The effect of Ramadan weight loss on body composition of overweight and obese Muslims in University Putra Malaysia

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ABSTRACT

Introduction: During Ramadan Muslims fast for a month and most research have reported significant decrease in weight and body mass index (BMI). The objective of this study was to observe the body composition changes in the decreased BMI during Ramadan fasting among a group of overweight and obese Muslims.

Methods: Forty-eight overweight and obese Muslims working in Faculty of Medicine and Health Sciences, Universiti Putra Malaysia volunteered to participate in the program. They were brief on the appropriate quantity of food to be consumed according to Malaysia Dietary Guideline 2010. They were also briefed the correct fasting and eating ethics according to the teachings of Islam which mainly stresses on the prohibition over consumption of food. Using a sensor body composition monitor, their baseline body composition were assessed pre Ramadan and reassessed at the end of Ramadan.

Results: There were significant reduction in weight, BMI, body fat and subcutaneous fat percentages, visceral fat level, resting metabolism rate and body age (p<0.01). However no significant changes in skeletal muscle percentage were noted.

Conclusion: There were significant improvements in body compositions during Ramadan following Ramadan weight loss in this group of overweight and obese respondents. Ramadan weight loss may serve as a yearly opportunity to improve health.

Keywords: Ramadan, weight loss, body composition
1.0 Introduction

Ramadan provides a unique opportunity to reduce weight because Ramadan permits an accommodating environment for diet control initiation in a month long duration. At least twelve studies reported Ramadan weight loss (Ibrahim et al. 2011; Mafauzy et al. 1990; Poh et al. 1996; Haghdoot & Pooranjbar 2009; Ziaee et al. 2006; Memari et al. 2011; Al-Hourani & Atoum 2009; Mansi 2007; Khaled & Belbraouet 2009; Al-Numair 2006; Sadiya et al. 2011, Hajek et al. 2012). Ironically, there are also studies reported significant weight gain during Ramadan (Ait Saada et al, 2010; Bakthotmah, 2011). These atypical findings were probably due to overconsumption of food during ‘iftar’ (breaking fast) and ‘suhoor’ (predawn meal) which further complicates the study of weight changes in Ramadan. Nevertheless, the Ramadan weight loss trigger questions whether the weight reduction was due to dehydration, fat or skeletal muscle loss.

The study on the effects of Ramadan fasting on body composition particularly skeletal muscle percentage is mostly important among Muslim athletes as it might influence their physical performance. A systematic review involving nine studies has shown mixed findings (Chaouachi et al. 2012). Some studies showed decrease while others showed increase physical fitness and performance during Ramadan. These mixed findings could be due to the differences in individual coping skill and adaptability, and also the differences in their adjustments of their daily schedule–in accommodating Ramadan fasting (Kirkendell et al, 2014). A study among Muslim athletes living in hot climates showed no significant decreased in body fat percentage during Ramadan (Issiako et al. 2013), while a prospective study among 240 Muslims in the general population using bioelectric impedance and another study among 23 subjects using skin fold techniques showed that fat mass was significantly reduced during Ramadan (Norouzy et al., 2013; Hassan et al, 2012).

This study aims to observe the body composition (i.e. body fat and subcutaneous fat percentages, visceral fat level and skeletal muscle percentages), resting metabolism rate and body age changes that happen during Ramadan weight loss, among a group of overweight and obese Muslim. It is a prospective study using Omron Body Composition Monitor - HBF-362 to look into the changes of body compositions during Ramadan weight loss. Selection of the instrument was because it is a full body composition analyzer using body sensing technology and it is easy-to-read.

Due to the fact that a few studies have shown atypical finding of weight gain during Ramadan, this study of body composition changes in Ramadan weight loss need to control for the overconsumption of food. In this study, the information of Malaysia Dietary Guideline and correct fasting ethics according to Islamic teachings (which stresses on the prohibition of overeating) were conveyed to the respondents.

2.0 Methodology

2.1 Study sample

This prospective study was conducted among a group of Malay Muslim staffs working in Faculty of Medicine and Health Sciences, Universiti Putra Malaysia during Ramadan 2013. The inclusion criteria was having a body mass index (BMI) ≥ 25.0 kg/m². Those who were
2.2 Data collection

The respondents’ socio-demographics and socioeconomic characteristics were collected using a self-administered questionnaire. Their height was measured using SECA body meter. The body weight, BMI, body fat, subcutaneous fat, and skeletal muscle percentages, visceral fat level, resting metabolism rate and body age were measured using the Omron Full Body Sensor Body Composition Monitor (Model HBF-510). All measurements were collected pre Ramadan and again in the fourth week of Ramadan. Measurements were taken in the laboratory, at rest, on an empty bladder and at least 2 hours after food consumption. Subjects were instructed to stand straight on the scale with arms raised straight 90 degrees to the body.

2.3 Data analysis

Data was analyzed using IBM SPSS version 21.0. The pre Ramadan measurement were compared to the Ramadan measurement using paired t test. Significant levels were set at a standard value of $P<0.05$ and a confidential interval of 95%.

3.0 Results

Forty-eight overweight Malay Muslims staffs volunteered to participate in the study. Their mean age was 34.1±9.1 years old and mean income was Ringgit Malaysia 6890±5289. Majority of the respondents were female (90%), married (67%) and (75%) clerical staffs.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pre Ramadan Mean±SD</th>
<th>End of Ramadan Mean±SD</th>
<th>$P$ value</th>
<th>95%CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight (kg)</td>
<td>78.76±16.44</td>
<td>77.00±16.09</td>
<td>&lt;0.01</td>
<td>(1.30, 2.23)</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>31.32±5.28</td>
<td>30.65±5.20</td>
<td>&lt;0.01</td>
<td>(0.48, 0.85)</td>
</tr>
<tr>
<td>Body fat (%)</td>
<td>37.44±3.89</td>
<td>37.12±4.12</td>
<td>&lt;0.01</td>
<td>(0.11, 0.53)</td>
</tr>
<tr>
<td>Visceral fat level</td>
<td>13.27±5.98</td>
<td>12.52±6.05</td>
<td>&lt;0.01</td>
<td>(0.54, 0.96)</td>
</tr>
<tr>
<td>Subcutaneous fat (%)</td>
<td>34.11±5.45</td>
<td>33.60±5.60</td>
<td>&lt;0.01</td>
<td>(0.34, 0.68)</td>
</tr>
<tr>
<td>Skeletal muscle (%)</td>
<td>23.46±2.31</td>
<td>23.48±2.30</td>
<td>0.70</td>
<td>(-0.14, 0.10)</td>
</tr>
<tr>
<td>RMR (kcal/day)</td>
<td>1533.63±256.19</td>
<td>1510.27±255.08</td>
<td>&lt;0.01</td>
<td>(16.59, 30.12)</td>
</tr>
<tr>
<td>Body age (years)</td>
<td>54.92±9.80</td>
<td>54.00±10.15</td>
<td>&lt;0.01</td>
<td>(0.64, 1.19)</td>
</tr>
</tbody>
</table>

Paired $t$ test, significant $P<0.05$
4.0 Discussion

In this group of respondents the mean BMI was 31.32±5.28 kg/m² which was obese class 1 according to World Health Organization (WHO) categorization (WHO, 2004). The mean body fat percentage was 37.44±3.89% which was higher than the standard range body fat percentage for age group 20-39 years (i.e. 8.0-19.9 % for males and 21.0-31.9 % for females). Similarly, the mean visceral fat level in this group was 13.27±5.98 which was also higher than normal (visceral fat level less than 9 is regard as normal, while the level 10 to less than 14, is regard as high). The high body fat percentage and visceral fat level in this study were expected since all the respondents were either overweight or obese. The subcutaneous fat percentage in this study was 34.11±5.45%. The amount of fat that was subcutaneous was not known, however it was reported to be between 27-42% (Siervogel, 1982). The skeletal muscle percentage in this study was only 23.46±2.31% which was lower than the standard skeletal muscle percentage range for age group 18-39 year (i.e. 33.3-39.3% for males and 24.3-30.3% for female). The lower skeletal muscle percentage could be because majority of the respondents were female. It could also be due to the occupation practices of respondents which were mostly sedentary in nature and skeletal muscle percentage having a positive relationship with the amount of physical activity or exercise (Tzanis et al., 2014).

The mean resting metabolic rate (RMR) at baseline among the respondents was 1533.63±256.19 kcal/day. As the RMR at baseline is influenced by many factors such as body size, gender, age and daily physical activity, there is no appropriate RMR value for adults (McMurray et al, 2014). However, the RMR per kg body weight has been found to be lower in the obese than in the normal weight (Horgan, 2003). Study also showed that RMR is positively related to skeletal muscle percentage (Lazzer et al., 2010). Therefore, RMR is predicted using calculation by using many predictive formulas (Frankenfield et al, 2005).

Body age (biological age) is a measurement of the age based upon ones’ health and fitness level while chronological age is based upon date of birth. The mean body age for this group of respondents was older (54.92±9.80 years old) than the mean age based upon date of birth (34.1±9.1 years old). This indicates that, on average the respondents in this group were not as healthy and fit for their age. This could be contributed by their excess body weight. Study has shown that obesity could accelerate aging of certain organs such as liver (Horvatha, et al., 2014).

As mentioned earlier, the significant weight loss and reduced BMI during Ramadan was an expected outcome (at least in 12 other studies) especially when correct fasting ethics were practiced (Ibrahim et al. 2011; Mafauzy et al. 1990; Poh et al. 1996; Haghdoost & Pooranjbar 2009; Ziaee et al. 2006; Memari et al. 2011; Al-Hourani & Atoum 2009; Mansi 2007; Khaled & Belbraouet 2009; Al-Numair 2006; Sadiya et al. 2011, Hajek et al. 2012). As a result of this Ramadan weight loss all body composition measurements (body fat and subcutaneous fat percentage, visceral fat level) were significantly reduced except for the skeletal muscle percentage. The RMR and body age were also significantly reduced.

There was a concern that the weight loss during Ramadan could be due to dehydration as Muslims refrain from drinking from dawn to dusk during this month. However, study has shown that there is no significant difference of blood creatinine level between fasting and non-fasting groups even among patients with renal diseases (Emami-Naini et al. 2013).
Therefore, weight loss in Ramadan is most probably not due to dehydration. These reductions were most likely to be due to reduced food quantity consumption during Ramadan.

The body fat and subcutaneous fat percentages and visceral fat level were all reduced during Ramadan in this study. A study done among adult using skin fold techniques also showed that the body fat percentage was significantly reduced during Ramadan (Hassan et al, 2012). As a result of starvation during fasting, the reserve fat in the body was used as energy (Soeters et al, 2012, Palesty & Dudrick, 2014), thus the body fat percentage, visceral fat level and subcutaneous fat were reduced during Ramadan in this study. However, the Ramadan fasting did not affect the percentage of skeletal muscle. This could be because the practice of Ramadan fasting is just for about 13 hours in Malaysia and it was only a short term starvation. The energy intake is replenished during ‘iftar’ (breaking fast) and ‘suhoor’ (predawn meal) which allows the body to replace the energy storage and protect the use skeletal muscles which will be used to perform required activity for living (Soeters et al., 2012).

The RMR among the respondents was also reduced during Ramadan in this study. This could be due the reduced food intake during Ramadan or indirectly due to the probably reduced physical activity in Ramadan. A decrease in food intake can lower the metabolic rate as the body tries to conserve energy (Martin et al., 2007). Study has also shown that RMR is reduced with reduced physical activity (Speakman & Selman, 2003). Although the reduced mean BMI in this study could have increased the RMR, the effect of the decreased food consumption and reduced physical activity could have more prominent and hence caused a significantly reduced RMR during Ramadan. The body age among the respondent also decreased significantly during Ramadan. This could be due to the significant reduction in BMI. Reduced excess weight could reduce acceleration of aging process especially the internal organs (Horvatha, et al., 2014).

There are several limitations of this study are. This study did not measure the actual diet and total calorie consumption of the respondents. Additionally the individual metabolic variation according to age sex and physical activeness was not controlled, and the blood lipid profile was not analyzed.

5.0 Conclusion and recommendation:

The Ramadan weight loss has improved the body compositions (i.e. lowered body fat and subcutaneous percentages, and visceral fat level), and body age of a group of overweight and obese respondents in this study. Therefore, Ramadan weight lost seems to improve their general health. Hence, Ramadan and Ramadan weight loss could serve as health opportunities. It is recommended that further study on body compositions changes during energy restriction and weight loss to be carried out to increase the understanding of physiological body weight regulations in the context of fasting in Ramadan and Ramadan weight loss.
Ethical

Ethical approval was obtained from the Ethical Committee of Universiti Putra Malaysia (UPM/TNCP1/RMC/1.4.18.1(JKEUPM)/1.

Declaration of conflict of interest

The authors declare that there is no conflict of interest regarding publication of this article.

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