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Comparison of Nutritional Status and Body Composition Pre and Post Ramadan

Mala Gurappa, Syeda Suriya Kouser

Assistant Professor, Student

Bishop Cotton Women's Christian College

ABSTRACT

Ramadan is the 9th moth of the Muslim Islamic lunar calendar and is one of the sacred times for Muslims. It is a month of 29-30 days during which Muslims are obliged to fast from dawn to dusk across the world, consuming one meal before sunrise (‘Suhoor’ or ‘Sehri’) and another after the sunset (‘Iftar’). The study titled “Comparison of Nutritional Status and Body Composition Pre-Ramadan and Post-Ramadan” was conducted in Bengaluru, Karnataka. It involved a total of 100 samples who fasted 21-30 days comprising of 50 males and 50 females from Al-Ameen Institute and Bishop Cotton Women’s Christian College. The aims to assess whether there is change in the Nutritional Status and Body Composition Pre and Post Ramadan and to educate on eating right during the month of Ramadan. The study took place for the span of 2 months from 5th March 2024 to 19th April 2024, involving self-developed questionnaire comprising of demographic details, anthropometric measurements, Body Composition parameters, food frequency questionnaire, 24-hour recall and KAP questionnaire (Knowledge Attitude Practices), the data was collected in 2 sessions, respectively.

Bio-electrical Impedance analyzer was used to determine the Body Composition parameters such as Body Fat percentage, Visceral Fat percentage, and Muscle Mass. The 1st session of data collection was done one week before the Ramadan and the 2nd session conducted one week after the Ramadan through physical and online surveys and tips were suggested along with Education material (Pamphlet) to the subjects. The collected data was then computed in Microsoft Excel spreadsheets and results were obtained through statistical analysis. The findings reveal that there were significant changes in the Nutritional Status and Body Composition Pre and Post Ramadan with increase in Muscle Mass, and decrease in Body Fat. .Waist to Hip ratio was also found to be reduced. Clinical observations had and impact as the skin colour and inner lining of eyes had improved Post-Ramadan. Fluid consumption was increased, smoking cessation was seen at high rates and dietary habits were also seen to be improved as Fruits, Vegetables, Cereals, Pulses, Dairy & its Products and nuts & seeds consumption was seen to be improved. The Nutritional Status was found to be improved with increased Energy, Protein, Fat and Carbohydrate consumption with minimal physical activity. In conclusion, this study emphasizes on Intermittent fasting to be a helpful factor for improving the Nutritional Status and positive Body Composition.

Keywords: Muslim, Pre-Ramadan, Post-Ramadan, Nutritional Status, Body Composition, dietary patterns, Intermittent Fasting.

1. Introduction:

Ramadan is the 9th month of the Muslim Islamic lunar calendar and is one of the sacred times for Muslims. It is the month in which Muslims believe that the Holy Qur’an was sent down from heaven “as a guidance for men and women, a declaration of direction, and a means of salvation". The Ramadan month consists of 29 – 30 days. During this month, the Muslims are obliged to fast from dawn to dusk across the world, consuming one meal before the sunrise ('suhoor' or 'sehri') and another after the sunset ('iftar'). The period of fasting varies between 08 to 18 hours depending on the geographical location to the country and season of the year.

In this month the adult and healthy Muslims refrain from food, liquids and smoking from approximately 1 hour before sunrise till sunset, average of the fast ranging from about 15 hours a day for 29-30 days. Throughout Ramadan month, people accept major changes to daily routines such as the food frequency, quantity, sleep duration at night, and exercise or physical activity are reduced. Consequently, Ramadan is associated with abstinence and changes in smoking or vaping behaviour. Because of its unique type and duration of the diet, Ramadan is an excellent opportunity to study the effects of various diets on human body.

Ramadan fasting has been shown to significantly alter body weight, blood glucose concentration, and lipid profile in athletes, with some studies showing positive effects on lipid profile and performance parameters, while others show opposite effects (1). Comparison on Ramadan and non-Ramadan intermittent fasting on body composition was studied, finding intermittent fasting beneficial for weight management, but non-Ramadan fasting appears more effective in overall body composition improvement (2). Fasting is linked to improved biochemical parameters and reduced risk of metabolic disorders like obesity, hypertension, and CVD. However, controversial studies suggest unfavorable effects and increased CVD risk due to physiological changes induced by Ramadan fasting (3).

A study in Malaysia found that fasting during Ramadan month can effectively reduce nicotine dependency in smokers, highlighting the potential for smokers to quit due to the positive changes in Fagestorm Test for Nicotine Dependency (FTND) score and saliva cotinine levels (4). Ramadan impacts cardio-vascular responses, metabolic changes, and fat metabolism, impacting physical fitness and activity levels. Fasting may reduce oxygen consumption in sedentary individuals and footballers (5). A study on 265 university students revealed that Ramadan fasting enhances daily practices, health, performance, stress-reducing activities, reduces caffeine and smoking, improves food intake, weight loss, and improves IBS and constipation symptoms (6). A literature review aims to educate healthcare professionals on fasting for cardiovascular disease patients, stratifying them into low, moderate, high, and very high risk groups (7)

2. Review of Literature

A 2947-participant study found a positive correlation between starting BMI and weight loss during Ramadan fasting, with overweight or obese individuals experiencing significant weight reductions and normal individuals remain with the same (8). The International Journal of Endocrinology and Metabolism found that there was improved biochemical parameters in healthy individuals, including menstruating women, but remained unchanged in cholesterol, random blood sugar, and alkaline phosphatase levels (9). The randomized controlled study found that consuming high fibre cereal at dawn during Ramadan improved satiety, improved bowel habits, reduced bloating, and lower cholesterol levels. However, no significant differences were found in body weight, body fat percentage, blood glucose, HDL cholesterol, and triglycerides (10). A 2020 meta-analysis by Faris Mo'ez Al-Islam E found that Ramadan diurnal intermittent fasting (RDF) reduces total sleep time from 7.2 to 6.4 hours, and slightly increases the Epworth sleepiness scale score, indicating a moderate reduction in TST and negligible effect on excessive daytime sleepiness (11).

A study in the Middle East and North Africa found that lockdown during Ramadan fasting improved the quality of life for children with type 1 diabetes, with better treatment adherence, increased food intake, and less exercise (12). In terms of kidney stone development, the study observed no statistically significant variations in urine pH, salt, oxalate, calcium, phosphate, and calcium phosphate levels between the fasting and non-fasting groups (13). An investigation was conducted on the effects of diurnal intermittent fasting (DIF) on cortisol, melatonin, ghrelin, and leptin levels in patients who were overweight or obese. The results showed that following Ramadan, the hormone levels were much lower, with male sex and anthropometric features having the strongest effects (14). An analysis of the effects of Ramadan fasting on metabolic dysfunction-associated steatotic liver disease (MASLD) found that fasting throughout the month of Ramadan can lower risk factors for non-alcoholic fatty liver disease, improve lipid profiles, and cause weight loss (15). Ramadan fasting has a major impact on sleep habits, nutrition, and physical activity levels, according to a study done on young athletes. The findings revealed a decline in training hours, sleep, and workouts but not in levels of physical activity, calorie intake, or nutrient intake (16).

3. Statistical Analysis

Table 3.1 Anthropometry Parameters

Sl.no	Nutritional Parameters	Pre-Ramadan Mean (SD)	Post-Ramadan Mean (SD)	P-value
1	Height (cm)	163.61 (7.34)	163.61 (7.34)	P>0.05
2	Weight (Kg)	63.06 (15.35)	63.50 (15.25)	P>0.05
3	BMI (Kg/m^2)	23.33 (5.21)	24.08 (6.64)	P>0.05
4	W:H	0.79 (0.74, 0.84)	0.79 (0.74, 0.84)	P<0.05

P value using paired t-test/Wilcoxon signed rank test. P value <0.05 considered as statistically significant.

From the above Table 4.6.1 it was observed that the analysis compared participants Pre-Ramadan and Post-Ramadan in Height, Weight, Body Mass Index (BMI) and Waist to Hip ratio (W:H). For Height there is no significant difference (p>0.05) between Pre and Post Ramadan. The same applies to Weight and BMI, where p-values indicate no significant distinctions between Pre and Post Ramadan. Whereas, Waist to Hip ratio shows that there is significant difference between Pre and Post Ramadan.

Table 4.6.2 Body Composition parameters

Table 3.2 Body Composition parameters

Sl.no	Body Composition Parameters	Pre- Ramadan Mean (SD)	Post-Ramadan Mean (SD)	P value
1	Body Fat Percentage (%)	23.17 (8.09)	20.99 (6.25)	<0.001
2	Fat Mass (Kg)	16.18 (8.87)	15.64 (9.15)	0.576
3	Fat Free Mass (Kg)	46.37 (9.86)	47.79 (14.23)	0.240
4	Muscle Mass (Kg)	33.48 (6.07)	36.74 (5.69)	<0.001
5	Visceral Fat Percentage (%)	5.5 (3,8)	5 (3,7)	<0.001

P value using paired t-test/Wilcoxon signed rank test. P value <0.05 considered as statistically significant.

According to the data depicted in the above Table 4.6.2 it can be presumed that Body Fat Percentage has significant difference between Pre and Post Ramadan as the p-value is found to be <0.001. Whereas, the p-value for Fat Mass and Fat Free mass was found to be >0.05 and hence there is no significant difference between Pre and Post Ramadan. However, the p-value for Muscle mass and Visceral Fat Percentage is also found to have significant difference as it has p-value <0.001 between Pre and Post Ramadan.

Table 3.3 Nutritional Status

Sl.no	Dietary Intake	Pre- Ramadan Mean (SD)	Post-Ramadan Mean (SD)	P value

1	Energy (Kcal)	657.17 (149.40)	943.00 (86.72)	<0.001
2	Protein (g)	26.86(8.66)	38.21 (5.93)	<0.001
3	Carbohydrate (g)	72.27 (13.50)	114.77 (15.99)	<0.001
4	Fat (g)	28.89 (8.79)	40.41 (5.19)	<0.001

P value using paired t-test/Wilcoxon signed rank test. P value <0.05 considered as statistically significant.

The above Table 4.6.3 shows the values for Mean, Standard Deviation and p-value for the 4 macronutrients (Energy, Protein, carbohydrate, and Fat) . Based on the data in the above Figure it can be concluded that Energy has a significant difference between Pre and Post Ramadan as the p-value was found to be <0.001. The same applies for the rest 3 macronutrients that are Protein, Carbohydrate, and fat where the p-values indicate significant distinctions between Pre and Post Ramadan. As the p-value is found to be <0.001.

4. Results:

4.1 Changes in Anthropometric parameters

The effect on weight loss was found in few and not in all with significant decrease in Waist to Hip ratio in many, BMI (Body Mass Index) was found to have no significant difference.

4.2 Changes in Body Composition

The effect of Fat percentage, Fat Free mass, and Visceral Fat percentage decline with increased Muscle Mass was observed in this research study.

4.3 Changes in Nutritional Status

The dietary intake during Ramadan month had improved and the nutrient intake was found to be high than that during the non-Ramadan period. The consumption fruits, Vegetables, Milk & its products, Nuts & Seeds had increased which led to improved Nutritional status in individuals.

5. Conclusions

Ramadan fasting helps in improving the body composition with reduction in Fat percentage and increase in muscle mass and also an improved dietary intake in the month of Ramadan that helps in improvement of Nutritional status. Hence, further research is required to know more importances of Intermittent fasting.

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