

Ramadan fasting and chronic kidney disease: does estimated glomerular filtration rate change after and before Ramadan? Insights from a mini meta-analysis

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Abstract: Ramadan fasting represents one of the five pillars of the Islam creed. Even though patients are exempted from this religious duty, they may be eager to share this particular moment of the year with their family and peers, taking part in the intense spiritual ceremonies and events that characterize this month. However, there are no guidelines or standardized protocols that can help physicians to properly address the issue of patients with chronic kidney disease fasting in Ramadan and correctly advising them. For this purpose, we carried out a systematic review and a meta-analysis to see whether glomerular filtration rate value changed before and after Ramadan. Our main findings are that: chronic kidney disease patients can safely fast during Ramadan since glomerular filtration rate does not change in a statistically significant way and, even though most studies have been carried out during Ramadan falling in cold seasons, the sensitivity analysis did not reveal any impact of seasonality. Further research in the field is needed.

Keywords: chronic kidney disease, glomerular filtration rate, Ramadan fasting

Introduction

The Holy Month of Ramadan, the ninth month of the Muslim lunar calendar (Hijra), is of great importance for Muslims, representing the month of the descent of the Holy Book (Qu'ran) and being one of the five Islamic pillars of the creed (arkan al-Islam), together with the faith declaration or profession (as-shahada), the five daily ritual prayers (as-salah), the pilgrimage to Mecca (al-hajj), and charity (az-zakat).

Ramadan is not only refraining from eating and drinking, but also from smoking, medication use, and sexual intercourse (as prescribed in the second chapter "The cow", Surat 2 "Al-Baqarah"). Moreover, it is a month of intense spirituality, characterized by supererogatory prayers termed as tarawih.

Ramadan represents a particular form of fasting, consisting of alternate abstinence and feasting (re-feeding) periods.¹ In order to mark the beginning and the end of the daily fasting, two traditional meals are taken (a pre-dawn meal, termed as suhoor, and an after-sunset meal, called iftar), whilst the end of the Holy Month is celebrated with a festival called "Eid al-Fitr". Ramadan duration is variable, since the Islamic calendar is a lunar one and therefore the Islamic year contains 354 days (instead of 365, as in the Gregorian solar calendar). For this reason, the Ramadan month can last 29 or 30 days, it occurs 11 days earlier every year, and may fall in any period of the year, either in cold or in hot seasons. Therefore, mean fasting duration is usually 12–14 hours, but, depending on the place and the time of the year, it can also last up to 18 hours² or even 22 hours, in the extreme latitudes.¹

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Some categories are exempted from the observance of this religious duty, such as pre-puberal and puberal children, menstruating, pregnant, and breast-feeding women, sick people, frail older subjects, and travelers (if the total traveled distance is at least 82 km or if the journey is customarily considered as such). However, they could be willing to fast and share the spirituality of this month with their family and peers, taking part in the numerous ceremonies that characterize this month.³

Chronic kidney disease (CKD) is a public health concern in the Arabic countries. Hassanien et al performed a systematic review about published epidemiological data related to end-stage renal disease (ESRD) in the Gulf Cooperation Council countries (namely, Saudi Arabia, the United Arab Emirates, Bahrain, Kuwait, Qatar, and Oman) and found that ESRD imposes a huge clinical and epidemiological burden, with an incidence rate ranging from 65.2 to 214.9 cases per million population, a prevalence rate of 80.6–138.0 cases per million population and a mortality rate of 8.0%–22.6%.⁴ CKD is an increasing problem, mainly caused by diabetes, hypertension, and obesity,^{4,5} which are highly prevalent disorders in the Arabic countries.⁵ Diabetes has indeed a prevalence of about 15%–20%, which is consistently higher than the prevalence rate in the USA (estimated about 8.3%).⁵ Prevalence of hypertension varies from 15.2% (in Saudi Arabia) to 40.6% (in Syria).⁵

It is known that spirituality plays an important role in patients suffering from CKD,^{6–11} acting as a coping strategy⁹ and contributing to psychosocial adjustment to illness, enabling individuals to experience a greater existential well-being, and a better health-related quality of life (HRQoL). Saffari et al implemented a cross-sectional design, assessing 362 patients undergoing hemodialysis patients in Tehran, Iran. They found that spiritual/religious factors may act as relevant resources promoting better health-related outcomes, at least explaining a certain percentage of variance of HRQoL and health status.¹²

For these reasons, the impact of Ramadan fasting on kidney physiology and above all on kidney physiopathology is not a topic of interest limited to the Arabic countries. In a globalized society, the physicians are faced with issues like the management of CKDs in Muslim patients who want to fast during Ramadan, since more Muslims live in the Western societies.¹³ However, information is sparse and no guidelines or standardized protocols exist.³ Moreover, information available on the Internet is sometimes misleading or contradictory. To the best of our knowledge, only one systematic review exists,¹⁴ but not a meta-analysis.

For this purpose, we have carried out a systematic review and a meta-analysis concerning the changes in glomerular filtration rate (GFR) before and after Ramadan, in such a way that could be helpful for general practitioners and nephrologists.

Materials and methods

We systematically searched ISI/Web of Science, Scopus, MEDLINE/PubMed, Google Scholar, Directory of Open Access Journals, EbscoHOST, Scirus, and ProQuest. We used a proper string made up of a combination of keywords such as “Islam”, “Ramadan”, “fasting”, “kidney”, and “glomerular filtration rate”.

Gray literature was also manually searched, as recommended by the Cochrane. Review articles or research manuscripts not pertinent to the aim of this systematic review were excluded, while all the other research articles (including editorials, letters, case reports) were retained. No time and language filters were applied.

Meta-analysis was carried out collecting all data concerning GFR in groups before and after Ramadan fasting. Data extraction, collection, and handling were managed by means of ReviewManager (RevMan) software, version 5.3.¹⁵

Results

We identified six studies.^{13,16–20} The study carried out by Hejaili et al¹⁶ is a prospective cohort study in which 43 fasting subjects and 37 fasting and non-fasting participants are recruited (mean age 45.2±15.6 years in the fasting group, 43.3±15.4 years in the non-fasting group). The study was carried out in Riyadh (Saudi Arabia) during two consecutive Ramadan feasts (August 2011, July–August 2012). The follow-up was 64.4±30.4 months and 27.7±36.7 months for the two groups, respectively; patients with ESRD stage 3b and 4 were also included. The authors found a significant but similar drop in the high GFR subgroups in both the fasting subgroup and in the non-fasting subgroup.

Qurashi et al¹⁷ performed a prospective matched case–control observational study recruiting 43 fasting and 37 non-fasting subjects (mean age 43.7±15.6 years and 41.8±15.4 years respectively). The mean fasting duration was in the range of 12–14 hours. The study included recipients of kidney allograft with a mean length of time after transplant in the two groups of 64.4±30.4 months and 27.7±36.7 months respectively. Mean follow-up was 7.6±1.3 months. The study was conducted in Saudi Arabia, during Ramadan 2011 (August). The authors did not find any statistically significant differences.

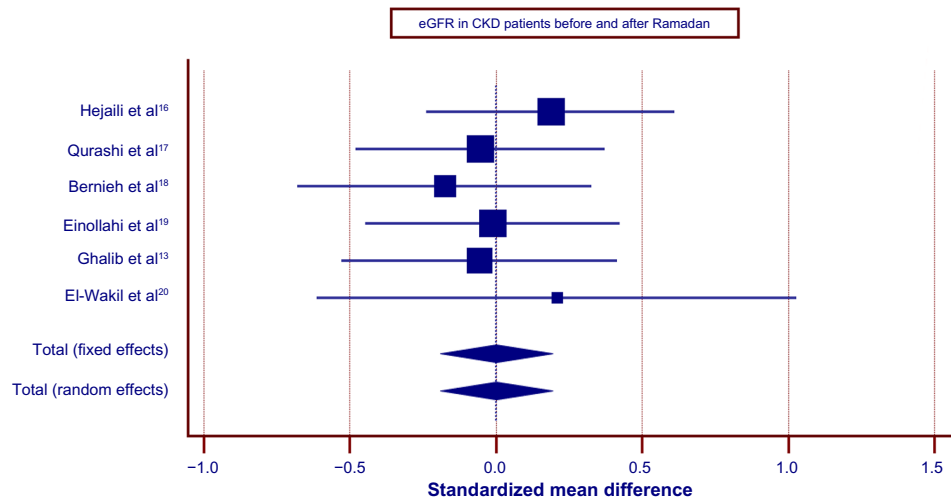


Figure 1 Meta-analysis of the entire group of studies carried out during Ramadan in CKD patients (total fixed and random effects: SMD 0.00 ± 0.098 , 95% CI -0.19 to 0.19 , $t=0.02$, $P=0.99$, $I^2=0.00\%$).

Abbreviations: CKD, chronic kidney disease; SMD, standardized mean difference; CI, confidence interval; eGFR, estimated glomerular filtration rate.

Bernieh et al¹⁸ designed a prospective observational cohort study, recruiting 31 CKD patients (19 male, 12 female, 14 in stage III, 12 in stage IV, five in stage V; 19 suffering from diabetes, 22 from hypertension) with a mean age 54.0 ± 14.2 years. The study was conducted in the United Arab Emirates during Ramadan 2005 (October–November). The authors found a weight reduction, and lower systolic and diastolic blood pressure. Estimated-GFR showed a significant improvement during the fast and the month after. The blood sugar was high during fasting with an increment in the HbA_{1c} . Furthermore, there was better lipid profile, reduction of the proteinuria and fractional extraction of sodium.

Einollahi et al¹⁹ carried out a prospective matched case–control observational study with a sample of 41 fasting kidney transplant patients matched with 41 non-fasting subjects (mean age 42 ± 12 years and 43 ± 12 years respectively), in Iran, during Ramadan 2007 (September–October). The authors did not find any statistically significant difference.

Ghalib et al¹³ implemented a prospective matched case–control observational study recruiting 35 fasting subjects matched with 33 non-fasting subjects (mean age 39.5 ± 13.2 years and 41.5 ± 14.0 years respectively). The mean duration of the fasting was 12–14 hours. Patients with impaired estimated-GFR/GFR and/or, severe co-morbidities were excluded. The study was conducted during 3 consecutive

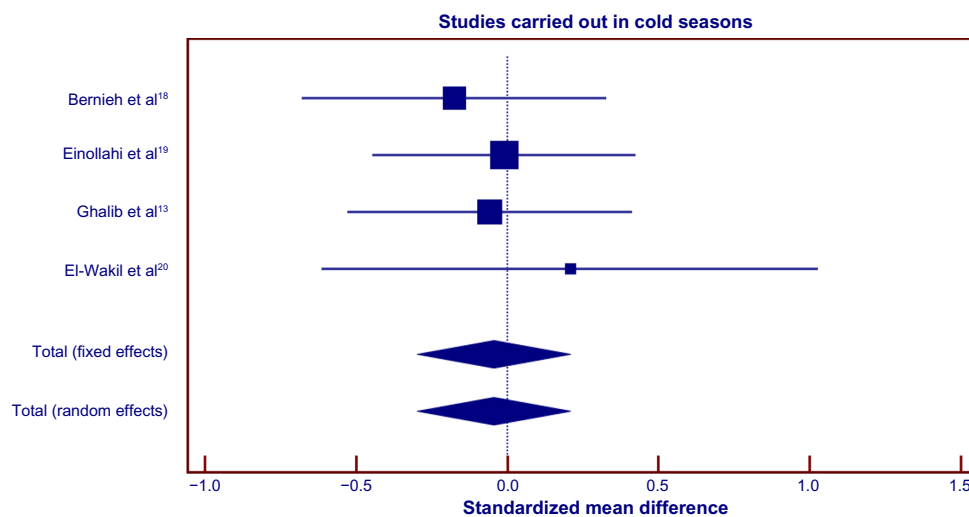


Figure 2 Meta-analysis of the subgroup of the studies carried out in cold seasons (total fixed and random effects: SMD -0.04 ± 0.13 , 95% CI -0.30 to 0.21 , $t=-0.35$, $P=0.73$, $I^2=0.00\%$).

Abbreviations: SMD, standardized mean difference; CI, confidence interval.

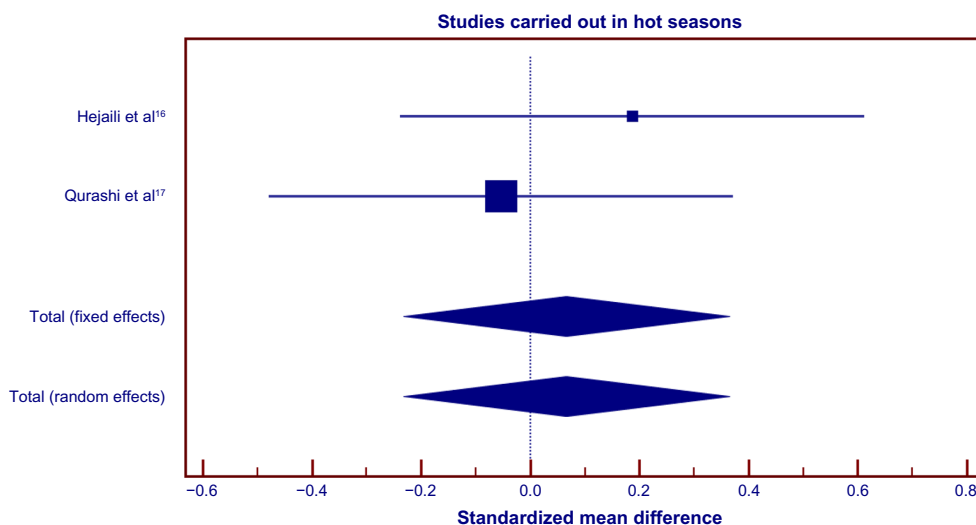


Figure 3 Meta-analysis of the subgroup of the studies carried out in hot seasons (total fixed and random effects: SMD 0.07 ± 0.15 , 95% CI -0.23 to 0.37 , $t = -0.44$, $P = 0.66$, $I^2 = 0.00\%$).

Abbreviations: SMD, standardized mean difference; CI, confidence interval.

Ramadan months (Ramadan 2004 October–November, Ramadan 2005 October–November, and Ramadan 2006 September–October), in Saudi Arabia. The authors did not find any statistically significant difference.

El-Wakil et al²⁰ in a prospective observational cohort study assessed 15 pre-dialysis CKD patients (nine female, six male) versus six healthy volunteers as control group. Patients were suffering from diabetes mellitus (21.4% of the cases), hypertension (21.4%), chronic pyelonephritis (21.4%), chronic glomerulonephritis (14.2%), polycystic kidney disease (14.2%), and obstructive uropathy (7.14%). Mean age of the studied sample was 53.0 ± 15.6 years. This study took place in Egypt (Ramadan 2001 November). The authors found that there was a significantly positive correlation between the *N*-acetyl- β -*D*-glucosaminidase values and the change in the blood glucose level (P -value = 0.001).

Mini meta-analysis

GFR values were extracted from the above-mentioned studies and meta-analyzed together. The mini meta-analysis of the entire group of studies carried out during Ramadan in CKD patients yielded a total fixed and random effects expressed as standardized mean difference (mean \pm standard deviation) of 0.00 ± 0.098 , with a 95% confidence interval in the range -0.19 to 0.19 , being not statistically significant and with no inconsistency among studies ($I^2 = 0.00\%$) (Figure 1). We performed sensitivity analysis in order to see whether the season in which studies were conducted had an impact on the mini meta-analysis. We found no difference between hot and cold seasons (Figures 2 and 3).

Discussion

Six studies investigated the effects and the impact of Ramadan fasting on patients suffering from CKDs, with emphasis on GFR.

All the selected studies were prospective and observational. Four studies were neutral, not finding any differences between before and after Ramadan fasting,^{13,16,17,19} while one study found negative evidence²⁰ and the study by Bernieh et al found improvements during the fasting and after.¹⁸

However, most of studies (four out of six) were conducted in cold seasons,^{13,18–20} while only two were conducted in hot seasons.^{16,17} For this reason, the findings may be not generalizable to hot seasons and therefore caution should be taken and applied when fasting during those periods. However, when performing meta-analysis of the subgroups, the difference in the effect sizes and the total mean difference were not statistically significant. We can conclude in a preliminary way that seasonality does not seem to have an impact on GFR in CKD patients.

Conclusion

There is a strong need for evidence-based suggestions and guidelines.^{3,14} CKD patients should be properly and carefully monitored before the beginning of Ramadan, as well as during and after the fasting period, and advised about the proper dietary and pharmacological regimen and other behaviors to follow.¹⁴

Also psychological and psychosocial aspects, such as coping strategies, motivation, and patient preferences and

adherence/compliance to treatment should be investigated and taken into account.

Our systematic review and meta-analysis did not show any statistically significant change of GFR before and after Ramadan fasting, indicating that stable patients can safely fast.

In conclusion, if stable, patients' eagerness to fast should be taken into account and even encouraged, since spirituality plays a key role in CKDs. Patients who feel more actively involved in the religious activities, and less depressed and isolated, experience better HRQoL outcomes and health status.³

Disclosure

The author has no conflicts of interest to disclose.

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