

Impact of Ramadan Fasting on Body Mass Index and Eating Habits: A Cross-sectional study amongst Muslim Adults in West Bengal, India

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ABSTRACT: *According to Islamic Hijra calendar in Islam, Ramadan is the ninth lunar holiest month. During that time Muslims do not eat and drink from sunrise to sunset. Fasting during the holy month of Ramadan is mandatory for all healthy adult Muslims and it is regarded as an Act of devotion which brings great blessings to health. The present study was a cross-section observation to understand the impact of Ramadan fasting on Body Mass Index (BMI) among the Muslim adults of north 24 Parganas district in West Bengal, India. Data were collected from 124 females and 40 males on height, weight and food habits during the fasting period. All the parameters were recorded four times i.e. the first week, mid-week, last week and one week after the Ramadan period to observe the change in BMI. The results revealed that there was an insignificant change in BMI and weight between periods of Ramadan fasting. The decreasing trend in weight was observed from the start to the end of the Ramadan fasting period. Overall, the changes in BMI and weight were not so much but the study participants practised healthy diets during these cultural events, which may an example of maintaining healthy food habits during the life course.*

Key words: *Ramadan, Muslim, North 24 Parganas, Body Mass Index, Diet, Fasting*

INTRODUCTION

It is well known fact that 'Ramadan' is the ninth month of the Islamic calendar which is practiced by Muslims globally, considered as a month of fasting and prayer. During Ramadan month, there will be many changes in Muslims day to day activities in case of dietary patterns and also working hours. That time Muslims are doing fast from dawn to sunset. During the fasting period a predawn meal which was known as '*Sahari*' is consumed and in the evening time they break the fast that is called '*iftar*'. Muslims of other country who live in a midnight sun or polar night region they generally follow the time of 'Mecca'. 'Fasting' is obligatory for all the adult Muslims excluding who are ill, travelling, elderly, breastfeeding, diabetic and menstruating (Holy Quran Recital). During fasting they could not eat or drinking anything with changes in diet and activities. It also effect on physiology of the human body (Azizi 2010). Some of the changes include blood parameters, lipid profile, albumin and leptin and others in fasting people (Boden et al. 2012). Ramadan fasting time is depended on geographic location and it may range between 9 and 22 hours per day (Sakr 1975). Ali and Abizari (2018) described the food patterns, dietary diversity and body weight changes during Ramadan. Fasting was considered by noticeable changes in regular dietary patterns, increased dietary diversities and loss of body weight. Food intake throughout 'Ramadan period' was principally categorized by increases in fruits and vegetables consumption, increased in dish variety, and importantly reduced eating of fast foods like fried rice), energy dense food and soft drink. The noteworthy decrease in the amount of eating times per day during Ramadan fasting was not unexpected since throughout the day was usually spent without food. As a result, Muslims adults significantly decrease daily meal frequencies during Ramadan as observed by Frost and Pirani (1987).

It was evident that impact of Ramadan fasting on human body weight varied from individuals to individuals as some of them gaining weight and others losing. It might be depended on amount of energy intake and expenditure during this cultural event (Trepanawski and Bloomer 2010). During fasting period there is a benefit in purifying the body from toxins as it also excludes to intake any tobacco, limited overeating and restricted unhealthy nutrients intake. Also it is an effective way of preventing certain disorders and assures a improved hormonal balance (Ait Saada et al. 2010). According to Akhter et al. (2019), Ramadan fasting was a partial type of controlled fasting. Ramadan observers although missed their lunch but took specific types of food during early breakfast and after sunset in order to maintain adequate calorie intake. Although there have been reports on metabolic changes during and

after *Ramadan* in healthy subjects (Frost and Pirani 1987), the majority of health-specific findings related to *Ramadan* fasting were mixed type (Trepanawski and Bloomer 2010). Ziaee et al. (2006) did a cohort during Ramadan on 81 students to see the changes in metabolic profile and weight during Ramadan fasting, this study evaluated weight, BMI, glucose, triglyceride (TG), cholesterol, low density lipid profile (LDL) and high density lipid profile (HDL) and very Low Density Lipid before and as well as after Ramadan. BMI, glucose, HDL decreased during Ramadan fasting and LDL was increased but there was no association between TG, cholesterol, LDL, VLDL, HDL because it appears that it may be a consequence of 'Ramadan' fasting on serum lipid levels which was closely related to the nutritional diet and bio-chemical reactions to starvation. The present study aims to find out the effect of Ramadan on the Body mass index and weight among Muslims adults and also the changing patterns in food habits.

MATERIALS AND METHODS

Area and People:

This present study was done among Muslim adults (both males and females) from different rural and peri-urban settlements (like *Madhyamgram, Berunanpukuria and Gopalpur Chandigarh, Dariala and Bongaon*) of North 24 Parganas districts of West Bengal, India.

Sample size and sampling

The study selection was based on purposive sampling and data was collected from 124 females and 40 males. Therefore, the total 164 Muslim respondents were included for the present study.

Data Collection Procedures

All measurements were taken in the morning hours between 7am and 10am. Data was collected from four phases –i) During the first week of Ramadan period ii) in the middle of Ramadan Period iii) during the last week of fasting period and iv) One week after Eid, i.e. after completing Ramadan period. Following anthropometric measurements were then taken. The weight was measured with a digital weighing scale calibrated in kilograms and recorded for all subjects. A stadiometer was used for height measurement. The measurement was done with subjects standing upright and bare footed. The height was recorded to the nearest centimetre and Body mass index was calculated using standard equation (WHO 1995).

The present study was cross-sectional in nature. It was carried out from rural and peri-urban areas of North 24 Parganas district of West Bengal, India. Ethical permission was obtained from research participants; they signed in informed consent prior to participate in the study.

Statistical Analysis

Arithmetic Mean and Standard Deviation were calculated for quantitative variables as age, weight and BMI. Hereafter mean difference was measured using ANOVA test. For qualitative variables, percentages distributions were calculated. All analyses were done using SPSS software 16.0 version.

RESULTS AND DISCUSSION

The study was undertaken on 124 healthy females and 40 males (Total 164 individuals) to assess the impacts of Ramadan fasting on their anthropometric measures like weight and BMI. Table 1 shows the background of the study participants. For the present study, majorities of the study participants belonged to female (75.6%) compared to male (24.4%). The mean age of the study participants was 38.69 years (± 13.01). It was noted that the female engaged in households duties (65.2%) followed by male engagement in business (24.4%).

Table 1: Background characters of the participants

Characteristic	Summery values (N=164)
Sex n (%)	
Male	40 (24.4)
Female	124 (75.6)
Age in years (Mean \pm SD)	38.69 (13.01)
Occupation n (%)	
Business	40 (24.4)
Household duties	107 (65.2)
Studying	17 (10.4)

Table 2 shows the regular changes in mean weight (kg) and BMI (kg/m^2) during Ramadan period of the 164 participants i.e. between Pre-Ramadan vs Mid-Ramadan vs End-Ramadan vs Post-Ramadan times. Mean weight (kg) of Pre-Ramadan and Post- Ramadan were relatively similar (59.03 vs 58.8) and BMI of Pre-Ramadan and Post- Ramadan were also shown quite similar values (24.4 vs 24.3). However, there was decreasing trend in both the weight and BMI during Ramadan period, which was statistically insignificant after using ANOVA test.

Table 2: Changes in weight (kg) and BMI (kg/m²) during Ramadan period of the participants (N=164)

Anthropometric variable	Pre-Ramadan Mean (\pm SD)	Mid-Ramadan (Mean \pm SD)	End-Ramadan (Mean \pm SD)	Post-Ramadan (Mean \pm SD)	ANOVA
Weight (kg)	59.03 (11.7)	58.5 (11.5)	58.5 (11.5)	58.8 (11.8)	0.073
BMI (Kg/m ²)	24.4 (4.3)	24.1 (4.2)	24.1 (4.2)	24.3 (4.3)	0.090

Although there was a little change in anthropometric measures between different time periods during Ramadan fasting, but the changes in dietary consumption and diversity was enormous (table 3).

Table 3: Changes in dietary pattern during Ramadan period of the participants

Time and type of dishes	Pre-Ramadan n/N (%)	Mid-Ramadan n/N (%)	End-Ramadan n/N (%)	Post-Ramadan n/N (%)
Breakfast				
None	0/164 (0.0)	17/164 (10.4)	4/164 (2.4)	0/164 (0.0)
Tea, Biscuit, Bread	164/164 (100.0)	0/164 (0.0)	0/164 (0.0)	164/164 (100.0)
Dates	0/164 (0.0)	46/164 (28.0)	52/164 (31.7)	0/164 (0.0)
Milk rice and fruits	0/164 (0.0)	101/164 (61.6)	78/164 (47.6)	0/164 (0.0)
Rice and egg/fish curry	0/164 (0.0)	0/164 (0.0)	30/164 (18.3)	0/164 (0.0)
Tiffin (morning time)				
None	33/164 (20.1)	164/164 (100.0)	164/164 (100.0)	14/164 (8.5)
<i>Chapati</i> and vegetable curry	91/164 (55.5)	0/164 (0.0)	0/164 (0.0)	70/164 (42.7)
Rice and fired potato	40/164 (24.4)	0/164 (0.0)	0/164 (0.0)	80/164 (48.8)
Lunch				
None	0/164 (0.0)	164/164 (100.0)	164/164 (100.0)	0/164 (0.0)
Rice, Pulses, and Red Meat	66/164 (40.2)	0/164 (0.0)	0/164 (0.0)	47/164 (28.7)
Rice, fish and vegetable	54/164 (32.9)	0/164 (0.0)	0/164 (0.0)	38/164 (23.2)
Rice, egg curry and vegetable	44/164 (26.8)	0/164 (0.0)	0/164 (0.0)	79/164 (48.2)
Snacks (evening time/ <i>Iftar</i> time)				
None	0/164 (0.0)	0/164 (0.0)	0/164 (0.0)	0/164 (0.0)
Tea and Biscuit	137/164 (82.5)	0/164 (0.0)	0/164 (0.0)	125/164 (76.2)
Fried food	27/162 (16.5)	0/164 (0.0)	0/164 (0.0)	39/162 (23.8)
Dates ,watermelon, apple, boiled peas, puffed rice	0/164 (0.0)	39/164 (23.8)	38/164 (23.2)	0/164 (0.0)
Mixed fruits, bread toast, lemon drink, boiled peas , Puffed rice, fried potato	0/164 (0.0)	125/164 (76.2)	126/164 (76.8)	0/164 (0.0)
Dinner				
None	0/164 (0.0)	0/164 (0.0)	24/164 (14.6)	0/164 (0.0)
Rice, meat, vegetable	59/164 (36.0)	58/164 (35.4)	45/164 (27.4)	0/164 (0.0)
Rice and vegetable	63/164 (38.4)	68/164 (41.5)	0/164 (0.0)	22/164 (13.4)
Rice, fish/egg/vegetable	42/164 (25.6)	38/164 (23.2)	95/164 (57.9)	142/164 (86.6)

Chapati means round flatbread; *Iftar* means the taking of food after whole day fasting

It was observed that before and after Ramadan, the study participants did not take any breakfast like Dates, Milk rice and fruits, Rice and egg/fish curry. They only consumed Tea and Biscuit and occasionally bread. Similar trend was noted during evening time snacks time. It was significant to observe that in both these time (breakfast and evening time snacks), consumption of fruits (like Dates, watermelon, apple) was increased significantly. Besides, it was also found that the consumption of vegetables was increased during Ramadan time compared to before and after the time and decreased of regular fried food consumption.

Sembiring et al. (2021) has recently studied effect of Ramadan on Body mass index of type 2 diabetes mellitus patients, they found that fasting causes a decrease in body mass and waist size and BMI but fasting does not cause a significant decrease in fasting blood sugar levels. It was estimated that during Ramadan period, nearly 40 to 50 million of people with diabetes practice fasting during Ramadan globally. During fasting, they refrained from eating and drinking, medications orally and also smoking from sunrise to sunset. Because people fast from sunrise to sunset, they consumed considerable quantities of carbohydrate-rich meals after the fasting hours (Benaji et al. 2006).

There were several reasons like fasting hours, climatic conditions, cultural influences, physical activity and most commonly dietary patterns. (Benaji et al. 2006). The patterns of eating differ due to variation in socio-economic status, personal choices and climatic state, some people immediately after breaking their fast increase their carbohydrate intake while some eat a high calorie snack, with a large meal an hour or two later and small tit-bits throughout the night (Fazel 1998). Even in the present study it is seen that many participants break their fast by consuming carbohydrate rich food and some of them also intake oil fried foods.

From a study it was noted that Muslims who are performing fasting undeniably they are dehydrated at that time and this rate was determined by the loss of body water minus metabolic water amount and that was produced over this period. This Severe changes in total body water are best considered by repetitive measurements of body mass. Nevertheless, with small changes in body mass over a long period, any other changes in body composition may bias the calculation; during Ramadan fasting period a little weight loss was found which might be due to mild dehydration (Leiper et al. 2003). During Ramadan fasting period basal metabolism slows down (Husain et al. 1987).

Hajek et al (2012) studied among 202 Muslims attending a mosque in East London, UK, it was noticed that over four weeks during Ramadan period on an average a kilogram weight loss has been found but it was also observed that after completing Ramadan fasting period

again that lost weight is regained. Sadeghirad et al (2014) had done a systematic review on thirty five studies which were mostly conducted in West Asia, Africa, East Asia and North Europe and America and had done meta-analysis on Islamic fasting and weight loss. From this study, it was found that there was a small change in case of body weight and weight was regained after Ramadan period and therefore steadily reverted as in pre-ramadan state. According to Marbut et al (2005) may be due to short duration of fasting (30 days) period fasting did not execute any significant change on body weight as shown in the present study. The research has limitations including the small sample size and lack of proper sampling. Therefore, this study cannot be generalized. However, the outcome was shown a change in healthy diet due to cultural performances by studied Muslim adults, which sustained from generation after generation.

CONCLUSION

In the present study, it was found that there was an insignificant change in weight and BMI loss but the dietary habits was altered considerably. The consumption of fruits and vegetables increased during the Ramadan cultural practices, which is important to maintain a healthy lifestyle. However, further in-depth study with sufficient sample size and sampling will be required to generalize the present issue. Moreover, future study will be also required to incorporate the other physiological parameters, which are related to cardiovascular health of human population.

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