

Original Research Article

# Effect of Yoga Exercises on Irisin Hormone in Obese People

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## ABSTRACT

Research reviews revealed that irisin hormone was discovered in 2012, when researchers at Harvard Medical School found that both mice and human could produce the hormone during exercise. Further studies revealed that, in mice, irisin improved blood-sugar regulation and led to weight loss, causing some people to speculate that a drug based on the hormone could be used as a treatment in obesity. This study was, therefore, undertaken to find out the impact of the training of yogic exercises on irisin hormone in obese people. Sixty obese female (n=60), age: 40-50 yrs., from different nearby housing societies in Pune (India), were randomly divided into two groups viz., 30 experimental and 30 control. The obese subjects were selected on the basis of their BMI (Body Mass Index). Blood sample of these 60 subjects were collected during pre-test, post-test and follow up test to assess the level of irisin hormone by employing Elisa Reader instrument. Yogic exercise training was imparted to the experimental group for a period of 6 months, whereas the controlled subjects did not participate in the said programme. The result of post t-test revealed that the yogic exercise training was significantly effective in increasing the level of irisin hormone ( $t=3.69$ ,  $p<0.05$ ) than the control group. This result, in turn, suggests that yogic exercise programme increases irisin hormone that might have helped for weight loss among the female obese.

**Key words:** hormone, irisin, obese and yoga.

## INTRODUCTION

Nowadays, yoga has become a popular system of exercise for wholesome development of personality by maintaining fitness and health. In fact, the term yoga is derived from the Sanskrit word *yuj* that means union of the individual consciousness with the Universal Consciousness. Although yoga unfolds the infinite potentials of the human mind and soul, the science of yoga imbibes itself a complete essence of the *Way of Life*, including - *Gyan Yoga* or philosophy, *Bhakti Yoga* or path of devotional bliss, *Karma Yoga* or path of blissful action, and *Raja Yoga* or path of

mind control (considering eight-fold parts viz., *yama, niyama, asana, pranayama, pratyahara, dharana, dhyana and Samadhi*). However, in this piece of research, the real sense of yoga has been restricted to a system of exercise for controlling obesity in producing irisin hormone. Many investigations revealed that yoga exercises help to reduce excessive body fat and body weight thereby controlling obesity (Iyengar, 1976). Appearance of such result may be due to fact that yogic methods involving a balanced nutritious diet and practicing yoga *asanas / poses, pranayamas* (breathing

exercises), *bandhas* (physiological locks), *kriyas* (cleansing process) and *mudras* (psychophysiological and hormonal balance) might have improved blood circulation, body's metabolism and endocrine functions and inhibited the process of obesity (Hagan, Upton, Wong & Whittam, 1986; Jakicic *et al.*, 2003; Jeffery, Wing, Sherwood & Tate, 2003). Moreover, along with controlled endocrine functions, yoga training perhaps produced irisin hormone in blood so as to control obesity. Irisin hormone was discovered in 2012 by the researchers at Harvard Medical School and found that both mice and human could produce the irisin hormone during exercise. (Elsen, Raschke & Eckel, 2014). However, during yoga exercises the role of irisin hormone in controlling obesity is not known so far and hence this piece of research has been conducted with the following objectives.

1. To assess the status of irisin hormone in obese people.
2. To develop suitable schedules of yoga exercises considering the nature of obesity.
3. To find out the effect of yoga training intervention on irisin hormone of the obese people.

## METHOD

### The Subjects:

Female veterans (age: 40-50 years) and their mean age (45.61±2.42 years) with

obesity residing in Pune city, belonging to renowned veteran's clubs and willing to participate in the present experiment, were the subjects of this study. Considering the paucity of fund and less availability of the participants, the duration of the experiment has been restricted for 6 months only.

### Inclusion and exclusion criteria:

- The female subjects, who were given a written consent to remain till the experiment is over, were included.
- The people suffering from the various contagious diseases as discarded by the physician were excluded.
- Those who look obese, but not obese as per BMI (Body Mass Index) were excluded.

### The training programme:

Yoga training programme was designed on the basis of following:

The yoga intervention was designed and imparted to the experimental group for 1 hour daily (morning: 1 hour), every day in a week except Thursdays and Sundays. For 1<sup>st</sup> 30 days, they were given *Easy-Course of Yoga* and during next 60 days they were trained in *Full Course of Yoga* programmes (along with *OM recitations* as per Kaivalyadhama Tradition and Dhyana) (Kunalayananda,1956). as follows:

Easy Course of Yoga	Full Course of Yoga
❖ Ujjayi Pranayama	❖ Sarvangasana
❖ Bhujangasana	❖ Halasana
❖ Ardha-Shalabhasana	❖ Bhujangasana
❖ Ardha-Halasanana	❖ Shalabhasana
❖ Vakrasana	❖ Dhanurasana
❖ Chakrasana	❖ Ardha-Matsyendrasana
❖ Paschimatanasana	❖ Paschimatanasana
❖ Yoga-Mudra	❖ Mayurasana
(with possible alterations keeping in view of "Yoga module")	❖ Shavasana
	❖ Yoga Mudra
	❖ Ujjayi
	❖ Bhastrika.
	(with possible alterations keeping in view of "Yoga module")

**Elapse of time between food and yogic exercises:**

- ❖ Heavy Meal - Practice after 4 Hours.

- ❖ Moderate food (Solid/Liquid) - Practice after 1½hours
- ❖ A cup of tea - Practice after ½ hour

- ❖ Food should be taken after 30 minutes of yogic practices.

**Instructions for the Practice of Asanas:**

- ❖ Asanas work with the deeper muscles of the body and therefore utmost care was taken while practicing it.
- ❖ Practice was given according to student's body limitations. They were advised not to compete with fellow practitioner or Attempt to attain final position right in the beginning, especially when their body is not ready for the same.
- ❖ Maintenance of the final posture in asana according to one's own limitations and in a relaxed way was emphasized.
- ❖ During maintenance of Asana there was no tremor or any type of discomfort.
- ❖ They were instructed not to alter the breathing voluntarily during asana. As body would adjust the breathing as per the posture.
- ❖ The practitioners was followed each instruction sincerely and practice them with optimum attention.

**Instructions for the Practice of Pranayama:**

- ❖ Pranayama is special 'hatha-yogic' practice in which we are working with our respiration and in which we try to manipulate, control and prolong the respiration.
- ❖ This is related with the most important and delicate system of the body i.e. Respiratory system and Cardiovascular system. Therefore, we should never experiment with Pranayama.
- ❖ Hathapradipika declares that Control over respiration results into control over mind.
- ❖ Hatha Texts caution, "Just as a wild animal like tiger, lion or an elephant is tamed gradually, similarly the respiration should be controlled gradually".
- ❖ According to Hatha-pradipika (Lesson II, Verse No.23), traditionally pranayama has three phases. They are

known as Puraka (P) - Controlled Inhalation, Kumbhaka (K)– Controlled Retention, Rechaka (R) – Controlled Exhalation. The ideal ratio according to tradition is 1 (P) : 4 (K) : 2 (R) The ideal Matra for P : K : R is 20 : 80 : 40 (for highest / best type ) 16 : 64 : 32 (for mediocre type) 12 : 48 : 24 ( for lowest type).

However, while practicing Pranayama, subjects were never told to resort to any of the above-mentioned ideal ratio.

**The Experiment:**

Considering the principle of purposive sampling, the researcher selected 60 females with obesity and divided them into two equal groups, i.e. first group for *yoga practices* and second group as *sedentary controls*; each group consisting of 30 obese individuals.

The researcher, with the help of medical expert, collected the blood sample for measuring the status of "irisin hormone" for 3 times (i.e., during pre-test, post-test and follow-up test). The blood sample was tested with ELISA reader that helped to assess the level of *irisin hormone* nearest to 0.05 ng/ml (i.e., nanograms per milliliter).

Two groups viz., Gr.I (yoga group) underwent respective yoga training program for a period of 3 months; whereas the Gr. II (control group) was treated as control but the subjects of the control group were kept busy with some recreational activities / library reading during the period of experiment. One trainer, specialized in yoga exercises, was appointed for 3 months to render training to the yoga group. The researcher himself took care of the control group and supervised the overall experiment. After completion of 3 months of training interventions, there was a follow-up period (i.e., detraining period) for a period of next 3 months. Thus, total duration of the experiment was 6 months.

**The schematic diagram of the experiment is as follows (Table 1)**

**Table-1: Schematic diagram of the experiment**

Tests (pre-, post-, follow-up)	Gr.I	Gr.II
Test (Duration)	Pre-test (2 days)	
Training (Duration)	Yoga exercises (3months)	Control group (3months)
Test (Duration)	Post-test (2 days)	
Follow up (Duration)	No training intervention (3months)	
Test/ Duration	Final test (2 days)	

The data were analyzed by using t-test and the level of significance was set at 0.05 level of confidence.

**RESULT**

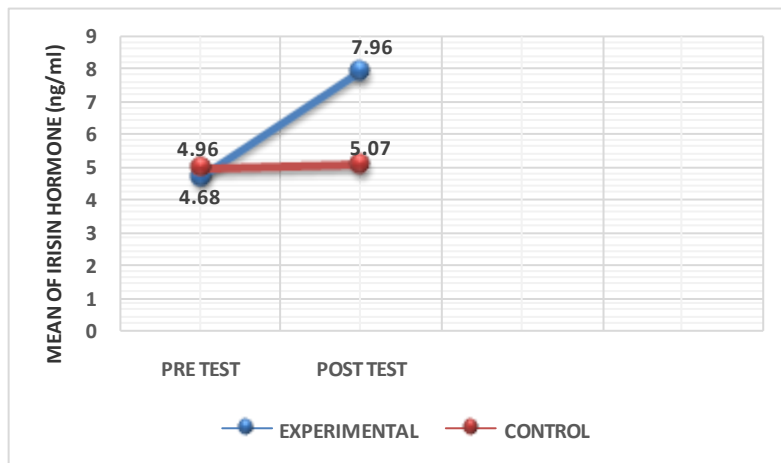
From the Table-1, in case of irisin hormone, it is evident that the obtained t-value of experimental group (pre- & post-test comparison) is 5.30 ( $p < 0.05$ ), which is

greater than the tabulated t-value (28) 3.67. Therefore, there is significant difference between pre- and post-test means on irisin hormone in experimental group. However, the obtained t-value of control group (pre- & post-test comparison) is 0.34 ( $p > 0.05$ ) which is lesser than the tabulated t-value (28) 3.67. Therefore, there is no significant difference in control group (pre-post test comparison) on irisin hormone. The result finally indicates that yoga exercise training (i.e., experimental group) could contribute to improve irisin hormone in the blood sample of obese people, whereas the control group could not (Fig.1).

**Table-2: Pre-posttest means of irisin hormone (ng/ml) of experimental and controlled obese people**

Group	n	Mean (ng/ml) (SD)		MD (Mean difference)	df	SEM	t-ratio
		Pre	Post				
Experimental	30	4.68 (SD=0.89)	7.96 (SD=1.69)	-3.28	28	0.37	<b>5.30*</b>
Control	30	4.96 (SD=0.99)	5.07 (SD=0.95)	-0.10	28	0.26	<b>0.34</b>

\*Significant at 0.05 level  
Tab 0.05 (28) = 3.67



**Fig.1: Graphical representation of pre-post scores of experimental and control groups on irisin hormone**

The result of post-test comparison of mean values of irisin hormone revealed that the mean value of experimental group is higher than the control group ( $t=3.69$ ,  $p < 0.05$ ) (Table 3). This indicates that yoga exercise training was found effective in producing irisin hormone in the blood, which perhaps helped to burn excessive body fat among the obese people.

**Table-3: Posttest means of irisin hormone (ng/ml) among experimental and controlled obese people**

Group	n	Mean (ng/ml) (SD)	MD (Mean difference)	df	SEM	t-ratio
		Post-test				
Experimental	30	7.96 (SD=1.69)	2.89	28	0.38	<b>3.69*</b>
Control	30	5.07 (SD=0.95)				

\*Significant at 0.05 level  
Tab 0.05 (28) = 3.67

In case of irisin hormone, it is evident from the Table-4 that the obtained t-value of experimental group (post-follow-up comparison) is 3.74 ( $p < 0.05$ ), which is greater than the tabulated t-value (28) 3.67. Therefore, there is significant difference on irisin hormone in experimental group (post-test Vs follow up test comparison). However, the obtained t-value of control group (post-follow-up comparison) is 0.37 ( $p > 0.05$ ), which is lesser than the tabulated t-value (28) 3.67. Therefore, there is no significant difference in irisin hormone between posttest and follow up test of control group (Fig.2).

Table-4: Comparison of post-test and follow-up-test means on irisin hormone of experimental and controlled obese people

Group	n	Mean (ng/ml) (SD)		MD (Mean difference)	df	SEM	t-ratio
		Post	Follow up				
Experimental	30	7.96 (SD=1.69)	5.02 (SD=0.91)	2.94	28	0.36	<b>3.74*</b>
Control	30	5.07 (SD=0.95)	4.99 (SD=0.85)	0.07	28	0.23	<b>0.37</b>

\*Significant at 0.05 level  
Tab 0.05 (28) = 3.67

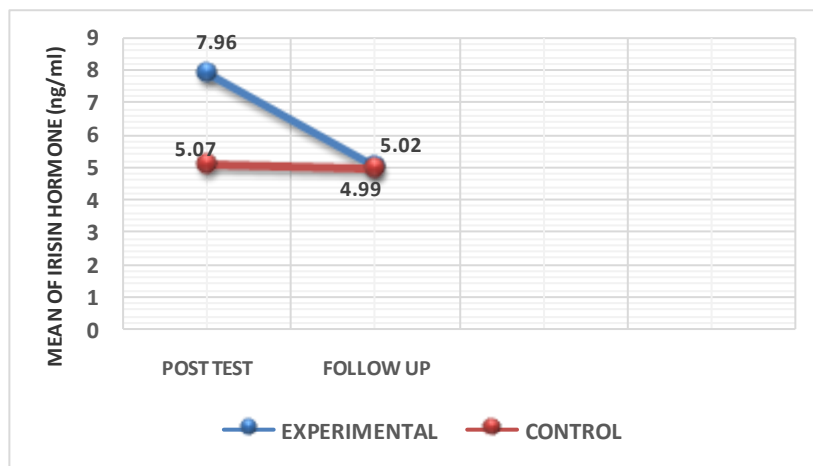


Fig.2: Graphical representation of experimental and control post test and follow up test on irisin hormone

The result of post-follow-up-test comparison between experimental and control groups on mean values of irisin hormone revealed that there was no significant difference between the groups on irisin hormone ( $t=0.45$ ,  $p < 0.05$ ) (Table-5). This in turn indicates that yoga exercise training did not follow-up effect on the irisin hormone.

Table-5: Post follow-up test means of irisin hormone (ng/ml) among experimental and controlled obese people

Group	n	Mean (ng/ml) (SD)	MD (Mean difference)	df	SEM	t-ratio
		Post follow-up test				
Experimental	30	5.02 (SD=0.91)	0.02	28	0.24	<b>0.45</b>
Control	30	4.99 (SD=0.85)				

\*Significant at 0.05 level  
Tab 0.05 (28) = 3.67

## DISCUSSION OF RESULTS

Appearance of irisin hormone in blood helps to control body fat (Panati, Sunnetha & Narala, 2016). Many reports also revealed that participation in physical exercise programme also contributes to increase irisin hormone in blood that helps for fat reduction (Elsen, Raschke & Eckel,

2014). It was, therefore, hypothesized that yoga exercises programme may facilitate to improve irisin hormone in blood so that the obese people can accelerate the process of fat reduction. The result revealed that yoga exercises training for a total duration of 3 months contributed to improve more irisin level in blood among the obese people

( $t=3.69$ ,  $p<0.05$ ) (Table 3). The result appeared is found logical and in turn support the findings of many other earlier research reports in controlling obesity (Bera, Gore, Kulkarni, Bhogal, & Oak, 2003; Murugesan & Govindarajulu, & Bera, 2000). Finally, it is confirmed that yoga exercises help for secretion of more irisin hormone in the blood of obese people, which in turn controlled obesity.

Many of the earlier literature indicate that yoga has follow-up effects for a longer period of time (Bera, Gore, Kulkarni, Bhogal, & Oak, 2003). However, in this investigation the result is found different because yoga exercises did not have follow-up effects ( $t=0.45$ ,  $p>0.05$ ). Appearance of such results may be true because secretion of irisin hormone seems to be aggressive during exercise (Elsen, Raschke & Eckel, 2014).

Thus, the result finally concludes that the irisin hormone is effectively increased after a 3-months training session of yoga exercises, which in turn significantly reduces the body fat level of the obese people. The result finally recommends that yoga exercises may be incorporated in the training intervention for obese people for reduction of obesity by increasing irisin hormone in the blood.

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