DOES FASTING DURING RAMADAN AFFECT RENAL FUNCTIONS OF PATIENTS WITH CHRONIC KIDNEY DISEASE?

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Objectives:

Fasting during Ramadan represents one of the five pillars of the Islamic creed. Although not mandatory for patients, a lot of Muslims fast in Ramadan, which may cause decline in renal functions in patients with chronic kidney disease (CKD). However, there are no guidelines or standardized protocols about the patients with CKD fasting in Ramadan. In this study, we aimed to assess the impact of fasting during Ramadan on renal functions in patients with CKD.

Methods:

A total of 94 stage 3 to 5 CKD patients (male/female: 56/38, age: 65.4±11.6 years) with stable kidney function were recruited to this prospective observational study. All patients were instructed regarding possible deleterious effects of dehydration, and patients themselves chose whether to fast or not. Patients were divided into 2 groups according to their fasting status during Ramadan; fasting group (n: 45, male/female: 31/14, age: 66.8±10.3 years) and non-fasting group (n: 49, male/female: 25/24, age: 64.1±12.6 years). Clinical and laboratory data including serum urea, creatinine, estimated glomerular filtration rate (e-GFR), spot urine protein/creatinine ratio (PCR) was recorded before and after Ramadan.

Table 1. Baseline characteristics of study participants.

	Fasting (n: 45)	Non-fasting (n: 49)	P-value
Age (years)	66.8±10.3	64.1±12.6	0.258
Gender (male, %)	31 (%68.8)	25 (%51)	0.078
Weight (kg)	78.5±15.6	79.2±16.2	0.623
BMI (kg/m²)	24.2±0.6	24.6±0.4	0.536
Systolic BP (mm Hg)	147.5±27.5	156.7±32.4	0.239
Diastolic BP (mm Hg)	87.0±14.5	90.7±17.6	0.427
DM (n, %)	11 (24.4%)	19 (38.7%)	0.136
Antihypertensive medication (n, %)			
Diuretics	15 (33.3%)	23 (46.9%)	0.179
CCB	20 (44.4%)	30 (61.2%)	0.103
RAS blockers	19 (42.2%)	22 (44.8%)	0.794
Beta blockers	14 (31.1%)	19 (38.7%)	0.484
Alpha blockers	10 (22.2%)	10 (20.4%)	0.830
Baseline creatinine (mg/dL)	1.64±0.41	2.22±0.99	< 0.001
Baseline e-GFR (mL/min)	42.6±9.8	31.9±12.4	< 0.001
CKD stages at baseline (n, %)			
Stage 3	37 (82.2%)	24 (48.9%)	
Stage 4	8 (17.8%)	19 (38.7%)	0.001
Stage 5	0 (0%)	6 (12.4%)	

BMI: Body mass index, BP: Blood pressure, DM: Diabetes mellitus, CCB: Calcium channel blockers, RAS: Renin angiotensin system, e-GFR: Estimated glomerular filtration rate, CKD: Chronic kidney disease

Table 2. Changes in clinical and laboratory parameters after Ramadan according to fasting status.

Parameters	Fasting (n: 45)			Non-fasting (n: 49)		
	Before Ramadan	After Ramadan	P value	Before Ramadan	After Ramadan	P value
Weight (kg)	78.5±15.6	78.8±16.1	0.368	79.2±16.2	79.6±17.1	0.390
BMI (kg/m²)	24.2±0.6	24.3±0.5	0.472	24.6±0.4	24.8±0.5	0.475
Systolic BP (mmHg)	147.5±27.5	146.8±28.1	0.523	156.7±32.4	159.5±32.1	0.586
Diastolic BP (mmHg)	87.0±14.5	86.4±14.4	0.684	90.7±17.6	90.2±17.4	0.691
FPG (mg/dl)	116.9±39.1	120.3±32.2	0.515	124.7±50.2	136.5±69.9	0.147
Urea (mg/dl)	66.5±25.4	68.8±25.1	0.630	90.0±41.4	84.4±35.7	0.163
Creatinine (mg/dl)	1.64±0.41	1.64±0.48	0.962	2.22±0.99	2.33±1.11	0.125
e-GFR (mL/min)	42.6±9.8	44.4±15.5	0.444	31.9±12.4	29.8±13.7	0.090
Uric acid (mmol/L)	7.9±2.0	7.8±1.8	0.960	7.8±2.5	7.6±1.5	0.087
Sodium (mmol/l)	140.0±2.8	139.9±2.8	0.966	140.4±2.4	140.4±2.6	0.976
Potassium (meq/L)	4.7±0.6	5.4±0.7	0.397	4.7±0.5	4.9±0.5	0.094
Hemoglobin (g/L)	13.3±1.5	12.9±1.6	0.015	12.1±1.9	12.0±1.0	0.481
Albumin (g/L)	4.2±0.5	4.1±0.3	0.074	4.0±0.2	4.0±0.4	0.082
Calcium (mg/dl)	9.4±0.6	9.2±0.4	0.012	9.2±0.6	9.3±0.5	0.307
Phosphorus (mg/dl)	3.6±0.6	3.7±0.7	0.316	3.7±0.7	3.8±1.0	0.849
intact PTH (pg/ml)	196.4±66.5	201.5±66.0	0.609	183.9±17.6	186.3±17.0	0.867
Total cholesterol (mmol/L)	210.1±56.9	203.3±44.2	0.256	220.9±53.5	215.2±49.6	0.306
TG (mmol/L)	167.5±91.5	179.5±102.3	0.479	190.2±97.1	188.2±100.2	0.869
LDL (mg/dl)	127.2±32.1	123.5±32.8	0.395	142.6±44.4	134.7±34.6	0.146
TIBC (g/L)	253.7±65.6	265.7±61.6	0.403	219.7±69.7	212.8±75.3	0.483
Ferritin (ng/ml)	83.2±13.2	92.4±14.1	0.365	150.3±24.5	163.0±27.2	0.255
Spot urine PCR (mg/g)	0.97±1.93	0.71±1.33	0.341	1.30±1.57	1.50±2.14	0.315

Table 3. Differences in renal functions after Ramadan according to fasting status.

	Fasting (n: 45)	Non-fasting (n: 49)	P value
≥ 30% rise of serum creatinine (n, %)	4 (8.8%)	4 (8.1%)	0.900
Change in e-GFR (mL/min)	+1.82±15.81	-2.03±8.23	0.311
≥ 25% drop of e-GFR (n, %)	7 (15.5%)	6 (12.2%)	0.642
Change in proteinuria (mg/g)	-0.257±1.480	+0.201±1.373	0.164

e-GFR: Estimated glomerular filtration rate

Table 4. Multiple linear regression analysis of the factors that may predicts ≥25% drop in eGFR in fasting group after Ramadan.

	Beta	95% Confidence Interval		P value
		Lower	Upper	
Advanced age	0.403	0.003	0.020	0.010
Gender, male	-0.243	-0.336	0.037	0.114
Presence of DM	0.004	-0.189	0.195	0.978
RAS blockers	-0.084	-0.251	0.154	0.629
Diuretics	0.117	-0.138	0.279	0.496
Baseline e-GFR	0.232	-0.002	0.015	0.110

DM: Diabetes mellitus, RAS: Renin angiotensin system, e-GFR: Estimated glomerular filtration rate

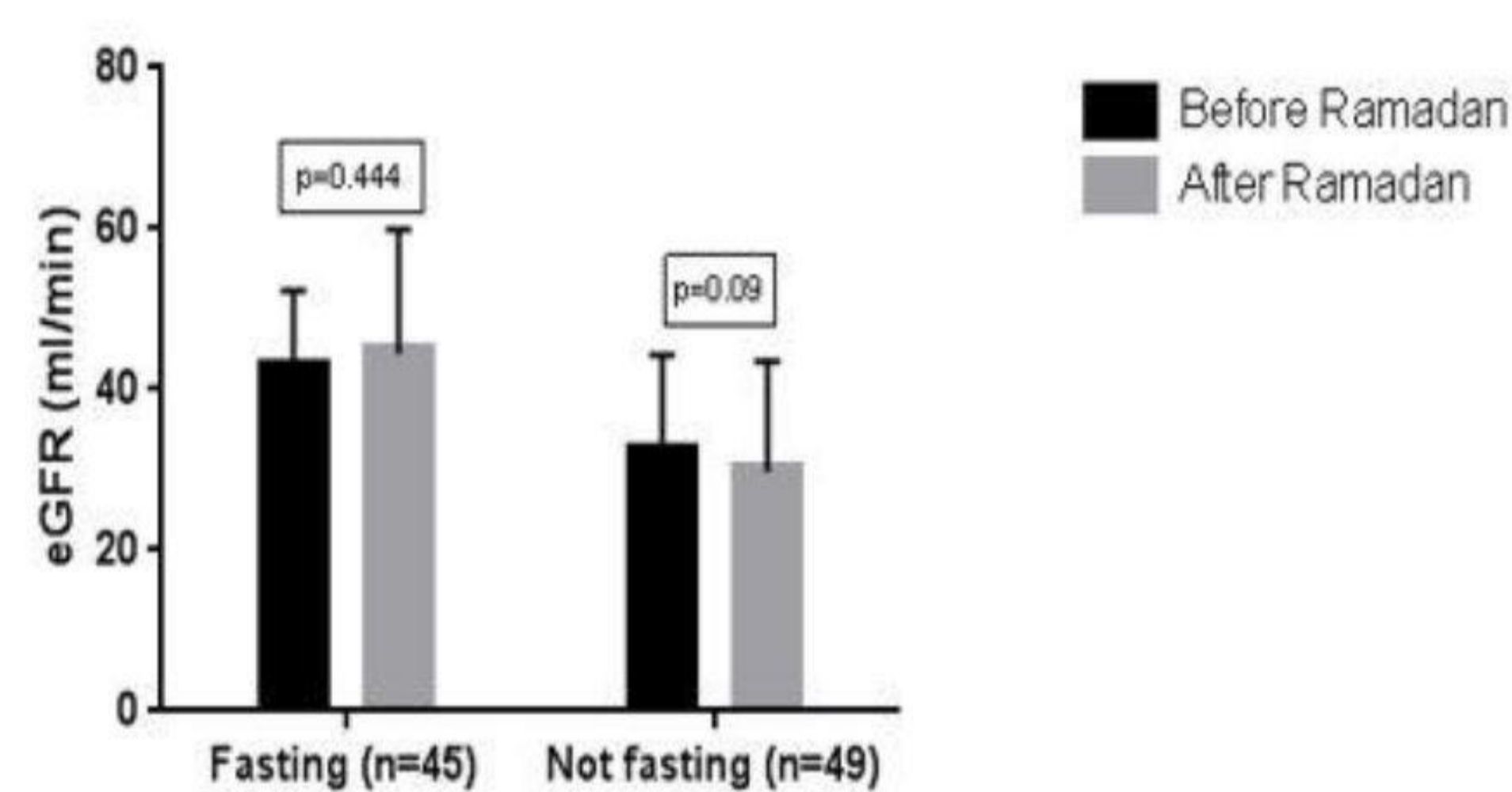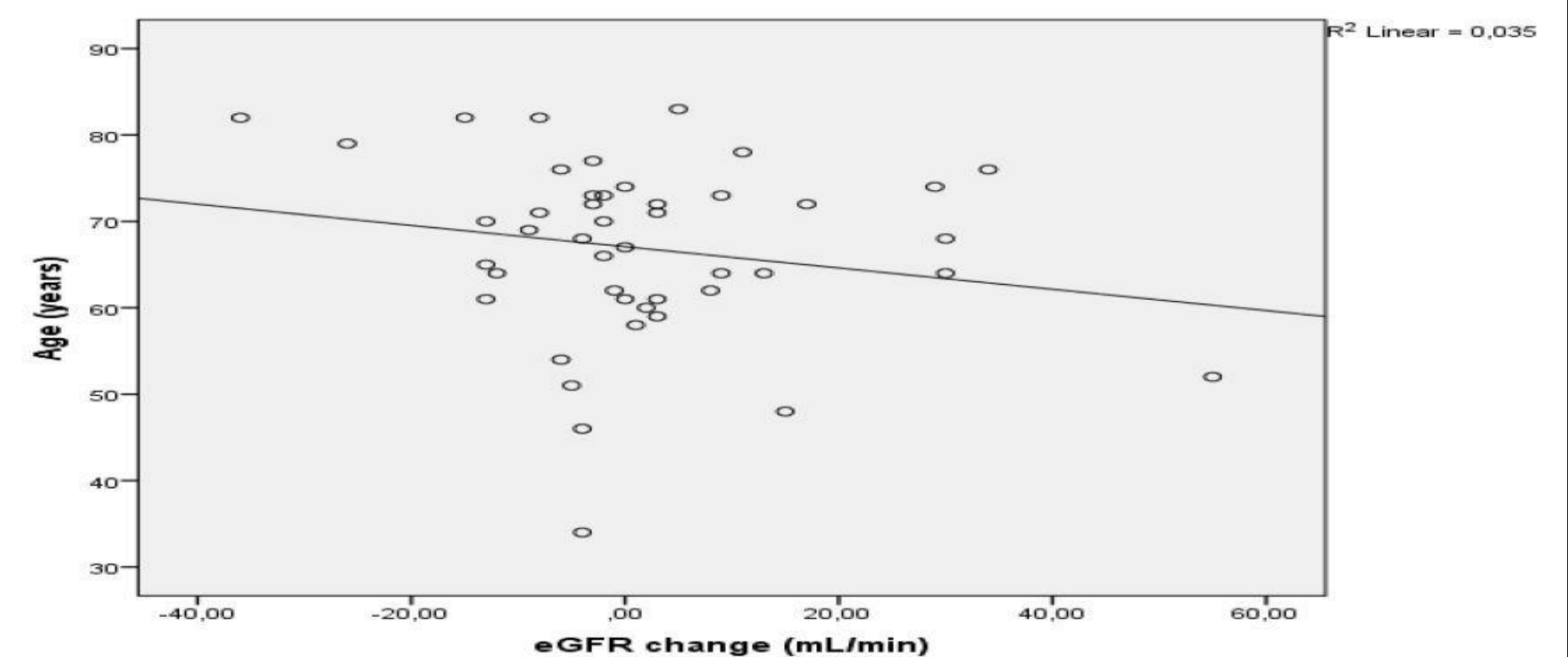**Figure 1.** eGFR changes after Ramadan according to fasting status.

Figure 2. The relationship between age and eGFR changes in the fasting group after Ramadan in multiple linear regression analysis.

Results:

There were no differences in baseline characteristics between fasting and non-fasting group regarding age, gender, body mass index (BMI), blood pressure, presence of diabetes mellitus (DM), antihypertensive medications. Compared to the fasting group, non-fasting group had significantly higher baseline serum creatinine (2.22±0.99 vs. 1.64±0.41 mg/dl, respectively, p < 0.001) and lower e-GFR (31.9±12.4 vs. 42.6±9.8 ml/minute, respectively, p < 0.001) levels. There were no significant changes in serum urea, creatinine, e-GFR, electrolytes, albumin, lipid profile, ferritin, parathormone and spot urine PCR levels after Ramadan both in fasting and non-fasting groups. Hemoglobin (p: 0.015) and serum calcium (p: 0.012) levels were found decreased after Ramadan in fasting group. There was no significant difference between fasting and non-fasting groups in terms of the deterioration of renal functions, which was defined as ≥ 30% rise of serum creatinine (4/45, (%8.8) vs. 4/49 (%8.1), respectively, p: 0.900) and/or ≥ 25% drop of e-GFR (7 (%15.5) vs. 6 (%12.2), respectively, p: 0.642). Compared patients with stable CKD (n: 81), patients with deteriorating renal functions (≥ 25%drop of e-GFR, n: 13) were older (64.3±11.7 vs 72.3±8.3 years, respectively, p: 0.020) and had higher proportion of diuretic usage (29 (%35.8) vs 9 (%69.2), respectively, p: 0.023). In multipl linear regression analysis, only the advanced age was found associated with ≥ 25% drop of e-GFR after Ramadan in fasting group.

Conclusions:

Fasting during Ramadan was not associated with increased risk of declining in renal functions in patients with stage 3 to 5 CKD. However, elderly patients may still be under a higher risk.

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