

## Sex Hormones and Liver Enzymes Status in Singles Fasting Males

Dr.Majid M. Mahmood    Dr.Kadhim A. Muhsin    Ahmed F. shallal

Al-Mustansirya University  
College of Science  
Department of Biology

### Abstract

**Objective:** To investigate the effects of Ramadan fasting on the secretion of sex hormones and liver function tests

**Methods:** Blood samples were collected before fasting as a control group and after (14, 28) days of the fasting. These tests were done on sample of forty apparently healthy males who were singles; non-smoker and their age range were 20-30 years in the month of Ramadan (2012). We measured blood hormone levels of follicle-stimulating hormone (FSH), Luteinizing hormone (LH), Testosterone. Liver enzymes included Aspartate Transaminase (AST), Alanine Transaminase (ALT), Alkaline phosphatase (ALP), also to investigate the effect of fasting on blood Pressure and body weight.

**Results:** FSH was increased, but non-significantly; the results of the current study showed that the Ramadan fasting has slight effect on LH concentration but not reach to be significant. The change in Testosterone level was decreased during 14<sup>th</sup> and 28<sup>th</sup> days of fasting but non-significantly. AST level was lower, significantly ( $P < 0.05$ ) so for the 14<sup>th</sup> and 28<sup>th</sup> of the month; the study recorded that there was not significant decrease in ALT and ALP activity level during Ramadan fasting. The study showed significant decrease ( $P < 0.05$ ) in systolic and diastolic pressure. The study showed as well a decrease in body weight but non-significant during fasting.

**Conclusions:** This study shows that fasting during Ramadan may cause no detrimental effect on health; on the contrary, it may be associated with some favorable effects to body.

**Recommendations:** Additional studies are necessary to elucidate the effect of fasting in females with other age factions. Further studies, are recommended to investigate the impact of fasting on another parameters.

**Key words:** Ramadan fasting, (LH), (FSH), Testosterone, (AST), (ALT) (ALP), pressure, Weight.

## Introduction:

Fasting is considered to be a healthy practice in many cultures and religions. The Ramadan holy month (Islamic fasting during Ramadan month, the ninth lunar month of the Muslim year) is observed by millions of Muslims all over the world<sup>[1]</sup>. In Islamic fasting, one should prepare himself for a slight change in his lifestyle (sleep, food and work) during the month of Ramadan which is unclear if it causes a variation in the function of the body's hormonal system<sup>[1,2]</sup>. Previous studies have demonstrated that abstinence from eating and drinking during the Ramadan fast, which is accompanied by variations in the sleeping and waking pattern, and the psychological effects of fasting may bring about rhythmic changes in the secretion of most of the body's hormones<sup>[3]</sup>. Several studies are conducted on fasting during Ramadan which does not have any adverse effect on healthy adults<sup>[2,4]</sup>. Although there have been many studies regarding the effect of fasting on various metabolic aspects of human, it remains to be conflicted.

The aims of this study are to assess the impact of fasting during Ramadan on healthy single males and to evaluate the effect of fasting on sex hormones, liver enzymes, blood pressure and weight on healthy adult males.

## Subjects and methods

### Subjects

Forty apparently healthy single males at 20-30 years of age, who indicated that they were going to fast during Ramadan during 2012, were recruited to the study. Women were excluded from the study since they are prohibited to fast during their menstrual cycle due to religious rules. In addition, subjects with any acute or chronic diseases, or those who used medications during the study period, were excluded. The content of the subjects' diets was similar before and during Ramadan.

### Methods

Blood samples (5ml from each participant) were collected in plain tubes. Sera were separated by low-speed centrifugation at 1000 g for 15 min at room temperature. Samples were immediately separated into aliquots and stored at (-20 C) until analyzed. All serum samples were analyzed in a single batch to avoid day-to-day laboratory variations. AIA-PACK(Automated Immunoassay Analyzers) was used to measure serum (FSH, LH and Testosterone). Enzymes analyzed by using spectrophotometer. In addition, blood pressure was determined by Mercury sphygmomanometer while body weight measured by DETECTO-M

### Statistical analysis

Statistical analysis was done using a one way of analysis of variance (ANOVA). For all analyses, a value of (P<0.05) was considered significant. All statistical analyses were performed statistical Package for Social Science (SPSS) V20.

**Results:**

Changes in sex hormones (FSH, LH and Testosterone) during Ramadan are given in Table (1, 2, 3) respectively. FSH non-significantly increased. Both LH and Testosterone not significant decreased while AST was significantly differ ( $P<0.05$ ) during Ramadan compared with before fasting Table (4). The results of ALT and ALP are shown in Table (5, 6). ALT and ALP decreased but not significantly. Changes in blood pressure during Ramadan are given in Table (7, 8). Systolic and diastolic pressure were significantly ( $P<0.05$ ) decreased during Ramadan compared with before fasting and body weight decreased but not significant Table(9).

**Table (1)** shows the mean± S.E levels of FSH (mIU/mL) in pre-fasting healthy men comparison with fasting period.

		N	Mean± Std. Error	F	S
FSH	Pre-fasting	40	9.810 <sup>a</sup> 0.7319	2.444	0.091
	After(14)days	40	10.715 <sup>a</sup> 0.7143		
	After(28)days	40	12.028 <sup>a</sup> 0.6928		

- Similar letters mean non-significantly different ( $P>0.05$ ).
- Non-Similar letters mean significantly different ( $P<0.05$ ).
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**Table (2)** shows the mean± S.E levels of LH (mIU/mL) in pre-fasting healthy men comparison with fasting period.

		N	Mean± Std. Error	F	S
LH	Pre-fasting	40	6.628 <sup>a</sup> 0.4961	1.904	0.154
	After(14)days	40	5.988 <sup>a</sup> 0.4401		
	After(28)days	40	5.393 <sup>a</sup> 0.4015		

- Similar letters mean non-significantly different ( $P>0.05$ ).
- Non-Similar letters mean significantly different ( $P<0.05$ ).

**Table (3)** showed the mean± S.E levels of Testosterone (ng/dl) in pre-fasting healthy men comparison with fasting period.

		N	Mean± Std. Error	F	S
Testosterone	Pre-fasting	40	430.85 <sup>a</sup> 30.875	0.758	0.471
	After(14)days	40	398.59 <sup>a</sup> 28.659		
	After(28)days	40	381.30 <sup>a</sup> 26.977		

- Similar letters mean non-significantly different (P>0.05).
- Non-Similar letters mean significantly different (P<0.05).

**Table (4)** shows the mean± S.E levels of AST (U/L) in pre-fasting healthy men comparison with fasting period.

		N	Mean± Std. Error	F	S
AST	Pre-fasting	40	11.545 <sup>a</sup> 0.5094	8.968	0.000
	After(14)days	40	10.020 <sup>b</sup> 0.4262		
	After(28)days	40	8.963 <sup>b</sup> 0.3503		

- Similar letters mean non-significantly different (P>0.05).
- Non-Similar letters mean significantly different (P<0.05).

**Table (5)** shows the mean± S.E levels of ALT (U/L) in pre-fasting healthy men comparison with fasting period.

		N	Mean± Std. Error	F	S
ALT	Pre-fasting	40	12.448 <sup>a</sup> 0.6617	2.007	0.139
	After(14)days	40	11.353 <sup>a</sup> 0.5748		
	After(28)days	40	10.798 <sup>a</sup> 0.5341		

- Similar letters mean non-significantly different (P>0.05).
- Non-Similar letters mean significantly different (P<0.05).

**Table (6)** shows the mean± S.E levels of ALP(U/L) in pre-fasting healthy men comparison with fasting period.

		N	Mean± Std. Error	F	S
ALP	Pre-fasting	40	52.86 <sup>a</sup> 1.915	1.544	0.218
	After(14)days	40	50.72 <sup>a</sup> 1.806		
	After(28)days	40	48.18 <sup>a</sup> 1.940		

- Similar letters mean non-significantly different (P>0.05).
- Non-Similar letters mean significantly different (P<0.05).

**Table (7)** shows the mean± S.E levels of systolic pressure (mmHg) in pre-fasting healthy men comparison with fasting period.

		N	Mean Std. Error±	F	Sig
Systolic	Pre-fasting	40	12.375 <sup>a</sup> .128	52.169	0.000
	After(14)days	40	11.550 <sup>b</sup> .107		
	After(28)days	40	10.800 <sup>c</sup> .089		

- Similar letters mean non-significantly different (P>0.05).
- Non-Similar letters mean significantly different (P<0.05).

**Table (8)** shows the mean± S.E of diastolic pressure levels (mmHg) in pre-fasting healthy men comparison with fasting period.

		N	Mean± Std. Error	F	S
Diastolic	Pre-fasting	40	8.150 <sup>b</sup> .137	29.240	0.000
	After(14)days	40	7.375 <sup>b</sup> .093		
	After(28)days	40	7.075 <sup>b</sup> .066		

- Similar letters mean non-significantly different (P>0.05).
- Non-Similar letters mean significantly different (P<0.05).

**Table (9)** shows the mean± S.E levels of body weight (Kg) in pre-fasting nhealthy men comparison with fasting period.

		N	Mean± Std. Error	F	S
Weight	Pre-fasting	40	67.575 <sup>a</sup> 1.510	1.391	.253
	After(14)days	40	65.808 <sup>a</sup> 1.381		
	After(28)days	40	64.300 <sup>a</sup> 1.269		

- Similar letters mean non-significantly different ( $P>0.05$ ).
- Non-Similar letters mean significantly different ( $P<0.05$ ).

### Discussion:

In the present study, the fasting caused non- significant increase in the serum level of FSH after 14 days and 28 days of fasting. This study disagree with other study <sup>[5]</sup> and in agreement with the results recorded by Mesbahzadeh<sup>[3]</sup>. The result of the current study revealed that Ramadan fasting has slight effect on LH concentration but not reach to be significant. There is no similarity with the result of Azizi<sup>[5]</sup>. Another study proved that the mean value of LH did not change significantly during Ramadan fasting <sup>[3]</sup>. Our results demonstrated that not significant changes in the level of testosterone during the fasting. This study agree with another study<sup>[3,5]</sup>. This is understandable considering the negative feedback system that controls testosterone secretion: following a decrease in testosterone secretion from the testes, the secretion of gonadotropin-releasing hormone from the hypothalamus increases and this hormone enters the anterior pituitary through the blood of the hypothalamus pituitary portal system, thus stimulating the secretion of FSH and LH from the anterior pituitary<sup>[6, 7]</sup>. Moreover, the results of experiments by other researchers confirm the findings of the above study. In this study, the levels of serum AST, ALT and alkaline phosphotase are decreased specially in 14<sup>th</sup> and 28<sup>th</sup> day of Ramadan, and AST is statistically significant ( $p<0.05$ ), while, ALT and alkaline phosphotase change are not meaningful. The findings in the study of liver function analysis during and per- Ramadan are in agreement with other studies<sup>[2,8-13]</sup>. This study demonstrated decrease in the (AST, ALT,ALP) levels but still within the normal range and do not cause specific clinical changes. It means that Ramadan improves health status. The mean of SBP (Systolic blood pressure) and DBP (diastolic blood pressure) of our samples was significantly lower at Ramadan measurements, compared to pre-Ramadan measurements.

Our results are in agreement with other studies<sup>[9,13-17]</sup>. Theses variations in blood pressure during Ramadan may be influenced by variations in sleep pattern, low activity, eating pattern and hydration status during the Ramadan month. In the

present study, fasting causes tendency of decreasing in body weight but not reach to be significant. Other studies have same finding <sup>[18, 19]</sup>. Khaled and Belbraouet found significant changes in body weight or body composition during Ramadan <sup>[20]</sup>. In general, most of fasting people reduced their activities during Ramadan. They may be contributed to the not significant decrease in their mean body weight as they do not spend much, energy as usually they do in other normal days. In this context AL-Jewari recorded some important notices <sup>[21]</sup>. Other people, who do not reduce their activities, will subsequently lead to some loss of their body weights. Their loss may be significant depending on the degree of activities level and food intake after fasting day.

### References:

1. Ramadan J.( 2002). Does fasting during Ramadan alter body composition, blood constituents and physical performance? *Med Princ Pract.* 11 Suppl 2: 41-46.
2. Ziaee, V.; Razaei, M.; Ahmadinejad, Z.; Shaikh, H.; Yousefi, R.; Yarmohammadi, L.; Bozorgi, F.; Behjati, M J.(2006). The changes of metabolic profile and weight during Ramadan fasting. *Singapore Med J.* 47(5): 409-414.
3. Mesbahzadeh, B.; Ghiravani, Z and Mehrjoofard, H. ( 2005). Effect of Ramadan fasting on secretion of sex hormones in healthy single males. *EastMediterr Health J.* 11(5-6): 1120-1123.
4. Hind, A.E.; Awad, M.A.(2006). Effect of Ramadan fasting on blood levels of glucose, triacylglyceride and cholesterol among type II diabetic patient. *Sudanese Journal of public Health.* 1(1): 203-6.
5. Azizi, F.(2002).Research in Islamic fasting and health. *Annals of Saudi Medicine, Vol 22, No (3-4),* 186-191.
6. Bogdan, A.;Bouchareb, B.; Touitou, Y.(2001). Ramadan fasting alters endocrine and neuroendocrine circadian patterns. Meal-time as a synchronizer in humans? *Life Sci;*68(14):1607-15.
7. Abbas, S.M and Basalamah, A.H. (1989). Effects of Ramadan fasting on male fertility. *Archives of andrology.* 16(8):161–6. 16(2):161-6.
8. Bakir. S.M. et al. (1994). The effect of Ramadan fast on the diurnal change of total calcium, parathyroid hormone and calcitonin. *Medical journal of Cairo University,* 62 (2):485–90
9. Vozarova, B.; Stefan, N.; Lindsay, RS.; Saremi, A.; Pratley, RE.; Bogardus, C.; Tataranni, PA. (2002). High alanine aminotransferase is associated with decreased hepatic insulin sensitivity and predicts the development of type 2 diabetes. *Diabetes* 51(6):1889–1895.

10. Murat, U.; nalacak, M.D.; SmailHamdi Kara, M.D.; DavutBaltaci, M.D.; Zgu` r Erdem, M.D.; GamzeErtenBucaktepe, P. M.D. (2011). Effects of Ramadan Fasting on Biochemical and Hematological Parameters and Cytokines in Healthy and Obese Individuals. METABOLIC SYNDROME AND RELATED DISORDERS. Mary Ann Liebert, Inc. 9(2). Pp. 157–161.
11. Hassan Chamsi-Pasha and Waqar H. Ahmed, (2004).The effect of fasting in Ramadan on patients with heart disease. Saudi Med J ; Vol. 25 (1): 47-51
12. Azizi,F.and Rasouli, H.A. (1987). Serum glucose, bilirubin, calcium, phosphorus, protein and albumin concentrations during Ramadan. Med J Islamic Rep Iran; 1(5):38-41.
13. El-Hazmi, MAF.; Al-Faleh ,FZ.; Al-Mofleh, IB.(1987). Effect of Ramadan fasting on the values of hematological and biochemical parameters. Saudi Med J. 8 (2): 171-176.
14. Zahid, J. Mohammed. (2011). The Influence of Ramadan Fasting on Some Hematological and Biochemical Parameters in Healthy Adult Males. . Iraqi National J. for Nursing Specialties, 24(1) 45-51.
15. Salhamoud, Abdelfatah Saleh.; Salah, AniesElsharouni.; Bobby, Cherian.; and M. Mourou. (2005). Effects of Ramadan fasting on Waist Circumference, Blood Pressure, Lipid Profile, and Blood Sugar on a Sample of Healthy Kuwaiti Men and women. Department of Medicine, Adan Teaching Hospital, Kuwait. Mal J Nutr 11(2): 143-150.
16. Habbal, R.; Azzouzi, L.; Adnan, K.; Tahiri, A &Chraibi, N. (1998). Variations of blood pressure during the month of Ramadan. Arch Mal Coeur Vaiss.91 (8): 995-998.
17. Kadiri, A.; Al-Nakhi, A.; El-Ghazali, S. *et al.* (2001). Treatment of type 1 diabetes with insulin lispro during Ramadan. Diabetes Med. 27(4 1):482-6.
18. Fakhrzadeh, H.; Larijani, B.; Sanjari, M.; Baradar-Jalili, R.; Amini, M. (2003). Effect of Ramadan fasting on clinical and biochemical parameters in healthy adults. Ann Saudi Med.23 (3–4):223–226.
19. Karli, U.; Guvenc, A.; Aslan, A. et al. (2007). Influence of Ramadan fasting on anaerobic performance and recovery following short time high intensity exercise. J Sports Sci Med. 9(6):490-7.
20. Khaled, BM.; Belbraouet, S. (2009). Effect of Ramadan fasting on anthropometric parameters and food consumption in 276 type 2 diabetic obese women. Int J Diabetes DevCtries. 29(2):62-8.
21. Al-Jewari, M.M.; Mohammed, K. I.A. and Al-Hakim. S.A.G. (2007). Effect of Ramadan fasting on clinical biochemical and immunological parameters in healthy fasting and type 2 diabetes mellitus patients. Iraqi Postgrad Med J; 6 (4): 272-275.

## پوخته

**ئامانچ :** بۆ زانینی رادهی کاریگه‌ری پۆژووگرتن له‌سه‌ر ئاستی هۆرمۆناتی سیکیسی ، وه له‌سه‌ر فرمانه‌کانی جگه‌ر.

**پێگاکانی کارکردن :** نمونه‌کانی خوین له پێش مانگی پهمه‌زان وه‌ك کۆنترۆل وه له‌ دواي (14, 28) پۆژ له پۆژووگرتن له 40 پیاوی تهن‌دروست كه هاوسه‌رگه‌ریان نه‌کردبوو ، وه‌رگه‌راون ئه‌وان جگه‌ره‌ کیش نه‌بوون وه به‌ رواله‌ت تهن‌دروست دياربوون وه ته‌مه‌نیان له نیوان (20-30) سال دابوو ، مانگی پهمه‌زانی (2012). پیاوانه‌ی ئاستی هۆرمۆنی (FSH) Follicle-Stimulating Hormone و هۆرمۆنی (LH) Luteinizing hormone و هۆرمۆنی تیستۆستیرۆن و ئه‌نزیمه‌کانی جگه‌ر Alanine Transaminase (ALT) , Aspartate Transaminase (AST) و Alkaline phosphatase (ALP) ئه‌نجام درا له سه‌روی ئه‌مه‌شه‌وه کاریگه‌ری پۆژووگرتن له‌سه‌ر په‌ستانی خوین و کیشی له‌ش ئه‌نجام درا .

**ئه‌نجامه‌کان :** ئه‌نجامه‌کان ده‌ریخت كه زیاده‌بونیکی بی‌بايه‌خ له‌ خه‌ستی (FSH) پرووی داوه به‌لام نزمبونه‌وه‌یه‌کی بی‌بايه‌خ له (LH) پرووی داوه ئاستی هۆرمۆنی تیستۆستیرۆن نزم به‌ تاییه‌تی له پۆژی چوارده‌هه‌م وه بیست و هه‌شته‌مین پۆژی به پۆژوووبون به‌لام بی‌بايه‌خ بوون ، به‌پۆژوووبون کاریگه‌ری هه‌بوو له‌سه‌ر ئه‌نزیمه‌کانی جگه‌ر ، ئه‌نزیمی (AST) نزمبونه‌وه‌یه‌کی بايه‌خدار بووه ( $P<0.05$ ) له نیوان ماوه‌ی پێش وه دواي به‌پۆژوووبون له‌سه‌ر ئه‌نزیمی (ALT) بووه هۆی دابه‌زینی ئاستی به‌لام به‌ شیوه‌یه‌کی بی‌بايه‌خ . وه هه‌روه‌ها تیبینی کرا نزم بونه‌وه‌یه‌کی زۆر که‌م له چالاکی ئه‌نزیمی (ALP) كه بی‌بايه‌خ بوو . ئه‌نجامی توێژینه‌وه‌که ده‌ریخت نزمبونه‌وه‌یه‌کی بايه‌خدار له په‌ستانی خوین سیتۆل و دایه‌ستۆل دا پرووی داوه ( $P<0.05$ ) هه‌روه‌ها توێژینه‌وه‌که ده‌ریخت كه دابه‌زینیکی بی‌بايه‌خی کیشی له‌ش له‌کاتی به‌پۆژوووبوندا پرووی داوه .

**ده‌رئه‌نجامه‌کان :** ئه‌م توێژینه‌وه‌یه ده‌ریخت كه به‌پۆژوووبون له‌کاتی پهمه‌زاندایه‌هی کاریگه‌ری خراپی نیه له‌سه‌ر تهن‌دروستی به‌لکو به‌ پێچه‌وانه‌وه هه‌ندی کاریگه‌ری خوازاوی هه‌بیت له‌سه‌ر له‌ش . پاسپارده‌کان : توێژینه‌وه زیاتر پێویسته بۆ پونکردنه‌وه‌ی کاریگه‌ری به پۆژوووبون له‌سه‌ر ژنان به ته‌مه‌نه جیاوازه‌کانی وه هه‌روه‌ها پشکنینی کاریگه‌ری به‌پۆژوووبون له‌سه‌ر پێوه‌ره‌کانی تر.

## الخلاصة

**الهدف:** لمعرفة مدى تأثير الصيام على مستويات الهرمونات الجنسية وعلى وظائف الكبد.

**المنهجية:** جُمعت عينات الدم قبل الصوم كمجموعة ضابطة أولى وبعد (14, 28) يوم من الصيام لأربعين شخص جميعهم ذكور, غير متزوجين, غير مدخنين, أصحاء ظاهريا وأعمارهم ما بين (20-30) سنة, في شهر رمضان (2012). تم قياس مستويات هورمون المنبه للجريبات (Follicle-Stimulating Hormone (FSH) و Luteinizing hormone (LH) والتستوستيرون Testosterone وأما أنزيمات الكبد فشملت Alanine (ALT), Aspartate Transaminase (AST) و Transaminase و Alkaline phosphatase (ALP) بالإضافة إلى تأثير الصيام على ضغط الدم ووزن الجسم.

**النتائج:** بينت النتائج حدوث زيادة غير معنوية في تركيز (FSH)؛ فيما أظهرت انخفاضا في تركيز (LH) ولكن لم يكن معنويا. وكان مستوى هرمون التستوستيرون منخفضا ولا سيما في اليوم الرابع عشر و الثامن والعشرون من الصيام ولكن لم يكن معنويا. كان للصيام تأثيراً في مستويات أنزيمات الكبد فبالنسبة للأنزيم (AST) فكان الانخفاض معنويا ( $P < 0.05$ ) مابين فترة قبل الصيام وخلال الصيام. كما إمتد تأثير الصيام على إنزيم (ALT) فقد إنخفضت مستوياته كذلك ولم يكن معنويا. وكذلك لوحظ انخفاضا طفيفاً في نشاط إنزيم (ALP). وأظهرت نتائج الدراسة حدوث انخفاضا معنويا ( $P < 0.05$ ) في ضغط الدم الأنقباضي و الأنقباضي. أظهرت الدراسة كذلك حصول انخفاضا غير معنويا في الوزن خلال الصيام

**الاستنتاجات:** نتيجة لذلك، أظهرت هذه الدراسة بأن الصوم أثناء رمضان لن يُسبب بأي تأثير ضار على الصحة؛ بالعكس، هو قد يرتبط ببعض التأثيرات المناسبة للجسم.

**التوصيات:** الدراسات الإضافية ضرورية لتوضيح تأثير الصيام على الإناث بفئات عمرية مختلفة. بالإضافة إلى تحري تأثير الصيام على معايير فسلجية أخرى.