

Short communication

Effect of Ramadan fasting on secretion of sex hormones in healthy single males

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تأثير صيام شهر رمضان على إفراز الهرمونات الجنسية في العزّاب الأصحاء

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الخلاصة: بُعِيَّة تحديد التّأثيرات التي يحدثها صيام شهر رمضان على إفراز الهرمونات الجنسية لدى العزّاب الأصحاء، قام الباحثون بقياس مستوى هرمون التستستيرون والهرمون الملوّتين LH والهرمون المنبّه للجريبات FSH في الدم، لدى 52 من الطلبة العزّاب الذين تراوحت أعمارهم بين 18 و24 عاماً، والذين كانوا صائمين لمدة 12 ساعة أو أكثر خلال شهر رمضان. وتم أخذ أربع عينات دم من كل منهم، إحداها قبل رمضان بيوميّين والأخرى في أيام 10 و20 و28 رمضان. وكان مستوى هرمون التستستيرون منخفضاً يُعْتَدُّ به إحصائياً، ولاسيّما في يوميّ 20 و28 من الشهر (P أقل من 0.05) وكان مستوى الهرمون المنبّه للجريبات مرتفعاً ارتفاعاً بشكل كبير يوم 20 رمضان (P أقل من 0.05)، أما الهرمون الملوّتين فلم يحدث فيه تغيير يُعْتَدُّ به إحصائياً.

ABSTRACT To determine the effects of Ramadan fasting on the secretion of sex hormones in single healthy males, we measured blood hormone levels of testosterone, luteinizing hormone (LH) and follicle-stimulating hormone (FSH) in 52 single male students aged 18–24 years who were fasting for ≥ 12 hours during Ramadan. Four blood samples were taken from each, one 2 days before and the others on 10, 20 and 28 Ramadan. Testosterone level was lower, significantly so for the 20th and 28th of the month ($P < 0.05$); FSH was increased, significantly for the 20th ($P < 0.05$); LH did not change significantly.

Effet du jeûne du ramadan sur la sécrétion d'hormones sexuelles chez des hommes célibataires en bonne santé

RÉSUMÉ Afin de déterminer les effets du jeûne du ramadan sur la sécrétion d'hormones sexuelles chez des hommes célibataires en bonne santé, nous avons mesuré les concentrations sanguines de testostérone et d'hormones lutéinisante (LH) et folliculostimulante (FSH) chez 52 étudiants célibataires âgés de 18 à 24 ans qui jeûnaient pendant 12 heures ou plus pendant le ramadan. Quatre prélèvements sanguins ont été effectués sur chacun des sujets, le premier 2 jours avant le début du ramadan et les autres au 10^e, 20^e et 28^e jour du ramadan. La concentration de testostérone était plus faible, et ce de manière significative pour le 20^e et le 28^e jour du mois ($p < 0,05$) ; la FSH avait augmenté, et ce de manière significative pour le 20^e jour ($p < 0,05$) ; la LH n'avait pas significativement changé.

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Introduction

Fasting, a principal obligation of Islam, is practised over a vast area of the globe by over 1 billion Muslims for a complete month. In the Islamic Republic of Iran, which has a population of more than 70 million people, the vast majority of the adult population fast in Ramadan. The fast involves abstaining from eating and drinking from early morning to sunset.

The study of the impacts of this act of worship from different angles can offer solutions to hygiene and psychological problems. During the past 2 decades researchers have found that abstinence from eating and drinking accompanied by a change in sleeping and waking pattern may cause changes in the physiology and functioning of the body's hormonal system [6,8,10].

The main concern of this study was to determine the effects of Islamic fasting on the secretion of sex hormones in single healthy males.

Methods

This study was carried out in Birjand University of Medical Sciences on 52 volunteer students. Criteria for inclusion were being single, male, aged 18–24 years, in good health, not taking any medicines and not being on a diet. The length of daily fasting was ≥ 12 hours and all participants had the same ordinary diet (from the university catering service). There were no drop-outs during the study.

The study was carried out in 2002. There were 4 stages, 1 before Ramadan, and 3 during Ramadan. Four blood samples were taken from each participant by a technician from the University research laboratory. The first sample (control) was taken 2 days before Ramadan; the other 3 (experimental)

on 10, 20 and 28 Ramadan. All samples were taken at 16.00, after ≥ 12 hours of fasting. Samples were analysed immediately at Imam Reza Hospital in Birjand.

At the end of each stage an enzyme-linked immunosorbent assay (Stat Fax 2001 ELISA reader; Stat Fax 2600 incubator and washer, Awareness Technology, Palm City, Florida) was used to measure hormone levels. Standard luteinizing hormone (LH), follicle-stimulating hormone (FSH) (Radim SpA, Pomezia, Italy) and testosterone (DRG Diagnostics, Italy) kits were used for estimating hormone levels using the standard manufacturer's methods, supplied with the kits.

The data were statistically evaluated using the analysis of variance method using SPSS, version 11.5. The level of significance was $P < 0.05$.

Results

Mean blood hormone levels are shown in Table 1. Mean testosterone levels decreased in all 3 test samples. The decrease was significant for the samples from 20 and 28 Ramadan ($P < 0.05$).

Mean FSH levels increased during Ramadan but the increase was only significant in the sample from 20 Ramadan ($P < 0.05$). In contrast, mean LH level did not change significantly in comparison with the control sample (2 days before Ramadan).

Discussion

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

Table 1 Variation in mean blood/serum/plasma testosterone, follicle stimulating hormone and luteinizing hormone levels before and during Ramadan

Hormone	Mean (SD) hormone level			
	2 days before Ramadan	10 Ramadan	20 Ramadan	28 Ramadan
Testosterone (ng/mL)	7.17 (0.3)	6.59 (0.3)	5.68 ^a (0.2)	5.92 ^a (0.3)
Follicle stimulating hormone (mIU/mL)	5.46 (0.4)	5.80 (0.4)	5.90 ^a (0.3)	5.80 (0.3)
Luteinizing hormone (mIU/mL)	6.75 (0.9)	5.78 (0.4)	6.15 (0.5)	7.35 (0.4)

^aSignificantly different from before Ramadan.
SD = standard deviation.

in the secretion of most of the body's hormones [4,5].

From the findings of our study and those of other studies [2,6–8], it is clear that levels of sex hormones and gonadotrophins, as well as other hormones, vary in healthy single males during the Islamic fasting month of Ramadan.

Besides, the significant decrease in testosterone on the 20th and 28th days of Ramadan (compared with before Ramadan) occurs simultaneously with significant increases in FSH levels. This is understandable considering the negative feedback system that controls testosterone secretion: following a decrease in testosterone secretion from the testes, the secretion of gonadotrophin-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 [7,9].

Moreover, the results of experiments by other researchers confirm the findings of the above study. Studies on a great number of healthy fasting men and women have shown that all quantitative variations observed in gonadotrophin-releasing hormone and sex hormones are within the normal range and

do not cause specific clinical changes [7,9]. Experiments carried out on other hormones such as thyroxin, prolactin, cortisol and endorphin during fasting indicate that their variation is within the normal range [10–13]. It has been reported that despite the disturbance of biological processes of the body caused by the change in the times of eating and sleeping, the endocrine system does not change the concentration of pituitary, thyroid, parathyroid and sex hormones [8,12].

Islamic fasting is a unique form of abstinence recurring over a definite period of time. On the other hand, biological rhythms are factors that create physiological balance. This balance, according to many researchers, is maintained by the neuroendocrine system [5,14,15].

To sum up, Ramadan fasting produces variations in the secretion of gonadotrophins and sex hormones among healthy single men. These variations are within the normal range.

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