

# The Effect of Yogic Activities on Body Composition

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**Abstract—This article reports on the changes in the body composition of high school boys when they subjected to selected yogasanas. Statistical procedure (T- test) was adopted to conclude that the body mass and the benefits of yogasana training will reduce the body fat. Various muscular contraction and kinesiological movements experienced by the boys made the impact on their physical and mental activity.**

**Index Terms—Yogasana, Pranayama, Sanskrit, Composition, and Skinfold calliper.**

## I. INTRODUCTION

The scientific and technological progress all over the globe has made man highly sensitive, critical and also creative. Sharp to the core, his intellect has gained tremendous power of analysis. The left side of his brain is highly developed, helping him to unravel the general laws of nature. Automation and computers have brought great speed and sophistication in all our interactions. The theoretical knowledge of science is made practical and useful in the form of new machinery, gadgets and appliances to reduce human labour and help man towards a more comfortable and enjoyable life.

Yoga being originated from a Sanskrit word 'Yuj' means union, control, to yoke. Yoga is a science that consists of ancient theories, observations, principles about the body and mind which is now being proved by modern science. Yoga makes the body more flexible and helps to relax even in the midst of a stress stricken environment. This is one of the foremost reasons people practicing yoga to feel more energetic, happy and peaceful.

The body composition test estimates the percentage of body fat by measuring skinfold thickness at specific locations on the body [1]. This includes the abdominal area, the sub scapular region, arms, buttocks and thighs. The thickness of these folds is a measure of the fat under the skin, also called subcutaneous adipose tissue. The skinfold measurement is generally taken at the right side of the body with skinfold calliper to measure the skinfold thickness in millimetres. Three measurements are recorded and average is considered.

Body fat includes essential fats, such as lipids and nonessential body fats. These fats make up around 5 % of total body weight for men and up to 12 % for women. Nonessential fat is found mainly within fat cells and adipose tissue below the skin and surrounding major organs. The amount of nonessential fat stored in the body is different among individuals on factors such as age, gender and diet. Excess nonessential fat can normally be attributed to consuming more food energy than what is burned through metabolic functions and activity.

Plenty of physical activities are available but yoga has gained tremendous popularity all over the world at a faster pace. Mainly yogic exercises are not required more space and expensive equipment and it can be performed in indoor or outdoor also [2- 5]. Considering all this facts I took this study.

## II. DESIGN OF THE STUDY

The study was conducted on 30 high school boys; they were selected randomly from V.V.S. Sardar Patel High School, Rajajinagar, Bangalore, their age ranged between 14 to 15 years, the date of birth was collected from the school admission records. The exact age of each subject from the date of test was converted to the present age into decimal age. Before training Body composition test was conducted. The selected subjects were trained yogic exercises for duration of 45 minutes, 5 days a week and a period of 8 weeks. After completion of training the subjects were re-tested to collect post-test data to determine the effect of yogic exercises on Body composition. The schedule of the exercises was strictly followed. The table- 1 indicates the selected yogic exercises.

TABLE I. THE LIST OF SELECTED YOGASANAS

ASANAS	DURATION
<ul style="list-style-type: none"> <li>• <b>Suryanamaskara</b></li> <li>• <b>Standing Posture</b> Ardakati Chakrasana, Trikonasana, Rukhsana, Thadasana.</li> <li>• <b>Sitting Posture</b> Padmasana, Parvathasana, Ushtrasana, Janusirasana, Sputa Vajrasana</li> <li>• <b>Prone Posture</b> Bhujangasana, Dhanurasana, Shalabhasana</li> <li>• <b>Supine Posture</b> Sarvangasana, Halasana, Matsyasana, Chakrasana</li> <li>• <b>Pranayama</b> Bramari Omkar (A-U-M) Relax with Shavasana</li> </ul>	45 Total minutes

### A. Procedure

Body composition commonly refers to the relative percentage of fat and non-fat tissues in the body, fat free mass and present body fat% are typically the most frequently reported values for a body composition assessment.

### B. Purpose

To measure the body fat percentage and lean body mass.

### C. Equipment

The calibrated correct jaw tension calliper and weighing machine.

### D. Organization and Description of the test

- The measurements were taken on the right side of the subject's body.
- Caliper was placed 1 cm away from thumb and finger, perpendicular to skin fold and halfway between crest and base fold.
- The pinch was maintained while reading the calliper.
- Duplicate measurements were taken at each site and retested duplicate measurements did not fall within 1 to 2 mm.
- Rotate the measurement sites to regain normal texture and thickness.
- For each skin fold sites three measurements were taken and the average of those three was recorded.

1. *Biceps*: The superior side of the upper arm, a vertical skin fold was lifted with thumb and forefinger and the calliper was applied one centimetre below the finger and the grip of the calliper was slowly released so that a full tension of the calliper was applied on the skin fold.

2. *Triceps*: The posterior side of the upper arm, a vertical skin fold was lifted with thumb and forefinger, the calliper was applied one centimeter below the finger and the grip of the calliper was slowly released, a full tension of the calliper was applied on the lifted skin fold.

3. *Suprailiac*: At this site a vertical skin fold was lifted with thumb and forefinger just superior to the iliac crest at the mid auxiliary line, the calliper was applied one centimetre below the finger and the grip of the calliper was slowly released, so that the full tension of the calliper was applied on the lifted skin-fold.

4. *Sub-Scapular*: A diagonal fold, inclined approximately 45° from horizontal, in the natural cleavage of the skin, was picked up in the inferior angle of the scapular. The subject was comfortably erect with the arms relaxed at the sides of the body. The calliper jaws were applied one centimetre below the finger and the grip of the calliper was slowly released, so that a full tension of the calliper was applied on the lifted skin fold.

5. *Body weight*: The body weight of the subjects was taken on a portable weighting machine, the subjects were asked to wear only under clothing and be bare footed. The accuracy of the weighting machine was checked at intervals with standard weights. Before taking the measurements, care was taken to see that the pointer of weighting machine stood at zero when there was no weight on it [6-8]. The measurement of body weight was recorded to nearest half a kilogram.

*E. Scoring*

The subject age, body weight, and four sites of skinfold measurements has entered in to Durnin and Wimberley online body fat percentage calculator, body fat percentage and lean body mass scores were obtained.

*F. Statistical analysis*

The general descriptive statistics like mean, standard deviation and standard error of mean has been computed. The paired t-test has been carried out to find out the difference between the means for arriving at the results.

TABLE II. PRE AND POST-TEST DESCRIPTIVE STATISTICS OF BODY FAT PERCENTAGE

Test	N	Mean	Std. Deviation	Std. Error Mean
Pre-test	30	12.535	1.469	0.268
Post-test	30	10.099	1.162	0.212

The table – 2 shows the pre and post-test Body Fat Percentage mean, Std. Deviation and Std. Error mean. The pre-test mean is 12.535, post-test mean is 10.099. The pre-test Std. Deviation is 1.469, post-test Std. Deviation is 1.162, the pre-test Std. Error Mean is 0.268 and post-test Std. Error mean is 0.212 respectively.

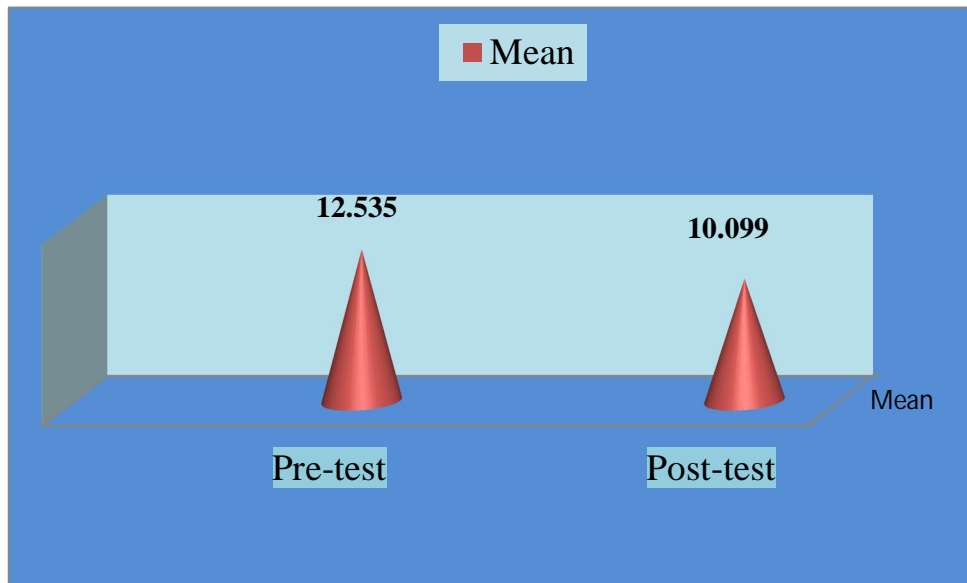


Figure - 1 Bar Plot Of Pre And Post-Test Mean Body Fat Percentage

The mean score in the table -2 is represented graphically as shown in the bar plot (figure – 1) the bar plot denotes that, the reduction in mean Body Fat Percentage of post-test when compared with pre-test.

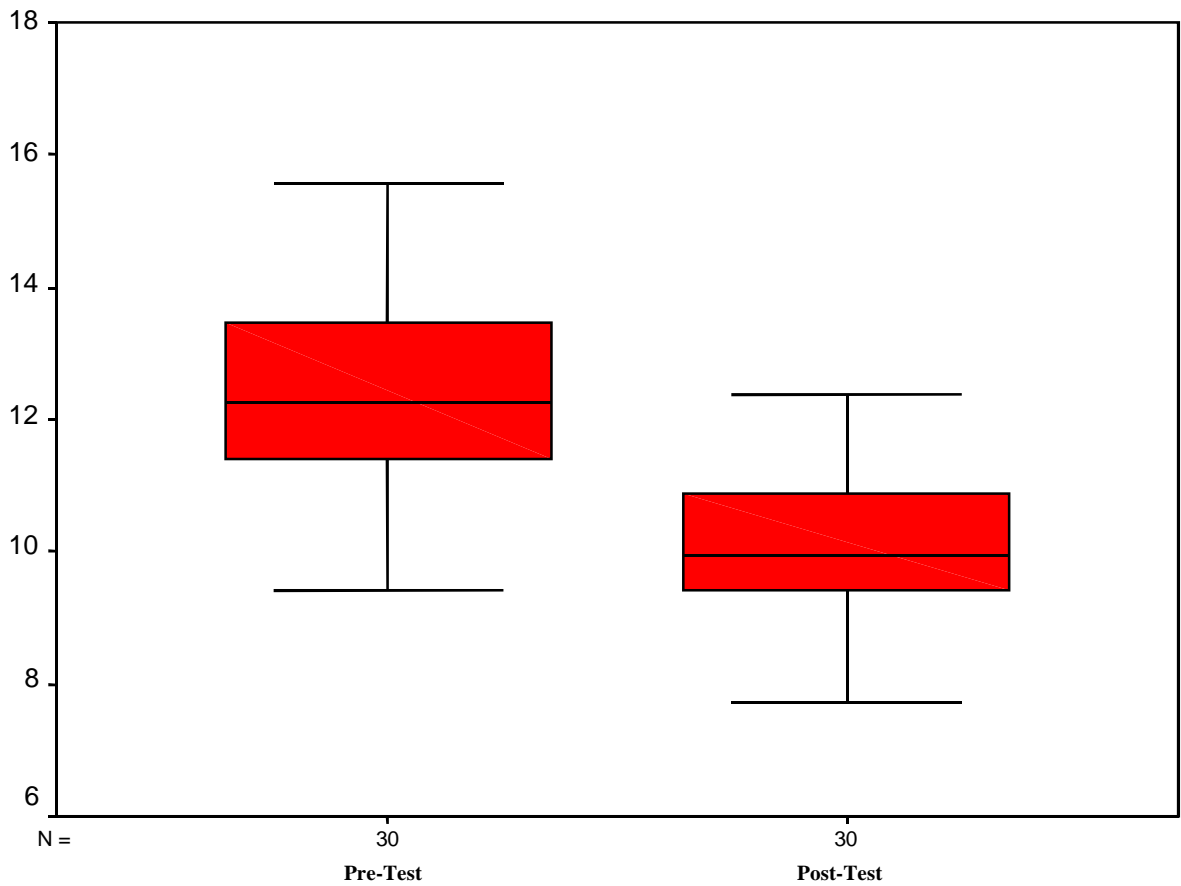


Figure - 2 Box Plot Of Pre And Post-Test Body Fat Percentage

Figure - 2 shows box plots indicates that there is a decrease in Body Fat Percentage in post-test when compared with the pre-test. The same will be confirmed using paired 't' test.

TABLE III. PAIRED T-TEST OF BODY FAT PERCENTAGE

Variable	Mean	Std. Dev	Std. Error Mean	t	p-value
Body Fat Percentage	2.436	1.011	0.185	-13.250	0.000*

*\*indicate significant (p value < 0.05)*

The table - 3 indicate that since p-value is < 0.05, we reject the hypothesis and conclude that there is significant difference in Body Fat Percentage between the pre and post-test. This confirms the fact that yoga has decreased the Body Fat Percentage.

TABLE IV. PRE AND POST-TEST DESCRIPTIVE STATISTICS OF LEAN BODY MASS

Test	N	Mean	Std. Deviation	Std. Error Mean
Pre-test	30	34.672	3.369	0.615
Post-test	30	35.734	3.337	0.609

The table – 4 shows that pre and post-test Lean Body Mass Mean, Std. Deviation and Std. Error Mean. The pre-test Mean is 34.672, post-test Mean is 35.734. The pre-test Std. Deviation is 3.369, post-test Std. Deviation is 3.337, the pre-test Std. Error Mean is 0.615 and post-test Std. Error Mean is 0.609 respectively.

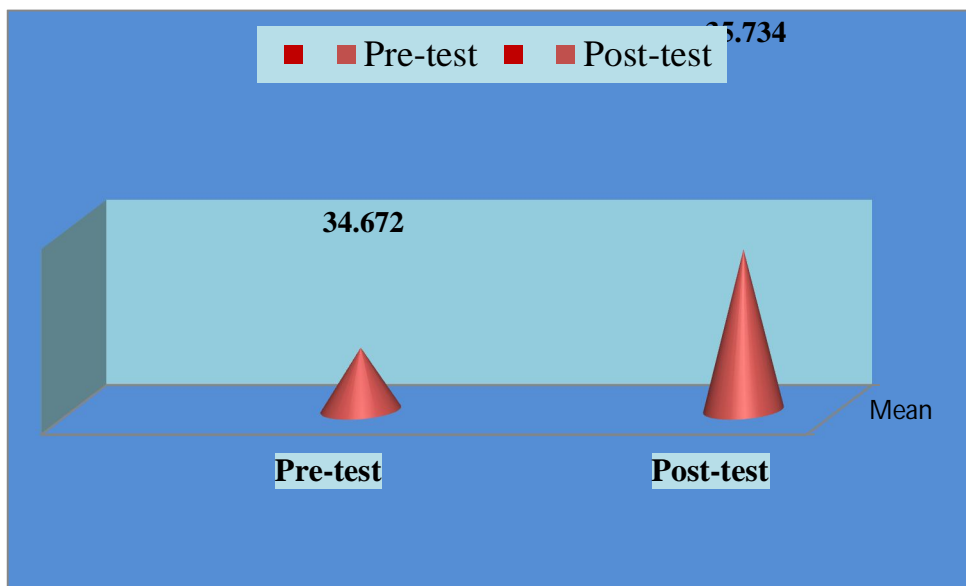


Figure - 3 Box Plot Of Pre And Post-Test Lean Body Mass

The mean score in the table - 4 is represented graphically as shown in the bar plot (figure – 3) the bar plot denotes that, there is an increase of mean lean body mass in post-test when compared with pre-test.

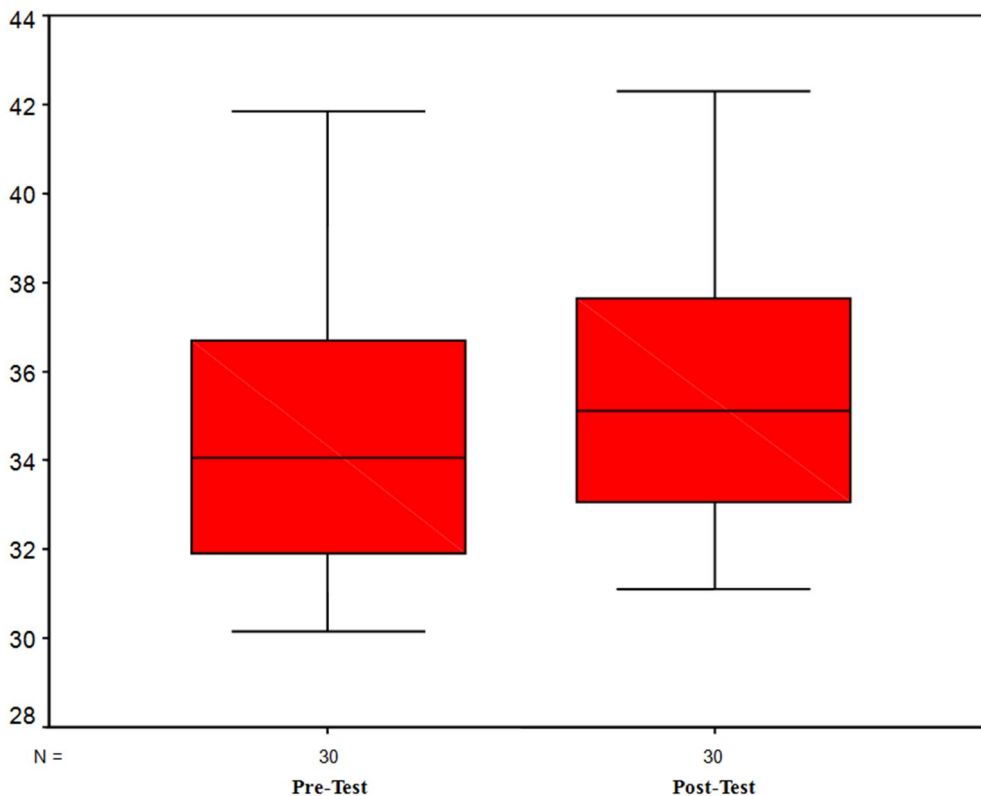


Figure - 4 Box Plot Of Pre And Post-Test Lean Body Mass

The Figure – 4 box plots indicates that there is an increase in Lean Body Mass in post-test, when compared with the pre-test. The same will be confirmed using paired ‘t’ test.

TABLE V. PAIRED T-TEST OF LEAN BODY MASS

Variable				t	p-value
	Mean	Std. Dev	Std. Error Mean		
Vital Capacity				-9.696	
	-1.062	0.510	0.110		0.000*

\*indicate significant ( $p$  value < 0.05)

The table - 5 indicate that since p-value is < 0.05, we reject the hypothesis and conclude that there is significant difference in Lean Body Mass between the pre and post-test. This confirms the fact that yoga has enhanced the Lean Body Mass.

### III. CONCLUSION

From the results of the study, it is concluded that, the body composition was significantly improved due to the influence of eight weeks yogic training. Because yogic activity provides complete exercise to the body and massage all the internal organs and glands. Yoga is postural pattern, these patterns are to be achieved slowly, maintained for some time steadily and released again in a slow and smooth manner. It may be also due to the various muscular contraction and kinesiological movements experienced by the subjects. This process will surely systematize reduction of body fat percentage and increase in lean body mass.

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