

Weight change during and after Ramadan fasting

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ABSTRACT

Background During Ramadan, observant Muslims fast from sunrise to sunset for a month. Knowing whether Ramadan fasting affects body weight has implications for health advice to the Muslim community, for understanding the effects of skipping meals on body weight, and for general weight management advice.

Methods We compared body weight before and after the Ramadan fast and 1 month later in observant Muslims attending a Mosque in East London, UK.

Results In 202 participants who provided weight at the beginning and the end of Ramadan, there was a small weight decrease (-0.84 kg, 95% CI = -0.6 to -1 , $P < 0.0001$), with 46% of participants losing >1 kg. Participants who fasted throughout Ramadan lost significantly more weight (1 kg) than those who occasionally broke fast (0.3 kg, $P = 0.013$). In 87 participants who provided weight at the beginning and end of Ramadan and also 1 month later, all the lost weight was regained ($+0.1$ kg, 95% CI = 0.2 – 0.5 , $P = 0.504$ compared with baseline).

Conclusions Observers of Ramadan lose on average about a kilogram of weight over 4 weeks, and the lost weight is quickly regained. Current weight management treatments generally assume that skipping meals leads to weight gain and advise against it. The finding suggests that further research is needed on the justification of the ‘do not skip meals’ advice.

Keywords body weight, Ramadan fasting, skipping meals, weight loss

Introduction

During Ramadan, observant Muslims eat and drink only before sunrise and after sunset for a month. Theories could be generated for such a schedule bringing about weight loss, no weight change or weight gain. For example, weight loss could be caused by a reduction in the total intake of energy,^{1–3} the homeostatic mechanisms regulating food intake could ensure no weight change,^{4,5} or fasting could induce weight gain if excessive hunger accompanied by sufficient food supply leads to over-compensatory eating once the fast is broken each day when meals are often eaten in a social context and include foods rich in fat and sugar.^{6–9} Having data on whether, and in what direction, this schedule influences body weight has a bearing on health advice to the Muslim community.

Such data would also be relevant for our understanding of the relevance of spacing of meals on body weight and for

general weight management advice. The current routine weight management approach assumes that skipping meals hinders weight loss (e.g. NICE,¹⁰ FSA,¹¹) and a recommendation to eat regularly throughout the day is common (e.g. eatwell.gov.uk and nhs.uk/livewell, and most commercial programmes, e.g. WeightWatchers, Slimming World, Tesco Diet, Jenny Craig and Diet.com), though the evidence for such advice is weak.^{12–14}

To find out if and how Ramadan fasting influences body weight, we searched electronic databases using the KA24

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(Knowledge Access 24 h a Day) internet-based resource. The databases included the British Nursing Index (from 1985), CINAHL (from 1981), Embase (from 1980), Medline (from 1950) and PsycINFO (from 1806), all searched to January 2011. The following search terms were used: Ramadan AND fasting AND weight.

We found nine studies providing interpretable data. One found a weight gain,¹⁵ three reported weight loss,^{16–18} and five found no significant weight change.^{19–23} With one exception (a report on 80 students)¹⁶ studies were small (12–30 participants), and several of them focused on special groups such as students^{16,18,19} or employees of a nutrition institute or hospital.^{15,21} It thus transpired that, surprisingly, there are no robust data available on the effects of Ramadan fasting on body weight. A recent non-systematic review, which also tabulates nutrient intake and weight changes in available studies, presented the same conclusion.²⁴

The present study aimed to assess weight change over Ramadan and the following month in adults who attend the East London Mosque in a sample which is inclusive and large enough to detect small effects.

Method

Setting up the study

Approval for the study was obtained from the NHS National Research Ethics Service and from the imam of the East London Mosque. The mosque serves Muslims from different countries, but most attendees are from the Indian subcontinent. In the days leading up to the start of Ramadan, information was placed within the mosque explaining the study, and an announcement was made by the imam encouraging worshippers to take part.

Study design

The month of Ramadan fell on 11th August to 9th September in 2010. Four stations with scales were set up in front of the mosque with posters explaining the study over 6 days before the start of Ramadan (6–11 August 2010). The second weigh-ins took place at the end of Ramadan over 3–9 September. The follow-up weigh-ins took place on 8 October, with one participant attending on 12 October. Volunteers received £5 travel expenses for attending the second weigh-in.

Inclusion criteria

All volunteers over 18 years of age who reported fasting during Ramadan were eligible to take part in the study.

Measures

Apart from weight, we also recorded gender and age of the participants and at the second visit the participants were asked whether there were any days on which they did not fast.

The same set of scales was used with each volunteer on all three occasions. The scales were Omron Body Fat Scale BF400. All weigh-ins were taken with participants dressed, but with shoes, contents of their pockets and any overcoats taken off. Five participants did not wish to take their shoes off and were weighed wearing shoes on all occasions. Two participants wanted to keep their shoes on at the second weigh-in and were not included in the analyses.

Statistical analysis

The weight change was assessed by repeated measures analysis of variance. Effects of all baseline variables were first assessed by univariate analyses, and any variables with a significant relationship to weight change were entered into a multiple regression model.

Results

There was on average 15 h 49 min of fasting between sunrise and sunset. The temperature was similar on all study days, ranging between 16 and 20°C, and participants wore similar clothing. One participant attended the last weigh-in on 12 October when the temperature was 12°C, but removed his overcoat.

Two-hundred and eighty-seven participants provided weight at baseline. Of these, 202 provided weight at the end of Ramadan, and of these, 87 provided weight 1 month later. The volunteers were primarily those who came for the service early and had time on their hands. The mosque has separate entrances for men and women. As women were more reluctant to remove their shoes and have their weight taken, we focused primarily on the male entrance and the sample is mostly male.

Table 1 shows baseline characteristics of subsamples who had their weight taken only at baseline, those weighed before and after Ramadan and those weighed on all three occasions. There were no significant differences between the samples in any of the variables collected at baseline.

In 202 participants who provided weight at the beginning and the end of Ramadan, there was a significant weight decrease (-0.84 kg, 95% CI = -0.6 to -1 , $P < 0.0001$). The data set included one outlier, who gained 6.9 kg over the Ramadan period. Removing him from the sample had little effect on the results (weight change = -0.87 kg, 95%

Table 1 Characteristics of participants who attended at 1, 2 and 3 time points

	Attended session 1 only (n = 87)	Attended session 1 + 2 only (n = 115)	Attended session 1, 2 + 3 (n = 87)	
% Male	90.8	88.7	95.4	$F(2, 286) = 1.43, P = 0.240$
Age (SD)	35.3 (14.1)	34.5 (12.3)	34.3 (11.3)	$F(2, 286) = 0.169, P = 0.845$
Average weight in kg at baseline (SD)	71.8 (13.5)	72.3 (11.9)	71.2 (12.4)	$F(2, 286) = 0.184, P = 0.832$

Table 2 Proportion of people who lost or gained weight and whose weight did not change

	N (%)
Lost over 1 kg	92 (45.5)
Lost over 0.5 kg	33 (16.3)
Maintained weight + -0.5 kg	42 (20.8)
Gained over 0.5 kg	15 (7.4)
Gained over 1 kg	20 (9.9)

CI = -0.7 to -1.1, $P = 0.0001$). The participant did not attend the final follow-up.

Thirty-one participants reported breaking the fast on at least one occasion. The weight loss in this group was 0.3 kg. Among 162 who reported not breaking fast, the average weight loss was 1.0 kg. The difference was significant ($t = 2.50$; $P = 0.013$). Nine participants did not provide data on whether they broke fast.

Table 2 shows the proportions of people who lost or gained weight and whose weight did not change. Sixty-two per cent of participants lost at least 0.5 kg, 17% gained at least 0.5 kg and the rest (21%) did not change their weight by >0.5 kg in either direction.

In 87 participants who provided weight on all three occasions, there was a weight loss of 0.63 kg at the end of Ramadan (95% CI = -0.3 to -0.9, $P < 0.0001$), which was re-gained 1 month later when the weight change from baseline was a 0.1 kg increase (95% CI = -0.2-0.5, $P = 0.504$).

None of the baseline variables (age, gender and baseline weight) were related to weight change at any time point.

Discussion

Among this sample, fasting during Ramadan generated a small weight loss. The effect showed a dose-response in that it was weaker in participants who broke the fast occasionally. The lost weight was re-gained over 4 weeks after the fast.

We were able to monitor body weight only, and did not collect data on BMI or on any health outcomes such as blood pressure, blood lipids, insulin sensitivity or biomarkers of oxidative stress. We also did not record smoking status of the participants. Smoking is forbidden during the daylight hours of Ramadan and smokers limiting their smoke intake may gain weight.²⁵ This however could not have contributed to the main finding of weight loss.

A number of people who provided weight at baseline were not available at follow-up. As the weight measurements were being taken outside the mosque during the busiest times of the religious year, some loss to follow-up was inevitable. We do not expect that this created a systematic bias as within the Muslim community involved, there were no clear expectations of weight change in either direction, but incomplete follow-up is nevertheless a limitation of this study.

Regular monitoring of weight can bring about weight loss in populations attending slimming programmes. Such an effect however is unlikely in unselected populations over a 4-week gap between the two weigh-ins. It is reassuring that the participants who had their weight taken for the third time, and thus had a higher exposure to any such monitoring effect, gained rather than lost weight between the second and third weigh-in. We are thus reasonably confident that the observed effect was genuine.

Regarding guidance for the Muslim community, our study, which is by far the largest and most robust to date, suggests that Muslims observing Ramadan do not increase body weight as a result of skipping daytime meals, but rather lose on average a kilogram of weight. This is unlikely to have any health consequences, especially as the lost weight is regained within a few weeks.

The study results raise a question mark regarding the current routine advice on skipping meals. As discussed in the introduction, weight loss interventions almost invariably recommend eating regularly during the day. This is based primarily on a finding that obese individuals skip meals (mainly breakfast),^{1,6,26-29} although not all studies have shown this.^{2,3,30,31} It is assumed that periods of food deprivation

lead to hunger and can generate lipo-genesis³² and/or over-compensatory eating.^{6–9} The correlation between obesity and spacing of meals does not of course necessarily imply causality. Several experimental studies manipulated meal frequency, but generally the sample sizes were small and interventions were only short term.¹⁴ A recent review reported no evidence that meal frequency affects weight, but it emphasized the paucity of interpretable data.¹⁴

There are limits in considering Ramadan fasting an analogue to skipping meals in the context of weight loss. Although food normally consumed is not eaten, i.e. meals are skipped, and there is an extended period of accumulating hunger, the motivation is different. The difference which would seem most relevant however is that a Ramadan observer can be expected to be less inhibited in having a large meal at the end of the fast than a dieter skipping meals to lose weight. This makes the finding of a small weight loss (rather than weight gain as we originally expected) more rather than less noteworthy. It raises a possibility that advising people with weight problems who skip meals to stop the practice may be unhelpful in terms of weight loss—although it may still make sense in terms of healthy eating. As the fasting period lasted for 4 weeks only and the sample was mostly male, this one result on its own cannot be used as a basis for weight management advice, but it does suggest that further work in this area is needed.

Authors' contribution

P.H., K.M. and H.M. designed the study and analysed the data, all authors contributed to data collection, interpretation of the findings and writing of the manuscript.

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