

Effects of Ramadan Fasting on Lipid Profiles In Normal Subjects.

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Keywords: Ramadan, fasting, lipid profile.

(Received april.2012, Accepted June 2012)

Abstract:

Fasting during Ramadan is a religious duty for all healthy adult muslims, fasting is abstention from food and drink from sunset to dawn. The study was conducted on the undergraduate students and officers of the College of Medicine, College of Pharmacy and College of Engineering, University of Tikrit. Twenty five apparently healthy students volunteered participated in the study. Their ages ranging from (18-50) years. Serum lipid profile were measured for this group. The investigations were done in the laboratories of Tikrit Teaching Hospital from Oct. to Nov. 2004. Average duration of the fasting was about 12 hours and maximum ambient temperature ranged from 10-12 C. The study was conducted in three trails. The first trial during a period extending up to one week before Ramadan fasting, the second trail during the 7,8,9th days of Ramadan fasting, the third trail during the 7,8,9th days of Ramadan fasting, the third trail during 27,28,29 th days of Ramadan fasting. During each trail five ml of blood was collected from vein by a disposable syringe and centrifuged (centrifuge 1500 r/min) and serum kept in deep freeze at -20C for biochemical analysis (lipid profile). The instrument used for the determination of lipid profile is the spectrophotometer. There was a non significant decrease in concentration of serum cholesterol at the beginning of Ramadan as compared to pre-ramadan values and there was a non significant increase in concentration of serum cholesterol at the end of Ramadan as compared to pre-ramadan values. There was a non significant decrease in concentration of serum triglycerides at the beginning of Ramadan as compared to pre-Ramadan values and there was a significant decrease in concentration of serum triglyceride at the end of Ramadan as compared to pre-Ramadan values. There was a non significant decrease in concentration of serum VLDL at the beginning of Ramadan as compared to pre-Ramadan values and there was a significant decrease in concentration of VLDL at the end of Ramadan as compared to pre-Ramadan values. There was a non significant decrease in concentration of serum LDL at the beginning of Ramadan as compared to pre-ramadan values and there was a significant increase in concentration of serum LDL at the end of Ramadan as compared to pre-Ramadan values. There was a significant decrease in concentration of serum HDL at the beginning of Ramadan as compared to pre-ramadan values and there was a

significant decrease in concentration of serum HDL at the end of Ramadan as compared to pre-Ramadan values. There was a non significant decrease in body weight at the end of Ramadan as compared to pre-Ramadan values .

تأثير صوم رمضان على صورة الدهون لدى الاشخاص الطبيعيين.

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مفتاح البحث: رمضان، الصيام، صورة الدهون

الخلاصة:

الصوم في رمضان هو واجب ديني لكل المسلمين الاصحاء البالغين، الصوم يعني البقاء بدون اكل وشرب من شروق الشمس الى غروبها. الدراسة اجريت على طلاب وموظفي كلية الطب، كلية الهندسة وكلية الصيدلة في جامعة تكريت. شملت هذه الدراسة 25 متطوعا وتم قياس مستوى الكوليسترول، الدهون الثلاثية، البروتينات الدهنية الواطئة الكثافة جدا، البروتينات الدهنية الواطئة الكثافة، البروتينات الدهنية العالية الكثافة، وزن الجسم. الدراسة اجريت في مختبر مستشفى تكريت التعليمي للفترة من شهر تشرين الاول الى شهر تشرين الثاني لسنة 2004. تم جمع العينات في ثلاث زيارات، الزيارة الاولى كانت قبل رمضان باسبوع، الزيارة الثانية كانت خلال الايام السابع والثامن والتاسع من رمضان، والزيارة الثالثة كانت خلال الايام السابع والعشرين والثامن والعشرين والتاسع والعشرين من رمضان. حيث قمنا بدراسة اثر الصيام في رمضان على مستوى الدهون والبروتين الدهني في الدم وعلى وزن الجسم. في هذه الدراسة كان هناك انخفاض غير معنوي في تركيز الكوليسترول في بداية رمضان من 5.08 (mmol/l) الى 4.94 (mmol/l) بالمقارنة الى ما قبل رمضان وكان هناك زيادة معنوية في تركيز الكوليسترول في نهاية رمضان من 5.08 (mmol/l) الى 5.52 (mmol/l) بالمقارنة الى ما قبل رمضان. كان هناك انخفاض غير معنوي في تركيز الدهون الثلاثية في بداية رمضان من 1.91 (mmol/l) الى 1.80 (mmol/l) بالمقارنة الى ما قبل رمضان وكان هناك انخفاض معنوي في تركيز الدهون الثلاثية في نهاية رمضان من 1.91 الى 1.76 (mmol/l) بالمقارنة الى ما قبل رمضان. كان هناك انخفاض غير معنوي في تركيز البروتينات الدهنية الواطئة الكثافة جدا في بداية رمضان من 0.88 (mmol/l) الى 0.82 (mmol/l) بالمقارنة الى ما قبل رمضان وكان هناك انخفاض معنوي في تركيز البروتينات الدهنية الواطئة الكثافة جدا في نهاية رمضان من 0.88 (mmol/l) الى 0.81 (mmol/l) بالمقارنة الى ما قبل رمضان. كان هناك انخفاض غير معنوي في وزن الجسم في نهاية رمضان بالمقارنة الى ما قبل رمضان.

Introduction:

Fasting during Ramadan is a religious duty for all healthy adult muslims, fasting is abstention from food and drink from sunset to dawn, Ramadan is the ninth month of the Islamic lunar calendar. (1,2). Fasting means going without food and water for many hours (3). The experience of fasting teaches Muslims self discipline and self restraint, fasting is not obligatory for children, menstruating women, pregnant and lactating women are permitted to postpone the fasting during Ramadan (1,2). During Ramadan, the majority of Muslims have two good sized meals, one immediately after sunset and the other just before dawn, they are allowed to eat and drink between sunset and dawn but not after dawn, the month of Ramadan is either 29 or 30 days (4,5). Fasting during the Islamic month of Ramadan can be good for one's health and personal development (6). A diet that is less than a normal amount of food intake but balanced is sufficient enough to keep a person healthy and active during the month of Ramadan (7,8).

Materials and Subjects:

The study was conducted on the undergraduate students and officers of the College of Medicine, College of Pharmacy and College of Engineering ,University of Tikrit. Twenty five apparently healthy students volunteered participated in the study. Their ages ranging from (18-50) years. Serum lipid profile were measured for this group. The investigations were done in the laboratories of Tikrit Teaching Hospital from Oct .to Nov.2004. Average duration of the fasting was about 12 hours and maximum ambient temperature ranged from 10-12 C.

The study was conducted in three trails. The first trial during a period extending up to one week before Ramadan fasting, the second trail during the 7,8,9th days of Ramadan fasting, the third trail during the 7,8,9th days of Ramadan fasting ,the third trail during 27,28,29 th days of Ramadan fasting. During each trail five ml of blood was collected from vein by a disposable syringe and centrifuged (centrifuge 1500 r/min) and serum kept in deep freeze at -20C for biochemical analysis(lipid profile). The instrument used for the determination of lipid profile is the spectrophotometer. The serum cholesterol was estimated by cholesterol kit(Diamond, Jordan), the serum triglyceride was estimated by triglyceride kit use (biometrix, france) and the serum high density lipoprotein was estimated HDL kit (Randox, USA).

Statistical Analysis:

The analysis of variance followed by the students t-test (two tailed) for comparisons between different groups.

Results:

The concentration of lipid profile:1.

As shown in table 1 ,the was a anon significant decrease ($p>0.05$) in concentration of serum cholesterol from 5.08(mmol/l) to 4.94(mmol/l) but in trail 2 as compared to trail 1, there was a non significant increase ($p>0.05$) in the concentration of serum cholesterol from 5.08(mmol/l) to 5.52(mmol/l) in trail 3 as compared to trail 1 and there was significant increase ($p<0.05$) in concentration of serum cholesterol from 4.94(mmol/l) to 5.52(mmol/l) in trail 3 as compared to trail 2.

The was a non significant decrease ($p>0.05$) in the concentration of serum triglycerides from 1.91(mmol/l) to 1.80(mmol/l) in trail 2 as compared to trail 1, there was a significant decrease ($p<0.05$) in concentration of serum triglyceride from 1.91(mmol/l) to 1.76(mmol/l) in trail 3 as compared to trail 1 and there was no significant decrease ($p>0.05$) in concentration of triglycerides from 1.80(mmol/l) to 1.76 (mmol/l) in trail 3 as compared to trail 2.

There was non significant decrease ($p>0.05$) in concentration of serum VLDL from 0.88(mmol/l) to 0.82 (mmol/l) in trail 2 as compared to trail 1, there was

a significant (mmol/l) to 0.81(mmol/l) in trail 3 as compared to trail 1 and there was a non significant decrease ($p>0.05$) in concentration of serum VLDL from 0.82(mmol/l) to 0.81(mmol/l) in trail 3 as compared to trail 2.

There was a non significant decrease ($p>0.05$) in concentration of serum LDL from 3.12(mmol/l) to 3.11 (mmol/l) in trail 2 as compared to trail 1, there was significant increase ($p<0.05$) in concentration of serum LDL from 3.12(mmol/l) to 3.70(mmol/l) in trail 3 as compared to trail 1 and there was significant increase ($p<0.05$) in concentration of serum LDL from 3.11(mmol/l) to 3.70(mmol/l) in trail 3 as compared to trail 2.

There was significant decrease ($p<0.05$) in the concentration of serum HDL from 1.10(mmol/l) to 1.00) in trail 2 as compared to trail 1,there was significant decrease ($p<0.05$) in concentration of serum HDL from 1.10 (mmol/l) to 1.00 (mmol/l) in trail 3 as compared to trail 1 and there was no change in concentration of serum HDL in trail 3 as compared to trail 2.

Table(1): The concentration of lipid profile in trail 1,2,3.

Parameters		Trail1	Trail2	Trail3	t-test
CHOL(mmol/l)	Mean	5.08	4.94	5.52	1-2 NS 1-3 NS 2-3*
	S.D	±.78	±.61	±.81	
	SE	.15	.12	.16	
TG(mmol/l)	Mean	1.91	1.80	1.76	1-2NS 1-3* 2-3NS
	SD	±.14	±.26	±.32	
	S.D	2.810E-02	5.226E-02	6.554E-02	
VLDL(mmol/l)	Mean	0.88	0.82	0.81	1-2NS 1-3* 2-3NS
	S.D	±.14	±.26	±.32	
	S.E	2.810E-02	5.226E-02	6.554E-02	
LDL-C(mmol/l)	Mean	3.12	3.11	3.70	1-2NS 1-3* 2-3*
	S.D	±.70	±.57	±.90	
	SE	.1407	.11	.18	
HDL-C(mmol/l)	Mean	1.10	1.00	1.00	1-2* 1-3* 2-3
	S.D	±.13	±.10	±.12	
	SE	2.798E-02	2.160E-02	2.548E-02	

2. The values of body weight.

There was a non significant decrease ($p > 5.05$) in body weight from 63.39(kg) to 62.98 (kg) in trail 3 as compared to trail 1 (table 2).

Table(2):The values of body weight in trail1 and trail3.

Parameters		Trail 1	Trail3	t-test
Body weight(kg)	Mean	63.39	62.98	NS
	S.D	± 13.78	± 13.75	
	SE	2.75	2.75	

Discussion:

1.Cholesterol.

Changes in serum cholesterol level in the beginning of Ramadan in this study agree with that reported by other studies(9,10,11,12,13,14).Changes in serum cholesterol level in the end of Ramadan in this study agree with that reported by other studies (15,16,17,18,10),who reported a significant increase in the concentration of the cholesterol during fasting at Ramadan month.The decrease in the concentration of serum cholesterol at the beginning of Ramadan in this study can be explained by decreased saturated fatty acid intake which cause decrease in the concentration of cholesterol(19,20).

Changes in serum cholesterol level seem to be variable and depend probably on the quality and quantity of food consumption and the degree of weight changes, these changes may also be related to consuming a large meal and it has been shown that serum cholesterol level increase in individuals taking one large meal every day(18),tow other factors also play a part, first previous studies have shown that serum that serum cholesterol was significantly higher when the daily food intake was served as one large meals, the second factor is the type of food consumed during Ramadan as there is a tendency towards increased intake of carbohydrates (mainly sucrose especially to break the fast and during the night) and fat (18,21,22).

2.Triglycerides:

Changes in serum triglycerides level in this study agree with that reported by other studies (23),and disagree with (15,24),who reported a non significant increase in the concentration of serum triglycerides during fasting in Ramadan month.Epinephrine and partially norepinephrine released from the sympathetic nerve ending in adipose tissue are also physiological important activators of hormone sensitive lipase(3).Increased release of fatty acid, fatty acids obtained from hydrolysis of stored triglycerides are released in to the blood, bound to albumin ;they are transported to a

variety of tissues for use as fuel, the glycerol produced ,following triglycerides degradation is used as a gluconeogenic precursor by the liver(25).

Fatty acids are also converted to acetylCoA, Which can enter the Krebs cycle, thus producing energy for the adipocyte (3). Decreased uptake of fatty acids ,in fasting, lipoprotein lipase activity of adipose tissue, is low, consequently, circulating triglycerides of lipoproteins is not available for triglycerides synthesis in adipose tissue ,and also glucose transport into the adipocyte and its subsequent metabolism are decreased owing to low levels of circulating insulin, this leads to a decrease in fatty acid and triglycerides synthesis.

3. Very Low Density Lipoprotein (VLDL).

Changes in serum VLDL level in this study may be explained by decrease saturated fatty acid intake which cause decrease the concentration of VLDL(3).

4. Low Density Lipoprotein(LDL_C).

Changes of serum LDL level in the beginning of Ramadan agree with that reported by other studies (9,10,11,12,13,26). Changes of serum LDL level in the end of Ramadan agree with that reported by other studies(27). This can be explained by increased saturated fatty acid intake which causes increase in the concentration of LDL ,changes in serum LDL level seem to be variable and depends probably on the degree of weight changes, these changes may also be related to consuming a large meal, as it has been shown that lipids increase in individuals taking one large meal every day(18). And also may be explained by different food habits in particular populations, however it is possible that the varying results may be due to the different seasons during which Ramadan takes place(28).

When present in excessive numbers, LDL deposit cholesterol in and around smooth muscle fibers in arteries, forming fatty atherosclerosis plaques that increase the risk of coronary artery disease(3). LDL is transported cholesterol from liver to peripheral tissue(29,30,31,32), for this reason, the cholesterol is LDL, called (LDL cholesterol), is known as bad cholesterol, because some people have too few LDL receptors, their body cell cannot remove LDL from the blood as effectively, as a result, their plasma LDL level is abnormally high, and they are more likely to develop fatty plaques, further more ,eating a high-fat diet increases the production of veryLDL, which elevates the LDL and increases the production of very LDL, which elevates the LDL and increases the formation of fatty plaques(3).

High Density Lipoprotein-cholesterol(HDL-C).5.

Changes of serum HDL level in this study agree with that reported by other studies (25), and disagree with that reported by other studies (10,33,34,35,36). This can be explained by the increased lipids intake and fatty intake of meals due to intake of a large amount of rich foods (mainly lipids and carbohydrates) during the Ramadan month(37). HDL removes excess cholesterol from body cells and transport it to the

liver for elimination ,because HDL-C prevents accumulation of cholesterol in the blood, a HDL-C level is associated with decreased risk of coronary artery disease ,for this reason ,HDL-C is known as good cholesterol(3).

6. Body Weight:

Changes of body weight in this study agree with that reported by other studies(9,12,17,24,38).This is due to the short duration of fasting(30 days) and during this period, there was no valuble effect on the body weight and also the study was conducted on the normal healthy subjects and was not conducted on the persons who where affected by obesity,as we know loss in body weight in the persons affected by obesity more than in the normal healthy subjects(39).

Conclusions

1. There was a non significant decrease in concentration of serum cholesterol at the beginning of Ramadan as compared to pre-ramadan values and there was a non significant increase in concentration of serum cholesterol at the end of Ramadan as compared to pre-ramadan values.
2. There was a non significant decrease in concentration of serum triglycerides at the beginning of Ramadan as compared to pre-Ramadan values and there was a significant decrease in concentration of serum triglyceride at the end of Ramadan as compared to pre-Ramadan values.
3. There was a non significant decrease in concentration of serum VLDL at the beginning of Ramadan as compared to pre-Ramadan values and there was a significant decrease in concentration of VLDL at the end of Ramadan as compared to pre-Ramadan values.
4. There was a non significant decrease in concentration of serum LDL at the beginning of Ramadan as compared to pre-ramadan values and there was a significant increase in concentration of serum LDL at the end of Ramadan as compared to pre-Ramadan values.
5. There was a significant decrease in concentration of serum HDL at the beginning of Ramadan as compared to pre-ramadan values and there was a significant decrease in concentration of serum HDL at the end of Ramadan as compared to pre-Ramadan values.
6. There was a non significant decrease in body weight at the end of Ramadan as compared to pre-Ramadan values .

References

- 1.Sakr AH .Fasting in Islam .Jam Diet Assoc .,67,17-21(1975).
- 2.Aziz F. Medical aspects of Islamic fasting. Med J Islamic Rep Iran .,10,241-6(1996).
- 3.TortoraGj. Principles of anatomy and physiology 9th ed.Newyork,John Wiley and sons,IN.,584-897(2000).
- 4.Proceedings of the first International Congress on health and Ramadan.Casablanca,Morocca,19-22 January(1994).
- 5.Proceedings of the Second International Congress on health and Ramadan.Istanbul,turkey,1-3December(1997).
- 6.Daradkeh,T.K.Parasuicide during Ramadan in Jordan.ActaPsychiatrica Scandinavica.,86:253-254(1992).
- 7.Iraki,L,A.Bogdam,F.Hakkou.Amrani,A.Abkari and Y.Touitou.Ramadan diet restrictions modify the circadian time structure in humans.Astudy on plasma gastrin, insulin, glucose ,calcium and on gastric PH .Journal of Clinical Endocrinology and Metabolism.,82:1261-1273(1997).
- 8.Sulimani,R.A.Ramadanfasting:Medical aspects in health and in disease.Annals of Saudi Medicine.,2,637-641(1991).
- 9.Nagra SA, RahmanZ,MohammadJ.Guadri A.J .Study of some biochemical parameters in young women as affected by Ramadan fasting Int.J. Ramadan fasting res.,2:1-5(1998).
- 10.MaislosM,KhamaysiN,AssaliA,Abou-RabiahY,ZviliI,ShanyS.Marked increase in plasma high-density lipoprotein cholesterol after prolonged fasting during Ramadan. Am J clin Nut57,640-2(1993).
- 11.Adlouni A,GhalimN,BenslimaneA,LeceryJM,SailaR.Fasting during Ramadan induces a marked increase in HDL and decrease in LDL-cholesterol.AnnNutrmetab 41,242-9(1997).
- 12.AfrasiabiA,Hussan S, SattarivandR.NouriM,MahboodS.Effect of Ramadan fasting on serum lipid profile on 2 hyperlipiemic groups with or without diet pattern. Saudi Med J., 24,23-262(2003).
- 13.Nomani MZA. dietary fat blood cholesterol and uric acid levels during Ramadan fasting.Int.J.Ramadan fasting.,1;1-4(1997).
- 14.NomaniMZA.diet during Ramadan Int.J.Ramadan res fasting.,3;1-5(1999).

- 15.EL-Hazmi MAF,AL-FalehFZ,AI-MoflehIB.Effect of Ramadan fasting on the values of hematological and biochemical parameters.Suadi.Med J.,8;171-6(1987).
- 16.Gumaa KA,MustafaKY,MahmoudNA,GaderAM.The effect of fasting in Ramadan.1.Serum uric acid and lipid concentration.Br J Nutr.,40;573-81(1978).
- 17.Fedail SS,MurphyD,SalihSY,BoltonCH,HarveyRF.Changes in certain blood constituents duringRamadan.Am J Clin Nutr.,36;350-3(1982).
- 18.Gwinup G,Byron RC, Roush WH,etal.Effect of nibbling versus gorging on serum lipid in man. Am J Clin Nut.,13;209-13(1963).
- 19.TaylorDJE.Biogy Scient.3rd.ed.Gambridge.,20-23(1997).
- 20.Wilmore J and Costill. Training for sport and activity dubuguelowa.Wms, Brown puplishing.,47-481988.
- 21.Irwin MI, Feeley RM .Frequency of meals: effect on serum lipids and fat digestibility.AM J Clin Nut.,20;816-24(1967).
- 22.Fabry P ,Fodor Z, HejlZ.The frequency of meals,its relation to over weight, hypercholesterolemia,and decreased glucose tolerance.Lancet.,11;45-44(1964).
- 23.Adlouni A,GhalimN,SaileR,HadN,ParaHJ,BenslimaneA.Beneficial effects on serum apo A1,apo B and LP A1 levels of Ramadan fasting.ClinChimActa .,41;242-9(1997).
- 24.ShoukryMI.Effect of fasting in Ramadan on plasma lipoprotein andapoproteins. Saudi Med J 7;561-5(1986).
- 25.Champ PC ,Harvey RA, Fervier DR. Biochemistry. Lipincottes Illustrated reviews.3rded,Lipincotts Williams and Wikins,USA.,293-294(2005).
- 26.Wood PD.Change in plasma lipid and lipoprotein in over weight men during weight loss theory dieting as compared with exercise.EngelandJ.Med(1988).
- 27.Aksunger F.B.,ErenA.Effect of intermittent fasting on serum lipid levels and coagulation.Journal of thrombosis and haemostasis.,1;1-2(2003).
- 28.Nizal Sarraf-Zadegan,MD;MahoodAtashi,MD;GholamA;etal.The effect of fasting in Ramadan on the values and interrelations between Biochemical,Goagulation and Hematologicalfactores.Ann Saudi Med .,20;377-381(2000).
- 29.MurryRK,GrannerDK.MayesPA.Harper biochemistry.25thed.California.Appleton and lange.,569-670(2000).
- 30.Vranake.Biochemistry.2nded.Lippincott Williams and Wilkins.Philadelphia.,6;121-123(1999).
- 31.Americanstrokassociation.What about cholesterol and diet.(2003).

32. Stryer L. Biochemistry. 4th ed. WH. Freeman and Company, New York., 9;50-53(2000).
33. Dehghan MR, Nafarabadi MT, Navai, Azizi F. The effect of Ramadan fasting on blood glucose and lipids in type 2 diabetes. J Facult Med SBUMS., 18;42-7.
34. Etali J, Beji C, Danguri J. Increased fat oxidation during Ramadan fasting in health women :an adaptive mechanism for body weight maintenance. The American J of Clinical Nutrition ., 62;302-307(1995).
35. Khatibi, F.E. Effect of fasting in Ramadan on blood glucose and plasma lipid. Second international Congress on health and Ramadan. Istanbul., 42;1-3(1997).
36. Uysal A, Erdogan M, Shain G, Kamel P, Erdogan G. The clinical metabolic and hormonal effect on 41 NIDDM patients, during the Ramadan. Second Int. Congress on health and Ramadan(1997).
37. Nagra SA, Rahman Z, Mohammad J, Guadri A. J. Study of some biochemical parameters in young women as effected by Ramadan fasting Int. J. Ramadan fasting res.(1998).
38. Nomani, MZA, Hallak, MH, body weight loss change in blood lipid levels in normal men on hypocaloric diet during Ramadan fasting. AM. J. Clin. Nutr., 48:1197-1210(1988).
39. AL-Hader AFA, Abu-Farsak, Khatib SY, Husan ZA. The effect of Ramadan fasting on certain biochemical parameters in normal subjects and in type 2 diabetic patients Ann Saudi Med 1994;14:139-41(1994).