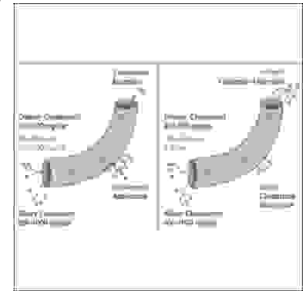


ORIGINAL

PROF-1173

## RAMADAN FASTING; EFFECTS ON SERUM LDL-CHOLESTEROL AND HDL-CHOLESTEROL LEVELS.



**PROF. DR. ISRAR AHMED AKHUND**  
MBBS, M.Phil

Prof. & Head of Physiology Department  
Muhammad Medical College, Mirpurkhas.

**PROF. DR. HABIBULLAH QURESHI**  
MBBS, M.Phil

Biochemistry Department  
Muhammad Medical College, Mirpurkhas.

**DR. ABDULLAH ABBASI**  
MBBS, M.Phil

Assistant Professor of Physiology  
Muhammad Medical College, Mirpurkhas

*Dr. Mir Muhammad Sahto*

Associate Professor of Pathology  
Peoples Medical College, Nawabshah.

**ABSTRACT... Background:** Coronary artery disease is leading cause of death in world. Relations of serum LDL-cholesterol and HDL-cholesterol is well established with this disease. **Objectives:** Present study was planned to observe the effects of Ramadan fasting on serum LDL-c and HDL-c levels. **Designs:** A descriptive study. **Setting and period of study:** Healthy subjects selected from city of Hyderabad Sindh from 25<sup>th</sup> September to 10<sup>th</sup> November 2005. **Material and Methods:** One hundred healthy subjects between ages of 30 to 65 years (mean  $41.32 \pm 7.3$ ) were selected for the study, their blood samples were collected one week before month of Ramadan, two weeks after start of Ramadan and in first week of Shawal month. Fasting samples were analysed for LDL-c and HDL-c by magnesium phosphotungstate precipitation and spin react kit method respectively on spectronic-21, spectrophotometer. **Results:** When results were summed up and compared statistically LDL-c mid-Ramadan ( $3.93 \pm 0.34$  mmol/L) and post-Ramadan ( $3.12 \pm 0.11$  mmol/L) were significantly lower ( $p < 0.05$ ) than pre-Ramadan ( $5.35 \pm 0.46$  mmol/L). Whereas HDL-c levels of mid-Ramadan ( $1.63 \pm 0.36$  mmol/L) and post-Ramadan ( $1.98 \pm 0.23$  mmol/L) were significantly elevated ( $p < 0.05$ ) than pre-Ramadan ( $1.12 \pm 0.16$  mmol/L). **Conclusion:** Ramadan fasting is well tolerated and effective lipid lowering agent.

**Key words:** Ramadan fasting; LDL-cholesterol; HDL-cholesterol.

### INTRODUCTION

High intake of dietary fat is a risk factors for coronary artery disease (CAD)<sup>1</sup>. The power of different plasma lipid fractions to predict risk of CAD has been demonstrated<sup>2</sup>. LDL-cholesterol normally carries about 2/

3<sup>rd</sup> of the total cholesterol of plasma. It is positively related with CAD<sup>3</sup>. Rhoads, et al Showed that elevated LDL-c is an independent risk factor for development of CAD<sup>4</sup>. A direct relationship between LDL-cholesterol level and atherosclerosis has been demonstrated<sup>5</sup>. HDL-

cholesterol is inversely related to the risk of CAD<sup>6</sup>.

A low serum HDL-cholesterol concentration in men and women with clinical CAD has been observed<sup>7</sup>. Truswell found inverse correlation of dietary carbohydrates with HDL-cholesterol levels<sup>8</sup>. Physical fitness is also related to increased HDL-cholesterol levels<sup>9</sup>.

High levels of LDL-cholesterol and low concentrations of HDL-cholesterol are accompanied by accelerated development of atherosclerosis<sup>10</sup>. The fasting month of Ramadan is the ninth lunar month of the Islamic calendar, during which Muslims abstain from food and drink from dawn to sunset. Eating and drinking is permitted only at night. Muslims typically eat two meals each day after sunset and just before dawn. Fasting during Ramadan is obligatory for all Muslims<sup>12</sup>.

Present study was planned to determine the effects of Ramadan fasting on LDL-cholesterol and HDL-cholesterol levels in study subjects.

## SUBJECTS AND METHODS

One hundred male volunteers were selected for the study from Hyderabad city of Sindh province. Their age was 30 to 65 year (mean  $41.32 \pm 7.3$ ).

All subjects were healthy non-smokers non-diabetic and normotensive<sup>13</sup>. Exclusion criteria included subjects with hyperlipidaemia and those who are taking hypolipidaemic drugs. There was no diet restriction during the study period.

All the participants gave their informed consent.

Subjects were evaluated (1) one week before Ramadan fasting (Pre-RF) (2) two weeks after the start of Ramadan fasting (mid-RF) and (3) at the First week of month of Shawal i.e First seven days of 10<sup>th</sup> lunar month of Islamic calendar (After-RF). 10 C.C of fasting blood samples were collected from antecubital vein in a disposable plastic syringe. The blood was allowed to clot at room temperature in centrifuge tubes. The blood was centrifuged at 3000 rpm for 10 minutes, within one hour after the collection of blood samples. Serum was collected and placed in plastic capped glass tubes at 20-°C in freezer till analysis. Serum showing haemolysis was discarded. Before analysis the serum samples were allowed to gain room temperature HDL - cholesterol was determined by magnesium – phosphotungstate precipitation 12 and LDL – cholesterol by Kit method (spin react);

Student's t-test was done to assess data with  $p < 0.05$  as minimum level of significance.

## RESULT

When results were summed up and test parameters were compared, it was seen that serum LDL-c levels as pre-RF, mid-RF and after-RF were  $5.35 \pm 0.46$ ,  $3.93 \pm 0.34$  and  $3.12 \pm 0.11$  mmol/L (mean  $\pm$  SD) respectively. Differences were found significant ( $p < 0.05$ ), When compared statistically while serum HDL-cholesterol levels as pre-RF mid-RF and after-RF were  $1.12 \pm 0.16$ ,  $1.63 \pm 0.36$ ,  $1.98 \pm 0.23$  mmol/L (mean  $\pm$  S.D) respectively. Again differences were found significant ( $p < 0.05$ ) when values were compared statistically (Table).

Table. Comparison of serum LDL-c and HDL-c levels before Ramadan mid-Ramadan and after Ramadan fasting.

Parameter	Pre-RF	Mid-RF	After-RF (1 <sup>st</sup> week of Shawal)	p-Value
LDL-c (mmo1/L)	$5.35 \pm 0.46$	$3.93 \pm 0.34$	$3.12 \pm 0.11$	$< 0.05^*$
HDL-c (mmo1/L)	$1.12 \pm 0.16$	$1.63 \pm 0.36$	$1.98 \pm 0.23$	$< 0.05^*$

\* - Significant

## DISCUSSION

The biological effects of changes in life style during holy month of Ramadan are to be expected<sup>11,12,14</sup>. Hyperlipidaemia is largely irreversible and primarily dependent on diet and life style factors<sup>15</sup>. Present study is compatible with studies done by Toda et al<sup>11</sup>, Quajeb et al<sup>15</sup> and Temizhen et al<sup>16</sup>, as we also found decreased levels of serum LDL- cholesterol, when examined during mid-Ramadan further decreased levels of serum LDL-c were also found during the first week of Shawal i.e immediately after the end of Ramadan, which also indicates positive relation. Another important result of our study is a rise in HDL- cholesterol levels, which is also compatible with previous studies<sup>11,15,16</sup>. Therefore net results of Ramadan fasting are both lowering LDL-c levels and increasing HDL-c levels. This decreases LDL-c / HDL-c ratio, which has an important beneficial change for coronary risk reduction<sup>16</sup>. Therefore Ramadan fasting may provide one means of preventing progression of atherosclerosis in high risk patients, and possibly for reversing existing atherosclerotic lesions. Finally we conclude that Ramadan fasting is well tolerated and effective lipid lowering agent. We also suggest future studies to be carried out to see this relation.

## REFERENCES

1. Castell, W.P; Dayle, J.T; Gordon, T; **Cholesterol and other dietary lipids in coronary heart disease; Circulation.** 1977;55:767-72.
2. Carlson. La; and Erikson, M; **Quantative and qualitative serum lipoproteins analysis; Atherosclerosis.** 1975;21:417-434.
3. Kannel, W.B; Castelli, W.P; Gordon, T; Namara, P.M; (1971); **High density lipoprotein and coronary risk factors; Ann. Intern. Med.** 1971;74:1-15.
4. Rhoads,G.G; Gulbrandsen, C.L; Kagan, A; **Serum lipoproteins and coronary heart disease in a population study of Hawaii men; New. Eng. J. Med.** 1976;294:243-302.
5. Nailto, H.K; Greenstreet, R.L; David, J.A; **High density lipoproteins (HLD-c) concentration and severity of coronary atherosclerosis; Artery.** 1980; 8: 101-102.
6. Miller, J.Z; Grim, C.E; Connally, P.M; Weinberger, M.H; **Association of blood groups with essential and secondary hypertension.** A possible association of the MNS system; *Hypertension.* 1971;1:493-497.
7. Miller; G.J; and Miller; N.E; **Plasma HDL-c concentration and development of coronary heart disease; Lancet.** 1975;l:16-23.
8. Truswell. A.S; **Diet and plasma lipids are appraisal; A.M; Clin; Nutri.** 1978;31:977-989.
9. Jenkins, P.J; Harper, R.W; Nestel, P.J; **Severity of coronary atherosclerosis related to lipoprotein concentration; Brit. J.Med.** 1978;2:388-94.
10. Kannel WB, Castelli WP, Gordon T. **Cholesterol in the prediction of atherosclerotic disease, new perspective based on the Framingham Study.** *Ann Intern Med* 1979;90:85-91
11. Todap M., Morimoto. K. **Effects of Ramadan fasting on the health of Muslims.** *Nippon Eiseigaku Zasshi* 2000; 54:592-6.
12. Iraki L, Bogdan A, Hakkou F, Amrani N, Abkari A, Touitou Y. **Ramadan diet restriction modify the circadian time structure in humans: a study on plasma gastrin, insulin, glucose, a calcium and gastric pH.** *J Clin Endocrinol Metab* 1997;82:1261-73.
13. Warnick, G.R. **Comparison of improved precipitation methods for quantification of high density lipoprotein cholesterol.** *Clin. Chem* 1985;31:217-22.
14. Aldouni A, Ghalim N, Benslimane A, Lecerf JM, Saile R. **Fasting during Ramadan induces a marked increase in high-density lipoprotein-cholesterol and decrease in low-density lipoprotein-cholesterol.** *Ann Nutr Metab* 1997;41:242-9.
15. Quajeb D, B:Jan: K, Kalari K. **Effects of Ramadan fasting on serum low-density and high density lipoprotein-cholesterol concentration-Ann. Saudi. Med** 2002; 22:297-99.
16. Temizhan A, Tandogan I, Doderici O, Dermibas B. **The effects of Ramadan fasting on blood lipid levels.** *Am J Med* 2000;109:341-2.