

The effect of Ramadhan fasting on kidney function among elderly patients

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Abstrak

Sejalan dengan makin meningkatnya usia harapan hidup, diperkirakan akan terdapat 15 juta orang usia lanjut di Indonesia. Sebagian besar dari mereka masih bersemangat untuk berpuasa di bulan Ramadhan. Padahal umumnya telah terjadi penurunan kapasitas cadangan fungsional, berkurangnya sensasi rasa haus dan multipatologi. Berkurangnya rasa haus akan menempatkan pasien usia lanjut dalam situasi yang berbahaya, terutama dehidrasi yang akan makin menurunkan fungsi ginjal. Tujuan penelitian ini adalah untuk mengetahui pengaruh asupan cairan selama puasa Ramadhan terhadap fungsi ginjal pasien geriatri. Empat puluh dua pasien geriatri berusia 60 tahun ke atas dengan CCT ≥ 25 ml/menit berpartisipasi dalam penelitian ini dan diperiksa fungsi ginjalnya dengan klirens kreatinin hitung (CCT) sebanyak 5 kali: 7 hari sebelum puasa, hari ke-7, 17 dan 28 puasa, dan 14 hari setelah berpuasa Ramadhan. Klirens kreatinin menurun secara bermakna pada hari ke 7 dan 17 Ramadhan, tetapi tidak menimbulkan gangguan klinis. Namun, fungsi ginjal justru membaik pada hari ke 28 Ramadhan dan hari ke 14 setelah Ramadhan. Kategori klinis berdasarkan nilai CCT (< 20 ; 20-30; 30-50 dan > 50 ml/menit) menunjukkan adanya kecenderungan perbaikan selama berpuasa. Disimpulkan bahwa tidak ada gangguan fungsi ginjal pada pasien usia lanjut yang menjalani puasa Ramadhan selama asupan cairan mencukupi.

Abstract

During the Ramadhan month, every Moslem is expected to abstain from eating and drinking between dawn to sunset, averaging 15 hours daily. Regardless of their declining functional capacity, changes in body homeostasis, diminished thirst sensation and multiorgan insufficiency, elderly people in Indonesia still have great motivation to do fasting. Diminished sensation of thirst will put them in difficult and possibly harmful situation, particularly dehydration which can lead to further declining of kidney function. Prospective self-controlled study was conducted in outpatient geriatric clinic, Cipto Mangunkusumo National Hospital, Jakarta, to evaluate the effect of Ramadhan fasting on kidney function in elderly patients. Forty two elderly people, aged 60 years or more with creatinine clearance (CCT) of ≥ 25 ml/minute were recruited in this study. Kidney function manifested by CCT was examined 5 times: 7 day before fasting; day-7, 17 and 28 of Ramadhan fasting; and 14 days after fasting. Kidney function significantly declined on the 7th and 17th day of Ramadhan without apparent clinical deterioration. However, on the 28th day, kidney function improved. Even, 14 days after Ramadhan, improvement of kidney function was evident. Clinical classification based on CCT level (< 20 ; 20-30; 30-50, and > 50 ml/minute) showed a tendency of improvement during fasting.

Keywords: Ramadhan fasting, kidney function, elderly patient

Fasting during the month of Ramadhan, the ninth month of the Islamic calendar, is obligatory for every Moslem, except those who have yet to come of age, those suffering from serious diseases and the older people. Fasting in Ramadhan month means: to abstain from eating and drinking between dawn and sunset, averaging 15 hours daily.¹

It is estimated that the number of older people in Indonesia will be 15 million by the year 2000. As most of them are Moslems, fasting among older people will also increase regardless of their declining functional capacity, changes in body homeostasis, diminished thirst and multiorgan insufficiency.^{2,3,4} Diminished sensation of thirst will put an older subject in difficult and possibly harmful situation, particularly dehydration which can lead to further declining of kidney function.

There are numerous studies on biochemical as well as hematologic changes that accompany Ramadhan fasting.^{5,6,7,8} However, the effect of Ramadhan fasting on the kidney function among elderly people has not

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been studied. Therefore the purpose of this study was to evaluate the intake of liquid during fasting and its effect on kidney function among elderly people.

METHODS

This study was conducted from November 1997 to February 1998 at the Geriatric Outpatient Clinic, Department of Internal Medicine, Cipto Mangunkusumo National General Hospital, Jakarta.

Forty two patients of both sexes (25 males, and 17 females) aged 60 to 79 years, with high motivation and intention to do fasting during Ramadhan were recruited in this study. The patients were in stable condition, good cognitive function, no acute infection and with creatinine clearance (CCT) of ≥ 25 ml/minute. Drugs known to alter body water such as diuretic, non steroidal antiinflammatory, corticosteroid as well as nephrotic drug such as aminoglycoside, were prohibited during the study. All the selected patients signed their informed consent to the study.

It was a self-controlled cohort study where the patients were observed for five times : seven days prior to Ramadhan fasting; the 7th, 17th, 28th day of Ramadhan; as well as 14 days after Ramadhan.

Each patient was given 3 similar glasses of 200 cc each for drinking and for measuring any liquid from other sources of fluid they consumed daily. Each patient had to record every liquid intake they consumed the whole day.

Daily liquid intake and creatinine clearance were taken as study parameters. The data were collected at each visit (at 9.00 - 11.00 am) before, during and after Ramadhan, through gathered information about illness and liquid intake (record and recall), complete physical examination, and examination of blood samples for creatinine.

The SPSS soft ware version 6 was used for data analysis. Changes of liquid intake and CCT from the first through the fifth measurements were analysed by ANOVA repeated measure. Correlation between liquid intake and CCT was tested by correlation table analysis. The changes of kidney function represented by CCT were clinically evaluated and presented descriptively according to CCT level (<20 ; 20-30; 30-50 and > 50 ml/min). Data were presented as mean \pm SD and p value of < 0.05 was considered statistically significant.

RESULTS

Of the 42 subject participating in this study, two were unintentionally dropped out. One suffered from acute respiratory infection and diarrhea, another discontinued the test on the fourth visit to perform Umroh Pilgrimage. It means that 41 patients completed the entire study. Among them, 34 patients performed a complete-month fasting; while one did not fast one day due to missing early breakfast; one cancelled fasting for 2 days in the fourth week of Ramadhan because of the weak condition; four of them stopped fasting for 1, 4, and 5 days in the last week of Ramadhan because of respiratory tract infection and were unable to fast for 3 days in the middle of Ramadhan due to diarrhea. None stopped fasting due to the deterioration of kidney function.

Most of the patients (83.72 %) had liquid intake as needed (30 ml/kgBW/day), while 16.28% consumed more. The amounts recorded on total patients during the five visits were 48.8 ± 13.3 ; 42.8 ± 11.1 ; 45.1 ± 9.2 ; 45.6 ± 9.9 ; and 49.1 ± 12.3 ml/kgBW/day. There were a slight but statistically significant changes in daily liquid intake from the first to the fifth observation. When the data are splitted into male and female subgroups, a significant decrease of liquid intake at the beginning of Ramadhan was observed in both sexes, but, in female subgroup, it regained the basal value at the middle and the end of Ramadhan (Figure 1).

Figure 2 depicted the influence of Ramadhan fasting on kidney function as indicated by CCT. The CCT was significantly declined on the 7th and 17th day of fasting. Nevertheless, it did not result in clinical impediment. On the 28th day, the CCT value regained the basal level. Interestingly, the kidney function was significantly improved 14 days after fasting as indicated by a highly significant increase of CCT.

Table 1 shows the number of patients undergoing clinical category changes of CCT, in which there was significant improvement at the end of- and after fasting.

Table 2 indicates the correlation between liquid intake and CCT in which correlation table analysis revealed significant improvement of CCT when liquid intake is > 30 ml/kg BW/day ($r = 0.327$; $p = 0.000037$), and no significant improvement of CCT when liquid intake is < 30 ml/kg BW/day ($r = 0.3829$; $p = 0.245$).

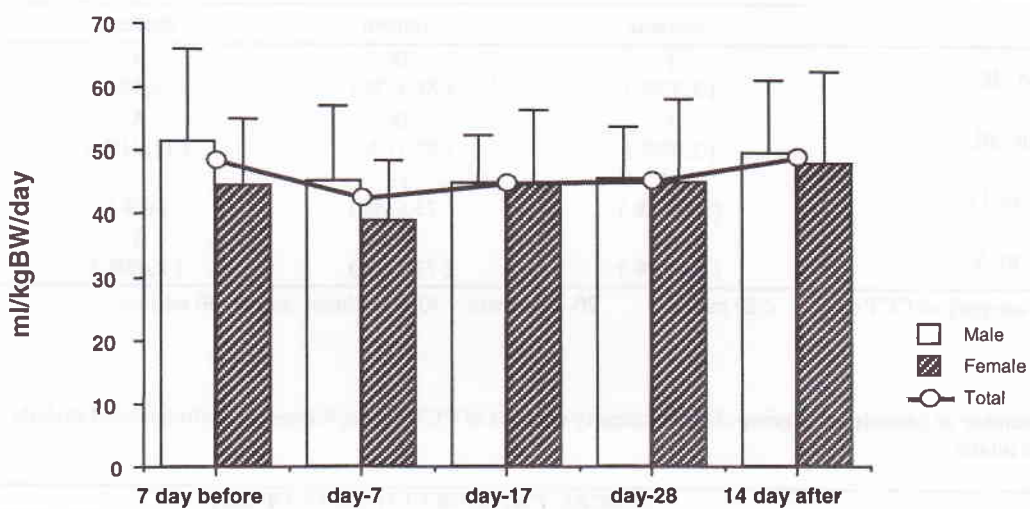


Figure 1. Liquid intake in elderly patients before, during and after Ramadhan fasting.

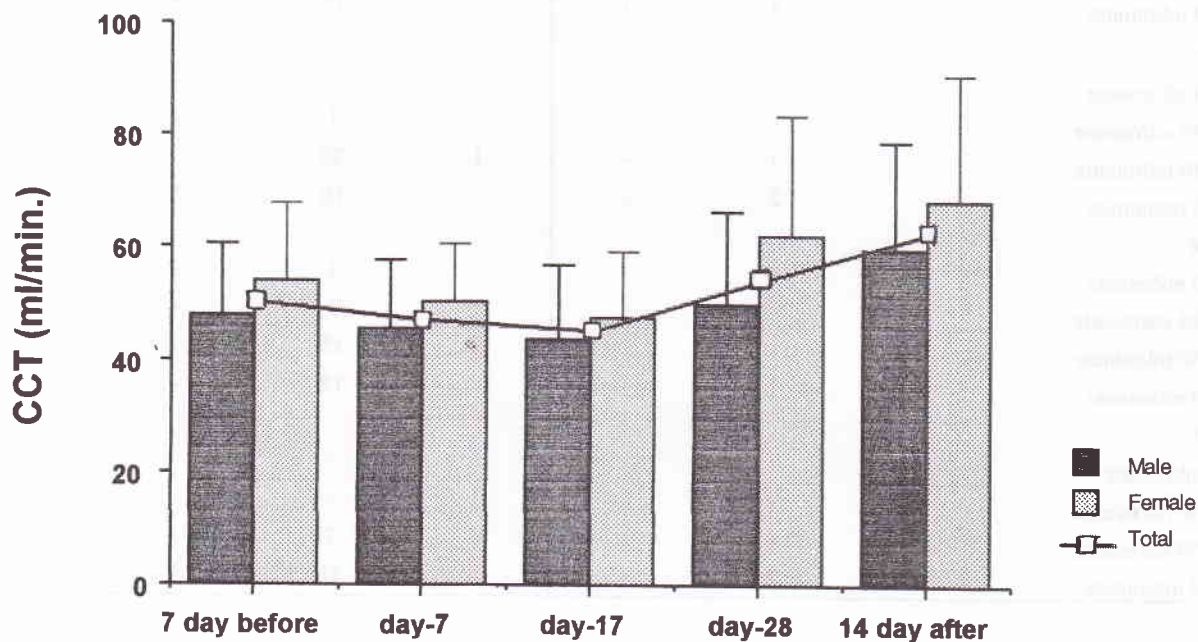


Figure 2. Creatinin clearance (CCT) in elderly patients, before, during and after Ramadhan fasting

Table 1. The number of patients undergoing clinical category changes of CCT (increase, remain, decrease) during Ramadhan fasting

PERIODS	CLINICAL CATEGORY CHANGES OF CCT		
	increase	remain	decrease
I to II	1 (2,33%)	38 (88,37%)	4 (9,3%)
II to III	1 (2,38%)	36 (85,71%)	5 (11,91%)
III to IV	10 (24,39%)	31 (75,61%)	- (0%)
IV to V	10 (24,39%)	30 (73,12%)	1 (2,49%)

Note: Clinical category of CCT used : < 20 ml/min, 20-30 ml/min, 30-50 ml/min and ≥ 50 ml/min

Table 2. The number of patients undergoing clinical category changes of CCT during Ramadhan fasting related to daily liquid intake

Examination	CLINICAL CATEGORY CHANGES OF CCT					
	fluid intake < 30 ml/kgBW/day			fluid intake ≥ 30ml/kgBW/day		
	increase	remain	decrease	increase	remain	decrease
● CCT value						
I → II						
● < 20 ml/minute	-	-	-	-	-	-
● 20-30 ml/minute	-	-	-	1	2	-
● 30-50 ml/minute	-	2	-	-	16	-
● ≥ 50 ml/minute	-	1	1	-	16	3
II → III						
● < 20 ml/minute	-	-	-	-	-	-
● 20-30 ml/minute	-	-	-	-	1	1
● 30-50 ml/minute	-	1	-	1	20	1
● ≥ 50 ml/minute	-	2	-	-	10	5
III → IV						
● < 20 ml/minute	-	-	-	-	1	-
● 20-30 ml/minute	-	-	-	1	1	-
● 30-50 ml/minute	1	-	-	9	15	-
● ≥ 50 ml/minute	-	1	-	-	12	-
IV → V						
● 20 ml/minute	-	-	-	1	-	-
● 20-30 ml/minute	-	-	-	1	-	-
● 30-50 ml/minute	-	-	-	8	7	-
● ≥ 50 ml/minute	-	2	-	-	21	1

DISCUSSION

The study has tried to find out whether Ramadhan fasting has influenced liquid intake in geriatric patients due to the decrease of thirst sensation and

limited time for drinking. According to previous investigation, there is a deficit in thirst and intake in healthy older men, as compared to the younger ones, although vasopressin responsiveness was maintained or even increased.⁴ Weinberg mentioned that liquid

intake requirement in the elderly should be at least 30 ml/kg BW/day.⁹ In this study, the liquid intake during Ramadhan fasting decreased compared to that before Ramadhan, but the amount was still sufficient (> 30 ml/kg BW/day). This may explain why kidney function was not clinically deteriorated during fasting, although statistics showed a significant decrease of CCT during the first two weeks of Ramadhan.

Theoretically, kidney function is influenced by advancing age. A cross-sectional analysis of individuals aged 20 to 80 years old confirmed a decrease of about 10 percent per decade.¹⁰ The ability to respond to internal and external stresses becomes less robust, and the likelihood of failure increases with advancing age. This study showed that kidney function was statistically affected by age but again was clinically insignificant. It might be related to the sufficient liquid intake, and relatively good kidney function (CCT > 25 ml/minute) before fasting.

It was assumed that the fasting would decrease creatinine clearance in those patients, since the appetite and thirst sensation diminished, resulting in a decline in food consumption and liquid intake,^{4,11} even after ending the fasting. This could influence the kidney function which had been already changed due to aging. It is observed that kidney function decreased in the first and second week, but surprisingly, it improved in the last two weeks of examination, even to higher level than before fasting. The cause of this improvement is not fully understood, but adaptation mechanism or excessive compensation could be the possible explanation. Unfortunately, we didn't examine the kidney function in a longer period of time to observe whether this phenomenon is reversible or not. Further investigation is needed to answer this question.

Dehydration is the commonest cause of fluid and electrolyte disturbance in the elderly. Reduced thirst and fluid intake in the presence of physiologic need and diminished water conservation by kidney may be the two important contributing factors. Several authors have noted reduced thirst in the elderly and may be particularly important in predisposing to dehydration. Phillips, et al (1984) reported that there is a deficit in thirst and water intake in healthy elderly men after 24 hours of water deprivation as compared with younger men.⁴ Our study showed that the subjects consumed much more than daily elderly

liquid intake requirement (> 30 ml/kgBW/day) following 13 hours fasting which meant that no actual water deprivation. This might have kept kidney function in good condition. A study comparing thirst sensation in elderly with that in young control group under similar physiologic condition is needed.

The daily liquid intake in our study is greater than what is mentioned in the data of available western literature. It is possibly due to the tropical climate in Indonesia which causes increasing evaporation leading to greater amount of liquid consumption. But, there have been no data about daily liquid intake requirement in elderly people in Indonesia.

Based on the above results, we conclude that : (1) Ramadhan fasting does not affect the liquid intake, even surprisingly, the average intake still meets the basal requirement. (2) There is no impairment of kidney function during Ramadhan fasting provided that CCT before fasting is > 25 ml/minute.

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