doi: 10.31674/mjmr.2020.v04i03.003

MJMR

ACUTE KIDNEY INJURY DURING FASTING IN RAMADHAN IN A PATIENT WITH NEPHROLITHIASIS – A CASE REPORT

Hassan Basri[1], Shaiful Ehsan Shalihin[2]*

[1]Faculty of Medicine, UNISZA, Kuala Terengganu, Malaysia
[2]Faculty of Medicine, IIUM, Kuantan, Malaysia

*Corresponding Author E-mail: shaifulehsan@iium.edu.my

ABSTRACT

Ramadhan fasting is a religious obligation for every Muslim since the era of Prophet Muhammad (peace upon him). Not only as a symbol of worship and obeying the command of the Creator, but it is also found to provide several health benefits. However, some patients might develop complications while observing Ramadan fasting, especially those with pre-existing medical condition or patient who is on certain medications. We would like to report a patient with gouty arthritis without a prior diagnosis of renal disease who was taking a urate-lowering agent and nonsteroidal anti-inflammatory drugs (NSAIDs) and presented to us with acute renal impairment during Ramadan fasting. Luckily, his renal function was improved with rehydration and cessation of NSAIDs. This case highlights the possible renal complication of Ramadan fasting among patient who takes regular NSAIDs and does not consume adequate fluid during sahur and breaking fast. Thus, identification and proper counselling of a patient with regular consumption of NSAIDs is vital before Ramadan begins.

Keywords: Renal Function, Renal Ultrasonography, Nephrolithiasis

INTRODUCTION

Ramadan fasting is obligatory for all healthy Muslim who is capable of performing it. Other than incorporating Islamic practitioners on moderation and good deeds, Ramadan fasting was found to bring health benefits such as a reduction in body weight and body mass index (BMI), improvement in lipid parameters, reduction of fasting and postprandial blood glucose, and reduction of markers of inflammation (Mohammad Hossein Rouhani, 2014). Nevertheless, Islam exempts groups of people from observing Ramadan fasting to prevent health complications. These include the elderly, pregnant or nursing women and patients with severe illness.

Available data demonstrated that Ramadan fasting could result in morbidity and mortality, particularly on individual with a pre-existing medical condition such as cardiovascular disease, chronic kidney disease (CKD) and diabetes with extensive long-term complications. A retrospective review of patients with end-stage renal failure (ESRF) undergoing haemodialysis demonstrated that the rate of mortality was higher during Ramadan as compared to other Islamic months (Salman Imtiaz, 2015). Patients with diabetes treated with Insulin or Sulphonylurea are also at risk of developing significant hypoglycaemia during fasting (Salem A Beshyah, 2019). Besides, patient with CKD could develop worsening renal function and cardiovascular event when observing Ramadan fasting (Osman, 2014). Thus, the physician should be aware of which group of people might develop complications, and they should be properly explained about such risks even before Ramadan to prevent such complication.

Case Report

A 43-year-old male with underlying gouty arthritis and type 2 diabetes was under our follow up at the health clinic for the past two years. He was on Metformin 1g BD, Allopurinol 300mg OD, Colchicine 0.5 mg TDS and Diclofenac Acid 50 mg PRN. Clinically, he had no tophi or features of active arthritis. His diabetes control was acceptable with HbA1c of 7%.

Three months before Ramadhan, his renal profile showed urea of 6.3 mmol/l, creatinine of 125 umol/l, uric acid of 0.67 mmol/l and eGFR of 61 ml/min/1.73m2. However, during his subsequent visits

during Ramadhan, his renal profile had significantly deranged, whereby his urea became 11.9 mmol/l, creatinine of 249 umol/l, uric acid of 0.67 mmol/l, and eGFR 26 of ml/min/1.73m2. He claimed that he was taking the NSAIDs more often at night and pre-dawn for his joint pain. He admitted that he did not consume adequate water and fluids during iftar. An ultrasound was done and revealed the presence of renal calculus at the upper pole of his right kidney and another two calculi at the mid pole and lower pole of his left kidney. There was no hydronephrosis or other abnormalities detected. Upon notice his worsened blood parameters, we referred this patient for early shared care with the nephrologist. He also was advised to consume adequate fluid and stop taking the NSAIDs.

During subsequent follow-up a month after Ramadhan, his renal profile showed tremendous improvement. His creatinine was reduced to 107 umol/l, while his uric acid was normalized to 0.36 mmol/l. He has complied with adequate water intake per day as advised. His renal function trend indeed demonstrates a case of acute kidney injury that is reversible with adequate rehydration and withdrawal of his NSAIDs. Table 1 below describes the renal function trend.

Table 1. Renal Function during Patient's Follow-up

	13/3/18 (Pre-Ramadhan)	4/6/18 (Ramadhan)	7/8/18(Post-Ramadhan)
Uric acid (mmol/l)	0.67	0.67	0.36
Urea (umol/l)	6.3	11.9	6.0
Creatinine (mmol/l)	125	249	107
eGFR (ml/min/1.73m2)	61	26	69

DISCUSSION

Ramadan fasting is generally safe for healthy individual. Few physiological changes are observed during Ramadan fasting including minor increase in serum uric acid, urea, creatinine and potassium level. There are no significant changes on serum osmolality, calcium, phosphorus, pH and bicarbonate. However urine output is reduced as the body try to conserve water content in the body (Hendawy, 2014). In good functioning and stable renal transplant patient (one year post-transplantation), observational data demonstrated that Ramadan fasting is safe without significant complication. (Yasser ELSayed Matter, 2018).However, those on multiple medications or with significant comorbidities are still not advised to observe fasting to avoid complications (Yasser ELSayed Matter, 2018).

Study about safety of Ramadan fasting among patients with CKD revealed mixed result. Majority of the studies were conducted in a controlled manner, closely supervised by nephrologist and excluding respondents with high risk of developing complications. (Bassam Bernieh, Mohammad Raafat Al Hakim, Yousef Boobes, 2010) revealed that not only patients with CKD can safely fast, but had attained weight loss, lower blood pressure and improvement in eGFR (Bassam Bernieh, 2010). There was also no significant difference in mean blood pressure changes and eGFR values among CKD patients compared to healthy individuals, although potassium levels were elevated observed among CKD group. Furthermore, there were no changes in clinical and laboratory variables among CKD patients, although patients undergoing haemodialysis had significant increase in serum erythrocyte, creatinine, blood urea, phosphorus albumin and uric acid during fasting period. But overall, none of CKD patients had clinically significant uraemia, and no haemodialysis patients had significant adverse effect requiring hospital admission during Ramadan fasting (Bassam Bernieh, 2010). In a study comparing fasting and non-fasting group found that there was significant increase in serum urea among fasting group during the end week of Ramadan but the level returned back to baseline after Ramadan with no significant reduction in eGFR (Shadia Hassan, 2018).

Nevertheless, there are group of patients who might develop complications after observing Ramadan fasting. They are patients with pre-existing cardiovascular disease, advance age, those who are on diuretics, NSAIDs and RAAS blocker and CKD with eGFR of less than 60 mL/min/1.73m2 (Osman, 2014). (Nasr Allah and Osman, 2014) reported that respondents who had pre-existing cardiovascular disease and fasting in Ramadan developed six cardiovascular events versus one in non-fasting respondents. These six respondents had significant increase in serum creatinine at first week of fasting, while four of them had increment of more than 30% from baseline (Osman, 2014). Plus, renal derangement were persisted until the end of Ramadan in five from six patients, while one respondent required temporary dialysis (Osman, 2014). (Mbarki *et al.*, 2015)

in their study involving 60 patients with CKD reported three patients developed acute renal failure (ARF) at first week of fasting, while seven patients developed super-imposed ARF while fasting during Ramadan (Houda Mbarki, 2015). Among patients with CKD, the risk of renal tubular injury is higher as compared to healthy individual evidenced by elevated urinary N-acetyl B-D glucosaminidase (NAG) although there was no derangement in eGFR or creatinine. Furthermore, fasting individual also experienced significant reduction of hydration during Ramadan as compared to those who did not fast although there was no deterioration of eGFR (Houda Mbarki, 2015).

Our patient has no previous history of cardiovascular disease, but his eGFR is at borderline level and this is exacerbated by urate nephropathy, toxic effect of NSAIDs and hypoperfusion due to dehydration during fasting as he did not take adequate water during period of iftar and sahur. He also did not receive adequate advice about risk of Ramadan fasting, and no specific advice of usage of NSAIDs and taking adequate fluid to avoid acute renal failure. In our case, the patient had Type 2 diabetes, gouty arthritis and undiagnosed chronic kidney disease evidenced by elevated creatinine and urea, while his eGFR was 61/min prior to Ramadan. His CKD is probably due to either chronic NSAIDs usage, urate nephropathy or combination of both. Furthermore, he also had diabetes, which also contribute to the development of CKD as well. One systematic review and meta-analysis involving 190,000 patients revealed that there was a significant positive association between hyperuricaemia and new onset of CKD (OR 2.35) (Ling Li, 2014). Another population-based retrospective cohort study in the UK demonstrated that gout was associated with an increased incidence of CKD especially those who were exposed to urate lowering agent (Matthew Roughley, 2018). They also have higher prevalence of diabetes mellitus, hypertension, and vascular disease which also highly correlated with CKD, and received more NSAIDs than patient without gout (Matthew Roughley, 2018). Hence, patient with gout like our patient should be suspected to have CKD, and they should be advised to be cautious on taking NSAIDs during Ramadan fasting to avoid acute deterioration of kidney function.

Renal ultrasonography of our patient also demonstrated that he has renal calculi, which is likely uric acid in origin. It is possible that the stones developed during Ramadan fasting as hypersaturation of serum uric acid could occur during fasting even among healthy individual. However, in one retrospective study involving 237 urinary tract stone patients, (Al Mahayni *et al.*, 2018) did not find significant difference in the frequency of urinary stones between Ramadan and non-Ramadan month. However, fasting in Ramadan is associated with double risk to present with stone at the ureter compared to other location (Abdullah Al Mahayni, 2018).

Another insult to the kidney for patient with underlying CKD is NSAIDs. In healthy individual, there is no significant adverse effect of NSAIDs on renal function. Nevertheless, in susceptible individual, this drug could lead to various toxic effect such as sodium retention, oedema, hyperkalaemia, acute renal failure, nephrotic syndrome and acute or chronic papillary necrosis. Our patient regularly consumed this medication to alleviate his joint pain. This is not surprising as a local study have shown that about 14.2% of Malaysian adult takes this medication particularly those with arthritis, heart disease, hypertension, asthma and patient with CKD(S Maria Awaluddin, 2017). This trend is worrying as NSAIDs could disrupt the homeostatic mechanism in kidney particularly in the setting of hypovolaemia and reduced cardiac perfusion. Prostaglandin is essential in maintaining homeostasis of renal physiology in the setting of decrease perfusion, but NSAIDs block this action thus lead to renal ischaemia.Clinically, it is manifested as elevated serum urea, creatinine and potassium, weight gain and oliguria.In this case, prompt cessation of NSAIDs will usually reverse the condition within a week in most cases. Our patient is fortunate enough as the routine investigation was taken during Ramadan where the renal function was abnormal, and prompt cessation of NSAIDs and adequate hydration were advised to him reversing it back to the baseline.

CONCLUSION

This case is able to highlight the benefit of regular renal function monitoring for those with underlying risks for renal impairment, even for those initially stratified as low risk group. Adequate water intake should be emphasized to all regardless of the background of the patient during fasting Ramadhan. Precaution should be given for patients that require regular NSAIDS especially during condition at risk of dehydration.

Funding

This research is funded by International Islamic University of Malaysia Research Initiative Grant Scheme (Publication) P-RIGS18-034-0034.

CONFLICT OF INTERESTS

The authors declare that they have no conflict of interest.

REFERENCES

Abdullah Al Mahayni, Sultan S Alkhateeb, Ibrahim H Abusaq, Amen A Bawazir. (2018). Does Fasting in Ramadan Increase the Risk of Developing Urinary Stones. *Saudi Medical Journal*, 39(5), pp:481-486.

Bassam Bernieh, Mohammad Raafat Al Hakim, Yousef Boobes, Fikri M Abu Zidan. (2010). Fasting Ramadan in Chronic Kidney Disease Patients: Clinical and Biochemical Effects.', Saudi J Kidney Dis Transplant. *Saudi Journal of Kidney Diseases and Transplantation*, 21(5), pp:898-902.

Beshyah,S.A., Hassanein, M., Ahmedani, M.Y., Shaikh, S., Ba-Essa, E.M., Megallaa, M.H., Afandi, B., Ibrahim, F., Al-Muzaffar, T. (2019). Diabetic Hypoglycaemia during Ramadan Fasting: A Trans-national Observational Real-world Study. *Diabetes Research and Clinical Practice*. 150, pp: 315-321

Hendawy, Achraf. (2014). Effect of Ramadan Fasting on Renal Physiology. *Urology & Nephrology Open Access Journal*, 1(3).

Houda Mbarki, Nada Tazi, Adil Najdi, Nabil Tachfouti, Mohamed Arrayhani, Tarik Sqalli. (2015). Effects of Fasting during Ramadan on Renal Function of Patients with Chronic Kidney Disease. *Saudi Journal of Kidney Diseases and Transplantation*, 26(2), pp:320-324.

Ling Li, Chen Yang, Yuliang Zhao, Ping Fu. (2014). Is Hyperuricemia an Independent Risk Factor for New-onset Chronic Kidney Disease?: A Systematic Review and Meta-analysis Based on Observational Cohort Studies. *BMC Nephrology*, 15(1), pp:122.

Matthew Roughley, Alyshah Abdul Sultan, Lorna E Clarson, Edward Roddy. (2018). Risk of Chronic Kidney Disease in Patients with Gout and the Impact of Urate Lowering Therapy: A Population-based Cohort Study. *Arthritis Research and Therapy*, 20(1), pp:243.

Mohammad Hossein Rouhani, Leila Azadbakht. (2014). Is Ramadan fasting related to health outcomes? A review on the related evidence. *Journal of Research in Medical Sciences*, 19(10), pp:987-992.

Osman, Mohamed M. NasrAllah. Noha A. (2014). Fasting during the Month of Ramadan among Patients with Chronic Kidney Disease: Renal and Cardiovascular Outcomes. *Clinical Kidney Journal*, 7(4), pp:348-353.

S Maria Awaluddin, Noorani Ahmad, Balkish Mahadir Naidu, Mohd Kamal Ariff Abdul Ghani. (2017). Prevalence of non-steroidal anti-inflammatory drugs (NSAIDs) use in Malaysian adults and associated factors: A population-based survey'. *Malaysian Journal of Public Health Medicine* 17(3), pp:58-65.

Salman Imtiaz, Kiran Nasir, Murtaza F Dhrolia, Aasim Ahmad, Mehwish Hussain, Nasir Abbas. (2015). Mortality Trend among Hemodialysis Patients during the Islamic Month of Ramadan: A 24 Years Retrospective Study. *Journal of the College of Physicians and Surgeons Pakistan*, 25(3), pp:189-192.

Shadia Hassan, Fadi Hassan, Nur Abbas, Khaled Khazim. (2018). Does Ramadan Fasting Affect Hydration Status and Kidney Function in CKD Patients? *Annals of Nutrition and Metabolism*, 72(3), pp: 241-247.

Yasser ELSayed Matter, Hussein A Sheashaa, Ayman F Refaie. (2018). Effect of Ramadan Fasting on Patients with different Kidney Diseases: An Updated Review. *Journal of The Egyptian Society of Nephrology and Transplantation*, 18(1), pp:1-5.