CONSEQUENCES OF FASTING ON DIFFERENT ANTHROPOLOGICAL AND PHYSIOLOGICAL PARAMETERS

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Abstract

Fasting is a practice and numerous studies have examined different aspects of fasting. The current study is aimed at examining the effect of Islamic fasting on different anthropological and physiological changes like body mass index (BMI), Waist hip ratio (WHR), arm and wrist circumferences (Arm and Wrist C) as well as blood pressure (BP) in fasting. This is a cross sectional study in which three BMI groups of 55 fasting Muslim healthy males and 55 females in the age group 20-40 years were included. Detailed history and anthropometric measurements were carried out and blood pressure was taken in all the subjects, twice: once, at day one and last Ramadan. Data were investigated by using one-way ANOVA technique.Fasting significantly reduced BMI (Kg/m^2) ($P< 0.05$; $P< 0.05$), WHR ($P< 0.05$; $P< 0.05$), SBP (mmHg) ($P< 0.05$; $P< 0.05$) and DBP (mmHg) ($P< 0.05$; $P< 0.05$) of overweight and obese males. BMI and WHR of were considerably reduced ($P<0.05$; $P<0.05$) in obese females as well. Average SBP of Post Ramadan females weresignificantly reduced ($P<0.01$; $P<0.01$). Post Ramadan normal weight and obese females showed reduced DBP ($P<0.05$; $P<0.05$).This study signified that Ramadan fasting caused significant reduction in BMI, WHR and BP in obese and overweight people who fasts.

Keyword: Blood pressure, Body Weight, fasting,

INTRODUCTION

Globally, the Muslim community observed fast during holy month of Ramadan. Fasting duration depends upon seasonal and geographical condition of the country. Average fasting hours vary between 12-18 hours. (1). Islamic fasting causes various

anthropological and physiological changes in human body due to changes in eating and sleeping behavior (2). Changes in type and time of food intake and sleep duration cause physiological and psychological changes (3). The dietary intake during Ramadan is limited to two portions, one at dawn (Sahar) and other after dusk (Iftar). These dietary limitations cause reduction in energy intake and ultimately the body weight and body fats (4). Waist circumference also decreased due to Ramadan fasting (5). Ramadan fasting has calming effects on human body. Various studies demonstrated the significant reduction in blood pressure and body mass index (BMI) (6, 7). Limited previous literature is available in this part of the country. Studies conducted in past in neighboring countries also demonstrated that Islamic fasting trim down waist circumference, basal metabolic index and body weight (8,9).

This study was designed to check the consequences of fasting during Ramadan on different anthropological and physiological parameters like BMI, WHR and blood pressure.

MATERIALS AND METHODS

This survey was performed during the period of Ramadan (month of 30-days according to the Islamic Calendar). Research procedure was permitted by The Research Ethics Committee of Federal Urdu University of Arts Science and Technology Karachi Pakistan (FUUAST). Volunteers were selected from FUUAST and some other places within the city of Karachi-Pakistan.Individualswho were interestedin the studywere approached seven days before Ramadan. A composed agreement was signed by all participants. Consideration criteria for the investigation were that their BMI according to criteria for Asians (10), as well as fast throughout the month of Ramadan andnot experiencing any interminable health issue. Pregnant ladies, subject with cardiovascular illnesses and old enough over 40 years were not considered.An aggregate of female (n=55) and male (n=55) participants whose ages went somewhere in the range of 20 and 40 years experienced anthropometric and physiological assessment on day one and last of Ramadan. They were categorized according to their BMI, there were 15 normal weight, 10 overweight and 30 obese male subjects. Among females 15 normal weight, 10 overweight and 30 obese were included.

Normal fasting time was around 15 hours every day during the study. All participants were directed to low oil and sugar intake at iftar as well as Sahar. Individual readings were recorded at 1st day and last day of Ramadan were labeled as Pre and Post Ramadan group respectively. To calculate BMI weight and height were taken, Similarly Waist, hip, arm and wrist circumferences were taken and WHR was calculated. BP was taken from each participant with sphygmomanometer (CERTEZA, Germany).All readings were statistically evaluated through SPSS (SPSS, Chicago, IL, USA), as well as comparison of meanwas done by One-way ANOVA technique. P values below 0.05 were accepted as significant.

RESULTS

This study was designed to check the consequences of fasting during Ramadan on different anthropological and physiological parameters like BMI, WHR and blood pressure.The demographic characteristics of the participants were computed as; the mean age (in years) of normal weight, overweight and obese male subjects were 24.73 ± 0.65, 32.10 ± 1.58, 33.90 ± 1.38 years respectively.Over-weight (P=0.013) and obese (P=0.046) subjects exhibited considerable reduction in their BMI (Kg/m^2) towards the end of the month of Ramadan. Results of our analysis showed post overweight and obese men exhibited significantly lower WHR values (P=0.053; P=0.010) respectively. We observed significant lower values of SBP in normal weight (P=0.035), overweight(P=0.014) and obese male subjects (P=0.010) than their respective pre groups. No significant changes were seen in mean DBP values of overweight (P=0.051) and obese males (P=0.020) (Table 1).

Table 1 Parameters (Mean ± SEM) of Three BMI groups of Males(Pre and Post Ramadan)

Variables	Groups	Normal (n=15)	Overweight (n=10)	P-Value	Normal (n=15)	Obese n=(30)	P-Value
BMI (Kg/m^2)	Pre	21.465±1.11	24.69±0.33	0.000	21.56±1.11	34.90±4.17	0.000
	Post	21.24±1.07	23.81±1.00	0.000	21.25±1.07	32.78±3.85	0.000
	P-value	0.448	0.013		0.449	0.046	
WHR	Pre	0.76 ± 0.09	0.91 ± 0.04	0.000	0.76 ± 0.09	0.96 ± 0.11	0.000
	Post	0.75 ± 0.07	0.87 ± 0.05	0.000	0.75 ± 0.07	0.89 ±0.05	0.000
	P-value	0.554	0.056		0.554	0.010	
Arm (cm)	Pre	10.73±0.95	13.81±4.30	0.013	10.73±0.95	19.08±8.42	0.000
	Post	9.99 ± 1.41	12.10±0.55	0.000	9.99 ± 1.41	18.34±8.39	0.000

	P-value	0.104	0.229		0.104	0.737	
Wrist(cm)	Pre	6.48 ± 0.83	11.43±2.91	0.000	6.48 ± 0.83	12.87±6.64	0.001
	Post	6.11 ± 0.84	9.64 ± 2.46	0.000	6.11 ± 0.84	12.22±6.26	0.001
	P-value	0.243	0.155		0.243	0.698	
SBP (mmHg)	Pre	97.20±8.71	112.70±6.75	0.000	97.20±8.71	129.47±17.37	0.000
	Post	90.20±8.62	105.50 ± 4.99	0.000	90.20 ± 8.62	120.87±9.31	0.000
	P-value	0.035	0.014		0.035	0.020	
DBP (mmHg)	Pre	70.40 ±6.55	82.20 ± 6.66	0.000	70.40 ± 6.55	88.46 ± 9.52	0.000
	Post	66.93 ±5.72	76.80 ± 5.18	0.000	66.93 ± 5.72	82.96 ± 8.00	0.000
	P-value	0.134	0.058		0.134	0.019	

***BMI**=Body mass index, **WHR**=Waist hip ratio, **Arm C**=Arm circumference, **Wrist C**=Wrist circumference, **cm**=centimeter, **SBP**=Systolic blood pressure, **DBP**=Diastolic blood pressure, **Pre**=1st Ramadan group, **Post**=Same individuals appeared at last day of Ramadan*

The age of normal, overweight and obese females were 21.80 ± 0.44, 30.70 ± 1.42 and 31.83 ± 1.16 years respectively. When average BMI values of both obese female groupswere equated, post-obese females exhibited considerable decrease in their BMI (P=0.036). Mean values of WHR of obese group showed significant decrease at the end of fasting month (P=0.050). The comparisons between the mean values of circumferences of arm and wrist of control, overweight and obese females did not show significant differences. Normal weight women showed that SBP mean values of Post group was significantly decreased (P=0.005). Mean value of SBP of overweight females did not show statistically significant difference (P=0.106). Mean values of SBP of obese women were significantly reduced (P=0.001).Mean DBP (mmHg) of normal weight (P=0.054) and obese female subjects (P=0.016) was considerably reduced at the end of Ramadan.

Table 2. Parameters (Mean ± SEM) of Three BMI groups of Females(Pre and Post Ramadan)

Variables	Groups	Normal (n=15)	Overweight (n=10)	P-Value	Normal (n=15)	Obese n=(30)	P-Value
BMI (Kg/m^2)	Pre	19.84 ± 1.73	25.36 ± 1.10	0.000	19.84±1.73	33.80±5.26	0.000
	Post	19.28 ± 1.50	25.13 ± 1.06	0.000	19.28 ±1.50	31.06±4.57	0.000
	P-value	0.354	0.641		0.354	0.036	
WHR	Pre	0.747± 0.05	0.84 ± 0.05	0.000	0.747± 0.05	0.87 ± 0.07	0.000
	Post	0.73 ± 0.06	0.82 ± 0.05	0.001	0.73 ± 0.06	0.83 ± 0.07	0.000
	P-value	0.488	0.414		0.488	0.050	
Arm (cm)	Pre	12.45 ± 6.81	10.63 ± 0.92	0.542	12.45 ±6.81	18.08 ±9.08	0.054
	Post	11.64 ± 8.39	10.21 ± 1.12	0.600	11.64 ±8.39	16.80 ±8.53	0.061
	P-value	0.789	0.373		0.789	0.574	

Wrist(cm)	Pre Post P-value	6.25 ± 0.70 6.04 ± 0.54 0.467	8.30 ± 4.35 7.53 ± 3.79 0.611	0.157 0.232	6.25 ± 0.70 6.04 ± 0.54 0.467	9.11 ± 4.45 8.40 ± 4.08 0.524	0.564 0.493
SBP (mmHg)	Pre Post P-value	97.87 ± 5.45 91.07 ± 6.67 0.005	114.50±6.88 109.20±7.04 0.106	0.000 0.000	97.87 ±5.45 91.07 ±6.67 0.005	125.03±9.41 117.20±7.64 0.001	0.000 0.000
DBP (mmHg)	Pre Post P-value	67.33 ± 5.74 63.26 ± 5.54 0.058	78.30 ± 2.79 75.60 ± 4.06 0.10	0.000 0.000	67.33 ±5.74 63.26 ±5.54 0.058	85.50±8.02 80.83 ±6.37 0.016	0.000 0.000

***BMI**=Body mass index, **WHR**=Waist hip ratio, **Arm C**=Arm circumference, **Wrist C**=Wrist circumference, **cm**=centimeter, **SBP**=Systolic blood pressure, **DBP**=Diastolic blood pressure, **Pre**=1st Ramadan group, **Post**=Same individuals appeared at last day of Ramadan*

DISCUSSION

Ramadan fasting causes various changes in anthropometry as well as physiology of human body. We observed significant body weight reduction in obese and overweight subjects due to one month fasting. Our research findings are in agreement with Malekmakan, *et al.* (2017), also found substantial reduction in BMI of both genders because of fasting during Ramadan (2). One study showed that overweight subjects are likely to reduce more weight during Ramadan, as compared to normal weight or underweight (11). Weight reduction is due to dehydration during fasting (12). This research was carried out during peak summer and the average fasting time was about fifteen hours, the dehydration is the major cause of weight reduction.

It was anticipated based on previous studies findings that the magnitude of weight loss to some extent may encompasses a reduction in WC and thus lower WHR (13). Our experiment also detected a statistically significant reduction in WHR. Significant reduction in WHR indicated the reduction in abdominal adiposity as also found by the Sayedda, *et al*. (2013)(9). This resultcontradicts other reported findings (14, 15). Abbas and Marbut, (2012), also concluded that Ramadan fasting caused no significant difference in body weight (16). The discrepancy between the former studies and this study may because of the seasonal variations. Ramadan may did not fall during the summer and the fasting period was comparatively shorter in the previous studies.

The mid upper arm circumference of our subjects did not significantly decrease at the endof Ramadan. Recently arm circumference has been accepted as a simpler measure of obesity and an alternative of BMI. Our finding is not parallel with the research in the past(17). Central adiposity is greatly decreased in our study subjects than the peripheral body fats. Thus, in this study mid upper arm circumference showed no change due to fasting.Our findings showed significant decrease in blood pressure in both the sexes. Variety of literature found on the impact of Islamic fasting on blood pressure. Some of the studies evaluated that both SBP and DBP were lowered due to fasting (18) and some of them reported no changes (19, 20). Trepanowski and Bloomer (2010), reported that SBP and DBP lowered significantly in fasting people due to Ramadan fasting (21). Kassab*et al*. (2004), found that level of BP remain unchanged during Ramadan. The weight loss may be the reason of decrease in BP in our subjects (22).

Most of the research found on the positive correlation between BMI and blood pressure (18, 23). Ünalacak*et al*., (2011) and Shehab*et al*., (2012) find out that Islamic fasting has significantly decreased blood pressure among healthy individuals (24, 25). AL-Kubati*et al*. (2007), have reported lowered level of hypertension during the day but increases in the evening and early morning during Ramadan fasting which may increase the risk for hypertensive patients (26). Nemat*yet al*. (2012), demonstrated that SBP decreased while not DBP in Ramadan (27). Sayedda*et al*. (2013) found that the blood pressure fluctuates at different times of the day in the early fifteen days of Ramadan, however it resumed the previous values in the last week of Ramadan (9).

CONCLUSION

This study concludes that BMI, WHR as well as blood pressure significantly reduced in both male and female subjects toward the end of Ramadan. Therefore Ramadan fasting brings healthy changes in overweight and obese individuals also reduce the risk of hypertension.

Conflict of interests

The authors declared no conflict of interest.

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