

Effect of Yoga Practices on the Body Composition of Fasting Females

Dr. Sangita Deshmukh

Director of Physical Education & Sports
Bhartiya Mahavidyalya, Amravati

Abstract

The purpose of this study was to investigate the effect of one-month fasting along with yoga training on the body composition of novice female athletes. Twenty trained women were randomly assigned to experimental (n=10) and control (n=10) groups. The experimental group participated in yoga training classes for 4 weeks, two 60-min sessions per week; the control group did not participate in any regular Practices programs. This study was conducted on two fasting groups in the month of Ramadan. The study variables including body fat percentage, body mass index (BMI), waist circumference and waist-to-hip ratio (WHR) were measured in three stages: a week before Ramadan, the fifteenth day of Ramadan, and a week after Ramadan. The results showed that BMI in the fasting yoga group decreased; however the changes of BMI in the control group were not significant. Also, subcutaneous fat showed significant reduction in both experimental and control groups, though the changes were more significant in the Practices group; also, the results showed that waist-to-hip ratio significantly changed in the experimental group. As to the results, yoga Practices along with fasting can help overweight people to experience ideal weight loss; also for the athletes who stop exercising in Ramadan, yoga can be used as an alternative to maintain their weight.

Keywords: Fasting; yoga training; body composition; female; weight loss

Introduction

Ramadan is considered a holy month for Muslims, and fasting is one of the most important principles of Islam (1). Each year during this month, Muslims avoid eating or drinking from dawn (Sahar) to sunset (Iftar), which is approximately 14 hours, on average. Metabolic and physiological responses to physical Practices have been well elucidated (2). In this month, Muslims eat and drink mostly during the night, after Iftar; therefore, reduced frequency of meals leads to elevated concentrations of free fatty acids (3). On the other hand, the amount of sleep through the night (5, 6), food intake (4), and daily physical activities (7) reduce by fasting. Previous studies have shown that fasting can cause significant changes in the body weight (1, 8), lipid profile (9, 10) and multiple physiological variables in many subjects who did not have any health problems.

Various changes have been reported in Ramadan including (13): decrease in resting metabolic rate, dehydration (28), changes in metabolism and eating habits (depending on the climate and geographical area) (11), and hormonal changes (12). During Ramadan, women stop exercising due to their household chores; they also assume that physical activity can cause health issues. However, research has shown that fasting is not a barrier to non-professional sports.

It seems the best time to Practices during Ramadan is after Iftar, since water and food are available to the body after doing physical Practicess. Several studies have shown that during Ramadan, cardiovascular responses to Practices and other activities vary from an individual to another. Another study showed that in fasting subjects, metabolic changes and Practices-induced reductions of fat metabolism depend on the level of physical activity. Also, after a month of fasting, a significant decrease in maximal oxygen uptake was reported in sedentary and active (soccer players) participants .

Furthermore, increase in daily energy intake and weight gain in Ramadan has been reported. This increase is due to the higher energy intake at iftar and in most cases, the extra energy comes as fat and protein (not carbohydrates) . In some studies, changes in energy balance, body weight, subcutaneous fat, and waist-to-hip ratio have not been observed.

Regarding the physical Practicess which people can do in Ramadan, yoga has received less attention from the researchers. Yoga has an ancient scientific origin in Aryan and Hindu cultures of India. In a book called "Yvgasotra" which is collected by Patanjali, Yoga is divided into 8 parts:

1) Rules of life: avoidance and control of social orders; 2) Nyama: biological principles, personal obligation; 3) Asana: status, and coordination of the body; 4) Pranayama: breathing Practicess, control of prana, and maintaining and providing vital energy; 5) Pratyahara: control and withdrawal from the senses; 6) Dharana,: concentration; 7) Dhyana: meditation; 8) Samadhi: to be one with the truth and integrity of the whole universe. In other words, yoga Practicess affect one's whole being: body, soul and mind.

Yoga through asana detoxifies the body and strengthens the bones, muscles, joints, and the nervous system; it also regulates various body systems such as the endocrine, and immune systems. Through breathing Practices, the cardio-pulmonary efficiency increases and breathing and heart rate gradually become slower and deeper; via these Practices, enough oxygen gets into the bloodstream, reaches the cells, and heals depression and anxiety. Mental Practices also help the nervous system to have a better function.

In Western countries, yoga is one of the most important methods of alternative medicine. Although many studies have been conducted on the effects of yoga on healing ailments such as back pain, hypertension, cancer, insomnia and restlessness, there have been a few studies focusing on the its impact on healthy individuals.

In Ramadan, yoga has great gradual effects on the health status of an individual including: decreasing the blood pressure, resting heart rate, body mass index, and lipids. Savasana in yoga, which includes body movements and breathing, is an important aid to weight loss and stress reduction through relaxation, stretching, and healthy eating.

Yoga is one of the most effective treatments for stress. It seems that neural system control is achieved via yoga training, and by production and internal secretion of hormones . Regarding the effect of yoga, Nidhi and colleagues (2012) conducted a study on two groups of females (90 females); one group did aerobic Practicess and the other practiced yoga. They reported that the WHR in both groups decreased, although the change was not significant; these changes in the yoga group were more than the other.

The current study was conducted on the impact of fasting and yoga Practicess on body composition index in athletes. More attention should be paid to the effect of fasting alone, and with yoga on the body composition of female athletes. The importance of this research is in the selection of right Practicess during the hot season, for fasting subjects. The present study sought to examine the effect of one-month fasting along with yoga Practicess on the body composition of female athletes, who were beginners in yoga.

Materials and Methods

Participants

The study sample was selected from female athletes who were beginners in aerobic training. In a public meeting, advantages and disadvantages of the study were fully explained to the participants. Afterwards, the participants were asked about their willingness to participate in the study, and finally, the written consents were obtained from 20 participants; the subjects also filled out the health questionnaires. The subjects were randomly divided into control (n=10) and experimental (n=10) groups. Although at the beginning, 28 subjects were enrolled in the study, 8 of the participants were excluded from study due to their illness.

Research design

The aim of the present quasi-experimental field study was to investigate the effect of one-month fasting along with yoga Practicess on the body composition of novice female athletes. A week before starting the Practicess, the athletes attended the Practices room. First, the subjects completed the consent forms to

participate in the class, and then filled out the sports medical history questionnaire. A week before starting any Practices program, weight and subcutaneous fat thickness of the participants were measured.

After a week, the experimental group participated in classes of yoga Practicess, two training sessions per week, at the Gil Send gym in Rasht; the second analysis of the variables was conducted in the middle of Ramadan. The control group did not do any Practicess except for their daily chores. The subjects were asked to write down their food intake for three days, and the caloric intake was calculated accordingly; also nutritional suggestions (isocaloric) were offered to the participants. All the participants followed a sedentary lifestyle during the study.

In this study, yoga Practicess (60-min sessions) included: stretching Practicess, pranayama, asana and meditation. Some asana Practicess were as follows: tadasana (standing right), trikonasana (plain triangles), vrikshasana (a tree pose), uttanasana (standing and bending forward), dandasana (sitting right) and sayyidasana (master mode). Meditation (relaxation) was conducted in the last ten minutes of each training session.

To calculate BMI, the weight and height of subjects were measured, and then data were analyzed in the BMI formula. Subcutaneous fat thickness was measured in three body parts including triceps, thigh and above the pelvis; the subcutaneous fat was measured by caliper (Saehan skinfold caliper, SH5020, Korea). It should be noted that all measurements were taken from the right side of the body. The three rotational measurements in each body part (to the nearest 0.1 mm) were recorded; four seconds after the release of folding handle, caliper measurements were read. In order for the measurements to be reliable and valid, the analysis was performed at a particular time of day, preferably in the afternoon; an expert measured the skinfold thickness of all subjects. Measurements were obtained using Jackson- Pollock nomogram , and finally, the ratio of waist-to-hip circumference was measured.

Results

Data regarding the characteristics of the subjects including age, weight and height are presented in Table 1. The descriptive information related to the body composition variables, including subcutaneous fat, BMI and WHR are shown in Tables 1 to 3.

Table 1. Description of the subjects' demographics

		Age (years)	Weight (kg)	Height (cm)			Age (years)	Weight (kg)	Height (cm)
Experimental group	MEAN	41	68.9	154.60	Control group	MEAN	39.4	72.10	161.70
	SD	9.30	5.68	6.53		SD	8.08	10.43	4.80
	min	30	60	143		min	29	56	157
	max	54	77	163		max	56	87	169

Repeated measures analysis of variance (Table 2) indicated significant differences between the measurements of BMI in the experimental group; the measurements were taken a week prior to Ramadan, on

the fifteenth day of Ramadan, and a week after it. On the other hand, the results showed that there is no significant difference between various measures of BMI in the control group ($p \geq 0.05$).

Table 2. Three measured BMI in two groups

BMI(kg/m ²)	Measures	Mean	P-value
Experimental group	1	28.89	0.00*
	2	27.84	
	3	27.79	
Control group	1	27.40	0.14
	2	27.04	
	3	27.35	

*significant differences within the group ($p \leq 0.05$)

Bonferroni post hoc test results (Table 3) showed significant differences in the experimental group between the first and second measurements, and also the first and third measurements; subjects' BMI significantly decreased in both periods, while no significant differences were observed between the three measurements in the control group.

Table 3. The results of the post hoc Bonferroni test for BMI in the experimental group

BMI	Group Comparisons		Mean Differences	P-value
Experimental group	First measure	Second measure	1.04	0.00*
		Third measure	1.10	0.00*
	Second measure	Third measure	0.05	1.00

*significant differences ($p \leq 0.05$)

According to the repeated measures analysis of variance (Table 4), there were significant differences between the amounts of subcutaneous fat, in different measurement times of the experimental group. On the other hand, regarding the fat percentage of the control group, the results showed no significant differences at different measurement times.

Table 4. Body fat percentage in two groups

Fat%	Measures	Mean	P-value
Experimental group	1	39.75	0.00*
	2	37.15	
	3	37.45	
Fat%	Measures	Mean	P-value
Control group	1	38.90	0.00*
	2	37.80	
	3	38.90	

*Significant differences within the group ($p \leq 0.05$)

In the experimental group, as to Bonferroni post hoc test results (Table 5), significant differences are observed between the first measurement of subcutaneous fat and the second and third ones. Subcutaneous fat significantly decreased in the subjects of both groups; although there were no significant differences between

the second measure of the skin fold (during Ramadan) and the third measurement (after Ramadan). According to Bonferroni post hoc test results, the percentage of body fat decreased significantly from the first to the second test. This variable increased significantly from the second to the third measurement ($P \leq 0.05$).

Table 5. The results of post hoc Bonferroni test of body fat percentage

Fat%	Group Comparisons		M D	P-value
Experimental group	First measure	Second measure	2.60	0.00*
		Third measure	2.30	0.00*
	Second measure	Third measure	-0.30	0.77
Control group	First measure	Second measure	1.10	0.01*
		Third measure	0.00	1.00
	Second measure	Third measure	-1.10	0.01*

*Significant differences within the group ($p \leq 0.05$)

The differences between the experimental and control groups were compared using independent t-test (Table 6). The results showed that subcutaneous fat loss in the experimental group, between the first and second measurements, was significantly higher than the control group. However, this increase in subcutaneous fat between the second and third measurements was significantly greater in the control group. In the experimental group, subcutaneous fat experienced lesser increase after Ramadan, compared with the control group.

Table 6. Differences in the fat percentage of groups during three measurements

Fat%	Mean Differences	t	P-value
Diff 1	1.50	4.23	0.00*
Diff 2	0.80	2.60	0.02*
Diff 3	2.30	6.14	0.00*

* Significant differences between the groups ($p \leq 0.05$)

With respect to the impact of yoga Practicess along with fasting on WHR of women, the results of the analysis of variance with repeated measures showed significant differences (Table 7). On the other hand, the results indicated that WHR measurements in the control group did not change significantly.

Table 7. The results of WHR during three measurements

WHR	Measures	Mean	P-value
Experimental group	1	0.830	0.00*
	2	0.800	
	3	0.793	
Control group	1	0.853	0.06
	2	0.849	
	3	0.861	

*Significant differences within the group ($p \leq 0.05$)

Based on Bonferroni post hoc test (Table 8), it is indicated that in the experimental group, there were significant differences between the first and second measurements, and also between the first and third measurements; however, waist-to-hip ratio in subjects significantly decreased, while the second and the third measurements didn't show any significant differences.

Table 8. Post hoc results of WHR in the experimental group

WHR	Group Comparisons		Mean Differences	P-value
Experimental group	First measure	Second measure	0.03	0.01*
		Third measure	0.073	0.01*
	Second measure	Third measure	0.007	0.67

*Significant differences ($p \leq 0.05$)

Discussion

The results of the present study showed that in the experimental group, there were significant differences in BMI, a week before Ramadan, on the fifteenth day, and finally a week after it; however, no significant differences were observed in BMI of the control group. In fact, in the experimental group, Bonferroni post hoc test results showed a significant reduction in BMI from a week before Ramadan until 15th, and also from a week before Ramadan until a week after it; while in the control group, no significant differences were observed between Ramadan 15th and a week after this month.

Fasting causes changes in the size and number of meals, and thus affects the amount of calorie and nutrient intake. However, it can be inferred from the results of some previous studies that fasting may have a significant impact on body mass index. In fact fasting is only one factor, and other agents such as the activity level, calorie and water intake, gender and specific conditions are also effective in this regard.

The results of our study showed that yoga training causes significant changes in body mass index, and these results indicated the specific effect of yoga. In this study, the control group which was only fasting and did not participate in yoga training sessions did not experience significant changes in BMI.

Several studies conducted on adults and middle-aged people have obtained positive results from these Practices. Many studies have shown that people who practiced yoga for 4 consecutive years (twice a week, half an hour per session), were able to maintain the normal body mass index; if they were overweight, their weight reduced to the desired level (1). Unlike the results of this study, Al-Hourani and Atoum (2007) reported that BMI significantly reduced in Ramadan, while the average energy intake and physical activity level of the subjects did not significantly change; therefore, the weight loss may be due to the loss of body water (14). The conflicting results of the studies may be related to the subjects' differences of age, gender, dietary habits and duration of fasting.

As to the results of the present study, there were significant changes in body fat percentage of the experimental group in different measurements. However, the results showed that the amount of subcutaneous fat of the control group significantly changed in various measurements. Our findings revealed that in the experimental group, body fat reduced significantly in the second measurement compared with the first one, also a reduction was observed in the third measurement in comparison with the first one; though there were no significant differences between the second and third measurements. In the control group, as to Bonferroni post hoc test results, a significant reduction was observed from the first measurement of subcutaneous fat to the second one; also there were significant differences between the second and third measurements; however, the fat percentage increased. On the other hand, between the first (prior to Ramadan) and the third measurements (after Ramadan), no significant differences were observed.

Due to the significant changes in both experimental and control groups, the differences between the two groups were compared, using independent t-test. The results showed that loss of subcutaneous fat in the first and the second measurements was significantly greater in the experimental group in comparison with the control group. On the other hand, this increase in the amount of subcutaneous fat, between the second and third measurements in the control group was significantly higher than the experimental group, and subcutaneous fat levels after Ramadan in the experimental group increased less significantly compared with the control group.

The results showed that WHR of the experimental group, was significantly different at various times of measurement (a week before Ramadan, on 15th day and a week after Ramadan). On the other hand, in the control group, the results indicated that there were no significant differences in WHR between three measurements. In the experimental group, there was a significant difference between the first measurement of WHR and the second measurement, and also between the first and third measurements; WHR reduced significantly in subjects of the experimental group, while there were no significant differences between the

second and third measurements of WHR. Meanwhile, Abdelfatah (2005) showed that after a period of fasting, WHR of men decreased significantly, but no noticeable change was observed among women (16).

Conclusions

The main finding of the present study is that yoga Practicess, two sessions per week, can be a reasonable option for fasting athlete women, to maintain their ideal weight, WHR, and body fat percentage. In the experimental group, the desirable changes are maintained during a week after Ramadan; however, some of the changes are related to other factors rather than Practices, We conclude that female athletes, who stop exercising during Ramadan, can consider yoga as an alternative to control their body weight.

References

1. Ziaei, V., Yousefi, R., Ahmadinezhad, Z., Sheykh, H., Rezaei, M., Behjati, M.J., 2007, The effect of Ramadan fasting on serum osmolarity, some electrolytes and haematological parameters, *IJEM*, 2007, 9 (1): 47-53.
2. Trabelsi, Khaled., El Abed, Kais., Trepanowski, John.F., Stannard, Stephen.R., Ghlissi, Zohra., Effects Of Ramadan Fasting On Biochemical And Anthropometric Parameters In Physically Active Men, *Asian Journal Of Sports Medicine*, 2011, Volume 2 (Number 3): 134-144.
3. Chaouachi, A., Chamari, K., Roky, R., Wong, P., Mabazza, A., Bartagi Z., 2008, Lipid profiles of judos athletes during Ramadan, *Int J Sports Med*, 2008, 29 (4): 282-8.
4. Sarraf-Zadegan, Nizal, Atashi, Mahmood., Naderi, Gholam.A., Baghai, Abdoul.M., Asgary, Sedighe., Fatehifar, Mohammad.R., Samarian, H., Zarei, M., The Effect Of Fasting In Ramadan On The Values And Interrelations Between Biochemical, Coagulation And Hematological Factors, *Annals Of Saudi Medicine*, 2000, 20, 5-6, 377-399.
5. Tayebi, Seyed Morteza., Ghanbari Niaki, Abbass., Hanachi, Parichehr., Ghorban-Alizadeh, Fatemeh., The Effect Of Ramadan Fasting And Weight-Lifting Training On Plasma Volume, Glucose And Lipids Profile Of Male Weight-Lifters, *Iranian Journal Of Basic Medical Sciences*, 2010, Vol. 13, No. 2, 57-62.
6. Mirzaei Bahman, Rahmani-Nia, Farhad., Ghahremani Moghadam, Mahdi., Ziyaoilgh, Seyed Javad., Rezaei, Abolfaz., The Effect Of Ramadan Fasting On Biochemical And Performance Parameters In Collegiate Wrestlers, *Iran J Basic Med Sci*, 2012, Vol. 15, No. 6. 1215-1220.
7. Ben Salama, F., Hsairi, M., Belaid, J., Achour, N., Achour, A., Nacef, T., Food intake and energy expenditure in high school athletes before, during and after the month of Ramadan: effect of fasting on performance, *La Tunisie Médicale*, 1993, 71 (2), 85-89.
8. Bigard, A.X., Boussif, M., Chalabi, H., Guezennec, C.Y., Alterations in macular performance and orthostatic tolerance during Ramadan, *Aviation, Space and Environmental Medicine*, 1998, 69 (4), 341-346.
9. Afrasiabi, A., Hassanzadeh, S., Sattarivand, R., Nouri, M., Mahbood, S., Effect of low fat and low calorie diet on plasma lipid levels in the fasting month of Ramadan, *Saudi Medical Journal*, 2003, 24 (2), 184-188.
10. Frost, G., pirani, S., Meal frequency and nutritional intake during Ramadan; a pilot study, *Hum Nutr Appl Nutr*, 1987,41 (1), 696-724.
11. Gharbi, M., Akrouf, M., Zouari, B., Food intake during and outside Ramadan, *East Mediterr Health J*, 2003, 9 (1-2), 47-50.
12. Maislos, M., Khamaysi, N., Assali, A., Abou-Rabiah, Y., Zvili, I., Shany, S., Marked increase in plasma high-density-lipoprotein cholesterol after prolonged fasting during Ramadan, *Am J Clin Nutr*, 1993, 57 (5), 640-2.
13. Vyas, R., Dikshit, N., Effect Of Meditation On Respiratory System, Cardiovascular System And Lipid Profile, Department Of Physiology, B. J. Medical College, Ahmedabad-380 016.
14. Brown, R.P., Gerbarg, P.L., Sudarshan Kriya. Yogic breathing in the treatment of stress, anxiety, and depression: part I-neurophysiologic model, *J Altern Complement Med*, 2005,11 (1), 189-201.
15. Nidhi, Ram., Padmalatha, Venkatram., Nagarathna, Raghuram., Ram, Amritanshu., 2012, Effect Of A Yoga Program On Glucose Metabolism And Blood Lipid Levels In Adolescent Girls With Polycystic Ovary Syndrome, *Bottom of Form Published Online 16 April 2012*.