

Comparing the Sustainability of an Islamic Dietary Intervention to Maintain weight Loss 6 Months after Ramadan between Intervention and Control Groups

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ARTICLE INFO	ABSTRACT
<p><i>Article type:</i> Original article</p> <hr/> <p><i>Article History:</i> Received: 05 Aug 2015 Revised: 15 Aug 2015 Accepted: 16 Aug 2015 Published: 20 Aug 2015</p> <hr/> <p><i>Keywords:</i> Ramadan Weight loss intervention Weight lost maintenance Adherence to treatment</p>	<p>Introduction: Maintaining weight loss after the initial phases of any weight loss intervention is a challenge. Rationally, it depends on how well the adherence is to the prescribed treatment. This study is to test the sustainability of an intervention in maintaining weight lost during Ramadan by using voluntary fasting.</p> <p>Methods: Two groups of respondents (Muslim women with body mass index (BMI) ≥ 25.0 kg/m²) were randomly recruited from two states in Malaysia. One group received the Islamic based intervention (Group A) and the other received the standard intervention (Group B). The intervention consisted of three phases. The first phase was the intensive phase which was the control of food quantity intake during the fasting month of Ramadan. The second phase was the maintenance phase where the respondents were assisted to continue monitoring their food consumption using the food diary for 3 months and the third phase was the following 3 months without any assistance. The variables studied were BMI, blood pressure (systolic and diastolic pressure) and selected blood biochemical (i.e. total cholesterol (TC) and high density lipoprotein (HDL-C)). Variables were measured at baseline, at the end of Ramadan and at 6 months post Ramadan.</p> <p>Results: At 6 months post Ramadan the BMI, diastolic pressure, TC, HDL-C and TC/HDL-C ratio changes were different between the two groups (except for BMI changes where $P=0.02$, all others $P<0.01$).</p> <p>Conclusion: Islamic dietary intervention is effective in sustaining weight loss and biochemical parameters 6 months after Ramadan.</p>
<p>► Please cite this paper as: Suriani I, Shamsuddin K, Khalib AL, Hazizi AS, Latifah AM, Fadlan Mo. Comparing the Sustainability of an Islamic Dietary Intervention to Maintain Weight Loss 6 Months after Ramadan between Intervention and Control Groups. J Fasting Health. 2015; 3(2): 86-93.</p>	

Introduction

Weight loss interventions range from changing one's lifestyle (such as diet control and physical exercise), shifting to specific food replacement regimes, and appetite suppressant medication to bariatric surgeries. However all these weight loss interventions share a common challenge of maintaining the weight loss after the initial phase. Successful weight loss maintenance can be defined as being able to maintain the weight lost (i.e. lost of 10% of body weight at the end of the intervention) for a year's duration. The reported prevalence of successful weight loss maintenance varies according to the type and duration of intervention, however overall prevalence was estimated to be about 20% (1).

Many studies have looked into factors influencing the maintenance of weight loss. Among the possible factors are psychological

factors such as unrealistic expectation, depression, body image and internal motivation (2-4). Other factors include initial weight loss and adherence to treatment. Initial weight loss is the weight loss within the first month of intervention. Studies showed that initial weight loss in lifestyle intervention is a possible positive predictor to the following weight loss and to the success in weight loss maintenance (5,6). However, there were other studies which reported that although initial weight loss is a positive predictor to weight loss maintenance, the amount of initial weight loss which is 20% or higher of the pre intervention weight has a higher risk of weight regain when unsupervised(7).

Logically, the effectiveness of any form of treatment depends on how well the patient adheres to the prescribed treatment. Therefore,

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studies have shown that adherence to intervention components (treatment that was prescribed during the intensive phase) is one of the main factors for successful weight loss maintenance while the decline in adherence indicated otherwise (8). Studies have also shown that an intervention which could be abided by to overcome the important behavioural problem, will result in long term changes and thus better weight loss maintenance (9).

Referring to these studies which supported substantial 'initial weight loss' and 'adherence to treatment' as two important factors influencing weight loss maintenance, there is a golden opportunity in the Islamic faith dietary practices. Ramadan fasting can be used as a means to obtain a substantial initial weight loss while voluntary fasting can be used as a method to comply with 'adherence to treatment'. At least 12 studies have shown significant weight loss can occur during Ramadan even without any intervention (10-21). Therefore, Ramadan environment provides a great opportunity for weight loss. However, regrettably studies have also shown that the weight lost during Ramadan was regained within two weeks to one month after Ramadan (12,17,18,21). Therefore, in this study an intervention was developed to observe its effect in maintaining Ramadan weight loss.

To summarize, in the context of this Islamic-based intervention, the intervention was the two types of Islamic fasting - the targeted initial weight loss was during Ramadan, while the adherence to treatment was to continue fasting voluntarily after Ramadan. The opportunity to use the month of Ramadan occurs yearly in Muslim calendar while voluntary fasting outside the month of Ramadan is a recognized norm among Muslims. The aim of this write up is to report the effect of using an Islamic-faith dietary approach in maintaining the Ramadan weight loss up to 6 months post Ramadan.

Methods

This was a community intervention study using the quasi-experimental design. Two intervention packages were developed - the standard intervention package and the Islamic faith-based intervention package. In the standard intervention package, respondents were encouraged to self-monitor the quantity of food that they consumed. The package consisted

of pamphlets on recommended food quantity according to groups based on the national dietary guideline, and a 7 days per month food diary to be used for 5 consecutive months (before, during and 3 consecutive months after Ramadan). This group of respondents was referred to as Group B.

In the Islamic faith-based intervention package, contents of the standard package were included, but had additional encouragement materials from religious sources. Respondents were encouraged to practice the Islamic etiquettes of fasting (related to predawn meal and breaking fast), Islamic etiquettes of eating (emphasizing etiquettes related to quantity) and also to practice voluntary fasting after Ramadan. The faith based encouragement was delivered using four booklets on relevant Islamic teachings (i.e. Islamic motivation to stay healthy, Islamic eating etiquettes, Islamic fasting and Islamic motivation to be perseverance in the efforts to be healthy) as well as the food diary which contained relevant Islamic reminders. This group of respondents was referred to as Group A.

The implementation of the intervention was conducted in three phases. The first phase was the intensive phase, when respondents practice their obligatory fasting during the whole month of Ramadan. The second phase was the maintenance phase which was up to 3 months post Ramadan. Respondents were still assisted to monitor their food consumption using the food diary. The third phase was the following 3 months (i.e. until 6 months after Ramadan) to test the sustainability of the behaviour change without assistance by the food diary.

The intervention module and the questionnaire were validated by religious, as well as diet and nutrition experts. The reliability of the module and questionnaire were tested through a pilot test.

Two groups of overweight and obese working Malay Muslim women were randomly recruited from public offices in two states in Malaysia. Thus the basic characteristics (socio-demographic and socioeconomic) matching was assumed at planning stage. The main inclusion criteria was having body mass index (BMI) ≥ 25.0 kg/m² and the exclusion criteria were inability to fast, pregnancy and if respondent was on a specific diet regime. The intervention

group was the group which had received the Islamic faith-based intervention (Group A) and control group was the group which had received the standard intervention (Group B). Sample size was calculated using Snedecor and Cochran's formula for experiment and hypotheses testing, and the calculated sample size was 86 respondents per group. Data was collected by the researchers. Verbal and written consent was obtained from each respondent. The variables studied were Body Mass Index (BMI), blood pressure (systolic and diastolic pressure) and selected blood biochemical (i.e. total cholesterol (TC) and high density lipoprotein (HDL-C)). Variables were measured at baseline (July 2011), at the end of Ramadan (August 2011) and at 6 months post Ramadan (Mac 2012). IBM SPSS Statistic software Version 20 was used to perform statistical analysis.

The basic characteristics (socio-demographic, socioeconomic, BMI, blood pressure and blood biochemical) of the two groups were compared at baseline using independent t test and Chi squared test. The differences in changes (of BMI, blood pressure and blood biochemical) between the two groups were compared using repeated measure ANNOVA adjusted to the relevant covariates.

Results

Table 1 shows the respond and attrition rates of both groups during Ramadan and at 6 months post Ramadan. Only 56 respondents agreed to participate in Group A (Islamic faith-based intervention) and thus the response rate was only 65%. The respond rate in Group B (standard intervention) was higher at baseline, but the attrition rate in Group B was also higher compared to Group A. At 6 months post Ramadan the attrition rate in Group B (46.4%) was almost double the attrition rate in Group A (23.8%).

Table 2 shows that at baseline, the basic socio demographic and socioeconomic characteristics of Group A and Group B were comparable except that the mean number of children was significantly more in Group B ($P=0.01$). Group B had higher percentage of respondents who were practicing food quantity

control and physically active ($P=0.03$ and $P<0.01$, respectively). Therefore Group B had higher HDL-C and lower TC/HDL-C ratio compare to Group A (both $P<0.01$).

Table 3 shows the differences in changes between the two groups. There was no difference in BMI changes between the two groups during Ramadan ($P=0.05$). However during 6 months post Ramadan the differences in changes between the two groups were significantly different ($P=0.02$). During Ramadan the BMI in both groups was reduced. After Ramadan the BMI in both groups increased towards their baseline. However, the increase in Group A did not exceed its baseline BMI while the increased in Group B exceeded its baseline BMI.

Table 3 also shows that during Ramadan there were no differences in blood pressure changes between the two groups. However, during 6 months post Ramadan the difference in diastolic blood pressure was significant ($P<0.01$). The blood pressure (systolic and diastolic) in both groups reduced during Ramadan. After Ramadan, the blood pressure increased toward its baseline in Group B, but on the other hand it continued to decrease in Group A. However during 6 months post Ramadan, the difference was significant only for diastolic blood pressure.

Also shown in Table 3, that comparison of TC, HDL-C and TC/HDL-C ratio changes between the two groups were all significant during Ramadan (all $P<0.01$). In Group A, the TC decreased and HDL-C increased during Ramadan, while in Group B, both TC and HDL-C decreased in Ramadan. Therefore during Ramadan, TC/HDL-C ratio decreased in Group A, but increased in Group B. and also during 6 months post Ramadan (all $P<0.01$). After Ramadan, the comparison of TC, HDL-C and TC/HDL-C ratio changes between the two groups were also all significant (all $P<0.01$). The main observation was TC/HDL-C ratio in Group A increased toward its baseline but did not exceed its baseline value, while the TC/HDL-C ratio in Group B reduced but did not reach its baseline value.

Table 1: The respond and attrition rate in Group A and Group B during Ramadan and at 6 months post Ramadan.

Time of data collection	Group A		Group B	
	n(%)	Attrition rate	n(%)	Attrition rate
Baseline	56 (100%)	0	84 (100%)	
End of Ramadan	48 (85.7%)	8 (14.3%)	70 (83.3%)	14 (16.7%)
6 months after Ramadan	36 (64.3%)	20 (23.8%)	45 (53.6%)	39 (46.4%)

Table 2: Characteristic of respondents in Group A (received Islamic-faith intervention) and Group B (received standard intervention) at baseline and the difference

Variables	Group A (N = 56)	Group B (N = 84)	t/ χ^2	P value
	Measurements	Measurements		
Married (n,%)	42(75.0)	72(85.7)	$\chi^2=2.57$	0.28
Finished high school (n,%)	36(64.3)	57(67.9)	$\chi^2=2.99$	0.23
Clericals (n,%)	39(69.6)	66(78.6)	$\chi^2=1.43$	0.23
Age (year)	36.65+10.16	39.84+10.28	t=1.81	0.07
Parity (number of children)	1.79+2.14	2.67+1.89	t=2.56	0.01*
Household income (RM) Median IQR	3000 (3000) #	3000 (2000) #	t=0.33	0.76
Strong religious (n,%)	15(26.8)	24(28.6)	$\chi^2=0.05$	0.82
Practice control food quantity (n,%)	22(39.3)	49(58.3)	$\chi^2=4.88$	0.03*
Practice voluntary fast (n,%)	34(60.7)	62(73.8)	$\chi^2=2.67$	0.10
Active physically (n,%)	6(10.7)	32(38.1)	$\chi^2=12.74$	<0.01*
Body Mass Index(kg/m ²)	31.01+4.07	31.14+4.26	t=0.17	0.86
Systolic pressure mmHg	123.43+12.31	124.51+18.14	t=0.39	0.70
Diastolic pressure (mmHg)	79.80+10.32	76.37+10.08	t=1.96	0.05
TC (mmol/l)	4.91+1.16	4.68+1.16	t=1.15	0.25
HDL-C (mmol/l)	0.73+0.19	1.27+0.36	t=10.29	<0.01*
TC/HDL-C	6.97+1.73	3.87+1.06	t=13.12	<0.01*

t = t test, χ^2 = Chi squared test * significant at P<0.05 # Median and inter quartile range (IQR)

Table 3: Comparing changes between Group A and Group B during Ramadan and at 6 months post Ramadan

Time of data collection	Group A n=56	Group B n=84	Comparing changes between groups		
	Mean±SD	Mean±SD	Time	F Stat(df) _a	P a
BMI					
Baseline	31.01+4.07	31.14+4.26			
End of Ramadan	30.09+4.16	30.47+4.26	(1)-(2)	3.97(1,136)	0.05
6 months after Ramadan	30.70+4.00	31.30+4.25	(1)-(3)	4.99(1,136)	0.02*
Systolic					
Baseline	123.43+12.31	124.52+18.14			
End of Ramadan	122.93+12.78	123.27+16.14	(1)-(2)	0.11(1,137)	0.74
6 months after Ramadan	121.48+13.18	126.65+19.24	(1)-(3)	3.45(1,137)	0.07
Diastolic					
Baseline	79.80+10.32	76.37+10.08			
End of Ramadan	77.77+ 8.42	76.25+9.31	(1)-(2)	2.15(1,137)	0.15
6 months after Ramadan	76.66+ 8.00	77.81+9.90	(1)-(3)	7.83(1,137)	<0.01*
TC					
Baseline	4.91+1.16	4.68+1.16			
End of Ramadan	4.78+1.14	4.62+0.96	(1)-(2)	14.58(1,131)	<0.01*
6 months after Ramadan	4.94+1.02	4.51+1.03	(1)-(3)	10.93(1,131)	<0.01*
HDL-C					
Baseline	0.73+0.19	1.27+0.36			
End of Ramadan	0.78+0.22	0.89+0.31	(1)-(2)	68.65(1,131)	<0.01*
6 months after Ramadan	0.77+0.19	0.87+0.30	(1)-(3)	68.78(1,131)	<0.01*
TC/HDL-C					
Baseline	6.97+0.23	3.87+1.06			
End of Ramadan	6.46+0.24	5.61+1.80	(1)-(2)	110.03(1,131)	<0.01*
months after Ramadan	6.70+0.25	5.58+1.84	(1)-(3)	82.31(1,131)	<0.01*

a Repeated measure ANOVA (time * group) –adjusted with Bonferroni method

* Significant at P<0.05

Discussion

During Ramadan, as expected the BMI decreased in both groups. This was consistent with the 12 other studies mentioned earlier which showed significant weight or BMI reduction in Ramadan. However, at 6 months after Ramadan, Group A (Islamic faith intervention) was found to be more successful

in maintaining their Ramadan weight loss compared to Group B (standard intervention). At 6 months after Ramadan, the BMI in Group A did not exceed its mean BMI at baseline, while Group B has exceeded its mean BMI at baseline. The better weight regain control in Group A could be contributed by several factors.

First, better weight regain control in Group A could be because the initial weight loss was

greater in Group A compared to Group B (0.92 kg/m² vs 0.67 kg/m²). The greater initial weight loss in Group A could be due to better control of food quantity consumed as a result of the additional religious component received by Group A (the booklets and relevant Islamic reminders in their food diary). The religious reminders include emphasis on the prohibition of excessive food consumption. These reminders could have contributed in reminding the respondents in Group A to avoid food indulgence during the tempting Ramadan feasting. Studies have shown that initial weight loss is a positive predictor of weight loss maintenance. The greater weight loss during the initial phase the better weight loss maintenance (5,6).

Second, voluntary fasting after Ramadan was strongly promoted only to Group A (who had received the Islamic faith intervention). Therefore the better weight regain control in Group A could be because many respondents in Group A had practiced voluntary fasting after Ramadan. During fasting, the frequency of food consumption was normally reduced and thus contributing to better food quantity control. More studies have shown that reduced frequency of eating was positively associated with reduced weight (22,23). In fact, non-religious intermittent fasting which was popularized as the '5:2 diet' is becoming a popular trend (24). The '5:2 diet' regime suggested low caloric intake or fasting 2 days in a week. Coincidentally, this was similar with one type of voluntary fasting promoted in Islam i.e. fasting 2 days a week on Mondays and Thursdays. In the context of this study, voluntary fasting can be described as good adherence to treatment. Good adherence to treatment as another positive predictor for weight loss maintenance (8,25).

Third, the better weight regain control in Group A could also be due to the lower attrition rate in the group compared to Group B. The attrition rate in Group A was almost half the attrition rate in Group B (23.8 % vs 46.4%). This was an indication that more respondents were able to sustain in program and thus maintain the behaviour changes. A 10 year behaviour change observational study of 2886 respondents showed that the weight loss maintenance required sustained behaviour changes (26).

Therefore in this study, the percentage of respondent who managed to sustain their behaviour changes was more in Group A. The reasons for dropping out from this study were not studied. However the lower attrition rate in Group A (at 6 months post Ramadan) could be influenced by factors such as greater initial weight loss. Studies show that greater initial weight loss reduces the odds of attrition (27,28). Therefore, greater initial weight loss positively influenced not only in better weight loss maintenance but also through lower attrition rate.

Finally, the better weight regain control in Group A could also be due to the religious inputs (relevant information and reminders) received which were not received by Group B. These inputs could have increased the intentions to practice Islamic eating etiquettes and Islamic fasting which ultimately result in control of food quantity intake in Group A. The positive association between intention (to perform behaviour) and behaviour has been explained in the Theory of Reasoned Behaviour (29). Religious inputs could have also motivated respondents to be persevered in their efforts to change their eating behaviour according to the teachings. This is because the teachings in Islam include the belief of 'rewards in the hereafter' as a crucial part of the religion. Therefore, even though there were not much physically changes taking place (i.e. weight loss), the respondents were reminded that religiously it was not a total loss since according to their belief in the hereafter, their good efforts will rewarded generously (30). This belief could have encouraged respondents to be persevered in their efforts and adhered to the program. This could also contribute positively in lowering the incidence of feeling frustrated among the respondents and abandoning the program. The belief of 'rewards in the hereafter' also indirectly could have reduced the attrition rate in Group A.

As the BMI in both groups decreased during Ramadan in this study, the blood pressure of both groups also decreased because BMI was known to have positive association with blood pressure (31,32). Therefore, when the BMI of both groups increased during 6 month post Ramadan (heading back to their pre-Ramadan's BMIs), the blood pressure in both groups were

expected to increase too. However, surprisingly, the increased blood pressures happened only in Group B, while the blood pressures in Group A were continually decreasing. The possible explanation for the different in the blood pressure changes observed was that fasting reduces oxidation damaged and increased cellular resistance and hence reduces blood pressure (33-36). Since voluntary fasting was promoted to only Group A, thus it is assumed that the voluntary fasting practices among the respondents could have contributed to the reduced oxidation damage and increased cellular resistance, thus lowering their mean blood pressure especially the diastolic pressure.

In this study, during Ramadan the blood TC was reduced in both groups but the reduction was more in Group A. Changes in TC level could be due to Ramadan dietary changes which were not studied in this research. However, the reduced TC was more pronounced in Group A compared to Group B. This could indicate that during Ramadan, the control of high cholesterol food was better among respondents in Group A. On the other hand, during Ramadan, the HDL-C increased in Group A but decreased in Group B. HDL-C is known to be positively associated with exercise (37) and fasting (38,39). The differences in HDL-C changes between the two groups during Ramadan (increased in Group A but reduced in Group B) could be explained by the fact that at baseline (pre Ramadan), there were more physically active respondents in Group B and their HDL-C level was significantly higher than Group A. Therefore during Ramadan, their level of physical activity might have relatively more reduced compared to respondents in Group A and thus decreasing their HDL-C. At 6 months post Ramadan, the HDL-C level in Group B had not return to the baseline (pre-Ramadan) which could indicate that Group B had not returned to their baseline physical activeness while the stable HDL-C level in Group A could indicate that they were either increasing their level of activeness compared to baseline or practicing voluntary fasting.

In general, at baseline Group B was at advantage because they have better health indicators (i.e. significantly higher percentages of respondents who were practising food quantity control and physically active, higher HDL-C, lower TC and TC/HDL-C ratio) except

that it was at a disadvantage for having higher mean number of children since studies had shown that parity was positively associated with body weight and BMI (40, 41). Therefore at 6 months after Ramadan health changes in Group A (Islamic faith intervention) was better. In Group A its BMI did not exceed baseline, the blood pressure showed a decreasing trend and the TC/HDL-C was reduced.

A systematic review of 17 studies of behavioural lifestyle intervention among African women showed that the inclusion of cultural adaptation reduces the percentage of weight regain (42). Therefore similarly, in this study, at 6 months after Ramadan the group who had received Islamic faith intervention (Group A) was found to have better weight regain control. As discussed, the differences between intervention and control group in this study could be due to greater initially weight loss (in Ramadan), adherence to treatment (practice voluntary fasting), lower attrition rate and also religious inputs. These possible contributing factors intertwine with each other and augment the sustainability effect in this study.

Obligatory Ramadan fasting could serve as a promising opportunity to reduce weight while voluntary fasting (according to the teachings of Islam) after Ramadan could serve as an opportunity to maintain the Ramadan weight loss. This intervention would be beneficial and practical especially for Muslims who are overweight and obese. Even though most Muslims have already been practicing obligatory Ramadan and voluntary fasting, the details of fasting etiquette which includes recommended quantity and the sequence of consumption were not emphasized or reminded adequately. In most situations the negative cultural practices are more pronounced than the religious teachings. For example although the religious teaching encourages eating in moderation during breaking of the fast, the cultural practices on the other hand incites feasting. Therefore, Muslims should be reminded about the relevant religious teachings which could contribute to better health and in the context of this study are teachings related to the prohibition of over consumption of food and the practice of proper fasting etiquette.

Strengths and limitations

The strength of this study was that it was an experimental study. Although it was a quasi-experiment the differences in changes between the studied groups were able to be established. The limitation of this study was the use of 'intention to treat' method to analyse the data. It was assumed there were no changes in the respondents who were lost to follow up, which reduced the internal validity of the findings. Nonetheless, using ITT is one of the acceptable methods in managing data which was loss to follow up (43).

CONCLUSIONS

This Islamic dietary intervention could be considered in the treatment for overweight and obesity Muslims. It is economical, supported by scientific principles, religiously appropriate and thus could increase intervention acceptance.

ACKNOWLEDGEMENTS

The authors wish to thank all respondents who had participated in this study and the funding party i.e. Malaysian Health Promotion Board (through the Islamic Medical Association of Malaysia) and Universiti Kebangsaan Malaysia. The article reflects findings from the research, and do not necessarily represent the official views of either funders.

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