Effects of Ramadan fasting on serum lipid profiles on 2 hyperlipidemic groups with or without diet pattern

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ABSTRACT

Objectives: The effects of Ramadan fasting, with low fat and low calorie diet, on blood lipid and lipoprotein levels were studied. Results revealed reduction of plasma lipid levels and anthropometric parameters in the hyperlipidemic cases. To find out whether such reductions were due to nutritional diet or Ramadan fasting, we conducted a study to evaluate effects of Ramadan fasting on 2 separate hyperlipidemic groups with or without nutritional diet regimen.

Methods: This study was carried out at Madani Heart Hospital, Tabriz, Iran, during the year 1998. Thirty-eight hyperlipidemic healthy men voluntarily enrolled into 2 groups, group I, 22 men on low fat and low calorie diet and group II, 16 men without any special diet interference. The blood lipid profile tests were measured 4 times (3 weeks before, first week, last week and one month after Ramadan). To evaluate nutritional composition, 12 times in non-successive days, 24 hour nutrition recalls were obtained from all individuals during the study.

Results: Analysis of data revealed that only triglyceride in both groups reduced in the beginning of Ramadan compared to 3 weeks before. During Ramadan, with a reduction of 300 Kcal/day in comparison to before Ramadan, no changes were seen concerning anthropometric parameters and serum lipids levels.

Conclusion: It seems that the effect of Ramadan fasting on serum lipid levels may be closely related to the nutritional diet. For reduction of plasma lipid levels, it would be necessary to omit at least one term meal or reduce energy by 500 Kcal or more per day.

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Ramadan fasting is one of the pillars of Islam. During Ramadan, muslims abstain from taking food and liquids from dawn to sunset. Limitation of food intake during Ramadan could lead to reduce energy intake. Reports are available which show the effect of Ramadan fasting on various metabolic factors[1-5] however, few studies[6-8] showed conflicting results. Different results have been reported on the effect of dietary fat on changes in blood cholesterol levels.[9,10] Nomani[11] suggested there is an increase in blood cholesterol levels with either increasing or decreasing levels of energy intake in relation to the requirement. In 1998, we studied the effect of Ramadan fasting with low fat and low calorie diet on anthropometric parameters and blood lipid and lipoproteins levels. The results revealed that by the end of Ramadan as compared with the beginning of it, serum lipid levels such as cholesterol-low-density lipoprotein (C-LDL), total cholesterol (TC), triglycerides (TG) and anthropometric parameters, body weight and body mass index all reduced, and reduction was

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maintained one month after Ramadan. To find out whether such reductions were as a result of a nutritional diet or Ramadan fasting, this study was conducted to evaluate effects of Ramadan fasting on 2 separate hyperlipidemic groups with or without observing nutritional diet.

Methods. This study was conducted on 38 volunteers, hyperlipidemic healthy men in the Ramadan month during the year 1998, at the Madani Heart Hospital, Tabriz, Iran. The study started 20 days before Ramadan and ended one month after. To eliminate the deteriorating effects which may alter the study, persons on medication to control their blood lipid levels or on any medicines which influence the metabolism of lipid factors and those who smoked more than 5 cigarettes each day were excluded from this study. Hyperlipidemia was defined as an increase in the measures of any of the following factors: TG more than 160, TC more than 200, C-high-density lipoprotein (C-HDL) less than 35, C-LDL more than 130 milligram in deciliter and TC/HDL proportion more than 6.[12] The cases voluntarily were divided in 2 groups. The first group included 22 hyperlipidemic healthy men and the 2nd group comprised of 16 hyperlipidemic healthy men. To coordinate meal baskets, persons in group I were trained to use low fat and low calorie regimen during the study and decrease one term meal calorie during Ramadan and group II without interference in meal habit during the study. Aerobic exercises also were included to be carried out 3 times a week, each time for 45-60 minutes. The members of both groups were encouraged to use a 3 times diet before and after the holy month. In Ramadan, the members of group I were encouraged to reduce one term of their normal meal taking. During the holy month of Ramadan, the blood samples of 2 groups were taken in the evening time after 12 hours fasting, and before and after the holy month in the morning after 12 hours of abstention of any food and drinking. First, in order to have a basic data, the first phase of the anthropometric measures and blood samples were taken to measure TC, C-LDL, C-HDL and TG. The next times of measurement and blood sampling were the first and end days of Ramadan and 30 days after that. During the

Table 1 - The mean and standard error of mean of received energy, nutrient materials before, during and after Ramadan.

Variables	Group	Before Ramadan	During Ramadan	After Ramadan	P value
Energy (Kcal)	1	2096 ± 135	1773 ± 92	2051 ± 117	0.05
	2	2184 ± 138	2043 ± 140	2302 ± 195	NS
Carbohydrate (g)	1	354 ± 22	279 ± 17	316 ± 24	0.0001
	2	350 ± 22	317 ± 22	383 ± 28	0.028
Fat (g)	1	55 ± 6	47 ± 4	45 ± 5	NS
	2	58 ± 5.6	60 ± 6.6	52 ± 7.3	NS
Protein (g)	1	73 ± 5	65 ± 4	76 ± 6	NS
	2	73 ± 5	66 ± 5.6	83 ± 9.4	0.028
Carbohydrate (%)	1	64 ± 1.3	62 ± 1.6	66 ± 1.7	NS
	2	63.5 ± 1.6	61.8 ± 1.8	66.3 ± 1.7	0.0001
Fat (%)	1	22 ± 13	24 ± 1.6	19 ± 1.7	0.05
	2	23.2 ± 1.4	25.3 ± 1.7	19.6 ± 1.6	0.0001
Protein (%)	1	14 ± 0.7	15 ± 0.7	14 ± 0.6	NS
	2	13.3 ± 0.42	12.8 ± 0.6	14 ± 0.7	0.034
Fiber (%)	1	20 ± 2.1	18 ± 1.8	22 ± 2.6	NS
	2	16 ± 1	16 ± 1.8	17 ± 2	NS
Sugar (%)	1	37 ± 7	45 ± 5	43 ± 4.4	NS
	2	31 ± 4	54 ± 5	45 ± 6	0.007
P/S	1	1.41 ± 0.16	1.24 ± 0.10	1.01 ± 0.10	NS
	2	1.42 ± 0.19	1.48 ± 0.12	1.02 ± 0.14	0.01
P/M	1	1.16 ± 0.12	1.07 ± 0.13	0.79 ± 0.03	0.012
	2	1 ± 0.11	1.04 ± 0.08	0.89 ± 0.10	NS
Diet cholesterol (mg)	1	144 ± 25	183 ± 41	192 ± 23	NS
	2	199 ± 42	164 ± 23	212 ± 50	NS

P/S - ratio of polyunsaturated fatty acid to saturated fatty acid,
P/M - ratio of polyunsaturated fatty acid to monounsaturated fatty acid, NS - not significant

study, for nutritional assessment in terms of observing the assigned meal diet, in non-successive days in 12 times, 24 hour nutrition recalls were collected.

Auto-analyzer apparatus COBAS, Mira system (Switzerland) using Pars Azemon enzyme kits measured lipid profiles. Cholesterol-HDL level was measured after the sediment of another lipoprotein. The body weight and height of persons were measured with Chinese made apparatus, Smic with tolerance of 0.1 kg for the body weight and 0.1 cm for the height and for calculation of body mass index the weight/height formula (wt/ht^2) was used. Twenty-four hour nutrition recalls were analyzed through the use of the computer package Nutrition III. Some Iranian meal stuff, not being included in the above program, was included with regard to Iranian table of meal stuff composition. Analysis of data was performed by the use of Statistical Package for Social Sciences. The statistic method of paired t-test was used to compare the different phases in each group and simple t-test, and analysis of variance being used to compare the differences between the averages of 2 groups.

Results. This study was conducted on 38 hyperlipidemic healthy and fasting men in the age group 30-64 years in 2 groups, group I, 22 men with low fat, low calorie diet and group II, 16 men without any special diet interference. The time of fasting was 12 hours. The members of group I, used 3 times low fat and low calorie diet before and after Ramadan and reduced received calorie during holy month, while group II members were free to eat and drink during the study. **Table 1** indicates the evaluation and analyses of nutritional composition and the mean of received energy and nutrient materials in 2 groups. As it is shown, in group I, there was reduction in received energy and nutrient material during Ramadan and an increase after the holy month ($P<0.05$). In the holy month, the reduction of received energy in comparison to before Ramadan was 323 Kcal/day in group I while, 141 Kcal/day in group II. Also, in group I, there was a reduction of carbohydrate use during Ramadan in comparison to before the month. **Table 2** indicates the serum lipid levels and anthropometric measures. As it is shown, serum TG level decreased in both groups in the first week of Ramadan in comparison to 20 days before ($P<0.03$) but during the holy month there was no significant changes in lipid parameters. In group I, rising C-HDL during Ramadan decreased 30 days after the holy month ($P<0.001$) and TC/HDL decreased at the first week of Ramadan and was maintained by the end of the month and increased one month after Ramadan ($P<0.01$). Anthropometric parameters showed significant reductions of body weight in group I at the end of Ramadan.

Discussion. Fasting during Ramadan is from dawn to sunset. The period of starvation may be short or long. During Ramadan, there is a reduction in feeding

Table 2 - The mean and standard error of mean of levels of serum lipid and antropometric measure during study.

Variables	Group	Before Ramadan	First week of Ramadan	Last week of Ramadan	One month after Ramadan	P value
Triglyceride (mg/dl)	1	260.4 ± 25.9	214 ± 23.5	226.6 ± 29.8	228.1 ± 26.1	0.03
	2	235.7 ± 36.9	185.3 ± 22.3	171.1 ± 25.9	220.3 ± 35.1	0.02
Cholesterol (mg/dl)	1	247.1 ± 15.8	233.1 ± 13.4	245.6 ± 13.3	237.8 ± 15.8	NS
	2	202.1 ± 9	202.7 ± 9.9	202.8 ± 7.5	202 ± 8.4	NS
HDL (mg/dl)	1	42.9 ± 2.7	47.6 ± 2.4	48 ± 2.4	42.6 ± 1.8	0.001
	2	43.2 ± 2.2	42.7 ± 1.6	45 ± 2.1	41.9 ± 1.5	NS
LDL	1	148 ± 16.5	145.1 ± 13.6	144.2 ± 14.1	148.7 ± 16.9	NS
	2	111 ± 7.3	122.3 ± 9.8	122.4 ± 6.6	111.2 ± 7.3	NS
TC/HDL	1	6.03 ± 0.38	5.05 ± 0.26	5.28 ± 0.31	5.71 ± 0.38	0.01
	2	4.88 ± 0.35	4.86 ± 0.3	4.67 ± 0.29	4.92 ± 0.28	NS
LDL/HDL	1	3.6 ± 0.38	3.1 ± 0.24	3.05 ± 0.29	3.56 ± 0.38	0.004
	2	2.68 ± 0.24	2.95 ± 0.27	2.82 ± 0.22	2.69 ± 0.2	NS
BW (Kg)	1	86.7 ± 2.7	85.3 ± 2.6	84.4 ± 2.6	84.3 ± 2.8	0.05
	2	79.8 ± 1.7	79.3 ± 1.7	78.6 ± 1.77	79.5 ± 1.7	NS
BMI (Kg/m^2)	1	29.9 ± 0.8	29.43 ± 0.8	29.0 ± 0.8	29.1 ± 0.9	NS
	2	26.9 ± 0.7	26.7 ± 0.7	26.7 ± 0.6	26.8 ± 0.7	NS
W/H	1	0.97 ± 0.01	0.98 ± 0.01	0.99 ± 0.03	0.95 ± 0.01	NS
	2	0.96 ± 0.01	0.96 ± 0.01	0.94 ± 0.01	0.94 ± 0.01	NS

HDL - high-density lipoprotein, LDL - low-density lipoprotein, TC - total cholesterol, BW - body weight, BMI - body mass index, W/H - weight/height, NS - non significant

frequency, but each meal is nutritionally more dense or bulkly than that taken before Ramadan. A previous study from this hospital showed that fasting in Ramadan with low fat (20-25%) and low calorie diet (reduction of one term meal calorie) leads to decreasing TC, C-LDL and TG at the end of Ramadan and the reduction was maintained one month after the holy month. In the present study, in continuation with the previous one (1998), fasting time was 11.5-12.5 hours in winter season. Triglyceride showed a decrease during the first days of Ramadan in comparison to 3 weeks before, maintained during the month and increased after Ramadan in both groups. It seems both groups have decreased receiving energy since the beginning of the study, and probably it leads to reduction of TG in the first days of Ramadan. During Ramadan, significant reduction in receiving energy occurred in group I and no changes were observed in serum lipid levels at the end of Ramadan. The amount of reduced energy was 320 Kcal/day. Hallak and Nomani[7] reported in fasting men by hypocaloric diets, either high carbohydrate or high fat, at the end of the Ramadan, blood TG and C-HDL significantly decreased, C-LDL increased and TC had not changed compared with the beginning of month. Nomani[11] confirmed increase in blood cholesterol levels with either increasing or decreasing levels of energy intake in relation to the requirement. Mahbob and Satarivand[13] showed in hyperlipidemic fasting men with reducing one term of meal calorie during Ramadan, TC, C-LDL, TG decreased and C-HDL increased. In our previous study performed one year before, at the end of the holy month, serum TG, TC, C-LDL levels and the proportion of LDL/HDL in the hyperlipidemic fasting group decreased. In this group, the consumed energy was reduced on an average to approximately 600 Kcal/day during a 24 hour period. In the present study the reduction of receiving energy was less than one meal (320 Kcal/day) and therefore, there were no changes observed in plasma lipid levels during Ramadan.

It seems there is a direct relation between energy intake and serum lipid levels during Ramadan. When the reduction of energy intake is more than one term meal (500 Kcal/day), there is decreasing plasma lipid and lipoproteins levels at the end of Ramadan. It must be pointed out that this study was performed on a small group of fasting individuals during Ramadan in the shortest fasting days. Our suggestion for the next study in hyperlipidemic fasting men is to observe reducing energy more or less than one term of meal calorie.

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