Original article

Assessing the Effects of Water Quality and Intake on Chronic Kidney Disease Progression in Western Libya

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Abstract
Chronic kidney disease (CKD) has become a worldwide health problem driven by both identified and obscure causes. Besides the well-known causes of CKD, such as uncontrolled diabetes and hypertension, the quality of drinking water, particularly the hardness level, has been suggested by researchers as one of the causes of CKD. Monitoring and improving drinking water quality and quantity for CKD patients could delay the progression of kidney impairment. This cross-sectional study aims to evaluate the impact of water quality and quantity on the progression of CKD by analyzing biochemical parameters, serum electrolytes, and estimated glomerular filtration rate (e-GFR) in CKD patients. The study includes 106 CKD patients, comprising 50.9% males and 49.1% females. Among the study participants, over 40% were aged above 60 years. The majority (71.7%) consumed Reverse Osmosis (RO) water, while 28.3% drank well water. Regarding water intake, 52.8% of participants consumed one to two liters daily. Most participants (68%) had stage 4 CKD based on e-GFR. Urea and creatinine levels were elevated in both water source groups, though without statistical significance. However, significant differences were observed in serum electrolytes, with higher sodium (p=0.027), phosphate (p=0.025), and potassium (p=0.001) levels in the well water group. Additionally, e-GFR levels are significantly associated with water sources and water intake (chi-square = 0.041 and chi-square = 0.039, respectively). The study revealed that CKD patients consuming RO water and maintaining a moderate daily water intake (1–2 liters) exhibited better kidney function than those drinking well water or consuming significantly higher or lower amounts of water. These findings highlight the importance of both water quality and adequate intake in the clinical management of CKD patients.
Keywords: Chronic Kidney Disease, Water Quality, Reverse Osmosis Water, Serum Electrolytes, e-GFR.

Introduction

Chronic kidney disease (CKD) has become as a worldwide health problem driven by both identified and unidentified causes [1]. a significant rise in a non-traditional type of CKD known as chronic kidney disease of “unknown etiology” (CKDu) that is not referred to uncontrolled diabetes and hypertension has been reported in rural lowland farming communities [2]. Quality of drinking water particularly hardness level, has been suggested by researchers as one of causes of CKD [3]. Because the quality of drinking water is crucial for maintaining human health, The WHO and other national organizations have set the standards of drinking water quality that determine the acceptable chemical, microbial and radiological properties to ensure water safety [4]. Ensuring access to safe and healthy drinking water is critical issue that constitute a major challenge for public health system globally [5,6]. Recently, the chemical properties of drinking water have significantly deteriorated due to the presence of trace amounts of toxic materials, which can lead to serious health risks [7]. Human health and productivity of life stock are affected by the physical, Chemical, and microbiological properties of water [8]. Association between high groundwater hardness and the incidence of CKDu has been frequently observed [9-12]. Groundwater is becoming increasingly contaminated, and wells are typically considered the most vulnerable source in terms of physiochemical pollution. This is because the absence of solid concrete base and improper surrounding drainage system [13]. The primary water source in Libya is groundwater, which represents for more than 98% of the total water consumption [14]. Abdou et al., 2016 stated that poor quality of drinking water in Tripoli, Zawia, and Zliten districts in Libya [15]. Recently, waterborne disease is becoming concern, People prefer to use bottled water instead of tap water [16].

The main goal of drinking water supply is human health protection by providing access to sufficient quantity to safe water [17]. Insufficient water intake during farming activities and dehydration from direct sun exposure may have resulted in kidney failure [3]. Previous studies have indicated the sufficient water intake is essential for healthy kidney function, and dehydration can aggravate kidney disease [18]. Dehydration is generally seen a short-term, reversible condition linked to acute renal disease and does not cause chronic kidney disease [19]. Chronic kidney disease on the other hand, is associated with chronic dehydration particularly in farming societies where prolonged exposure to heat is common [20]. In recent years, researchers have found that chronic dehydration due to heat stress is likely a risk factor in a baffling epidemic CKD in Central America [21,22]. The effect of water supply on renal function among general population and renal patients have been evaluated by earlier studies [10,11]. on the other hand, a prospective cohort study conducted in Australia demonstrated no major correlation of daily water consumption and incidence of CKD [23].

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In this study, we investigate the potential impact of different drinking water sources on kidney function among CKD patients. Also, we analyze additional variables such as daily water consumption and Glomerular Filtration Rate (GFR) levels and its progress in CKD Patients.

Methods

Study Design and patients

This cross-sectional study was conducted at Zawia Kidney Hospital and Zawia Medical Reference laboratory, Zawia city, Libya from February 1st 2024 to May 31st 2024. A total of 106 CKD patients were included in this study. The population was divided into two groups according to the type of water they drink: 76 patients were consuming Reverse Osmosis water (RO) and 30 patients were drinking well water. The participants in this study were in the age range of 15 to 85 years. Patients in current study were classified into five age groups for the purpose of comparison.

Data collection

Data were collected through a standard interview questionnaire during face-to-face meetings with the study population. The survey included the demographic and clinical data necessary for the study, as well as drinking water sources and daily water intake. Five milliliters of blood samples were collected from all CKD patients participated in this study for serum separation in clean dried tub without anticoagulant then centrifuged at 2000 rpm for 15 minutes. The clear non-hemolysis supernatant serum was used for serum biochemistry analysis kidney function test: urea and creatinine, and lipid profile: cholesterol and triglyceride using an automatic Hitachi chemistry analyzer of biochemical parameters and EasyLyte PLUS REF 2121 ANALYZER for electrolytes: Na, K, Ph, Cl. Also, e-GFR was calculated for all subjects in the current study to evaluate the progression of CKD.

Ethical approval

The ethical approval was taken from Zawia kidneys Hospital and Zawia reference laboratory for collecting and processing of data from the medical laboratory units.

Statistical analysis

Statistical analysis was assessed by using SPSS software version 25.0 (IBM SPSS, NY. USA). Continuous variables were expressed as Means + SEM. The level of statistical significance was taken as $P < 0.01$ & $P < 0.05$. Heterogeneity chi-square test was used to compare categorical variables.

Results

This cross-sectional study was conducted at Zawia Kidneys Hospital and Zawia Medical Reference laboratory, Zawia city, Libya from February 1st 2024 to May 31st 2024. A total of 106 people, 54 males represent 50.9% of the participants and 52 females be regarded as 49.1% of participants as showed in table 1.

***Table 1* Gender Distribution**

Gender	Frequency	Percentage (%)
Male	54	50.9
Female	52	49.1%
Total	106	100

All the subjects in this study were chronic kidney disease patients. Table 2 shows the mean age of the participants which was 53.05 years, with a standard deviation of 23.5 years and the mean weight of the participants was 74.5 kg, with a standard deviation of 28.06 kg.

Table 2. Mean and standard deviation of age and weight

Variables	Mean	SD±
Age	53.05	23.5
Weight	74.5	28.06

Table 3 illustrates the distribution of age groups among the population of the current study. The majority of the participants (41.5%) are in the age group above 60 years old, with a significant proportion (22.6%) being in the age group between 51 and 60 years old. The younger age groups (less than 30 and 30-40 years) are underrepresented, with only 20 subjects (18.9%) and 4 (3.8%) participants, respectively. The greater part of participants (71.7%) uses reverse osmosis water as their primary drinking water source and a significant proportion of participants (28.3%) use well water as represented in table 4.

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Table 3. Distribution of age groups

Age (years)	Frequency (n)	Percent (%)
Less than 30	20	18.9
30 to 40	4	3.8
41 to 50	14	13.2
51 to 60	24	22.6
>60	44	41.5

Tab 4. Distribution of sample among water source

Water source	Frequency	Percentage
Reverse Osmosis Water	76	71.7%
Well water	30	28.3%

Table 5 represents the distribution of water intake among the study subjects per day. The majority of study subjects (52.8%) consume between 1 to 2 liters of water per day. In the same context, a significant proportion of patients (26.4%) consume less than 1 liter of water per day, while a minor fraction (20.8%) consumes more than 2 liters of water per day. The bulk of participants 68%, have moderate to severe e-GFR loss, indicating significant impairment in kidney function, while a significant proportion of the population of patients in this study, 20.8%, are experiencing normal e-GFR levels. The remaining participants are distributed across mild loss and mild to moderate loss stages of e-GFR levels, as shown in Table 6.

Table 5. Distribution of sample among water intake per day

Water Intake Per day	Frequency	Percent
Less than 1 liter	28	26.4%
1 to 2 liters	56	52.8%
More than 2 liters	22	20.8%

Table 6. Prevalence of e-GFR level in the sample

e-GFR Level	Frequency (n)	Percentage (%)
Normal	22	20.8%
Mild loss	4	3.8%
Mild to moderate loss	8	7.5%
Moderate to severe loss	72	68%

The mean value of urea was higher in males than in females, 81.8 ±50 and 68.6 ± 42.7, respectively. In both genders, the mean value of urea was higher than the normal range. Likewise, the mean value of sodium and phosphate was higher in males than in females (139 SD±3.1, 140 SD±4.4 and 5 SD±1.3, 4.4 SD±1.08), respectively. On the other hand, the mean values of Creatinine and calcium levels were higher in females than in males (3.8 SD±3.09, 2.02 SD±2.9, 10.1 SD±11.09, and 8.2 SD±1.5) respectively. In the same context, the mean values of potassium, triglyceride, and cholesterol were almost equal in males and females. In addition to that, the mean values of HbA1c in males were higher than in females (6.9 SD±1.5 and 6.3 SD±1.2). The analysis reveals that there are no statistically significant differences in the mean values of the biochemical parameters mentioned between female and male participants (all p-values > 0.05) as shown in Table 7

Table 7. Comparison of the significance differences in mean values of kidney function parameters, cholesterol, triglyceride, FBS, HbA1c, and electrolytes among CKD patients in both genders

Variables	Male	Female	p-value
	Mean ± SD	Mean ± SD	
Urea mg/dl	81.8 ± 50	68.6± 42.7	0.31
Creatinine mg/dl	2.9 ± 2.02	3.09 ± 3.8	0.83
NA mEq/l	140.6 ± 4.4	139 ± 3.1	0.14
K mEq/l	4.8 ± 1	4.7 ± 1.02	0.79
CA mg/dl	8.2 ± 1.5	10.1 ± 11.09	0.37
Ph mg/dl	5 ± 1.3	4.4 ± 1.08	0.12
TGR mg/dl	140.3 ± 60.4	140.1 ± 53.7	0.99
Cholesterol mg/dl	164.7 ± 57.4	163.5 ± 41.7	0.93
HbA1c %	6.9 ± 1.5	6.3 ± 1.2	0.13

Accordant with the data revealed in table 8, which represents the distribution of the age groups according to levels of e-GFR, the majority of participants (41.5%) are over 60 years' old each of which (30.2%) were in

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fourth stage (moderate to severe loss stage) as their e-GFR indicates. The prevalence of severe e-GFR loss and kidney failure increases with age, with the highest rates observed in the over-60 age group. The younger age groups (less than 30 and 30-40 years) (18.9% and 3.8%), respectively, have a higher proportion of normal e-GFR levels compared to the older age groups.

Table 8. Distribution of age groups according to level of e-GFR

e-GFR level stages Age group		Normal	Mild loss	Mild to Moderate loss	Moderate to Severe loss	Total
Less than 30	count	10	0	0	10	20
	% of total	9.4%	.0%	.0%	9.5%	18.9%
30 to 40	count	0	0	2	2	4
	% of total	.0%	.0%	1.9%	1.9%	3.8%
41 to 50	count	0	0	0	14	14
	% of total	.0%	.0%	0%	13.2%	13.2%
51 to 60	count	8	2	0	14	24
	% of total	7.5%	1.9%	.0%	13.3%	22.6%
>60	count	4	2	6	32	44
	% of total	3.8%	1.9%	5.7%	30.2%	41.5%
Total	count	22	4	8	72	106
	% of total	20.8%	3.8%	7.5%	68%	100.0%

All of the participants in the age group of 41-50 were in the fourth e-GFR stage represents 13.2% of the total studied sample. Conversely, the 51-60 age group has a more even distribution of e-GFR levels, representing 22.6% of the entire sample that was studied, with participants experiencing various stages of kidney function impairment. The effect of drinking water sources on kidney function parameters, electrolytes, cholesterol, triglyceride (TAG), HbA1c, and e-GFR is presented in Table 9. The mean values of urea levels are higher than normal and similar across both drinking water source groups, including the reverse osmosis water (RO) consumers and well water consumers, 74.6 mg/dl, 77.3mg/dl, respectively.

Creatinine mean value levels were also higher than normal and varied across the RO drinking water consumers and well drinking water consumers, with 2.9 mg/dl, 3.2 mg/dl, respectively. For electrolytes; sodium, potassium, calcium, and phosphate mean values levels among RO water and well water was 139.1mg/dl and 141.7 mg/dl, and 4.48 mmol/l, 5.45 mmol/dl and 9.45mg/dl, 8.54mg/dl and 4.4mg/dl and 5.3mg/dl, respectively. The mean value of sodium was higher than normal in both RO water and well water. However, the mean values of potassium and phosphate were higher than the normal range in well water consumers, while the calcium mean value level was at the lower end of the normal range in well water drinkers. Since more than half of the study population was diabetic, HbA1c mean values were higher than normal, at 6.5 and 7.2, among the RO water drinkers and well water drinkers, respectively. The mean values of e-GFR among the studied groups of drinking water consumers, RO water, and well water drinkers were 50.5 and 41.9, respectively. There are no statistically significant differences in urea, creatinine, calcium, triglyceride, cholesterol, HbA1c, and e-GFR levels among the water source groups (p-value= 0.76, p-value= 0.92, p-value = 0.70, p-value= 0.64, p-value= 0.36, and p-value= 0.38, respectively). Conversely, a statistically significant difference appears in sodium, potassium, and phosphate levels in the company of the water source groups (p-value=0.027, p-value=0.001, and p-value=0.025, respectively).

Table 9. The effect of water source on kidney function parameters.

Variables	Osmotic water	Well water	P- Value
	Mean	Mean	
Urea. mg/dl	74.6	77.3	0.76
Creatinine. mg/dl	2.9	3.2	0.92
Na. mEq/l	139.1	141.7	0.027
K. mmol/l	4.48	5.45	0.001
Ca. mg/dl	9.45	8.54	0.70
Ph. mg/dl	4.4	5.3	0.025
TGR. mg/dl	138	146.2	0.64
Cho. mg/dl	162.5	168.2	0.36
HbA1c %	6.5	7.14	0.38

Table 10 shows the relationship between the measurement of kidney function through e-GFR levels and the drinking water source. The largest number of the study sample population was patients drinking RO water in the fourth stage of impaired kidneys, with 48 subjects, followed by 24 subjects in the same stage drinking well water. Also, 18 of 22 patients in the first stage of impaired kidney function drank RO water, and only 4 patients out of 22 in the same e-GFR stage drank well water. The chi-square test result of 0.041 indicates a

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statistically significant association between e-GFR levels and the water source used by the participants (p-value < 0.05).

Table 10. Relationship between e-GFR levels and the water source

e-GFR	Osmotic water (n)	Well water (n)	Total (n)
Normal	18	4	22
Mild loss	4	0	4
Moderate loss	6	2	8
Moderate/severe loss	48	24	72
Total	76	30	106
Chi-square /significance	0.041		

Table 11 represents the association between e-GFR levels and water intake among patients. The results showed that there is a significant correlation between e-GFR levels and water intake (Chi square = 0.039, p < 0.05). The data revealed that patients with normal e-GFR levels tend to have a higher water intake, with 8 out of 26 patients consuming more than 2 liters of water per day. On the other hand, patients with severe e-GFR loss tend to have a lower water intake, with 14 out of 42 patients consuming less than 1 liter of water per day. While 20 patients out of 42 patients were drinking 1 to 2 liters per day.

Table 11. Relationship between e-GFR levels (a measure of kidney function) and the water intake (Chi square test)

e-GFR levels	Water intake per day (in Liters)			Total
	Less than 1 L (n)	1 to 2 L (n)	More than 2 L (n)	
Normal	4	14	8	26
Mild loss	2	10	0	12
Moderate loss	8	12	6	26
Moderate/severe loss	14	20	8	42
Total	28	56	22	106
Chi square/significance	0.039			

Discussion

The present study investigated the possible contribution of drinking water quality to the progression of chronic kidney disease in CKD patients. The distribution of gender among patients with kidney dysfunction was analyzed. The results showed that there is a nearly equal distribution of males and females among the study population, with 50.9% of the patients being males and 49.1% being females. This result is consistent with a Chinese cross-sectional study that revealed the equivalent CKD incidence among men and women [24]. On the other hand, several previous studies have presented conflicting results on this matter. For example, a French epidemiologic study demonstrated that the prevalence of chronic renal failure was higher in men [25]. However, the US Renal Data System reported that the occurrence of kidney failure between the years 2007 and 2012 was more common in women than men [26]. These opposing data might be attributed to geographic differences in how gender affects the prevalence of CKD [27].

Also, the current study examined the demographic characteristics of patients with kidney dysfunction. The results showed that the mean age of the patients was 53.05 years, with a standard deviation of ±23.5 years. This suggests that the patients in our study were relatively old, with a significant range of ages represented. As the majority of patients with kidney dysfunction were older than 60 years (41.5%), followed by those between 51-60 years (22.6%). These findings are in agreement with previous studies that have shown that the risk of kidney disease rises with age [28, 29]. A study by the National Kidney Foundation found that the incidence of kidney disease rises significantly after the age of 60 [28]. These findings emphasize the importance of implementing targeted interventions to prevent and treat kidney disease in older adults.

This study found that the majority of patients with kidney dysfunction (71.7%) used drinking RO water as their primary water source, while the well water drinkers were 28.3%. This finding is important because water quality can impact kidney function, with some water sources containing pollutants that can exacerbate the progression of kidney disease. Previous studies have shown that RO water can serve as a secure source of water for patients with kidney disease [29].

In terms of water intake per day, the current study found that the majority of patients with kidney dysfunction (52.8%) consumed between 1-2 liters of water per day, while 26.4% consumed less than 1 liter and 20.8% consumed more than 2 liters. This observation is noteworthy because adequate water intake is crucial for maintaining kidney function, and inadequate water intake has a bad impact on kidney health and can exacerbate kidney disease. Previous studies have revealed that increasing water intake can be beneficial to decrease the progression of kidney disease [30]. However, the optimal water intake for CKD patients is still unknown and further research is needed on these issues.

The majority of patients with kidney dysfunction in the current study (68%) had moderate to severe e-GFR loss (fourth stage), followed by normal e-GFR stage with (20.8%), mild to moderate loss e-GFR stage (7.5%),

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and mild loss GFR stage (3.8%). This finding is alarming, as severe e-GFR decline is a strong indicator of kidney disease progression and mortality [28].

The current study compared biochemical parameters between female and male patients with kidney dysfunction. The results showed that there were no statistically significant differences between females and males in terms of urea, creatinine, sodium, potassium, calcium, phosphorus, triglyceride, cholesterol, and hemoglobin A1c (HbA1c) levels as p-values were ≥ 0.05 for all tested parameters. However, there was a trend towards higher calcium levels in females compared to males (10.1SD±11.09, and 8.2 SD± 1.5). In addition, urea mean values were higher in males compared to females (81.8 SD±50, and 68.6 SD±42.7) and both values were higher than normal. These findings suggest that laboratory parameters are nearly similar between female and male patients with kidney dysfunction, and that gender-specific differences may not play a significant role in the management of kidney disease. These results were coherent with previous study that revealed the difference in electrolytes levels between gender were not statistically significant [31].

Biochemical laboratory parameters among patients with kidney dysfunction patients drinking well water, and RO water were compared in this study. This study revealed that there were no statistically significant in urea and creatinine concentration among two groups. However, both of urea and creatinine were more than normal in both groups.

The results showed that there were significant differences in sodium levels (p=0.027). Although it was normal in both groups. Sodium level was higher in patients using well water compared to patients using RO water. Additionally, there was a significant difference in phosphate levels (p=0.025) and potassium levels (p=0.001) among the two groups, with patients using well water having higher potassium and phosphate levels compared to those using osmotic water. Potassium and phosphate concentrations were above the normal range. It has been established that CKD is linked to significant alterations in electrolyte handling [32]. A previous study stated that renal patients often have abnormal levels of serum potassium. Therefore, inadequate dietary potassium intake is a concern for patients with kidney disease [33]. Recently, the 2020 Kidney Disease Improving Global Outcome (KDIGO) Controversies Conference issued that the link between dietary intake and serum potassium levels is not significant in CKD, there for restricting dietary potassium is not required in renal patients [34]. Another study concluded that the effect of dietary potassium on the progression of CKD remains uncertain [32]. In non-dialysis-CKD patients, a tight association between serum phosphate levels and CKD progression [35]. Experimental studies have demonstrated that a high phosphorus diet results in a decrease in glomerular filtration rate and raises the mortality rate [36, 37]. Our study adds to the existing literature by highlighting the importance of considering water source in the management of kidney disease and suggests that patients using well water may be at higher risk of electrolyte imbalances.

This study examined the association between water source and e-GFR levels among patients with kidney dysfunction. The results showed that there was a significant association between water source and e-GFR levels (chi-square =0.041. Specifically, 48 out of 76 patients are in the fourth stage of e-GFR drinking RO water, regarded is 63% of the osmotic water consumers group, in meantime 24 out of 30 patients in the same e-GFR stage are drinking well water, representing about 80% of the well water consumers group. These findings suggest that the water source may play a role in kidney function and disease progression. RO water, in particular, may be associated with better kidney function compared to well water. This is consistent with previous studies that have shown that RO water is linked to better kidney function and slower advancement of the disease [28, 29], and switching to RO water has yielded positive outcomes and decreased the progression of CKD [38]. Furthermore, another previous study has established a strong link between well water consumption and kidney function decline [39].

The current study highlights the importance of considering water source in the management of kidney disease and suggests that RO water may be a preferred option for patients with kidney dysfunction. Meanwhile, this study examined the association between water intake per day and e-GFR levels among patients with kidney dysfunction. The results showed that there was a significant association between water intake and e-GFR levels (Chi square = 0.039, $p < 0.05$). Specifically, patients who consumed 1-2 liters of water per day had higher e-GFR levels compared to those who consumed less than 1 liter or more than 2 liters per day. In fact, 24 patients out of 38 who consumed 1-2 liters of water per day had normal or mild e-GFR loss, compared to 6 out of 38 patients who consumed less than 1 liter and 8 out of 38 patients who consumed more than 2 liters. On the other hand, patients with severe e-GFR loss tend to have a lower water intake, with 14 out of 42 patients consuming less than 1 liter of water per day. These findings indicate that moderate water intake may be linked to kidney function compared to both low and high water intake. Many evidences indicate that high water intake may benefit the kidneys [40-42]. In addition, two Australian cross-sectional studies demonstrated that there is a negative correlation between fluid intake and the incidence of CKD [43]. However, it has been established that both low and high-water intake might not be advantageous for individuals with chronic kidney disease, and high risk was noted for patients who consume the lowest and highest amounts of water [44].

Previous studies among CKD patients revealed that poor kidney outcomes are associated with lower water intake [45,46]. While others showed worse kidney consequences with higher water intake [47,28]. A prospective cohort study conducted on patients with moderate and severe stages of chronic kidney disease

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observed that higher water consumption may not be useful for patients with moderate or severe CKD [44]. Although the National Kidney Foundation sets adequate levels for total water intake per day at 3 L for men and 2.2 L for women with CKD, French health authorities suggest 1.5 L, to be regulated according to thirst and excretion [29]. Also, Sandra Wagner et al. (2022) concluded that 1 to 2 L/day is the ideal range of water intake for CKD patients [44]. All the above previous studies are in line with our study, which emphasizes the importance of encouraging moderate water intake as a possible approach for slowing kidney disease progression.

Conclusion

This study has demonstrated a significant association between the source of drinking water and kidney function in chronic kidney disease patients. These findings revealed that patients who consume RO water tend to have better kidney function, as indicated by higher e-GFR levels, compared to those who consume well water. This suggests that RO water may have a protective effect on kidney health, potentially due to its lower content of harmful contaminants. Moreover, the study highlighted the importance of adequate water intake in maintaining kidney function. Patients who consumed moderate amounts of water (1-2 liters per day) showed improved kidney function, emphasizing the role of both water quality and quantity in managing kidney disease are crucial. Further research is necessary to explore the underlying mechanisms by which different water sources affect kidney health and to develop comprehensive guidelines for optimal water consumption in this patient population.

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Conflicts of Interest

The authors declared no conflicts of interest.

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الملخص

أصبح مرض الكلى المزمن مشكلة صحية عالمية مدفوعة بأسباب معروفة وأخرى غامضة. إلى جانب الأسباب المعروفة لمرض الكلى المزمن، مثل داء السكري غير المنضبط وارتفاع ضغط الدم، اقترح الباحثون جودة مياه الشرب، وخاصة مستوى عسرها، كأحد أسباب مرض الكلى المزمن. يمكن أن يؤدي مراقبة وتحسين جودة مياه الشرب وكميتها لمرضى مرض الكلى المزمن إلى تأخير تطور ضعف الكلى. تهدف هذه الدراسة المقطعية إلى تقييم تأثير جودة المياه وكميتها على تطور مرض الكلى المزمن من خلال تحليل المعايير الكيميائية الحيوية، وشوارد المصل، ومعدل الترشيح الكبيبي المقدر-e) GFR)لدى مرضى مرض الكلى المزمن. شملت الدراسة 106 مرضى يعانون من مرض الكلى المزمن، منهم 50.9٪ ذكور و49.1٪ إناث. من بين المشاركين في الدراسة، كان أكثر من 40٪ فوق سن 60 عامًا. استهلكت الأغلبية (71.7٪) مياه التناضح العكسي(RO) ، بينما شرب 28.3٪ مياه الآبار. فيما يتعلق بتناول الماء، استهلك 52.8% من المشاركين من لتر إلى لترين يوميًا. كان لدى معظم المشاركين (68%) مرض الكلى المزمن في المرحلة الرابعة بناءً على معدل الترشيح الكبيبي المقدر. ارتفعت مستويات اليوريا والكرياتينين في كلتا مجموعتي مصدر المياه، وإن لم يكن ذلك ذا دلالة إحصائية. ومع ذلك، لوحظت فروق ذات دلالة إحصائية في إلكتروليتات المصل، مع ارتفاع مستويات الصوديوم (p=0.027) والفوسفات (p=0.025) والبوتاسيوم (p=0.001) في مجموعة مياه الآبار. بالإضافة إلى ذلك، ترتبط مستويات معدل الترشيح الكبيبي المقدر بشكل كبير بمصادر المياه وتناول المياه (مربع كاي = 0.041 ومربع كاي = 0.039، على التوالي). كشفت الدراسة أن مرضى مرض الكلى المزمن الذين يستهلكون مياه التناضح العكسي ويحافظون على تناول معتدل من الماء يوميًا (1-2 لتر) أظهروا وظائف كلى أفضل من أولئك الذين يشربون مياه الآبار أو يستهلكون كميات أكبر أو أقل بكثير من الماء. تسلط هذه النتائج الضوء على أهمية كل من جودة المياه وتناول كمية كافية في الإدارة السريرية لمرضى مرض الكلى المزمن.

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