Brief Communication

Impact of Fasting during Ramadan on Renal Functions in Patients with Chronic Kidney Disease

Abstract

Introduction: The impact of Ramadan fasting in patients with chronic kidney disease (CKD) remains less studied and with inconsistent results. In this study, we tried to look at the impact of Ramadan fasting on renal function in patients with CKD. **Materials and Methods:** In this prospective observational study, we included 28 adult CKD patients. All relevant biochemical parameters including renal function tests were done in the month before Ramadan fasting and within 3 months after Ramadan. Urine output, body weight, and blood pressure were also monitored during Ramadan and after the end of Ramadan for at least 10 days. **Results:** All the 28 patients (mean age: 46 ± 12 years) included in the study managed to fast for the whole month, and none displayed any new clinical symptoms or signs. The renal function worsened in four (14.28%), and it was significant in those with CKD Stages 4 and 5 ($P < 0.003$). **Conclusion:** Stable CKD patients can fast with careful monitoring; however, there is a risk of renal function deterioration in advanced CKD.

Keywords: *CKD, fasting, Ramadan, renal impairment*

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Introduction

Ramadan fasting is observed by Muslims in the ninth month of the Islamic lunar calendar. It consists of fasting for 12 to 18 hours per day with the duration of fasting as per the geographical location of the country. Studies on healthy people in different parts of the world have reported no adverse effects of fasting during Ramadan.[1-3] However, a large number of factors including acute kidney injury (AKI), dehydration, electrolyte imbalances, hypoglycemia, nephrolithiasis, and renal colic need to be considered in these patients. Very few studies have evaluated the impact of Ramadan fasting in patients with CKD, and these have reported inconsistent results.[4-8] We aimed to study the impact of fasting during Ramadan on renal function in patients with CKD.

Materials and Methods

In this prospective observational study, approved by the Institute Ethical Committee, we included 28 adult CKD patients aged between 18 and 70 years and were willing to fast during Ramadan, which commenced on May 6, 2019, and ended on June 4, 2019. We excluded patients with AKI, end-stage kidney disease, on renal replacement therapy, severe comorbidities, pregnancy, uncontrolled blood sugars, and/or blood pressure. None of our patients was on any immunosuppression during the study, and all the patients continued with the same amount of dietary protein intake during the study period. Biochemical tests including serum urea, creatinine, electrolytes, serum glucose, serum uric acid, hemoglobin levels, lipid profile, complete urine examination, spot urine protein to creatinine ratio were done within a month before fasting initiation, during and within 3 months after Ramadan. Serum creatinine, electrolytes, and urine output were also checked during Ramadan after fasting for at least 10 days. Worsening of renal function (WRF) was considered to have occurred when serum creatinine level increased by 0.3 mg/dL from the baseline during or within 3 months after Ramadan. Body weight (BW), blood pressure (BP), and 24-hour urine volume were monitored before, during, and after Ramadan.

Results

All the 28 patients included in the study managed to fast during the whole month

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of Ramadan. There were 10 males and 18 females with a mean age of 46 ± 12 (23–68) years. Comorbidities such as diabetes (n = 10), hypertension (n = 26), and hypothyroidism (n = 4) were well controlled. The average fasting duration per day was around 14.5 hours. None of the patients displayed any new clinical symptoms or signs. Body weight, pulse, and BP before and after Ramadan are shown in Table 1, whereas Tables 2 and 3 depict blood and urinary investigations, respectively. The changes in the estimated glomerular filtration rate (eGFR) during the study are shown in Figure 1. WRF was noted in four (14.3%) patients, of whom two improved later and two continued to have elevated creatinine. The advanced CKD stage was the only factor ($P < 0.003$) associated with WRF [Table 4].

Discussion

In our study, overall there was no significant difference in mean serum creatinine and eGFR before and after Ramadan fasting. Ankur Gupta *et al*.[9] described association between religion and renal failure (R^2 syndrome). Studies done by El-Wakil *et al*.[4] Bernieh *et al*.[5] and Al Wakeel *et al*.[6] concluded that Ramadan fasting was safe in CKD patients, although these studies were done in the winter season. However, another study in the summer season reported that fasting was associated with WRF in higher stage CKD.[8] Comparison of our study with some of the previous studies is shown in Table 5. We observed an increase in hemoglobin, hematocrit, serum calcium, and serum potassium. In our study, four (14.28%) patients developed WRF. Compared with other studies, the mean eGFR of our study was higher as shown in Table 5. Fasting during Ramadan has been found not to increase the risk of colic or stone formation.[10-12] It is suggested that patients should maintain adequate hydration by drinking water during the fasting breaks.[13] Tashkandi *et al*.[14] found temporary and nonsignificant changes in lipid profiles in their patient cohort. Most prospective and observational studies have found that fasting is safe in CKD[5] There is also some evidence that fasting may in fact have a negative effect on the renal status.[4] In our study, early-stage CKD (1–3) tolerated the fasting well; however, that was not the case with CKD 4 and 5 patients, although this cannot be generalized considering the small size of our study population. A recent study done in patients with

Table 1: Weight and blood pressure before and after Ramadan

	Before Ramadan	After Ramadan	*P*
Weight (kg)	62±11.6	61.3±11.4	1.188
SBP (mmHg)	140.6±11.1	129.7±9.2	2.008
DBP (mmHg)	86.7±6.8	79.1±5.6	4.155

SBP=systolic blood pressure; DBP=diastolic blood pressure

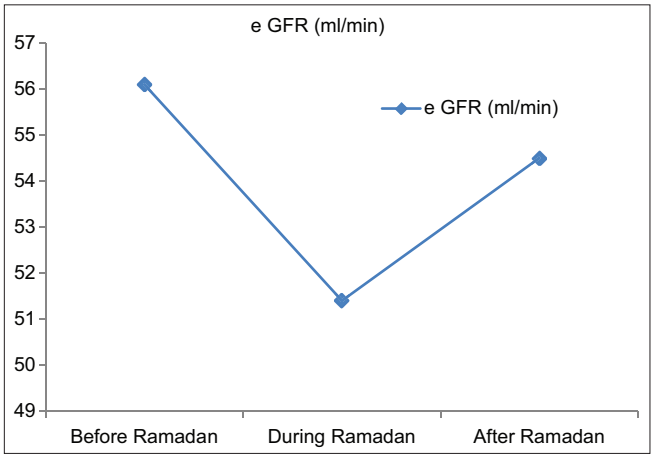

Figure 1: Estimated glomerular filtration rate (eGFR) changes during study

Table 2: Renal and biochemical variables

	Before Ramadan	During Ramadan	After Ramadan	*P*
Urea (mg%)	40.2±22.2		43.4±22.1	0.208
Creatinine (mg%)	1.7±0.9	1.8±0.95	1.68±0.95	0.021
				0.836
GFR (mL/minute)	56.1±33.3	51.4±30.3	54.5±30.8	0.0052
				0.296
Fasting sugar (mg/dL)	116.2±34.6		109.6±26.8	0.371
Hemoglobin (g/dL)	11.6±4.9		12.9±2.3	0.011
PCV	36.3±6.4		38.5±6.5	0.001
Sodium (mmol/L)	138.1±2.9		137.8±2.8	0.571
Potassium (mmol/L)	4.3±0.6		4.5±0.5	0.022
Calcium (mg/dL)	9.3±0.6		9.5±0.5	0.042
Phosphorus (mg/dL)	3.7±0.6		3.6±0.7	0.257
Uric acid (mg/dL)	5.8±1.8		6.3±1.9	0.183
Magnesium (mg/dL)	0.8±0.07		0.8±0.07	0.330
Albumin (g/dL)	4.1±0.4		4.2±0.3	0.381
Cholesterol (mg/dL)	143.7±33		144.9±40.5	0.753
Triglycerides (mg/dL)	109.6±41.6		112.1±47	0.522

GFR=Glomerular filtration rate; PCV=packed cell volume

Table 3: Urinary parameters before and after Ramadan

	Before Ramadan	During Ramadan	After Ramadan	*P*
Urine volume (mL/day)	1990±368	1425±253	1857±267	0.001
Urine Ph	5.63±0.6		5.7±0.7	0.698
Urine specific gravity	1.015±0.008		1.013±0.007	0.424
Protein/creatinine (g/mg)	0.6±0.5		0.61±0.5	0.830

Table 4: Effect of fasting on the development of worsening renal function (WRF)

CKD Stage	Number (%)	WRF
I	6 (21.4)	0
II	5 (17.85)	0
III	9 (32.1)	0
IV	6 (21.4)	3 (50%)
V (ND)	2 (7.1)	1 (50%)

CKD=Chronic kidney disease; ND=Non dialysis

Table 5: Comparison of CKD stages and baseline parameters with other studies

Parameters	Bernieh *et al.*[5]	Bakhit *et al.*[8]	Our study
Year	2005	2017	2019
N	31	65	28
Season	Winter	Summer	Summer
CKD 3, *n* (%)	14 (45.2)	36 (55.4)	9 (32.1)
CKD 4, *n* (%)	12 (38.7)	24 (37)	6 (21.4)
CKD 5, *n* (%)	5 (16.1)	5 (7.7)	2 (7.1)
Mean age (years)	54±4.2	53.1±15.2	46±12
Male gender (%)	61.3	61.5	35.7
Weight (kg)	76.4±18	78.41±7.4	62±11
GFR (mL/min)	29±16.3	31.1±13.3	56.1±33.3
Diabetes (%)	61	38.5	36
Hypertension (%)	71	89.2	93

CKD=chronic kidney disease; GFR=glomerular filtration rate

diabetes in CKD Stage 3 compared the fasting with those who did not fast and found no significant difference in clinical or biochemical parameters and adverse events.[15] In a meta-analysis by Bragazzi[16] that included five studies dealing with fasting and CKD, it was concluded that fasting in Ramadan is safe for patients with stable early-stage CKD. Another meta-analysis of six studies found that there was no significant change in GFR before and after fasting in CKD patients.[17] The suggested precautions include proper hydration, daily assessment of weight, electrolytes and creatinine assessment after 2 weeks of fasting, and patients should be advised not to continue fasting if serum creatinine rises to ≥30% from the baseline, or if severe electrolyte disturbances occur.[18]

Conclusion

We conclude that stable early-stage CKD patients can fast with careful monitoring; however, there is a risk of renal function deterioration in advanced CKD (Stages 4 and 5), and therefore, these patients should avoid fasting.

Limitations of our study

Ours was a small patient population and no long-term follow-up was available. Moreover, we did not include any inflammatory marker or cytokine-level assessment in our study.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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