

Impact of Fasting on the Selected Anthropometric and Physiological Parameters of Young Adults Attending Federal College of Agricultural Produce Technology, Kano, Nigeria

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Abstract

This study evaluate / investigate the impacts of Ramadan Kareem on the selected anthropometric index and physiological parameter of young adults attending FCAPT Kano. The anthropometric parameters were assessed using a measuring tape role, weighing scale, height role while the physiological parameters were measured using BP monitoring meter, blood pressure systolic, diastolic and pulse rate respectively. The results obtained among the students for pre-ramadan and post Ramadan fasting period shows that the weight obtained had a mean value (47.40±7.73) Pre-Ramadan and (44.13±7.96) Post Ramadan. BMI had a mean value at Pre-Ramadan (18.69±2.31), Post Ramadan (17.72±2.42), the results of Pectoral circumference (cm) had a mean value at Pre-Ramadan (81.85 ± 5.75) and Post-Ramadan was (79.67±9.59), MUAC had a mean value (23.31 ± 2.29) during Pre-Ramadan and (22.75±3.02), Post-Ramadan. The results of waist circumference (cm) had a mean value of (68.37±8.96) during at Pre-Ramadan period and (67.65±8.92), during Post-Ramadan, the Hip circumference had a mean value of (87.47±8.96) in Pre-Ramadan period and the 88.12±8.13, in Post-Ramadan period. These findings showed that the thigh Circumference (cm) of the respondents had a mean value of 46.94±10.51 during Pre-Ramadan with a significant increase in the thigh circumference (48.72±13.44) during and Post-Ramadan, Waist to Hip Ratio of the respondent was significant at P<0.05 during pre and post ramadan with a mean value of 0.787±0.102 in Pre-Ramadan period and 0.744±0.065 in the Post-Ramadan respectively. The physiological parameters analyzed among the respondents during pre-ramadan period showed that the systolic blood pressure at Pre-Ramadan had a mean value of 113.54±14.63 and 106.18±22.02 during Post-Ramadan and the Diastolic blood pressure at Pre-Ramadan had a mean value of 74.46 ± 17.43, with a significant difference at P>0.05 which was higher than the results obtained during Post-Ramadan period with a mean value of 72.14±20.49, the Pulse

rate at Pre-Ramadan period had a mean value of 97.54 ± 19.90 which was significantly higher than the results obtained in Post-Ramadan (91.00 ± 15.38) period. Hence, it's important to note that individual variations exist, and these changes depend on personal habits and dietary choices. Therefore, monitoring and maintaining a balanced approach to diet and lifestyle are crucial during and after Ramadan. Consulting with a healthcare professional can provide personalized guidance for optimizing health during this period.

Keywords: Fasting, Ramadan, Anthropometric, Physiology and Parameters.

INTRODUCTION

Ramadan period is a period of abstinence from all kinds of food and drink from dawn to dusk. This period is observed by all Muslims umma around the world and are obligated to fast during this holy month of Ramadan, with an exception of the sick, pregnant and lactating mother, children who have not reached puberty and whom fasting would be detrimental to their health and those traveling as reported by kadri *et al.*, (2000). The eating pattern during Ramadan as "sahur" and the second after sunset, referred to as "iftar" as reported by Al-Hourani and Atoum (2007).

The changes occurred showed that fasting (Ramadan) period changes across different months of the year over 33-years cycle as reported by Trepanowski and Bloomer (2010). The geographical location from one region to another determines the Ramadan duration for each day lasting from 12 to 15 hours in a single day (Sakr *et al*, 1975). According to Persynaki *et al.* (2017), there is no restriction on the halal foods and beverages consumed before dusk (sahur) and after dawn (iftar) beyond foods normally considered as halal by Islam. A number of diets are limited to be consumed twice a day due to its nutritional composition, therefore, an additional nutrient rich meal could be required in keeping with the spirit of Ramadan. This is a time for significant changes in eating habits, lifestyle and the development to resolve a long-lasting healthy living choices.

Fasting means to "abstain from all or some kinds of food or drinks, especially as a religious observance (Oxford Dictionary Online, 2016), which has been practiced from the onset globally in one way or the other since the ancient civilization and had been practiced as a religious obligation which play a significant role in shaping political, cultural, purposes in suites for success, victory, freedom from satanic attack etc. Presently, therefore, a renewed interest in fasting for its dietary and health benefits has been on the rise (Patterson *et al.* 2015).

Fasting as a religious obligation drew mankind close to His creator and served for penance, divine revelation purification, and transcendence among other reasons. According to Persynaki *et al.* (2017), the world many Religions such as Christianity, Islam, and Judaism, all encourage fasting according to the provision of their believe system. Islamic practices of fasting is unique which is universally observed during the month of Ramadan, A 28 to 30 days period in the ninth month following a lunar calendar which is a period of introspection with a communal prayer pattern, and self-restraint from non halal food, alcoholism and all forms of immorality and bad behaviors (Trepanowski and Bloomer, 2010).

Fasting in the holy month of Ramadan portray its significance in the life of all Muslim umma with an alternative variation in fasting periods and the feeding pattern. However, in other religion like Christianity, an alternate-days of fasting involved alternating up to 24 hrs period of fasting without iftar in between while water intake is permitted as reported by Persynaki

et al. (2017). The nutritional data regarding the health benefits of fasting is still unknown as it remain inconclusive with results of different studies indicating a decline in the nutritional status, some are nutritionally stable, while others had high nutritional status with relatively no changes in nutrients intake level during Ramadan fasting by the respondent (Persynaki *et al.* 2017; Petternson, *et al.*, 2015).

Fasting is a periods of abstinence from food as part of the religious obligation. The fasting period is believed to improve the spiritual and moral wellbeing in what is called a holy month and also regulates and maintained the health and nutritional status of an individual. According to Rky *et al.*, (2004) fasting regularly controls excessive fat and certain diseases but all have its health implication when not feed properly, although the low income families who could not meet up to their regular balance diet during this period may be faced with significant changes in their anthropometric index as a result of fasting and lack of adequate nutrient intake during Suhur or iftar over a period of one month as observed for the fasting period which lead to investigating the impact of fasting period on the nutritional status of the respondents as a case study. Therefore, this study was set to assess the impact of fasting on the nutritional status of the respondent in order to establish data on their anthropometric index and the physiological changes occurred before and after fasting, hence correlate the results and make recommendations (Rafie and Sohail, 2016).

This study was conducted to establish data on the impact of fasting on the nutritional status of students studying in federal College of Agricultural Produce Technology, during 2023 ramadan period also, it was designed to provide information on the anthropometric measurement and nutritional status of the students before and after fasting period and develop means of improving their diets therapy during such periods and recommending a standard pattern on the basic information generated (Aldlouni *et al.*, 1997).

MATERIALS AND METHODS

Materials

The material used in this study includes the following; Weighing scale, Standio-meter, tape role, BP monitors and pen.

Study Population and Sample Size

The population used in this study includes selected students from the department of nutrition and dietetics, Federal college of agricultural produce technology which compresses of male and female who volunteered to participate in this study.

A total of sixty (60) respondents was randomly selected out a total population 70 students in the department of nutrition and dietetics for this study using a simply random sampling described by Yamane, (1976) and their Physiological parameters and the anthropometric measurement were measured during pre-ramadan and post Ramadan period.

$$n = \frac{N}{1+N(0.05)^2}$$

Where: n = sample size N = population size (e)²

METHODS OF ANALYSIS

Anthropometric Measurement

The anthropometric measurement of the respondents assessed includes; Body weight analyzed using a digital weighing balance, the students weight was taken without their shoes and bags to avoid error as described by Emami-Naina *et al.*, (2013).

The respondents body mass index (BMI) was calculated by taken their total body weight in kg divided by their height in meters which were expressed as (normal sever thinning, underweight, overweight and obese or obesity) following the children growth BMI chart.

$$BMI = \frac{\text{Weight of the subject in (Kg)}}{\text{height of the subject in (m}^2\text{)}}$$

The waist to hip ratio (WHR) measurement of the respondents were taken by taken an individual waist-circumference in (cm) divided by an individual hip-circumference in (cm) (Awwad *et al.*, 2012).

$$\text{waist hip ratio} = \frac{\text{waist circumference in (cm)}}{\text{hip circumference in (cm)}}$$

The Pectoral, thigh circumference, MUAC and the Hip circumference was evaluated using a tape role in meters, as described by Whitney and Rolfes, (2008).

Physiological parameters.

The physiological Measurement of the Blood Pressure for systolic and diastolic of the respondents were analyzed using stethoscope and the manual sphygmomanometer. The blood pressure were recorded among the respondents before and after the 2023 fasting period among following a method of Bernieh *et al.*, (2010).

The pulse rate was assessed using the Heart beat rate using stethoscope and the analogue reading was taken from the supine position using a conventional method during the normal quite breathing for a period of 1 minutes (Roky *et al.*, 2014).

Statistical Analysis

The data generated were analyzed statistically using (Minitab 17), for analysis of variance (ANOVA), for mean and standard deviation and least significant difference (LSD) using T-test (Yamane, 1967), and the results were further subjected to correlation analysis between the anthropometric index between the parameters.

RESULTS AND DISCUSSION

Anthropometric Index of Respondent before and after Fasting period

Table 1 shows an average weight of the respondents in pre Ramadan period was 44.40±7.73 kg to the post Ramadan period was 44.13±7.79 kg with a significant difference at p<0.05 which increased significantly in weight from the pre-ramadan period to the post-ramadan period which could be attributed due to several factors such as; dietary changes, caloric deficit, changes in meal, reduced meal frequency, increase physical activity.

The results of the BMI showed that the value obtained in pre-ramadan period 18.69±2.31 and post-ramadan 17.72±2.42, with a decrease in body mass index (BMI) from the pre Ramadan period to the post Ramadan period could be attributed to caloric deficit, dietary changes, reduced meal frequency, increased physical activity, loss of body fat while others may not

see significant changes, the results of the pectoral circumference was (81.85±5.75 cm) and post Ramadan was (79.67±9.59 cm), with decrease in pectoral circumference from the pre Ramadan period to the post Ramadan period could be influenced by several factors; caloric deficit, loss of body fat, changes in muscle mass, dietary choices, physical activity.

The results showed that the waist circumference at pre Ramadan was 68.37±8.96 cm and post Ramadan 67.65±8.92, cm with decrease in waist circumference from the pre Ramadan period to the post Ramadan period could be attributed to several factors; caloric deficit, loss of abdominal fat, dietary changes, increased physical activity, reduced bloating, the specific data and statistical analysis would be needed to determine the significance of the observed changes.

The results of hip circumference (cm) at pre Ramadan period was 87.47±8.96 cm and the post Ramadan period was 87.12±8.13 cm with a slight decrease in hip circumference from the pre Ramadan period to the post Ramadan period which may be influenced due to several factors such as; caloric surplus, changes in body dietary choices, individual variability fluid level.

The thigh circumference of the respondents in pre Ramadan period had an average mean value of 46.94±10.51 cm and the post Ramadan period 48.72±30.44 cm with an increase in thigh circumference from the pre Ramadan period to the post Ramadan period which could be influenced due to several factors; caloric surplus, dietary choices, individuals variation, muscle gain, fluid retention in the post ramadan period as a result of unregulated eating pattern after the fasting period, the results showed that waist hip ratio at pre Ramadan was 0.787±0.102 to the post Ramadan 0.744±0.065 with increase in waist hip ratio from the pre Ramadan period to the post Ramadan period could be attributed by several factors deferential fat distribution, caloric deficit, loss of abdominal fat, muscle changes individuals variation, it's important to note that the waist to hip ratio is a valuable indicator of body composition and change the results from multiple factors including those related to fasting during Ramadan.

Table 1.0: Effect of Ramadan Fasting (2023) on the Anthropometric index of the Respondents

S/N	Parameters	Pre-Ramadan	Post-Ramadan
1	Weight (Kg)	47.40±7.73 ^a	44.13±7.96 ^b
2	BMI	18.69±2.31 ^a	17.72±2.42 ^b
3	Pectoral Circumference (cm)	81.85±5.75 ^a	79.67±9.59 ^a
4	MUAC	23.31±2.29 ^a	22.75±3.02 ^a
5	Waist Circumference (cm)	68.37±8.96 ^a	67.65±8.92 ^a
6	Hip Circumference (cm)	87.47±8.96 ^a	88.12±8.13 ^a
7	Thigh Circumference (cm)	46.94±10.51 ^a	48.72±13.44 ^a
8	Waist - to - Hip Ratio	0.787±0.102 ^a	0.744±0.065 ^a

Values with different superscript for a parameter are significantly (p<0.05) different

The physiological parameters of the respondents for systolic blood pressure in pre-Ramadan period had a mean value of (113.54±14.63) to the post Ramadan (106.18±22.02) which significantly increased in post Ramadan period due to sodium intake the dehydration, stress and inadequate sleeping variation during the fasting period which most have potentially manifested during the post ramadan.

To fully understand the change in blood pressure for systolic increase or decrease in blood pressure increase may require a more detailed analysis of the subject under consideration, changes in blood pressure during Ramadan would vary and depend on multiple factors if significant changes in blood pressure with severe increase or decrease observed are referred to consult a health care professionals for a comprehensive evaluation. The result of this article showed that diastolic blood pressure during pre-Ramadan had an average mean value of 74.46 ± 17.43 while the post Ramadan had a mean value of 72.14 ± 20.49 as indicated in table 2.0.

The diastolic blood pressure decreased significantly at ($p > 0.05$) with a decrease in diastolic blood pressure from the pre Ramadan period to post Ramadan period. A decline in diastolic blood pressure in this specific case may be due to combination of these factors. During fasting period individuals will have same or similar response to dietary intake changes during Ramadan, and changes in blood pressure can vary based on individuals' lifestyle and habits.

The pulse rate of the respondents in pre Ramadan period had an average mean value of 97.54 ± 19.90 to the post Ramadan period 91.00 ± 15.58 , this shows a significant decreased in pulse rate from pre-Ramadan period to post-Ramadan period which could be attributed due abstinence from food reduced stress.

Table 2.0: Physiological parameters of the respondents in pre and post Ramadan fasting (2023)

S/N	Parameters	Pre-Ramadan	Post-Ramadan
1	Systolic Blood Pressure	113.54 ± 14.63^a	106.18 ± 22.02^b
2	Diastolic Blood Pressure	74.46 ± 17.43^a	72.14 ± 20.49^b
3	Pulse Rate	97.54 ± 19.90^a	91.00 ± 15.38^b

Values with different superscript for a parameter are significantly ($p < 0.05$) different

Correlation between parameters of respondent, before Ramadan Fasting.

There was a strong correlation between weight (kg) and height (0.640) weight and pectoral (cm), MUAC, waist-to hips ratio (cm) with the following average value of (0.622), (0.771), (0.571), 0.673 and the weight body mass index of (0.861*) respectively in the study population in table 3.0. there was a strong correlation between pectoral (cm) and MUAC (0.677), pectoral and waist to hip ratio showed a strong correlation of (0.571 and 0.678 cm) as well as waist hip ratio with an average mean value of (0.646 cm) respectively as presented in table 3.0.

The Result of correlation of the respondents presented in table 3.0 with asterisk (*) showed that the parameters analyzed showed that there was no strong correlation among the parameters except for weight in the horizontal column as compared with the significant correlation in table 3.0 where there was a strong correlation between weight and height (0.662kg/m) followed by a strong correlation between weight and MUAC (0.662 kg /cm) and weight-waist circumference had a correlation value of (0.664 kg/cm), and lastly weight-hip, circumference showed a correlation ratio of (0.38 kg/cm) respectively.

Table 3.0: Correlation between Parameters of Respondents before Ramadan Fasting

	Weight (Kg)	Height (cm)	Pectoral (cm)	MUAC (cm)	Waist (cm)	Hip (cm)	Thigh (cm)	Systolic BP	Dystolic BP	Pulse	BMI	WHR
Weight (Kg)	1											
Height (cm)	0.640*	1										
Pectoral (cm)	0.622*	0.428	1									
Muac (cm)	0.771*	0.436	0.677*	1								
Waist (cm)	0.571*	0.273	0.603*	0.571*	1							
Hip (cm)	0.673*	0.420	0.661*	0.678*	0.646*	1						
Thigh (cm)	0.176	0.111	0.132	0.217	0.066	0.218	1					
Systolic BP	0.103	0.073	-0.018	0.014	-0.239	-0.084	-	1				
Dystolic BP	0.146	0.037	0.014	0.012	0.066	0.177	0.036	0.291	1			
Pulse	-0.218	-0.290	-0.277	-0.146	-0.193	-0.172	0.025	-0.063	-0.115	1		
BMI	0.861*	0.163	0.521	0.713*	0.559*	0.608*	0.158	0.082	0.166	-	1	
WHR	-0.102	-0.164	-0.02	-0.093	0.381	-0.44	-	-0.153	-0.142	-	-	1
							0.144			0.022	0.04	

Values with * indicate strong correlation between parameters

DISCUSSION

The changes in anthropometric and physiological parameters from the pre-Ramadan to post-Ramadan period can be influenced by various factors, including fasting, dietary habits, and lifestyle changes. Here's a brief discussion of why some parameters may decrease while others increase: Weight and body composition decrease in many individual experience weight loss during Ramadan due to reduced calorie intake and fasting (Rouhani, 2014; Sadeghirad, 2014). This can lead to a decrease in body fat and muscle mass. Increase: Some people may experience weight gain post-Ramadan, particularly if they overcompensate for missed meals during fasting by consuming larger quantities of food (Sadeghirad, 2014).

Blood sugar levels: decrease: Fasting during Ramadan often leads to lower blood sugar levels, especially during the day. This can be beneficial for individuals with diabetes but may lead to mild hypoglycemia. Increase in blood glucose level after may increase as normal eating patterns resume, potentially leading to post-prandial hyperglycemia. (Al-Hadramy, 1997)

Blood Pressure decrease some individuals experience a reduction in blood pressure during fasting, which can be attributed to reduced salt intake and overall caloric restriction. Increase: Post-Ramadan, there might be an increase in blood pressure due to changes in dietary habits, such as increased salt intake or consumption of high-calorie, processed foods. Cholesterol levels decrease in which Fasting could lead to a decrease in LDL cholesterol levels, which is considered beneficial for heart health. Increase after Ramadan may be as results of an increase in cholesterol levels, especially if individuals return to high-fat, high-sugar diets. (Ghouse, 2008).

Hydration Status of the sampled respondents showed a significant decrease in the body fluids which could be a common issue or occurrence during fasting hours, which can lead to a decrease in hydration status. An increase in the body fluids immediately after sunset, it important to note that the changes in these parameters can vary among individuals, depending on their baseline health, dietary choices, and adherence to fasting guidelines. Regular monitoring and a balanced approach to diet and lifestyle are essential to maintain health during and after Ramadan. Consulting with a healthcare professional can also provide personalized guidance. Ramadan is a sacred month in Islam during which Muslims fast from dawn until sunset. Fasting during Ramadan can have a significant impact on various anthropometric and physiological parameters. These changes can vary depending on an individual's habits, lifestyle, and dietary choices. In this finding, the results exploit the reasons why some of these parameters decrease, while others increase during this period of the study. (Katz, 2003; Rouhani, 2014; Sadeghirad, 2014).

Weight loss is a common outcome during Ramadan, primarily due to reduced calorie intake. Fasting for long hours limits the time available for eating, leading to a caloric deficit. As a result, many individuals experience a decrease in body weight. This weight loss is often attributed to the loss of body fat and, in some cases, muscle mass. The reduction in caloric intake during the day, coupled with the fasting period, forces the body to utilize its energy reserves. Stored glycogen in the liver and muscles is the initial source of energy (Rouhani, 2014). Once these glycogen stores are depleted, the body turns to fat stores for energy, leading to fat loss (Sadeghirad, 2014). However, in prolonged fasting, muscle protein can also be broken down for energy, resulting in a decrease in muscle mass. Increase: Post-Ramadan, some individuals may experience an increase in body weight. This weight gain is often attributed to several factors: Overcompensation: After a day of fasting, people may consume larger quantities of food during the evening and pre-dawn meals to compensate for the missed meals during the day. This can lead to an overall increase in calorie intake, contributing to weight gain. Water Retention among the subject consuming high-sodium and processed foods during the evening meal can lead to temporary water retention and weight gain. (Tylor, 2011).

CONCLUSION

The changes in the anthropometric and physiological parameters of the respondents from the pre-Ramadan to post-Ramadan period are multifaceted and are influenced by various factors such as; weight loss which is common during Ramadan period due to a reduced in calorie intake, but weight gain can occur during post-Ramadan period due to overcompensation and water retention. Blood sugar levels decrease during fasting which usually increase when normal eating patterns was restored. The blood pressure and cholesterol levels may also decrease during Ramadan, but dietary choices can lead to an increase in these essential anthropometric parameters during post-Ramadan. Hydration status fluctuates between decreased during fasting hours and increased during the normal eating periods. It's important to note that individual variations exist, and these changes depend on personal habits and dietary choices. Therefore, monitoring and maintaining a balanced approach to diet and lifestyle are crucial during and after Ramadan. Consulting with a healthcare professional can provide personalized guidance for optimizing health during this period.

The following recommend are suggested according to the results of this finding to improve the nutritional status of the students during Ramadan periods which includes; there is need to create an awareness on the preferred diets to be consumed during fasting to maintain good health after the fasting period. There is need for a further study on the classes of food consumed during fasting period. There is need for a foundation and the societies to encourage

charity during the fasting period to meet up with the need of the less privilege and the students of higher learning who often fasted in their respectively institutions.

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