



Alterations in anthropometric parameters, proteinous compounds and electrolytes during Ramadan fasting in overweight subjects

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ABSTRACT

The study was conducted to observe the effect of intermittent fasting during Ramadan on anthropometric parameters, proteinous compounds and electrolytes during Ramadan fasting in overweight subjects (BMI 25-29.9).

The anthropometric parameters, serum proteinous compounds (total proteins, albumin, creatinine and urea) and serum electrolytes levels were analyzed in 30 apparently healthy overweight subjects two days prior to Ramadan fasting and one day after Ramadan. The body weight and BMI was statistically significantly decreased at the end of Ramadan fasting in overweight females than males. The blood pressure was not affected significantly in both the groups. The total protein concentration in both overweight males and females was significantly reduced whereas the serum albumin concentration was significantly increased. The serum creatinine and urea concentration was increased non significantly. There was significant increase in serum Na⁺ concentration in overweight females as compared to males. The K⁺ and Cl⁻ concentration was significantly decreased in both the groups. It appears that the holy month of Ramadan fasting is not harmful to health. It is beneficial and a blessing for overweight and obese individuals if calorie restriction be followed strictly for a healthy lifestyle.

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INTRODUCTION

Ramadan is the ninth month of the lunar calendar observed each year by more than one billion Muslims worldwide. Muslims abstain from eating, drinking, smoking from sunrise to sunset. The time of observance differs each year because it is a lunar calendar and fasting from dawn to sunset occurs at a period that varies with geographical site and season. In summers the fast could last up to eighteen hours or even more.

During Ramadan, Muslims eat just two meals each day for a month. The first is taken just prior to the commencement of the daily fast and the other is taken immediately after the evening prayer after sunset. Constant restriction on the eating and drinking schedule may

have an effect in the body biochemical and physiological functions.

Food habits change during Ramadan when meals are taken two times. Overall the total daily amount of food intake decreases. Therefore, it has anthropometric, physiological effects, metabolic and endocrine changes on the human body (1).

In the present study we tried to evaluate and compare the effects of intermittent Ramadan fasting on blood pressure, waist circumference, BMI, body weight, proteinous compounds and electrolytes on apparently healthy overweight males and females.

MATERIAL AND METHODS

The study was conducted during the month of Ramadan on apparently healthy overweight (BMI 25-29.9) individuals during the year 2013. Informed consent was taken from the subjects who participated in this study and who fasted during the entire holy month of Ramadan with average duration of fasting of 15- 16 hours. Fasting venous blood samples were obtained from each subject at the beginning and end of Ramadan. The subjects 15 males and 15 females were aged between 20- 50 years and belonged to a higher socio-economic class. They were found to be apparently healthy on general medical examination and none were receiving any medication affecting the study parameters.

Subjects having hypertension, diabetes, hypothyroidism, obesity, pregnancy, smokers, alcoholics were excluded from the study.

Body weight, waist circumference, BP, BMI was measured two times. Pre Ramadan (2 days prior to the beginning of Ramadan) and post Ramadan (one day after Ramadan). Blood samples were analyzed for total proteins, albumin, creatinine, urea, sodium, potas-

sium, chlorides. The parameters were measured using ERBA kits on fully automatic analyzer. Electrolytes were measured on flame photometer.

Anthropometric measurements were performed on subjects in light clothing without shoes. Height was measured to the nearest 0.5 cm and body weight was measured on a level balance calibrated daily and recorded to the nearest 0.1 Kg. Body mass index (BMI) was calculated as weight (Kg) divided by height (m²). The right arm was used to measure blood pressure twice 5mins apart by the same observer and the average value was calculated. The waist circumference was measured at the narrowest point between the highest point of iliac crest and the lower costal margin by the same observer.

The statistical analysis was performed using standard software version. Quantitative data were reported as mean \pm standard deviation and compared using one tailed students 't' test. A probability level of $p < 0.05$ was considered statistically significant.

RESULT

TABLE 1 : Anthropometric data in middle aged overweight males

Parameters	Pre-Ramadan (n=15)	Post-Ramadan (n=15)	p-value
BMI (Kg/m ²)	27.45 \pm 3.018	26.88 \pm 2.89	0.07
Body weight (Kg)	84.75 \pm 11.606	82.89 \pm 13.02	0.05
Waist circumference (cm)	95.85 \pm 18.596	96.78 \pm 7.836	0.414
Systolic B.P (mmHg)	125.28 \pm 16.84	123.14 \pm 10.98	0.31
Diastolic B.P (mmHg)	84.428 \pm 12.06	86.286 \pm 5.58	0.278

TABLE 2 : Anthropometric data in middle aged overweight females

Parameters	Pre-Ramadan (n=15)	Post-Ramadan (n=15)	p-value
BMI (Kg/m ²)	28.61 \pm 3.08	28.03 \pm 3.463	0.048
Body weight (Kg)	72.392 \pm 9.494	71.81 \pm 9.789	0.027
Waist circumference (cm)	104.23 \pm 18.09	98.15 \pm 8.596	0.133
Systolic B.P (mmHg)	119.30 \pm 8.73	119.07 \pm 7.86	0.434
Diastolic B.P (mmHg)	77.53 \pm 6.95	77.076 \pm 6.873	0.29

TABLE 3 : Changes in proteinous parameters in middle aged overweight males

Parameters	Pre-Ramadan (n=15)	Post-Ramadan (n=15)	p-value
Total proteins (gm/L)	7.33 \pm 0.481	7.052 \pm 0.454	0.05
Serum Albumin (gm/L)	4.065 \pm 0.16	4.360 \pm 0.192	0.00062
Serum Creatinine(mg%)	1.128 \pm 0.23	1.178 \pm 0.19	0.265
Blood urea (mg %)	26.44 \pm 6.55	27.55 \pm 6.87	0.339

DISCUSSION

In overweight males and females the decrease in

body weight might be attributed to efficient utilization of body fat during fasting^[2]. It has also been reported that overweight persons lose more weight than normal or

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TABLE 4 : Changes in proteinous parameters in middle aged overweight females

Parameters	Pre-Ramadan (n=15)	Post-Ramadan (n=15)	p-value
Total proteins (gm/L)	7.229±0.555	7.0284±0.609	0.188
Serum Albumin (gm/L)	3.285±0.159	4.208±0.20	0.0005
Serum Creatinine(mg%)	0.866±0.11	0.891±0.088	0.266
Blood urea (mg %)	24.04±6.61	21.59±4.77	0.13

TABLE 5 : Changes in serum electrolyte levels in middle aged overweight males

Parameters	Pre-Ramadan (n=15)	Post-Ramadan (n=15)	p-value
Na+	136±2.445	138±1.8	0.006
K+	4.10±0.45	4.21±0.293	0.292
Cl ⁻	114.7±4.44	105.7±2.069	0.00052

TABLE 6 : Changes in serum electrolyte levels in middle aged overweight females

Parameters	Pre-Ramadan (n=15)	Post-Ramadan (n=15)	p-value
Na+	136.6±3.22	138.8±1.12	0.016
K+	4.32±0.56	4.07±0.3	0.095
Cl ⁻	112.6±4.35	107±1.43	0.002

underweight subjects during Ramadan fasting^[3]. In our study TABLE 1, 2 the body weight and BMI was statistically significantly decreased at the end of Ramadan fasting in both overweight males and females. The blood pressure was not affected significantly in both the groups. This may be influenced by the socio economic status, the altered sleep pattern, activity, eating pattern, hydration status as all had a sedentary life pattern.

In our study TABLE 3, 4 comparing the non fasting period the total protein concentration in both overweight males and females was significantly reduced whereas the serum albumin concentration was significantly increased^[4]. This can be due to over expression of certain hormones during prolonged fasting. This amino acid surge is usually caused by the need to compensate through gluconeogenesis the deficit in glucose in peripheral tissues^[5].

The serum creatinine and urea concentration was increased non significantly. This may be caused due to slight dehydration due to abstinence from drinking water during the fasting period resulting in fall in diuresis and rise in urea in blood. Also ammoniac discharge following desamination of certain amino acids used in glu-

coneogenesis may be the cause of an intense synthesis of hepatic urea^[6]. rise in serum creatinine can be due to absence in protein mobilization and / or low renal clearance^[7]. Creatinine does not depend only on the glomerular filtration but also on certain food substances rich in meat products whose consumption increases during this month^[1].

TABLE 5,6 in our study shows that there was significant increase in serum Na⁺ concentration in overweight females as compared to males. The K⁺ and Cl⁻ concentration was significantly decreased in both the groups. Body responds to intermittent fasting depending upon metabolism and physiology of nutritional ketosis. Na⁺ and Cl⁻ being most important extracellular electrolyte present in highest concentration and maintained in narrowest range. K⁺ is low outside the cell and high inside. Constant restriction on drinking schedule during Ramadan may result in blood getting more concentrated, the concentration of Na⁺ and other ions and urea rises. The kidneys maintain the concentration of solutes in blood plasma to maintain osmolarity. Na⁺ is most important in regulating kidney functions, besides sodium other important molecules to maintain osmolarity by kidneys is urea. The kidneys try to maintain osmolarity constant by retaining as much as they can of water present in blood.

CONCLUSION

In conclusion it appears that the holy month of Ramadan fasting is not harmful to health. It is beneficial and a blessing for overweight and obese individuals if calorie restriction be followed strictly for a healthy lifestyle. The limitation of our study is that dietary habits and restriction could not be followed; the volunteers were free to eat what they liked.

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