ORIGINAL ARTICLE

EFFECT OF ISLAMIC FASTING ON LIPID PROFILE, TOTAL PROTEIN AND ALBUMIN ON HEALTHY MUSLIM MALE SUBJECTS OF SHRI RAM MURTI SMARAK INSTITUTE OF MEDICAL SCIENCES, BAREILLY, UTTAR PRADESH

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ABSTRACT

Introduction: Fasting in the month of Ramadan is one of the five pillars of Islam. Starvation and fasting are not synonymous. Many studies have being carried out in starvation with respect to its effect on human health but very few studies have being done on Ramadan fasting and its effects. We carried out this study to observe the effect of Islamic fasting on the metabolism of human body.

Methodology: We estimated certain parameters which were Lipid profile tests, Total protein and albumin in human serum in addition to estimation of anthropometric parameter like body weight & blood pressure. The subjects were Muslim male students and staff of age group 20-30yrs, comprising 30 in number and were free of any medication and disease. The blood was taken on four occasions – one week before Ramadan, 14th Ramadan, 26th Ramadan and 21 days after Ramadan.

Results: There was significant decrease in body weight, Triglyceride & LDL, no significant decrease in total cholesterol. Significant decrease in total protein & albumin in the initial two weeks of fasting which slightly increased in the last week. The systolic blood pressure decreased significantly but there was no significant change in diastolic blood pressure. The HDL level was increased significantly by 26th Ramadan.

Conclusion: We conclude that Ramadan fasting causes no detrimental effect on health in healthy subjects. In fact it may cause improvement particularly on lipid metabolism.

Keywords: Islamic fasting, Lipid profile tests, Total protein, Albumin, Body weight, Systolic blood pressure.

INTRODUCTION

The month of Ramadan is the holiest month in Islamic calendar and it is an obligatory duty of every healthy Muslims to fast during Ramadan[1]. The Muslims have to abstain from eating and drinking between sunrise and sunset [2]. Because the Lunar calendar determines the month of Ramadan and is about 11 days shorter than the solar calendar, Ramadan is not fixed to any season [3] Thus, depending upon the season and the geographical position of the country, the length of the fast varies from 12 to 19hrs per day [4]. Muslims eat two meals a day, one before dawn, suhore and one just after sunset, iftar and eat a greater variety of food in their meals during Ramadan than in other months. As a result, the Ramadan fast provides an excellent opportunity to study the effect of various diets on the human body and can serve as an excellent research model for metabolic and behavioural studies[5]. Ramadan fasting and starvation are not synonymous and Ramadan fasting is considered a unique model of intermittent fasting [6]. Many physiological and psychological changes take place during Ramadan, most probably due to changes in eating pattern, eating frequency and sleep pattern [7]. Even though sometime more food may be taken during Ramadan than in other months which may be counterbalanced by the metabolism and maintain normal body weight & general health [5, 7, 8]. The effects of Ramadan fasting on lipid profiles are different in published articles and this may be due to a change in the dietary regimen during Ramadan, decreased activity and some cultural parameters. Further, Ramadan fasting contributed to better lipid

profile under the prevailing limited energy intake[8]. So we plan to study the impact of fasting in Ramadan on the blood lipid profiles, total protein and albumin levels in this geographical part of the country.

MATERIAL & METHOD

The study was performed during Ramadan of 2012 (21st July to 19th august 2012) Islamic year 1433 Hijra. Thirty subjects comprised of male Muslim students and staff of age 20-30yrs of this institute, free of any medical treatment and medically fit on general examination. Four blood samples were taken after 12 hours of fasting- one week before the starting of Ramadan, 14th Ramadan, 26th Ramadan and 21 days after Ramadan, and body weight and systolic and diastolic blood pressure were also noted during each visit. Antecubital venous blood samples were collected in tubes, serum separated from samples after clotting and centrifugation and analytes were assayed immediately. Tests of lipid profile, total protein and albumin were done. Total cholesterol estimated by enzymatic cholesterol oxidase peroxidase method, Triglyceride by glycerol phosphate oxidase peroxidase method, High density lipoprotein cholesterol was estimated, after precipitation with phosphotungstate/Mg2+ of chylomicron, LDL & VLDL fractions, by enzymatic method using cholesterol reagent, Low density lipoprotein was calculated by Friedwald's formula [9], Total protein by Biuret method and Albumin by Bromocresol Green method. All the above tests were carried on fully automated random access analyzer of MINDRAY (Diagnova). Atherogenic index was calculated based on the formula Log (Triglyceride/HDL-C)[10].

The research was done after approval of institute's research ethical committee and informed consent was taken from the study subjects.

Statistical evaluation was done by using PC compatible Graph Pad Quick Calcs Paired t test for comparison of results which were expressed as mean ± S.D. $p < 0.0001$ were considered to be extremely statistically significant.

RESULTS

Total number of days of fasting was 28±2 days & daily fasting duration was 15.15hrs in beginning to 14.45 hrs in the end. The study subjects were taking typical Indian diet before and after Ramadan. During Ramadan they were taking, Milk, egg, Dates, bread, vegetables & plenty of water at Sehri time. Dates, Fruits, Pakoras, Black gram cooked, Rice, Cheese, Yoghurt, Cold drinks and Sweets at Iftari time. Body weight (Table 1), decreased significantly by 14th Ramadan and also between 14th Ramadan and 26th Ramadan with $p < 0.0001$. Significant increase in weight between 26th Ramadan & 21 days after Ramadan was observed with $p < 0.0001$. And the body weight post Ramadan was very close to the pre Ramadan value. The systolic BP, (table 1), decreased by 14th Ramadan & was very significant p= 0.0011.and not statistically significant between 2nd and last week of Ramadan, where as between 26th Ramadan and 21 days after Ramadan was significant statistically (p=0.0017). The post Ramadan value was lower than that of pre Ramadan value.

Table 1: Anthropometric and other measurements of healthy male subjects

Measurements	One week pre Ramadan (mean ± SD)	14th Ramadan (mean ± SD)	26th Ramadan (mean ± SD)	21days after Ramadan (mean ± SD)
Body weight (kg)	68.8 ±9.06	67.4± 8.6	66.9± 8.5	69± 8.06
Systolic BOP(mmHg)	119± 8.35	112± 8.09	115± 6.9	114 ± 4.5
Diastolic B.P. (mmHg)	77± 7.04	79± 9.4	81± 9.5	76 ± 6.5

The Diastolic BP(table 1) showed no significant difference at all the period except the value between 26th Ramadan and 21 days post Ramadan was extremely statistically significant p= 0.0002.There was extremely statistically significant decrease in the total protein level (table 2)by the 14th Ramadan $p<0.0001$ & statistically significant increase between 26th Ramadan and 14th Ramadan p= 0.014 and by the 21 days post Ramadan extremely statistically significant decrease in comparison to 26th Ramadan and pre Ramadan result.

Table 2: Serum lipids, Total protein and Albumin in healthy male subjects

Analytes	One week pre Ramadan (mean ± SD)	14th Ramadan (mean ± SD)	26th Ramadan (mean ± SD)	21 days after Ramadan (mean ± SD)
Total protein (g/dl)	7.7 ± 0.45	7.4 ± 0.4	7.5 ± 0.4	7.1 ± 0.28
Albumin (g/dl)	4.8 ± 0.33	4.7 ± 0.15	5.2 ± 0.54	4.7 ± 0.06
Total cholesterol (mg/dl)	153 ± 24	152 ± 18	152 ± 24	153 ± 16
Triglyceride (mg/dl)	108 ± 23	73 ± 27	86 ± 32	73 ± 7.0
HDL-C (mg/dl)	37 ± 2.7	33 ± 4.7	38 ± 2.9	47 ± 4.1
LDL-C (mg/dl)	95.5 ± 26	101 ± 17.6	94 ± 18.2	90.6 ± 17.8
Atherogenic index (n.v < 0.11)	0.105	- 0.015	- 0.005	- 0.169

A significant decrease in albumin level (table2) by 14th Ramadan p=0.027 & extremely significant increase by 26th Ramadan p<0.0001. And by 21 days after Ramadan decrease in albumin level was significant statistically in comparison to 26th Ramadan value p<0.0001 returning to pre Ramadan level.

No significant change in total cholesterol level (table2) was observed throughout the study period. There was extremely significant decrease in the level of triglyceride(table2) by 14th Ramadan p<0.0001 and by 26th Ramadan significant increase p=0.0009 but is lower than pre Ramadan level and on 21 days after Ramadan remained lower than that of pre Ramadan value. High density lipoprotein cholesterol (HDL-C)(table 2) showed extremely significant decrease by 14th Ramadan p<0.0001 and extremely significant increase by the 26th Ramadan level being more than the pre Ramadan value p<0.0001 and extremely significant increase on 21 days after Ramadan p<0.0001 as compared to pre Ramadan value. Low density lipoprotein value increased initially on 14th Ramadan but decreased significantly by the 26th Ramadan and no significant change by 21days post Ramadan in comparison to 26th Ramadan but it was lower as compared to pre Ramadan value. Atherogenic index (table2) decreased significantly in the study with AIP < 0.11 meaning low risk.

DISCUSSION

According to Ziaee et al 2006 [11]; Mansi 2007 [8], Al-Hourani and Atourn 2007 [12], Ramadan fasting was associated with significant weight loss. Kamal Mansi, Masalmeh Amneh[3] found significant decrease in the body weight, systolic & diastolic BP at 4 week of Ramadan than pre Ramadan values. These studies are in accordance with our study. The decrease in body weight may be due to increase in fatty acid oxidation to provide energy, when all glycogen level is depleted to provide glucose for energy production. In addition the fluid intake is also abstained as body water comprises 60% of body weight [13] and this may also be the reason of decrease. Yavuz Furuncuoglu et al [14] also found a decrease in total protein concentration by the end of Ramadan

The decrease in total protein and albumin level may be because of proteolysis for gluconeogenesis and the increase in albumin level by the end of Ramadan may be because of hemoconcentration because of dehydration. No significant change in protein & Albumin level was seen by Azizi et al [15] Fararjeh A.Mohammed et al [16] showed an important significant increase in the concentration of HDL –C after Ramadan & Total Cholesterol, LDL-C and Triglyceride showed no significant change. Their finding is partly similar to our finding. Abdullah M. Thannoun [17] found total cholesterol and LDL-C in both men and women were significantly decreased during Ramadan and HDL-C level was significantly increased in Ramadan. Concerning LDL –C and HDL – C values; similar results were observed by several researchers (Maislos et al [18]; Adlouni et al[7]; Dowod[19], Mansi[8]). Furuncuoglu et al[12] found that the mean total cholesterol and triglyceride levels decreased significantly whereas HDL –C level remained similar throughout Ramadan. Jamil ur Rehman [20] found that cholesterol, triglyceride and LDL-C levels decreased significantly, while HDL –C rose considerably significantly at the end of the holy month. Qureshi MH[21] found no significant decrease in cholesterol level during Ramadan which was agreeing with our finding. The rise in HDL and decrease in LDL levels as observed in our study is in agreement with that of Aziz et al [22].Abdelfateh saleh et al[23] found total cholesterol and LDL-C to be significantly reduced at the end of the 21 days fast period and serum triglyceride, VLDL-C & HDL –C were not significantly increased in male subjects. Adlouni et al [7] reported a significant decrease in total cholesterol, serum triglyceride, LDL-C & HDL-C with fasting. Maislos et al [18] observed a rise in HDL-C, a reduction in the total cholesterol/HDL-C ratio and in the LDL-C/HDL-C ratio and no significant difference in serum triglyceride, total cholesterol, LDL-C & VLDL-C.

Hallak et al [5] found a decrease in LDL-C, an increase in HDL-C, but no change in the total cholesterol with fasting. This is similar to our finding. Nagra & Rahman [24] reported a significant decrease in total cholesterol & LDL-C but no significant increase in HDL-C, Triglyceride, and VLDL-C in a study conducted on healthy females.

These variations could be because as Ramadan follows the lunar calendar rather than the solar calendar, the duration of fasting which is limited during daylight hours, varies from country to country and from year to year depending on which season it falls. Also the social and economic differences between different ethnic groups may have influenced dietary patterns.

In our study the atherogenic index (normal AIP <0.11) decreased significantly from 0.105 pre Ramadan to -0.005 last week of Ramadan and remained low to –0.169 21 days post Ramadan., which was also observed by Thannoun Abdullah H et al [17] and Saleh A.S et al [23] and this reduction is due to beneficial effect of Ramadan fasting on lipid profile Reduction in Atherogenic Index were associated with decreased morbidity and mortality from coronary heart disease[25, 26]. The reduction of lipid profile parameters in Triglyceride, LDL-C may be attributed to the lipolytic effect of prolonged fasting period [8, 19], due to lesser availability of the precursor molecules acetyl –CoA and glycerol in fasting & decrease in the activity of dehydrogenases of pentose phosphate pathway in fasting which are mandatory requirement for fat biosynthesis [27].

So we conclude that fasting in the holy month has a beneficial effect on the lipid profile in the subject sample of our study in this geographical part of the country. Fasting in this holy month has no detrimental

effect to the human health. So a recommendation should be made to fast in this month.

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