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Effect of Ramadan Fast on Corticotrophin and β-Endorphins

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Abstract

The effect of Ramadan fasting on endogenous opioids in man was assessed by measuring plasma β-endorphins before and during Ramadan fast. In nine healthy volunteers, consecutive measurements of 24 hour (9.00 am, 4:00 pm, and 4:00 am) changes in plasma β-endorphins, corticotrophin and some circulating nutritional markers were recorded days before Ramadan fast and repeated on the 15th day after the start of Ramadan fast. β-endorphins levels did not differ significantly during Ramadan when compared to the non-fasting measurements. These findings indicate that the short terms intermittent fasting-refeeding patterns characteristic of the Ramadan fast do not seem to challenge the homeostatic stabililty of the body's "inside milieu".

Introduction

RAMADAN fasting is one of five pillars in Islam. It entails abstention from food for about fifteen hours daily starting from dawn to sunsent for the lunar month of Ramadan (9th Hegrian month). Research on this type of intermittent fasting and its hormonal changes is still scanty [1-5].

No work has been done on the effect of Ramadan fasting on corticotrophin and β-endorphin. In both animals [6] and humans [7,8] β-endorphins are involved in the physiological adaptation starvation-

like fasting. Therefore this study was undertaken to see (if) the effect of Ramadan fasting (starvation-like fasting) on the measured levels of cortitrophin and β-endorphins in healthy volunteers in comparison to control levels obtained during a non-fasting day.

Material and Methods

During Ramadan, abstention from food and drink is from dawn to sunset and the first meal (breakfast) is taken immediately after sunset, (approximately 6:00 pm) and thereafter the subject is free to consume food and drink. Sleeping hours, which are between 11:00 pm and 8:00 am are interrupted at 4:00 am by the intake of the light meal (Suhur) and dawn (Fajr) prayer. Daily working hours in Ramadan are from 9:00 am to 3:300 pm. Blood samples during Ramadan were collected in the middle of the month when adaptation to the changes in food and sleep rhythm is assumed to be complete. In a non-fasting day, work starts at 7:30 am and finishes at 4:30 pm. Lunch is between 1:00 pm and 2:00 pm, dinner is at 7:00 pm and bed time is approximately 10:00 pm The subjects wake up at 4:30 am for the dawn prayer, then remain awake until they go to work.

Blood samples:

Consecutive blood samples were collected over a 24 hour period: at 9:00 am, 4:00 pm, 9:00 pm and 4:00 am, both during a non-fasting and a Ramadan day. Plasma was separated in a refrigerated (4-8°C) centrifuge, and was sorted at -40°C until analyzed. Corticotrophin was assayed using RIA kits supplied by Diagnostic System Laboratories Inc. (Taxas, U. S. A.), β-endorphins were measured by kits supplied by Milab Malmo Immunolaboratorium AB (Sweden). Both assays were done with appropriate quality control specimens. Measurements of glucose (glucose Analyzer II, Beckman U. S. A.). Lipids Enzymatic Method was done for triglycerides, total cholesterol, uric acid, HDL and LDL using commercially available kits (Boehringer Mannhein, Germany). Lastly peptide was measured by radioimmunoassay (incstar Corp, Minnesota, U. S. A.).

Statistical Analysis:

All data were expressed as mean ± SE. Continuous variables were compared by one-way analysis of variance (ANOVA) to test the significance of the diurnal variation in the levels of ACTH and β-endorphins and other parameters. The paired Student's *t*-test was used to compare fasting results vs non-fasting ones. In both cases p values < 0.05 were considered significant.

Results

Table 1 shows that there were no statistically significant differences between fasting vs non-fasting plasma levels of β-endorphins through the 24 hour cycle (Fig. 1). On the other hand plasma adrenocroticotrophic hormone (ACTH) was

Table (1): Diurnal Changes in Plasma ACTH and β-endorphins before and during fasting.

Variable	9:00 am	4:00 pm	9:00 pm	4:00 pm
ACTH (pgm/ ml)				
before fasting	60.7 ± 5.7*	72.9 ± 8.7	74.5 ± 9.2	77.1 ± 8.4
during fasting	89.9 ± 9.9	75.6 ± 6.1	81.3 ± 6.7	77.0 ± 10
Beta-endorphins (pgm /ml)				
before fasting	10.9 ± 2.6	11.2 ± 3.1	10.1 ± 19	10.5 ± 3.3
during fasting	17.5 ± 2.5	18.1 ± 2.5	14.1 ± 2.2	8..8 ± 2.5

* Statistically significant ($p<0.05$).

significantly higher at 900 am during fasting ($p < 0.05$) (Fig. 2). No significant fluctuations in body weight were noted (Mean body weight 76.11 ± 2.89 kg).

It can be seen from tables 1&2 that there was significant reduction in total triglycerides (4:00 pm) and C-peptide (9:00 am and 4:00 pm) during Ramadan fast (Table 2), and no statistically significant changes were seen in glucose, total cholesterol, LDL, HDL and uric acid when comparing fasting and non-fasting measurements respectively.

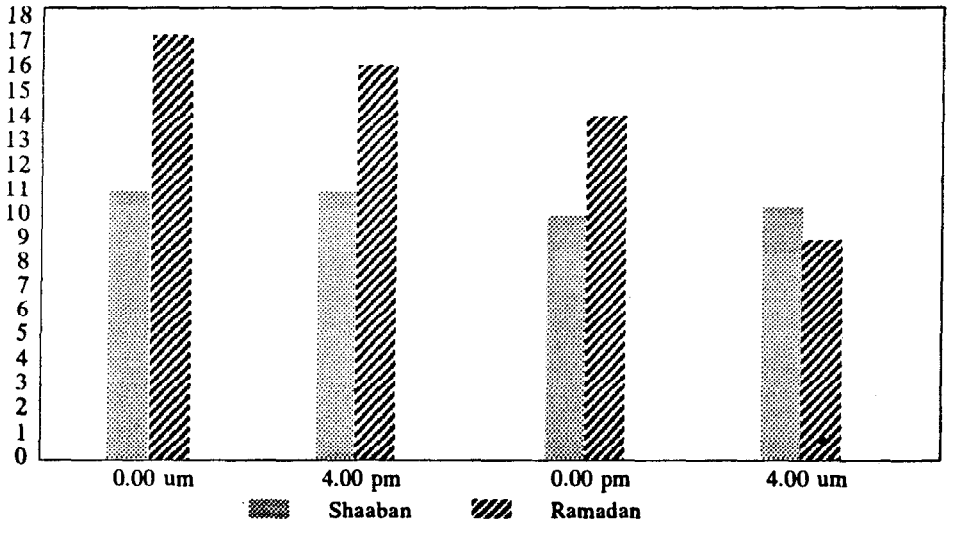

Fig. (1): Endorphin study

Table (2): Diurnal Metabolic Indices and C-peptide before and during Fasting.

Variable	9:00 am	4:00 pm	9:00 pm	4:00 pm
Glucose				
(mmol /L)				
before fasting	4.06 ± 0.2	467 ± 0.43	5.32 ± 0.24	5.15 ± 0.2
during fasting	4.52 ± 0.18	398 ± 0.18	4.34 ± 0.51	467 ± 0.3
HDL-CHOL				
(mgm /dl)				
before fasting	37.9 ± 3.2	38.4 ± 1.6	38.2 ± 1.5	37.9 ± 1.7
during fasting	39.1 ± 1.7	38.0 ± 14	36.3 ± 1.6	34..3 ± 1.9
LDL-CHOL				
(mgm /dl)				
before fasting	117 ± 14	120.0 ± 10.0	102.3 ± 17	107.5 ± 14.7
during fasting	111.7 ± 7	133.4 ± 12.1	101.4 ± 7.5	109.9 ± 12.3
Triglyceride				
(mgm /dl)				
before fasting	239.4 ± 25	279.7 ± 21.1*	320.4 ± 33	266.4 ± 16.5
during fasting	237.9 ± 38	1561 ± 9.24	32 ± 12.7	344.0 ± 1.0
Cholesterol				
(mgm /dl)				
before fasting	202.9 ± 11.6	214.4 ± 11.2	201 ± 14	198.8 ± 14
during fasting	207.9 ± 8.5	202.7 ± 13.2	210 ± 11.5	207.6 ± 13.2
Uric acid				
(mgm /dl)				
before fasting	6.07 ± 0.22	6.44 ± 0.27	6.66 ± 0.25	6.56 ± 0.2
during fasting	6.34 ± 0.19	6.38 ± 0.24	7.22 ± 25	6.86 ± 0.2
C-peptide				
(mgm /dl)				
before fasting	3.77 ± 0.9*	0.03 ± 0.4*	2.28 ± 0.51	1.81 ± 0.3
during fasting	1.40 ± 0.15	0.92 ± 0.18	2.26 ± 0.7	1.81 ± 0.3

* = ($p < 0.05$).

Discussion

Pervious reports [8] showed that β-endorphins increased significantly during acute starvation irrespective of its duration. Furthermore, the increase in β-endorphins is associated with alterations in the hypothalamic-pituitary-adrenal axis [9].

In this study there was a slight increase in β-endorphin levels during Ramadan fasting but did not attain statistical significance. On the other hand adrenocorticotropic hormone showed a significant increase at 9:00 am only during fasting; apart from that the levels obtained during fasting were not markedly different from the non-fasting levels.

Other nutrients, apart from triglycerids and C-peptide did not show significant changes during the intermittent Ramadan fasting-refeeding procedure; this is in contrast to other studies [10] where cholesterol and uric acid were seen to rise significantly suggesting a stressful state and a cellular energy crisis [11].

In conclusion, the Ramadan intermittent fasting-refeeding does not seem to put an extra strain on the body as measured by β-endorphins.

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