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Evaluation of some Measurements among Fasted Muslims in Ramadan

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ABSTRACT

The aim of this study is to explain the effect of fasting and dietary habits in Ramadan on lipid profile and some liver enzymes. The study had been carried from April, 2022 to May 2022 on 20 healthy male individuals.

Background & Aims: The fasting state in Ramadan has numerous health benefits. Nevertheless, its beneficial role on the lipid profile liver function was evaluated by limited studies and different findings were recorded. So, this study aimed to define the effect of fasting state in Ramadan on lipid profile and some liver enzyme levels in healthy individuals.

Materials & Methods: Twenty healthy adult men without history of liver diseases and current usage of any medication affecting the liver were involved in the present survey. Liver function tests were measured before and after Ramadan.

The biochemical parameters including liver enzymes Aspartate aminotransferase (AST) and Alanine Aminotransferase (ALT) were evaluated before and after Ramadan by the standard enzymatic method.

Results: A decrease was observed in mean level of cholesterol, Low density lipoprotein (LDL) cholesterol, Very low density lipoprotein (VLDL) and Triglyceride (TG). An increase in the mean level of healthy type High density lipoprotein (HDL) cholesterol. The values of ALP and AST decreased at the end of the study in the post-Ramadan group versus pre-Ramadan

Conclusion: The fasting state in Ramadan improve the lipid profile levels and liver function in healthy adults.

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Introduction:

Fasting in Ramadan can provide as an eminent research model for studying metabolism in human body and the lifestyle, it is important to explain the fasting effect in Ramadan on risk factors of atherosclerosis. Ramadan represents the Holy month of Muslims, in which fasting is needed from the dawn until sunset. They should be prevented from food and water. Fasting during Ramadan is one of the five pillars of Islam. All adults and healthy Muslims must apply this Pillar. During Ramadan the Muslims also stop smoking, control the anger and to do the good deeds. Emotions should be controlled throughout Ramadan and after Ramadan (Sarraf-Zadegan 2000, Saleh 2004, Madkour et al 2021).

Ideally during fasting peoples intake two meals, one just before dawn Sahur and other merely after sunset Iftar. Furthermore most Muslim peoples intake the great diet serving throughout Ramadan compared to remaining months of the year, i.e. there is intake more of lipid and carbohydrates (Saleh

2004).

Proportion of food consumption different during Ramadan with carbohydrate, proteins and fats. Subsequently the variations of fasting Ramadan providing better fashion to explain behavioural and metabolic studies. However, data examination showed that the effect of fasting during Ramadan on health is variable in various Muslim peoples (Khaled 2006, Ziaee 2006, Al-Hourani 2007).

The aspect of relationship between dietary fat composition and the incidence of cardio diseases (C.V.D.s) had been a subject of intense controversy for many years. Although increased consumption of saturated fatty acid (SFA) is known to elevate LDL_cholesterol and danger of atherosclerosis, intake of polyunsaturated fatty acid (PUFA) (n-6 and n-3) has a reversed effect with CVDs (Laaksonen et al 2005, Warensjo 2008).

Therefore, many former researches and studies approved that Ramadan fasting has positive affect on body

health by comparison between blood testes before and during Ramadan. In this study ,a comparison was done between blood tests before Ramadan and last week of Ramadan . So , this study aims to identify the effect of Ramadan fasting on lipid profile and some liver function tests .

Subjects & methods :

The present experimental study was conducted on twenty healthy nonsmoker Muslim adult male with age ranging (22-30) years and they were randomly selected, some were students and others were employees. Concern was taken from participants and the purpose of tests was explained to them. The following parameters were measured for each subject including total cholesterol , Low density lipoprotein (LDL) cholesterol, Very low density lipoprotein (VLDL) , High density lipoprotein (HDL) cholesterol ,Triglyceride(TG), serum aspartate aminotransferase (AST) and alanine aminotransferase (ALT), before and after one month of Fasting Ramadan .All persons had a questionnaire been

done for collecting data regarding age and past medical history. All those persons had a normal body mass index, and they devoid from any metabolic disorders. Data had been obtained as means (a standard deviation) .

The average concentrations gained and compared by using t-test . The differences had been reported significant at $p < 0.05$. Fasting blood samples from all subjects were collected twice during our study once in the week prior to the beginning of Ramadan (20 subjects) and then again in the last week of Ramadan (20 subjects). The first set of blood samples from 20 subjects were taken in the week before the start of Ramadan month after overnight fasting (8 hours) while the second set of blood sample from subjects was collected after whole day fasting (16-17 hours) in the last week of Ramadan. This was done keeping in view the religious concerns associated with the Ramadan fasting. All the biochemical parameters were measured using standard biochemical procedures described as follows:

(a) **Serum total cholesterol** estimation was done by fully enzymatic cholesterol oxidaseperoxidase method (CHODPOD).

(b) **Serum triglycerides** estimation was done by fully enzymatic glycerol phosphate oxidase-peroxidase method (GPO-POD).

(c) **Serum high-density lipoprotein (HDL) cholesterol and Serum very low density lipoprotein (VLDL) cholesterol** estimation was done by autozyme precipitation reagent method in conjunction with autozyme cholesterol reagent.

(d) **Serum low density lipoprotein (LDL) cholesterol** estimation was done by calculation.

(e) **Serum aspartate aminotransferase (AST) and alanine transaminase (ALT)** estimation was done by enzyme-linked immunosorbant assay.(Anderson et al 2020).

Statistical analysis

Statistical analysis were done using Statistical Package for Social Sciences (SPSS version 25). Comparison

between groups of the study done by using paired student t-test, in order to find the relation between variables. The P-value < 0.05 was considered as level of significance.

Result :

The present study was conducted on healthy adult male Muslim volunteers were taken on 20 healthy non smoker persons with age ranging (22-30) years and they were randomly selected, some were students and others were employees. The total Cholesterol, HDL ,LDL ,VLDL, TG, AST and ALT were measured, and the results are presented in Table (1) and figure (1)..Statistical analysis using t-test resulted in that the change in total serum cholesterol is apparent in comparing pre- and post-Ramadan values Table (1) and figure (1).

Mean value of total cholesterol before fasting was 184.4 ± 12.5 mg/dl. It decreased to 165.6 ± 12 mg/dl after fasting. Before fasting, the mean serum triglyceride levels were 122 ± 25.3 mg/dl which declined to 120.6 ± 20.9 mg/dl .

Fasting subjects had a high overall mean value of high-density lipoprotein-cholesterol after 1 month of fasting 43.6 ± 4.5 mg/dl as compared to the mean value before fasting 40.6 ± 1.8 mg/dl. In addition LDL is apparent in comparing pre- and post-Ramadan values Table (1) and figure (1).

There was a significant decrease after fasting. Mean value of total LDL before fasting was 118.2 ± 9.5 mg/dl. It decreased

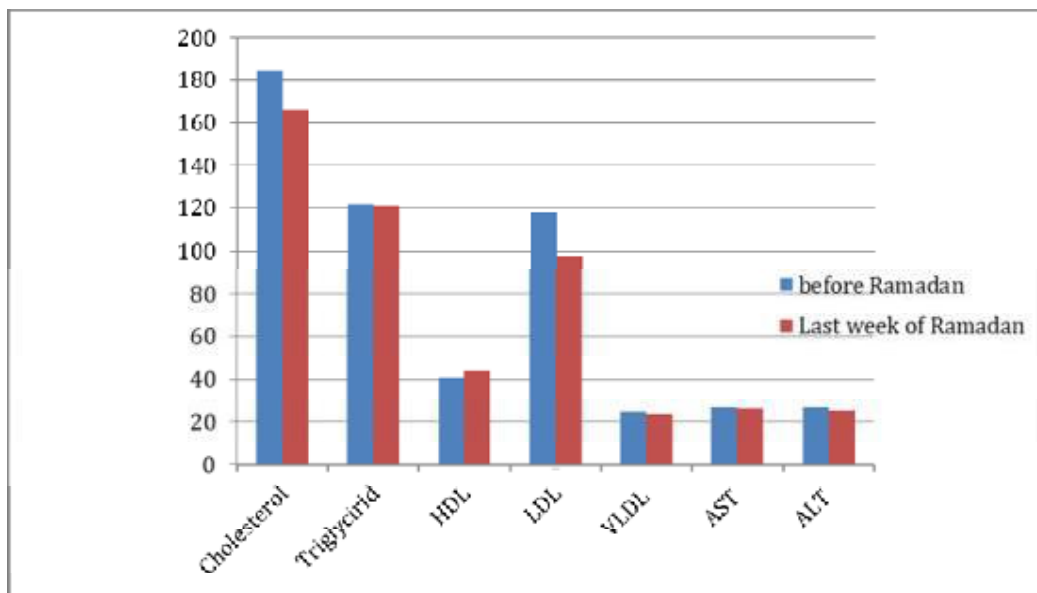
significantly

to 97.6 ± 9.6 mg/dl after fasting . There was a decrease in the mean value of total VLDL which was 25 ± 2.3 mg/dl before fasting. While after fasting it decreased to 23.6 ± 4.04 mg/dl. Regarding the liver enzymes, there was decrease in the level of AST and ALT enzymes but with in normal range. The level of AST and ALT was 27 ± 5 U/L and 27 ± 2.8 U/L subsequently ,before fasting .After fasting the level of AST and ALT decreased to 26.6 ± 5.8 U/L and 25.3 ± 4.1 U/L subsequently.

Table (1) :Comparison of variables that measured before Ramadan and at the last week of Ramadan:-

	One week before Ramadan	Last week of Ramadan	P(t)
Total Cholesterol (mg/dl)	184.4 ± 12.5	165.6 ± 12	$<0.05(-6.7)^*$
Triglycerid (mg/d)	122 ± 25.3	120.6 ± 20.9	$>0.05(0.3)$
HDL(mg/dl)	40.6 ± 1.8	43.6 ± 4.5	$<0.05(-4.3)^*$
LDL(mg/dl)	118.2 ± 9.5	97.6 ± 9.6	$<0.05(10.7)^*$
VLDL (mg/dl)	25 ± 2.3	23.6 ± 4.04	$<0.05(2.039)^*$
AST (U/L)	27 ± 5	26.6 ± 5.8	$>0.05(0.63)$
ALT (U/L)	27 ± 2.8	25.3 ± 4.1	$<0.05(2.48)^*$

Figure (1) The mean biochemical markers for the samples before fasting and after Ramadan fasting



Discussion :

During this study period, the average length of fast was about 16- 17 hours daily. In Islamic fasting, there is no malnutrition or inadequate calorie intake. The only difference between Ramadan fasting and total fasting is the timing of food. During Ramadan, those who observe fast miss a lunch, take early breakfast and do not eat until sunset. In other words,

Ramadan fasting is a controlled, partial type of fast. Ramadan fasting has spiritual, physical, psychological and social benefits; however, man-made problems may occur if fasting is not properly practised. Firstly, there is no need to consume excess food at Iftar (the food eaten immediately after sunset to break the fast) and dinner or Sahur (the light meal generally eaten about half an hour to one hour before

dawn). A diet that is less than a normal amount of food intake but balanced is adequate to keep a person healthy and active during the month of Ramadan. It is often said that the beneficial effects of fasting during Ramadan will occur only in people who maintain a diet that is appropriate to them (Boumediene MK 2009).

In this study, the mean total cholesterol level before fasting was 184.4 ± 12.5 mg/dl and after fasting was 165.6 ± 12 mg/dl

This shows a considerable decrease in total cholesterol after fasting. On statistical analysis, a P value of <0.05 was obtained which is highly significant. Studies have shown that during *Ramadan* fasting, the body develops adaptive mechanisms and there is increased oxidation of fat and decreased oxidation of carbohydrate and it has been noted that change in serum cholesterol level is inversely related to fat energy intake. It appears that the quality and quantity of fat intake in

Ramadan governs the blood cholesterol levels. Similar studies have shown that cholesterol levels decreased significantly ($P < 0.05$) during *Ramadan* fasting (Furuncuoglu Y 2007). This is in agreement with this study.

On the other hand, a study was performed about the effect of *Ramadan* fasting on lipids and lipoproteins and no significant change was found in total cholesterol (Ziaee V 2006).

Plasma concentration of HDL is a protective factor against the development of atherosclerosis and cardiovascular diseases.

In this study, HDL before fasting was 40.6 ± 1.8 mg/dl and after fasting it increased to 43.6 ± 4.5 mg/dl. These results on statistical analysis gave a P value of <0.05 which is highly significant. This is agree with many previous studies which show an increment of

HDL in Ramadan (Hind et.al 2006, Hasan et al 2022) .

The increase in HDL-cholesterol at the end of *Ramadan* in the present study can be explained by a decreased saturated fatty acid intake and a decrease in circulating insulin and a rise in catecholamine concentration from lipolysis in adipose tissue in response to hypoglycemia during Ramadan fasting (Nematy M et al 2012).

In the present study, the mean triglyceride level before fasting was 122 ± 25.3 mg/dl and after Ramadan fasting it was observed to be 120.6 ± 20.9 mg/dl. These observations showed a significant decrease in the values after fasting. Statistical analysis showed a *P* value of < 0.05 which is highly significant.

Also , LDL and VLDL values were 118.2 ± 9.5 and 97.6 ± 9.6 mg/dl concequently before Ramadan. while after fasting the LDL and VLDL values decreased to 97.6 ± 9.6 and

23.6 ± 4.04 mg/dl concequently as in the table (1) and figure (1) , and this is agree with pervious study by (Róžański et al 2021), their study explained that the LDL cholesterol level were significantly decreased in Ramadan (John 2010). Triglyceride biosynthesis is also decreased due to lesser availability of the precursor molecules acetyl-CoA and glycerol in fasting because of reduced glucose oxidation. Furthermore, the activity of dehydrogenases of the pentose phosphate pathway has also been reported to decrease in fasting and is a known mandatory requirement for the synthesis of fatty acids and cholesterol. This leads to lowering of the blood levels of total cholesterol, triglyceride, low density lipoprotein and very low density lipoproteins during fasting. It needs to be further investigated, how long the effects of Ramadan fasting last each year and what are the chronic effects of fasting year after year (Negm et al 2022).

In this study , AST and ALT values were 27 ± 5 and 27 ± 2.8 U/L concequently before Ramadan. while

after fasting Ramadan the AST and ALT values decreased to 26.6 ± 5.8 and 25.3 ± 4.1 U/L consequently as in the table (1) and figure (1), this is agree with pervious study by Unalacak et al the findings (Unalacak et al 2011). Mild changes in liver function tests may be related to changes in cytokines and alteration in circadian rhythms of hormones during fasting (Azizi F 2010).

A similar research which was conducted by Nasiri et al. (Nasiri J et al 2016) showed a decrease in the level of ALT after Ramadan fasting in healthy subjects in comparison to baseline levels. This report was in accordance with this study findings. Also, another study (Elfert A et al 2011), stated a decrease in ALT, AST, and ALP in cirrhotic patients after Ramadan fasting, and their findings were similar to results of the present survey. The altered levels of liver enzymes may be associated with variations in cytokine levels and alterations in circadian rhythms of

hormones as a result of Ramadan fasting. (Mahshid M et al 2021).

Limitations of the study: There were several limitations in the present study. (1) There was no details collected about the food items that the subjects consumed which might change lipid profile (2) sleeping habits of the subjects were not recorded.

Conclusion:

This study shows a reduction in total cholesterol, triglycerides, LDL and VLDL along with a rise in the levels of HDL which points towards beneficial effects of *Ramadan* fasting.

Through the comparing of the diet intake variations between different populations of Muslims and their effect on variable biologic and biochemical parameters could be a correct approach in recognizing a diet program to be used by Muslims and for advising even non-Muslims. Ramadan fasting induces (AST and ALT) a positive changes on liver function test.

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