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RESEARCH ARTICLE

Insulin resistance and blood lipid levels during fasting

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ABSTRACT

Background: Fasting is observed by Muslims during Ramzan. Here, they do not consume food and drinks. It is observed for 29–30 days. The fast begins early in the morning and lasts until evening. **Aims and Objectives**: This study tries to assess whether intermittent fasting (during Ramzan) can alter the insulin resistance and blood lipid levels in healthy individuals. **Materials and Methods**: A total of 30 healthy volunteers were subjected to anthropometric and biochemical assessment before the beginning of Ramzan and then at the end of fasting immediately after the month of Ramzan. Biochemical parameters were measured by standard laboratory methods, and statistical analysis was done by Student's *t*-test. **Results:** After the completion of Ramzan fasting, subjects experienced decrease in their body weight and body mass index. There was slight decrease in low-density lipoprotein and increase in high-density lipoprotein levels and not much significant changes in insulin resistance. **Conclusion**: Our study found that fasting during Ramzan produced reduction in body weight but no significant effect on fasting/postprandial glucose levels and blood lipid levels.

KEY WORDS: Ramzan; Intermittent Fasting; Insulin Resistance; Blood Lipid Levels; Fasting/Postprandial Glucose Level; Body Weight

INTRODUCTION

Fasting during Ramzan is a ritual carried out by Muslims. It includes non-consumption of food and drink for half a day from early morning till evening and is done for 29–30 days. There is less quantity of food being consumed and also the number of meals is less. At evening, the fast is ended and individuals take food usually at night hours. Due to this diet alteration, individuals may actually increase their weight, especially in well-developed nations. However, on the other hand, individuals from underdeveloped nations show a slight decrease in weight.[1]

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Fasting during Ramzan has impact on metabolic as well as physiological and also biochemical parameters. It has been found to increase red blood cell mass, leukocyte counts, and platelet number. Biochemical alterations such as increased high-density lipoprotein cholesterol and decrease in parameters such as total cholesterol, triglycerides, low-density lipoprotein cholesterol, and very low-density lipoprotein cholesterol were found. There was also reduction in body weight, waist circumference, body mass index (BMI), plasma glucose, blood pressures, and also psychological effects like decreased anxiety.[2]

Blood lipid levels are influenced by diet. Factors such as eating habits, amount of fat in the diet, calories contributed by refined sugars, and level of physical activity have a significant impact. Fasting during Ramzan has been found to address the above-mentioned issues in desirable way because of reduced caloric intake and number of meals taken per day.[3]

Taking into account of the above-mentioned findings in various studies, we designed the study to assess as to what would happen to insulin resistance and blood lipid levels during fasting in the month of Ramzan with respect to healthy individuals.

MATERIALS AND METHODS

We carried out our investigations during the holy month of Ramzan of May 2017. The subjects were patient attenders of Karnataka Institute of Medical Sciences, Hubballi.

Inclusion and Exclusion Criteria Include

A total of 30 healthy subjects aged 20–35 years were taken for the study. We did not include subjects who were suffering from acute or chronic illness also subjects with a history of cigarette smoking and who were on any medication were not included in the study. We decided to take those subjects who were observing the fast during the whole month of Ramzan.

Subjects were encouraged to continue their usual lifestyle and activities. Volunteers gave informed consent for participation in the study. Data gathering was performed by a questionnaire. Variables included general condition and examination of different systems, medical history, height, body weight, and BMI. Blood samples were taken in the morning at 9.00 AM before fasting of Ramzan had begun and then after the end of Ramzan fasting in all subjects.

Subjects' body weight and height were measured by standard techniques and expressed in kilograms and centimeters, respectively. Body weight was measured using digital scale and height was measured in standing position without shoes. Fasting venous samples were collected under aseptic precaution to ascertain the fasting status, at 9.00 AM for measurement of insulin, glucose, and lipids.

The biochemical analysis of blood sample was carried out at Sumukh Prayogalaya, Institute of Laboratory Science and Research Center. Insulin level was measured using radioimmunoassay. Data were analyzed using SPSS version 20.0 software. All the data were expressed as mean ± standard deviation. Insulin sensitivity and insulin resistance were estimated using homeostatic model of assessment (HOMA) from basal plasma glucose and plasma insulin value. Student's *t*-test was used to determine the effect of intermittent fasting on all parameters measured before and after fasting. Changes between the values of before Ramzan and after Ramzan fasting were calculated.

- $P < 0.05$ is considered as statistically significant (S).
- $P < 0.001$ is considered as highly significant (HS).

Ethical Issues Approval

Ethical approval was sought from the Ethical and Protocol Review Committee, Karnataka Institute of Medical Sciences, Hubballi.

RESULTS

1 month after observing the Ramzan fasting, a slight reduction in body weight ($P < 0.25$) but not significant and also slight reduction in BMI ($P < 0.32$) were observed. There was also a slight reduction in low-density lipoprotein (LDL) ($P < 0.22$) and increase in high-density lipoprotein (HDL) ($P < 0.34$). To study the effect on glucose homeostasis, plasma glucose and plasma insulin were measured, there was not much significant reduction in both parameters [Tables 1-3].

DISCUSSION

Our study found a slight reduction in body weight and BMI in the subjects after 1 month of intermittent fasting. On an average subject lost around 3 kg during this period. Increase in HDL cholesterol and decrease in triglycerides and LDL cholesterol were observed.

A similar study was conducted by Mazidi *et al.* on diabetic patients. They have opined that fasting produced increased high-density lipoprotein cholesterol and decreased low-density lipoprotein cholesterol and total cholesterol. However, in diabetic patients, blood lipid levels showed and undesirable effect during fasting in Ramzan. They also found decrease in body weight, body fat, and BMI.[4]

Another study by Radhakishun *et al.* measured weight, height, body composition, blood pressure, heart rate, glucose, insulin, total cholesterol, low-density lipoprotein cholesterol and high-density lipoprotein cholesterol, triglycerides, and high sensitivity C-reactive protein (hs-CRP) levels, Before Ramzan, during the last week of Ramzan. BMI and glucose homeostasis were not altered. They found that there was decrease in body, rise in heart rate, total cholesterol, LDL cholesterol, HDL cholesterol, and hs-CRP. All values reverted to before fasting levels after 6 weeks after the end of Ramzan.[5]

Syam *et al.* concluded that there was reduction in body fat, body weight, and also body water to a significant degree. Protein body mass and calorie intake did not significantly change. 4–5 weeks after Ramzan, body weight reverted to before fast levels.[6]

Another study conducted by Kiyani *et al.* observed a little reduction in body weight but a significant decrease in blood glucose level, LDL level, total cholesterol, and triglycerides.

They also found reduction in high-density lipoprotein cholesterol values.[7]

Lamine *et al.* found an increase in the caloric consumption also they found rise in the consumption of various fats in diet such as mono and polyunsaturated fatty acids. There also found a rise in total cholesterol and HDL cholesterol.[8]

Kul *et al.* found a decrease in LDL and fasting plasma glucose. HDL was found to increase only in females of the group. Reduction in body weight was found in males of the group.[9]

Ziaee *et al.* said that during Ramzan, body weight and BMI reduce. They also found reduction average blood glucose levels and high-density lipoprotein levels. No change was observed in total cholesterol and very low-density lipoprotein lipids.[10]

Table 3 summarizes no significant difference in insulin resistance and insulin sensitivity.

Table 1: Anthropometric parameters of subjects before and after fasting

Parameters	Mean±SD		*t*	*P*
	Before fasting	After fasting		
Height (cm)	173.4±2.41	173.4±2.41	0.000	1.00 (NS)
Weight (kg)	60±5.17	56±5.09	1.230	0.25 (NS)
BMI (kg/m^2)	19.97±1.92	18.72±1.86	1.043	0.32 (NS)

SD: Standard deviation, BMI: Body mass index, NS: Not significant

Table 2: Changes in lipid profile and FBS of subjects before and after Ramzan fasting

Parameters	Mean±SD		*t*	*P*
	Before fasting	After fasting		
Cholesterol (mg/dl)	152.4±35.01	162±32.31	0.366	0.72 (NS)
Triglycerides (mg/dl)	91.6±22.56	105±17.46	1.050	0.32 (NS)
HDL cholesterol (mg/dl)	41±4.81	44.2±5.21	1.009	0.34 (NS)
LDL cholesterol (mg/dl)	79±18.54	66±12.38	1.303	0.22 (NS)
FBS (mg/dl)	90±7.10	98.6±12.13	1.368	0.20 (NS)

SD: Standard deviation, FBS: Fasting blood sugar,
HDL: High-density lipoprotein, LDL: Low-density lipoprotein,
NS: Not significant

Table 3: Changes in plasma insulin levels and HOMA indices of subjects before and after Ramzan fasting

Parameters	Mean±SD		*t*	*P*
	Before fasting	After fasting		
Insulin (μU/L)	10.81±3.02	12.14±4.48	0.66	0.52 (NS)
I.R (HOMA)	1.39±0.40	1.59±0.58	0.60	0.56 (NS)

SD: Standard deviation, HOMA: Homeostatic model of assessment,
NS: Not significant

A study was conducted by Varady *et al.* opines that alternate day fasting has no effect on body weight and glucose handling. However, fasting during Ramzan produces a reduction in fasting glucose, insulin, and insulin resistance.[11]

Gnanou *et al.* have found that fasting during Ramzan leads to decrease in body weight and BMI. It also leads to reduction in average blood glucose levels, insulin levels, and adiponectin levels. Insulin sensitivity also increased.[1]

Shariatpanahi *et al.* have opined that caloric intake per day reduces during fasting in Ramzan. They also found reduced insulin resistance. HDL cholesterol increased and fasting blood glucose level decreased.[12]

CONCLUSION

Fasting during Ramzan by healthy subjects has beneficial metabolic effects. We observed a decrease in body weight and BMI, increase in HDL cholesterol, and decrease in LDL cholesterol and triglycerides. There was no significant effect of fasting on insulin resistence.

REFERENCES

1. Gnanou JV, Caszo BA, Khalil KM, Abdullah SL, Knight VF, Bidin MZ, *et al*. Effects of ramadan fasting on glucose homeostasis and adiponectin levels in healthy adult males. J Diabetes Metab Disord 2015;14:55.
2. Meo SA, Hassan A. Physiological changes during fasting in Ramadan. J Pak Med Assoc 2015;65:S6-S14.
3. Mohammed T. The Effect of Ramzan Fasting on Body Anthropometric Measurement, Haematological Indices and Serum Lipid Profile; 2016.
4. Mazidi M, Rezaie P, Chaudhri O, Karimi E, Nematy M. The effect of Ramadan fasting on cardiometabolic risk factors and anthropometrics parameters: A systematic review. Pak J Med Sci 2015;31:1250-5.
5. Radhakishun N, Blokhuis C, van Vliet M, von Rosenstiel I, Weijer O, Heymans M, *et al*. Intermittent fasting during Ramadan causes a transient increase in total, LDL, and HDL cholesterols and hs-CRP in ethnic obese adolescents. Eur J Pediatr 2014;173:1103-6.
6. Syam AF, Sobur CS, Abdullah M, Makmun D. Ramzan fasting decreases body fat but not protein mass. Int J Endocrinol Metab 2016;14:e29687.
7. Kiyani MM, Memon AR, Amjad MI, Ameer MR, Sadiq M, Mahmood T, *et al*. Study of human biochemical parameters during and after Ramadan. J Relig Health 2017;56:55-62.
8. Lamine F, Bouguerra R, Jabrane J, Marrakchi Z, Ben Rayana MC, Ben Slama C, *et al*. Food intake and high density lipoprotein cholesterol levels changes during Ramadan fasting in healthy young subjects. Tunis Med 2006;84:647-50.
9. Kul S, Savaş E, Öztürk ZA, Karadağ G. Does Ramadan fasting alter body weight and blood lipids and fasting blood glucose in a healthy population? A meta-analysis. J Relig Health 2014;53:929-42.

10. Ziaee V, Razaei M, Ahmadinejad Z, Shaikh H, Yousefi R, Yarmohammadi L, *et al*. The changes of metabolic profile and weight during Ramadan fasting. Singapore Med J 2006;47:409-14.
11. Varady KA. Impact of intermittent fasting on glucose homeostasis. Curr Opin Clin Nutr Metab Care 2016;19:300-2.
12. Shariatpanahi ZV, Shariatpanahi MV, Shahbazi S, Hossaini A, Abadi A. Effect of Ramadan fasting on some indices of insulin resistance and components of the metabolic syndrome in healthy male adults. Br J Nutr 2008;100:147-51.

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