Appetite 111 (2017) 38–45

Contents lists available at ScienceDirect

Appetite

journal homepage: www.elsevier.com/locate/appet

Effect of Ramadan fasting on fatigue, mood, sleepiness, and health-related quality of life of healthy young men in summer time in Germany: A prospective controlled study

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ARTICLE INFO

Article history:
Received 20 July 2016
Received in revised form
14 December 2016
Accepted 21 December 2016
Available online 24 December 2016

Keywords:
Ramadan
Fasting
Fatigue
Mood
Quality of life

ABSTRACT

Muslims around the world fast during the lunar month of Ramadan. The month consists of 29 or 30 days, which vary in length depending on geographic location and the time of year. During this month, Muslims abstain from food, drink, smoking, and sex from dawn until sunset. In 2015, Ramadan fell during the summer. As a result, Muslims in Germany fasted 19 h a day.

Previous research has shown associations between fasting and mood enhancement. This study aimed to determine the effect of fasting on young, healthy males who fasted in Germany during Ramadan 2015. In particular, this study examined the impact of fasting on mood, fatigue, and health-related Quality of Life (QoL).

This study had 2 groups: fasting group (FG; n = 25), and non-fasting group (NFG; n = 25). In FG, participants were assessed at four different points: one week before Ramadan (T1), mid Ramadan (T2), the last days of Ramadan (T3), and one week after Ramadan (T4). In NFG, participants were assessed only at T1 and T3.

The results revealed that there were no significant differences between the participants in the FG and the NFG at T1 or T3 for any of the outcomes. However, participants in the FG demonstrated significant improvement from T2 to T4 in fatigue (visual analogue scale $p < 0.01$; fatigue severity scale:$p < 0.01$), mood (Beck's Depression Index-II; ANOVA; $p < 0.05$), and sleepiness during day time (Epworth Sleepiness Scale: ANOVA; $p < 0.01$). Participants in the FG also experienced significant loss of body weight (ANOVA; $p < 0.001$), body mass index (ANOVA; $p < 0.001$), skeletal muscle mass (ANOVA; $p < 0.01$) and fat free mass (ANOVA; $p < 0.01$).

Findings demonstrate that Ramadan fasting did not significantly influence mood, fatigue and QoL, when compared to NFG. Even, it gives benefit to fasting group with regard to these parameters.

1. Introduction

Fasting has been practiced by many religions and cultures around the world for many centuries. In Islam, fasting during Ramadan is an obligatory duty for Muslims (Quran, 2:183). Ramadan lasts for 29 or 30 days. During this month, Muslims abstain from food, drink, smoking, and sex from dawn until sunset (Quran, 2:187). The length of the fast depends on the time of year and the location of the person fasting. In Hannover, Germany, people began their fast on the first day of Ramadan 2015 at about 2:45 and ended their fast at about 21:45 local time. Every day, the length of the fast changed as the time for dawn and sunset changed.

Many different studies in different type of fasting demonstrated its benefit for both healthy subjects and patients with particular conditions, like multiple sclerosis (Choi et al., 2016; Etemadifar et al., 2016; Fahrial Syam, Suryani Sobur, Abdullah, & Makmun, 2016; Michalsen, 2010). Fasting has also been recommended as therapy (Michalsen & Li, 2013; Wilhelmi de Toledo et al., 2013).

For Muslims, fasting is not perceived as a physical punishment,

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http://dx.doi.org/10.1016/j.appet.2016.12.030
0195-6663/

but a blessing with many rewards, particularly spiritual. Studies on the effect of Ramadan on body composition, hormones, and glucose level have been reported both in healthy and different types of patients (Askari, Alavinezhad, & Boskabady, 2016; Fahrial Syam et al., 2016; Fawzi et al., 2015; Lessan, Hannoun, Hasan, & Barakat, 2015; Yeoh et al., 2015). Although in some other health condition groups (e.g. diabetes), health professionals should monitor the patients' during Ramadan fasting (Yeoh et al., 2015).

Fasting has also possible benefits with regard to mood enhancement and increased vigilance. The neurobiological mechanism of fasting with particular topic on mood has been reported in a comprehensive review (Fond, Macgregor, Leboyer, & Michalsen, 2013). Referring to the results of this review, it is necessary to evaluate its effect in other type of fasting, including Ramadan. Moreover, to the best of our knowledge, there is still a lack of information and evidence regarding the effect of Ramadan fasting on mood, fatigue and health-related quality of life, particularly in summer time in Europe, which has longer day time and thus longer fasting time as compared to other southern European countries. Additionally, there is a need to have a controlled study in Ramadan-related research, as most of the other available studies had pre-post study design. Therefore, this study aimed to determine the effect of Ramadan fasting on fatigue, mood, and other health-related QoL in a prospective controlled trial. The body composition parameters, including body weight (BW), skeletal muscle mass (SMM), body fat mass (BFM), fat free mass (FFM), body fat percentage (BFP), body water (BW) and wait and hip ratio (WHR) were also measured.

2. Material and methods

This study was approved by the local ethics committee, Hannover Medical School (Ethics No. 6899) and was performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki. All patients agreed to participate on the basis of informed consent. This study had been conducted in Ramadan 2015: June–July 2015.

2.1. Participants

Healthy male volunteers were recruited (mostly students from Hannover Medical School) and divided into two groups. The first group planned to fast during Ramadan (fasting group; FG), the other group (non-fasting group; NFG) did not fast. To be eligible into the FG, participants had to: (1) be healthy, (2) be older than 18 years of age, (3) intend to fast the whole month of Ramadan, (4) have fasted during Ramadan at least once before, (5) understand the German or English language. For the NFG, all subjects had to meet the criteria of the FG, except that they would not be fasting.

In the fasting group, all study end points were measured at four time points (Table 1). The first end point of the study/baseline (T1) was one week before the beginning of Ramadan (June 2015). The second end point was in the middle of Ramadan (T2: day 14th or 15th or 16th). The third end point was during the last days of Ramadan (T3: day 28th or 29th or 30th). The last end point was assessed at one week after the Ramadan fasting finished (T4: day +6th, +7th, +8th from the end of Ramadan).

In the NFG, there were only 2 time points for measuring endpoints, which were before Ramadan (T1) and during the last days of Ramadan (T3).

2.2. End points

Primary endpoints were mood, fatigue and health related QoL. These were assessed by using self-administered questionnaires.

The Hospital Depression and Anxiety Score (HADS) and Beck's Depression Inventory (BDI)–II were used to assess the intensity of mood (anxiety and depression or only depression, respectively). HADS is a fourteen-item scale, which consists of seven items relating to anxiety and seven relating to depression (Zigmond & Snaith, 1983). The score of each parameter is from 0 to 21. A score of 8 or more indicates symptoms of anxiety/depression. BDI-II is a self-reporting questionnaire to measure the severity of depression. It consists of 21 questions. The lowest score is zero and the highest score is sixty-three. The higher the score is the more severe the depression (Wang & Gorenstein, 2013).

Fatigue was measured by the visual analogue scale (VAS) and fatigue severity scale (FSS). VAS is a unidimensional assessment tool from 0 (no fatigue) to 10 (the worst imaginable fatigue), and FSS is a nine-item questionnaire to evaluate the impact of fatigue. Each question consists of statements that are scored from 1 (strongly disagree) to 7 (strongly agree). The cut-off are different across health conditions (Valet, Stoquart, Glibert, Hakizimana, & Lejeune, 2016).

Day sleepiness was measured by using the Epworth Sleepiness Scale (ESS), ESS is a self-administered questionnaire with 8 questions. Each question can be rated on a 4-point scale (0–3). ESS score is the sum of 8 questionnaires that can range from 0 to 24. The higher the ESS score, the higher that person's average propensity in daily life of daytime sleepiness (Xiong et al., 2016).

The 12-short form questionnaire (SF-12) is a multipurpose questionnaire with 12 questions. This questionnaire consists of mental and physical functioning (Ware, Kosinski, & Keller, 1996).

Parameters related to body composition, including body weight (BW), skeletal muscle mass (SMM), body fat mass (BFM), body mass index (BMI), fat free mass (FFM), and percentage of body fat (PBF) were also measured by using InBody machine (InBody 230; Model MW160, Korea).

2.3. Statistics evaluation

The Saphiro-Wilk test was used to check the normality of the data. ANOVA repeated measure was used to compare significant differences in different time points (followed by post hoc test with Bonferroni correction). Student's t-test or Mann-Withney *U* test (depend on data distribution) was used to compare baseline T1 and T3 of FG and NFG for each parameter. The mean imputation method was used for handling missing value. Statistical analysis was performed by using SPSS version 22 (IBM, New York, USA). Significant was set at $p < 0.05$. Explorative statistics analysis such as correlation of body composition parameters with mood, fatigue,

Table 1
Time point of assessment.

Group	Time point of assessment			
	T1 (baseline: 1 week before Ramadan)	T2 (mid of Ramadan)	T3 (on the last days of Ramadan)	T4 (one week after the Ramadan)
Fasting Group (FG) (n = 25)	√	√	√	√
Non-Fasting-Group (NFG) (n = 25)	√	–	√	–