Journal of Nutrition & Food Sciences
ISSN: 2155-9600

Agoumi et al., J Nutr Food Sci 2013, 3:5
DOI: 10.4172/2155-9600.1000220

Research Article Open Access

The Assessment of the Follow-Up of Muslim Population during the Period of Ramadan

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Abstract

Background: The main aim of this report is to assess the changes in the state of health and the nutritional status of individuals, with regards to Ramadan and the effect of this particular diet on the human body.

Methods: The relevant clinical information, nutritional status and the changes which occur during Ramadan were recruited for every individual .The follow-up of persons started in the pharmacy shop 10 days prior Ramadan and finish's 10days afterwards. Biochemical and anthropometrical parameters were evaluated for each person.

Results: The following anthropometrical parameters including weight, waist, hip and abdomen perimeter decreased due to fasting in Ramadan. Cholesterol levels decreased during study period. Triglyceride and blood glucose FBS increased. Blood pressure decreased, otherwise heart rate increased. There were statistically changes in those parameters. (p<0,05)

Conclusion: Ramadan fasting causes no detrimental effect on health in healthy subjects. In fact, it reduces weight and may cause improvements in cholesterol levels and blood pressure.

Keywords: Ramadan fasting; Weight; Blood Pressure; Cholesterol; Triglycerides

Introduction

Ramadan fasting is one of the 5 pillars of Islam and one of the most significant ibadat (worships) of Islam [1]. Throughout the world, millions of Muslims fast during Ramadan to fulfill this religious obligation. Because the lunar calendar determines the month of Ramadan and is about 11 days shorter than the solar year, Ramadan is not fixed to any season. The timing of daily fasting varies from country to country and with the season in which the month of Ramadan falls. Thus, depending upon the season and the geographical position of the country, the length of the fast varies from 12 to 19 hours per day [2]. During Ramadan, Muslims abstain from food and drink from dawn until sunset.Traditionally the practice is to eat 2 meals, 1 before dawn, suhore, and 1 just after sunset, iftar. Often Muslims eat a greater variety of foods in their meals during Ramadan than in other months. As a result, the Ramadan fast provides an excellent opportunity to study the effects of various diets on the human body and can serve as an excellent research model for metabolic and behavioral studies [2]. Ramadan fasting and starvation are not synonymous. Many physiological and psychological changes take place during Ramadan, most probably due to the changes in eating patterns, eating frequency and sleep patterns [3]. The aim of this study is to assess the changes in the state of health and the nutritional status of individuals during the period of Ramadan.

Methods

A cohort study was conducted on health of 55 healthy subjects during Ramadan of 2012 (21st July to 19th August 2012), Islamic year 1433 Hijra. They indicated that they were going to fast during this month. This activity takes place in the pharmacy shop 10 days before Ramadan and finished 10 days afterwards, so the follow-up lasted for 50 days. Following parameters were measured each 10 days for healthy volunteers including: blood pressure (maximal diastolic blood pressure and minimal systolic blood pressure), heart rate and blood glucose (Fasting Blood Sugar), total cholesterol and triglycerides. The anthropometric variables including: weight, body- mass index, waist, hip, hip waist index, proportion of muscle mass, fat proportion and water proportion. In total 330 measurements were done for each person (15 parameters, 6 times).

A measuring tape A special electronic scale "Medisana" (made by Brand in Meckenheim, Germany), were used for body analysis functionalities (water, fat, muscle mass), digital wrist and hand devices; A multifunction analysis device "multicare" (made by prima in Palermo, Italy) were applied for measurements. For data processing, Microsoft word applications have been used, as well as the statistical programme (stat graphics plus 4.0). Quantitative data were reported as mean ± standard deviation and compared using the paired two-tailed student's test. A probability level of <0,05 was considered statistically significant.

Results

The effect of Ramadan fasting on the state of health and nutritional status was studied on 55 healthy volunteer's (whose ages vary between 18 and 70 years out of which 60% are women and 40% are men). All the parameters of the volunteers in the 10 days before first day, 10th, 20th, last day of Ramadan and 10 days after the end of Ramadan were further studied and compared. We evaluated anthropometric parameters as body weight, body mass index, waist, hip, waist hip index, abdomen perimeter, water proportion, Fat proportion and muscle mass proportion, we also evaluated blood parameters as blood

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Received April 23, 2013; **Accepted** July 21, 2013; **Published** July 23, 2013

Citation: Agoumi A, lopez MJO, Martinez FM, de la Serrana HLG (2013) The Assessment of the Follow-Up of Muslim Population during the Period of Ramadan. J Nutr Food Sci 3: 220. doi:10.4172/2155-9600.1000220

glucose FBS, cholesterol levels, triglycerides and systolic and diastolic blood pressure and pulse rate. We observed significant decrease in the following anthropometric parameters: weight, body mass index, waist, hip, abdomen perimeter ($p<0,05$). In our study, there was also a significant reduction in cholesterol levels and systolic and diastolic blood pressure ($p<0,05$). On the other hand, triglyceride levels and glucose concentration increased significantly ($p<0,05$). There was no significant change for waist- hip index, water proportion, fat proportion and muscle mass proportion.

The anthropometric parameters weight, body mass index, waist, hip decreased by 10th Ramadan and also between 10th and 20th Ramadan ($p<0,05$). 10 days after Ramadan, those parameters had a trend to recoup to pre-Ramadan status. However, they were still lower than he pre-Ramadan values. The abdomen perimeter decreased by all the periods of this study. A reduction in the cholesterol levels was observed at the end of the period study, especially between the 20th Ramadan and 10 days after Ramadan. Triglycerides increased significantly between the last day of Ramadan and 10 days after. Systolic and diastolic blood pressure increased statistically, otherwise the pulse rate decreased.

Also in the period of Ramadan strong positive correlations (pearson coefficient r vary between 0 and 1, p-values below 0,05 at the 95% confidence level) have been deduced among the following parameters: (Glucose concentration, hip-waist index); (hip, waist); (hip, body-mass index); (hip, fat proportion); (hip, abdomen perimeter); (Hip, weight); (waist, waist-hip index); (Waist, body-mass index); (Waist, fat proportion); (Waist, abdomen perimeter); (Waist, weight); (Waist-hip index, abdomen perimeter); (Waist–hip index, weight); (Body-mass index, muscle-mass proportion); (Body-mass index, abdomen perimeter); (Fat proportion, abdomen perimeter); (abdomen perimeter, weight); (Minimal blood pressure, maximal blood pressure) At the same time, strong negative correlations (Pearson coefficient r vary between -1 and 0, p-values below 0,05 at the 95% confidence level) have been deduced during Ramadan, among the following parameters: (hip, water proportion) (Hip, muscle-mass proportion); (Waist, water proportion); (Waist, muscle mass proportion); (Waist-hip index, body–mass index); (Body-mass index, water proportion); (Body-mass index, muscle-mass proportion); (Water proportion, fat proportion); (Water proportion, abdomen perimeter); (Water proportion, weight); (Muscle-mass proportion, abdomen perimeter); (Muscle-mass proportion, abdomen perimeter); (Muscle–mass proportion, Weight).

Discussion

In this study, we conclude a reduction in body weight and anthropometric parameters like: the body mass index, waist, hip, abdomen perimeter. Similarly, many studies have reported weight loss during the month of Ramadan fasting. In one study [4], it has been observed that lipid intake of muslim during the Ramadan period was excessive (48% of total energy), by decreasing hydrocarbons and particularly proteins. This was highlighted by means of the anthropometrical study observing a decrease in measurements such as muscular area of the arm, the arm area, the muscle perimeter of the arm and weight with an increase in arm fat perimeter of the arm, leg and mid–leg circumference in the muslim group, which are in contrast with parameters in the non-muslim group. One weight loss of 1.7 kg [5], 1.8 kg, 2.0 kg [6] and 3.8 kg [7] has been reported in normal weight individuals after they have fasted for the month of Ramadan. The body has regulatory mechanisms that activate during fasting. There is efficient utilization of fat [8] and basal metabolism slows down during fasting [8] contrary to the popular thinking.In contrast to this, one Saudi arabian study reported weight gain during Ramadan [9] and still others did not find any significant change in body weight [8,9]. In one study among healthy males, a significant reduction of skinfold thickness was reported during Ramadan fasting [10]. A study of Tunisian women suggested that increased fat oxidation during Ramadan fasting results in an adaptive mechanism for body weight maintenance [8]. In one study that was over represented by females, no change in bodyweight was seen, it has also been reported that overweight persons lose more weight than normal or underweight subjects [6]. The amount of energy (calorie) intake has been reported in some of the literature, indicating a decrease in energy in take [11,12]. Our observation of decreases in systolic and diastolic blood pressure is supported by the findings of [13]. The body has regulatory mechanisms that activate during fasting. There is efficient utilization of fat [7] and basal metabolism slows down during fasting [8]. The significant reduction in cholesterol levels occurred despite the fact that tendency to consume. Fried foods were increased during Ramadan. Consumption of increased fried foods suggests a higher intake of fats as compared to non Ramadan days. It appeared as if the quality and quantity of fat intake in Ramadan govern blood cholesterol level. In another study suggested that feeding behavior occurs during Ramadan beneficially affects serum apolipoprotein metabolism and may contribute to prevention of coronary heart disease [13]. Examined the relation of fasting to coronary events and found that the number of cases with acute coronary heart disease events were significantly lower in Ramadan than before or after Ramadan. Some studies in the Eastern Mediterranean area have indicated improved high density lipoprotein [HDL] cholesterol during Ramadan fasting [14,15]. More studies show no change or a slight decrease in concentrations of total cholesterol [16-18]. Increase in total cholesterol levels during Ramadan seldom occurs [19] as in healthy persons [3,7]. Few studies have reported increases in high-density lipoprotein [HDL] cholesterol in diabetics during Ramadan [20,21]. One report indicates an increase in low density lipoprotein [LDL] cholesterol and a decrease in HDL cholesterol [12]. The significant elevated serum triglycerides may be attributed to the lipolytic effect of prolonged fasting and this was in line with study [22] that observed increase in serum TG levels at the end of fasting. Other studies show no change or a slight decrease in concentration of triglicerides [16-18]. Our analysis found that a significant increase in serum glucose concentration in Ramadan, among our subjects all of them fall within physiological limits [23,24]. Few studies have shown the effect of Ramadan fasting on serum glucose [4,25-27]. A slight decrease of serum glucose concentration was observed in the first day of Ramadan followed by normalization by the [20th] day and a slight rise by the 29th day of Ramadan. It has been found that a slight decrease in serum glucose occurs in normal adults a few hours after fasting has begun.However the reduction in serum glucose concentration due to increased gluconeogesis in the liver, this occurs because of a decrease in insulin concentration and a rise in glucagons and sympathetic activity [5]. Other studies have shown an increase [27] or variation in serum glucose concentration, but all of them fell within physiological limits [25]. From the studies before one may assume that the stores of glycogen, along with some degree of gluconeogenesis, maintain normal limits of serum glucose when a fast follows a large pre- dawn meal. However slight changes in serum glucose may occur in individuals depending on habits and individual differences in metabolism and energy regulation (Tables 1,2 and Chart 1).

Conclusion

Ramadan fasting contributes to reduce the weight and anthropometric parameters. It also appears to have beneficial effect

PARAMETERS	10days Before Ramada	First day of Ramadan	10th day of Ramada	20 day of Ramadan	last day of ramadan	10 days after Ramadan	the average rate of change %	Pvalue
Weight (kg)								
Mean ± SD	77.76 ± 15,34	77.45 ± 15,21	76.95 ± 15,04	76.65 ± 15,21	76.67 ± 15,08	76.81 ± 14,81		
Changes during study		-0.40	-0.65	-0.38	0.01	0.18	-0.24	0
Body Mass Index (kg / m2)								
Mean ± SD	29,45 ± 6,01	29,34 ± 6,01	29,14 ± 5,90	29,02 ± 5,89	29,02 ± 5,83	29 ,09 ± 5,81		0
Changes during study		-0,38	-0,67	-0,42	0,00	0,OO	0,25	
Waist (cm)								
Mean ± SD	101,63 ± 12,00	100,93 ± 11,91	100,15 ± 11,63	99,56 ± 11,55	99,36 ± 11,24	99,69 ± 11,24		0
Changes during study		0,70	-0,77	-0,58	-0,20	0,33	0,38	
Hip (cm)								
Mean ± SD	108,5 ± 10,08	107,62 ± 9,66	106,95 ± 9,57	106,32 ± 9,48	106,2 ± 9,19	106,40 ± 9,22		0
Changes during study		-0,82	0,63	-0,57	-0,12	0,19	0,39	
Waist Hip Index								
Mean ± SD	0.935 ± 0,05	0.936 ± 0,05	0.935 ± 0,05	0.935 ± 0,05	0.934 ± 0,05	0.936 ± 0,05		0 ,98
Changes during study		0.10	-0.13	0.001	-0.07	0.15	0.01	
Abdomen perimeter Mean ± SD	94.50 ± 12,04	93.94 ± 11,85	92.87 ± 11,64	92.61 ± 11,44	92.42 ± 11,31	92.29 ± 11,16		
Changes during study Water Proportion (%)		-0.59	-1.14	-0.27	-0.21	-0.14	0.47	0
Mean ± SD	48.58 ± 11,32	48.35 ± 10,88	46.43 ± 12,38	48.02 ± 11,15	48.11 ± 12,47	47.58 ± 12,18		0.45
Changes during study Fat proportion (%)		-0.47	-3.98	3.44	0.18	-1.12	-0.41	
Mean ± SD	30.27 ± 10,98	30.26 ± 10,39	32.11 ± 11,90	30.71 ± 10,87	30.54 ± 12,02	31.19 ± 11,64		0 ,41
Changes during study Muscule mass proportion(%)		-0.047	6.13	-4.36	-0.55	2.11	0.59	
Mean ± SD	40.27 ± 5,16	40.21 ± 5,01	39.04 ± 5,91	39.76 ± 5,41	40.16 ± 5,79	39.66 ± 5,70		0. 38
Changes during study		-0.13	-2.92	1.84	1.00	-1.25	-0.30	
Cholesterol (mg /dl) Mean ± SD	2.28 ± 0,51	2.06 ± 0,32	2.34 ± 0,37	2.37 ± 0,44	2.31 ± 0,54	2.26 ± 0,60		0 ,002
Changes during study Triglycerides concentration(mg/dl)		-9.50	13.14	1.65	-2.48	-2.54	0.21	
Mean ± SD	1.51 ± 0,78	1.47 ± 0,78	1.78 ± 0,85	1.36 ± 0,71	1.22 ± 0,62	1.81 ± 0,80		0
Changes during study		-2.51	20.76	-23.49	-10.44	47.67	3.55	
Glucoseconcentratio in blood (mmol /l)								
Mean ± SD	1.13 ± 0,37	1.15 ± 0,31	1.34 ± 0,40	1.20 ± 0,41	1.16 ± 0,30	1.17 ± 0,33		0
Changes during study		2.10	16.20	-10.13	-3.27	0.08	0.63	
Systolic pressure (mmHg)								
Mean ± SD	8.49 ± 1,35	7.88 ± 0,91	7.91 ± 1,00	7.89 ± 1,11	8.02 ± 1,04	7.91 ± 1,07		
Changes during study		-7.21	0.32	-0.09	1.54	-1.38	-1.41	0
diastolic pressure (mmHg)								
Mean ± SD	13.53 ± 2,02	12.68 ± 1,81	12.63 ± 1,69	12.47 ± 1,67	12.74 ± 1,67	12.60 ± 1,73		

Changes during study		-6.26	-0.44	-1.22	2.11	-1.11	-1.42	0
Pulse rate(per min) Mean ± SD	74.41 ± 11,33	73.32 ± 11,27	74.11 ± 10,01	73.2 ± 11,15	73.49 ± 9,73	76.33 ± 12,80		0
Changes during study		-1.46	1.07	-1.22	0.39	-3.86	0.50	

Table 1: Averages and rates of change (%) of parameters.

Parameters	Rate of reduction (%)
Weight	0,24 (%)
Body mass index	0,25 (%)
Waist	0,38 (%)
Hip	0,39 (%)
Abdomen perimeter	0,47 (%)
Cholesterol levels	0,21 (%)
systolic blood pressure	1,41 (%)
diastolic blood pressure	1,42 (%)

Parameters	Rate of rise (%)
Triglycerides	3,55 (%)
Blood glucose FBS	0,63 (%)
Pulse rate	0,50 (%)

Table 2: changes of parameters during the study period

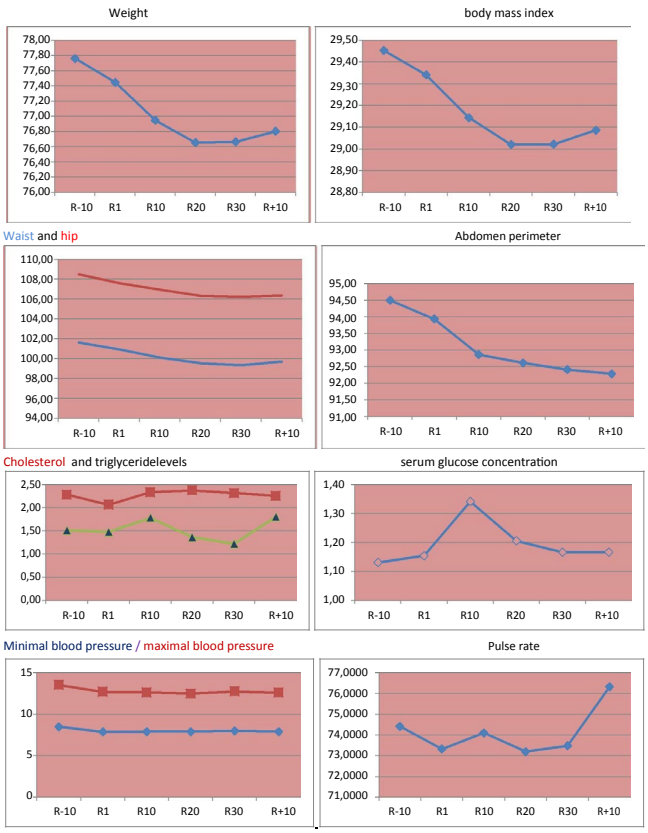

Chart 1: The variation of parameters by dates in Ramadan

on blood pressure and cholesterol levels that should translate into a significant reduction in coronary risk. Ramadan fasting contributed to better blood lipid profiles under the prevailing limited energy intake conditions of the study. One of the contributing factors may be higher fat intake to shed more light on the pathophysiological changes in Ramadan fasting, it is recommended that a multicentric international controlled clinical trial be employed to assess the effect of difference in gender, rase physical activity, food habits, sleep pattern and other important variables on physologic and pathologic conditions during Ramadan fasting.

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