKD, support systems, occupation and CKD class. The dependent categorical variable in this study was level of engagement with dietary and fluid restriction.

Ethical considerations

Permission to carry out the study was sought from the Department of health, KZN, CEO, King Edwards and Inkosi

Albert Luthuli Hospitals (Ethical clearance reference number BE377/14). Patient's rights namely rights to self-determination, right to privacy, right to confidentiality, right to fair treatment and right to protection from discomfort and harm were observed. Informed consent and participant authorization were sought from the study participants. Assessing research benefit was also part of the ethical process for balancing benefits and risks for this study.

Results

Demographic data

Table 1 reveals the distribution of demographic variables for CKD participants. The age of participants was from a minimum of 21 years to a maximum of 61 years with an age range of 40. The sample comprised of more males [53 (59%)] than females [33 (47%)]. The majority, [56 (62%)] of the CKD participants were married though some were divorced and widowed. Highest [58 (64%)] and lowest [9 (10%)] number of CKD participants were found in grade 10-12 and tertiary education respectively. The majority, [66 (73%)] were unemployed, on government medical grant and about a quarter of the population had jobs with no medical grant from the government. Duration of CKD ranged from three months to over 5 years among the population.

Table 1 Demographic characteristics of CKD participants (N=90).

Variable	Frequency (n)	Percentage (%)
Age categories (years)		
21-30	8	9
31-40	12	13
41-50	41	46
51-60	28	31
Greater than 60	1	1
Gender		
Male	53	59
Female	37	41
Level of Education		
Grade 8 to 9	3	26
Grade 10 to 12	58	64
Tertiary level	9	10
Marital status		
Married	56	62
Single	27	30
Divorced	3	3

Widowed	4	5
Occupation		
Self-employed	1	1
Professional	23	26
Non employed	66	93
Income		
Less than R3000	66	73
R3000 to R6000	18	20
R6001 to R10000	6	7
Support System		
Family and medical grant	66	73
Family only	24	17
Duration of CKD		
3 months to 1 year	22	24
Over 1 year to 2 years	20	22
Over 2 years to 3 years	12	13
Over 3 years to 5 years	14	16
Greater than 5 years	22	22

Engagement with fluid restriction among CKD participants

Table 2 displays results for engagement with fluid among CKD participants. Concerning health education by health professional on the importance of fluid restriction, 2 (2%) had health education that week, 5 (6%) last week, the majority, [76 (84%)] on monthly basis, 6 (7%) a month ago and 1 (1%) never had health education on the importance of fluid restriction. With regards to expected fluid intake per day, 24 (27%) took 500 ml to 600 ml per day, 1 (1%) had between 601 ml and 700 ml, 9 (10%) drank 701 ml to 800 ml, 3 (3%) took from 801mls to 900mls and most, [53 (59%)] had over 901 ml per day. Concerning following daily fluid restriction, 18(20%) followed all the time, 44 (50%) most of the time, 25 (28%) about half of the time and only 3 (3%) occasionally.

Table 2 Engagement with Fluid restriction for CKD participants (n= 90).

Variable	Frequency (n)	Percentage (%)
Health education on fluid restriction		
This week	2	2
Last week	5	6
One month ago	76	84
More than a month ago	7	8
Fluid expected to drink per day		

500 - 600	24	27
601 to 700	1	1
701 to 800	9	10
801 to 900	3	3
Over 901	53	59
How often have you followed fluid restriction?		
All the time	18	20
Most of the time	44	49
About half of the time	25	28
Very seldom	3	3
Level of importance to limit fluid intake		
Highly important	39	43
Very important	50	56
Moderate important	1	1
Why it's important to follow fluid restriction		
Kidney condition requires so	49	54
To keep my body healthy	41	46
Any difficulties with fluid intake		
Yes	57	63
No	33	37
How much difficulty with fluid intake		

No difficulty	33	34
Little difficulty	41	47
Moderate difficulty	16	19
Number of times of weighing at home		
Two times	2	2
Once	3	3
None of the times	85	95
Level of importance to weigh at home		
Very important	8	9
Moderate important	26	29
Little important	22	24
Not important	34	38
Weight gain or loss		
Weight gain	54	60
Weight loss	15	17
No weight gain or loss	21	23

On the level of importance to follow fluid restriction, 39 (43%) revealed as highly important, more than half, [50 (56%)] said it was very important and 1 (1%) felt it was moderately important. Concerning the reason for importance of following fluid restriction, 49 (54%) said that their kidney condition requires them to take required fluid and 41 (46%) said that taking required fluids keeps their body healthy. On experiencing difficulties with fluid restrictions, the majority, [57 (63%)] experienced difficulties and 33 (37%) verbalized no difficulties. Of those who experienced difficulties, 41 (47%) experienced little difficulties and 16 (19%) experienced moderate difficulties. Difficulties experienced with fluid restriction included thirst as a result of hot weather and high temperatures in the study area. Also inability to control fluid intake was cited as a difficulty by the participants. Concerning the number of times weighing at home, Most, [85 (94%)] verbalized none of the times, 3 (3%) once and 2 (2%) two times. With regards to level of importance of daily weighing, 8 (9%) believed as very important, 26(29%) said it was moderately important, 22 (24%) said it was little important and 34 (38%) believed it was not important. Concerning weight of the participants on review, the majority, [54 (60%)] had weight gain, 15 (17%) had weight loss and 21 (23%) had neither weight loss nor weight gain.

Engagement with fluid restriction scores among CKD participants

Engagement with fluid restriction scores was measured on a scoring system using Likert scale. The minimum possible total score for engagement with fluid restriction was ten and the maximum possible score, signifying perfect engagement with fluid restriction was 44. Dividing the attained score on this section by the maximum possible attainable score (44) and multiplying by a hundred to come up with a percentage

calculated engagement with fluid restriction. Engagement with fluid restriction of 90% to 100 % was classified as high, 80% to 89% as moderate and of below 80% was considered low.

As shown on **Table 3**, engagement with fluid restriction scores among CKD participants ranged from 20 (46%) to 38 (86%) out of total possible score of 44 (100%) and the mean score was 28 (63%). Although 40% scored above the mean score, none of the participants achieved high levels of engagement to fluid restriction. There were 10 (11.0%) with moderate levels and the majority, [80 (89%)] low levels of engagement with fluid restriction.

Table 3 Engagement with fluid restriction scores for CKD out of 44 (N= 90).

Engagement score out of 44	Engagement score in percentage (%)	Frequency (n)	Percentage Frequency
Twenty	46	4	4
Twenty one	48	8	9
Twenty two	50	3	3
Twenty three	52	6	7
Twenty four	55	13	14
Twenty five	57	7	8
Twenty six	59	6	7
Twenty seven	61	7	8
Twenty eight	64	4	4
Twenty nine	66	1	1
Thirty	68	5	6
Thirty one	70	4	4
Thirty two	73	5	6
Thirty three	75	4	6
Thirty four	77	3	3
Thirty five	80	3	3
Thirty six	82	4	4
Thirty seven	84	2	2
Thirty eight	86	1	1

Engagement with dietary restrictions among CKD patients

Table 4 shows results for engagement with dietary restriction among CKD participants. Concerning health education by health professional on the importance of diet restriction, 1 (1%) had health education the previous week, the majority, [82 (91.0%)] on monthly basis, 7 (8%) more than a month ago. All 90 (100%) had knowledge of the expected renal diet. On the level of importance to follow diet restriction, 42 (47%) revealed as highly important, 45 (50%) said it was very important and 3 (3%) believed it was moderately

important. Concerning the reason for importance of following diet restriction, more than half, [48 (53%)] said that their kidney condition requires them to take required diet, 39 (43%) said that taking required diet keeps their body healthy and 3 (3%) revealed that they are taking required diet because a medical practitioner told them to do so.

Table 4 Engagement with dietary restriction for CKD participants (n=90).

Variable	Frequency (n)	Percentage (%)
Health education on diet		
Last week	1	1
One month ago	82	91
More than a month ago	7	8
Expected diet		
Renal diet	90	100
Level of importance to diet intake		
Highly important	42	47
Very important	45	50
Moderate important	3	3.3
Why it's important to follow fluid restriction		
Kidney condition requires so	48	53
To keep my body healthy	39	44
Medical practitioner told me to do so	3	3
Any difficulties with diet intake		
Yes	43	48
No	47	52
How much difficulty with diet intake		
Not difficulty	47	52
Little difficulty	32	36
Moderate difficulty	11	12
How often have you followed diet		
All the time	29	32
Most of the time	47	52
About half of the time	14	16

On experiencing difficulties with diet restrictions, 43 (48%) experienced difficulties and 47 (52%) verbalised no difficulties. Of those who experienced difficulties with diet restrictions, 32 (36%) experienced little difficulties and 11 (12%) experienced moderate difficulties. Difficulties experienced included loss of appetite, nausea, vomiting and lack of funds to buy the required diet. Concerning following daily diet restriction, 29 (32%) followed all the time, more than half, [47 (52%)] most of the time and 14 (16%) about half of the time. Most participants did not follow dietary restrictions all the time

because they could not afford the prescribed diet and some of them were not willing to avoid certain recommended foods and control what they eat.

Engagement with dietary restriction scores among CKD participants

Engagement with dietary restriction scores was measured on a scoring system using Likert scale of the interview scheduled guide. The minimum possible total score for engagement with dietary restriction was seven and the maximum possible score, signifying perfect engagement with dietary restriction was 28. Dividing the attained score on this section by the maximum possible attainable score (28) and multiplying by a hundred to come up with a percentage calculated engagement with dietary restriction. Engagement with dietary restriction of 90% to 100 % was classified as high, 80% to 89% as moderate and of below 80% was considered low.

As shown on **Table 5**, total engagement with dietary restriction scores among CKD participants ranged from 18 (64%) to 26 (93%) out of total possible score of 28(100%) and the mean score was 23 (82%). Over half [52 (58%)] of the participants scored above the mean. However, 14 (16%) of the participants achieved high levels of engagement and equal numbers, [38 (42%)] had moderate and low levels of engagement with diet restriction.

Table 5 Engagement with dietary restriction scores for CKD participants out of 28 (N= 90).

Engagement score out of 28	Engagement score in percentage (%)	Frequency (n)	Percentage frequency
Eighteen	64	5	6
Nineteen	68	4	4
Twenty	71	5	6
Twenty one	75	12	13
Twenty two	79	12	13
Twenty three	82	9	10
Twenty four	86	17	19
Twenty- five	89	12	13
Twenty six	93	14	16

Associations between biographical characteristics and engagement with dietary and fluid restriction

Engagement with dietary restriction was significantly associated with monthly income (Chi square value=25.916, df=74, p<0.027) and educational level (Chi square value=28 219, df=74, p<0.013). Engagement with fluid restriction was not associated with any biographical characteristics. CKD

participants showed better engagement with dietary compared to fluid restriction.

Discussion

Biographical characteristics

Concerning age, the study showed that age ranged from 21 years to 61 years with the mean age of 45.6 years. The findings are partly supported by Venkateswararao et al. where the mean age of CKD participants was 46.7 years [17]. Overall, the results revealed that CKD is affecting a wide range of patients in terms of age groups in South African population. The sample comprised of more males [53 (58.89%)] than females [37 (41.11%)]. In South African population, studies have shown that more males suffer from risk factors for CKD hence more of them with the disease [4]. Highest 37 (62%) and lowest 4 (6%) number of CKD participants were found in grade 10-12 and tertiary education respectively. There was a significant association between educational level (Chi square value=28.219, df=74, $p < 0.013$ and engagement with dietary restriction. Low education has been found to have poor correlation with knowledge of disease and treatment [18]. Most, [66 (73.33%)] were unemployed and received less than R3000 as they were on government medical grant. Generally, there was low socioeconomic status in the study sample. The results reinforce the study by Assounga where majority of the CKD patients were unemployed [4]. There was a significant association between monthly income (Chi square value=25.916, df=74, $p < 0.027$) and engagement with dietary restriction. In this study, the source of source of income for the unemployed was from medical grant which government give to chronic CKD patients on monthly basis to aid in expenses related to CKD. However, the medical grant is minimal and this affected engagement with dietary restriction among CKD patients.

Engagement with fluid restriction

Engagement with fluid restriction scores among CKD participants ranged from 46% to 86% out of a total possible score of 100% and the mean score was 63%. Although 40% scored above the mean score, none of the participants achieved high levels of engagement with fluid restriction. There were 11% with moderate levels and the majority, (89%) had low levels of engagement with fluid restriction. Adherence to fluid restrictions is considered the most difficult to accomplish [9] as evidenced by none of the patients achieving higher scores of engagement in this study. The study results are also reinforced by Chan et al. where low rates of adherence have been observed [8]. Drinking considerably more fluid than recommended is known in many CKD patients. Fluid retention and associated fluid surplus is a major clinical problem in individuals with CKD [11] as shown by the study findings.

With regards to expected fluid intake per day, most (73%) had over 600mls per day. The expected fluid intake in this study was 500mls to 600 mls in addition to the volume of daily

urine output. Based on evidence and best practice, the CKD patient is advised a daily fluid allowance of 500 ml plus the volume equal to daily urine output [9] and all the participants were aware of the expected daily intake. Although patients were aware of the need to follow fluid restriction, this created an uncomfortable state of ambivalence regarding drinking [9]. As a result, CKD patients drank more than the expected per day as revealed by findings of this study.

Concerning following daily fluid restriction, 80% did not follow it all the time and the majority, (63%) experienced difficulties. These results are confirmed by the findings by Venkateswararao et al. where they revealed CKD patients experiencing difficulties with fluid restrictions [17]. Difficulties experienced with fluid restriction included thirst as a result of hot weather and high temperatures in the study area. Also inability to control fluid intake was cited as a difficulty by the participants. These results are affirmed by the study done by Venkateswara et al. where most commonly reported reason for non-adherence to fluid restriction was inability to control their desire for fluid followed by seasonal variation and wrong perception of the patient that dialysis will help in the removal of total fluid consumed [17]. Although Lindberg indicated that the season of the year may affect fluid consumption [9], winter season was highlighted with higher intake of fluid than in summer. This is in contrast with the study results where higher intake of fluid was reported in summer.

Concerning the weight of the participants on review, the majority (60%) had excessive weight gain meaning their weight was more than 3.5% of dry body weight on assessment as operationalised in the study. These results are supported by Lindberg and Charra where they revealed that associated fluid surplus is a major clinical problem in individuals with CKD [9,11]. Removal and control of excess fluid is the cornerstone of volume management in CKD patients [10]. Dietary sodium intake and other treatment-related use of sodium have a negative impact on fluid overload. A more frequent dialysis would reduce the fluid overload but with effective patient engagement with fluid restriction. Although effective fluid management in CKD population encompasses dialysis adequacy, medication and dietary restriction, it is the most difficult to achieve in CKD patients as confirmed by previous studies [9]. The results of this study confirm the findings in literature as they revealed least scores of engagement with fluid restriction.

Engagement with dietary restriction

Total engagement with diet restriction scores among CKD participants ranged from 18 (64%) to 26 (93%) out of total possible score of 28 (100%) and the mean score was 23 (82%). Over half [52 (58%)] of the participants scored above the mean. However, 14 (16%) of the participants achieved high levels of engagement and equal numbers, [38 (42%)] had moderate and low levels of engagement with diet restriction. These results reflect significant problems of engagement with dietary restrictions among CKD patients. This is further supported by findings in literature [8] where non adherence to diet ranges from 2% to 81.4%. All 90 (100%) had knowledge of

the expected renal diet. The results of the study are reinforced with findings by Shailendranath et al. where they found adequate knowledge among CKD patients regarding protein rich, sodium rich, potassium rich and fluid contributing food sources [18,19]. Nevertheless, people with good basic literacy and numeracy skills may struggle to understand and interpret health information in a way that prompts them to act appropriately to protect or enhance their health [20]. Although there was adequate knowledge about renal diet in CKD patients, level of engagement with this management modality was low in this study. On experiencing difficulties with diet restrictions, 43 (48%) experienced difficulties such as loss of appetite, nausea, vomiting, inability to control what they eat and lack of funds to buy the required diet. Additionally, more than half, 68% did not follow all the time because they could not afford the prescribed diet and some of them were not willing avoid certain recommended foods and control what they eat. These results are reinforced by the studies done by Sayed et al. where 50% of CKD patients reported having difficulties in following dietary restrictions all the time [21-23]. In this study, these side effects limited engagement of CKD patients with their dietary restrictions. Socio economic status was also cited to have a great influence on following dietary restrictions as most patients verbalised that they cannot afford it. As a result, there was limited engagement with dietary restrictions among CKD participants due to low socioeconomic status.

Dietary restriction in CKD forms part of the management of the condition and its goal is to minimize uremic and anaemia symptoms, reduce the incidence of fluid, electrolyte and acid base imbalances, decrease patient's vulnerability to infections and limit catabolism [13]. Low level of patient engagement with diet has been revealed by the study results. Yet diet plays a pivotal role in the effective management of CKD as it lowers morbidity, improve survival and clinical outcomes [5].

Conclusion

Engagement with fluid and dietary restriction remains a major problem among CKD population. If the situation is not addressed, the positive effects of CKD management will not be realized. More and more patients will continue to deteriorate and even require more aggressive therapies which are costly on the health care system. Controlling, minimizing and managing negative effects of CKD is the primary goal.

In this view, education should focus more on promotive aspects of engagement with fluid and dietary restriction to improve quality of life among CKD patients. Promoting will prolong life as well as increase chances of getting a kidney transplant among CKD patients. The study results have revealed unaffordability of renal diet due to low socioeconomic status. Therefore, engagement of nongovernmental organizations to introduce mobile kitchens with renal diet is crucial to enable CKD patients to get the required diet. Engaging CKD patients with their fluid and dietary restrictions will consequently facilitate highest positive adherent behaviors among this population.

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