

## Effect of Yoga on Anthropometric and Cardiovascular Parameters

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### Abstract

### Original Research Article

The present study is to see the effects of yoga on anthropometric and cardiovascular parameters for a duration of three months in 40 healthy volunteers. Volunteers recruited belonged to either gender, age 20–60 years. Weight, BMI, waist-hip ratio, pulse rate, systolic blood pressure and diastolic blood pressure were recorded before and after regular practice of yoga for a duration of three months. There was a significant reduction in the resting pulse rate from  $77.13 \pm 7.917$  to  $74.05 \pm 8.184$  ( $P=0.001$ ), systolic BP from  $120.68 \pm 8.547$  to  $117.28 \pm 7.809$  mmHg ( $P=0.001$ ), diastolic BP from  $81.20 \pm 5.090$  to  $79.00 \pm 4.956$  ( $P=0.001$ ), mean weight from  $68.88 \pm 13.259$  to  $64.888 \pm 12.9849$  ( $P=0.001$ ), mean BMI from  $26.255 \pm 4.6299$  to  $25.515 \pm 4.4938$  ( $P=0.001$ ) and there were no significant changes observed in Waist-Hip ratio with means of it remaining the same before and after yoga practice ( $P=0.426$ ).

**Key words:** yoga, BMI, waist-hip ratio, pulse rate, systolic blood pressure, diastolic blood pressure.

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## INTRODUCTION

Yoga, an ancient technique which perceives the mind and body as an integrated unit. Yoga, means to achieve balance within the external and internal environment and thereby attaining physical, mental, spiritual wellbeing and so health as a whole. It includes asanas, pranayamas, kriyas, mudras, bandhas, deep relaxation and meditation. As it focuses more on body awareness, relaxation and meditation, it may be perceived as less strenuous and more pleasurable [1].

Regular yoga practice brings beneficial effects on cardiovascular, respiratory, metabolic and cognitive functions as proven by various available evidences [2, 3]. Numerous scientific studies from Jawaharlal Institute of Postgraduate Medical Education and Research (JIPMER) and other laboratories all over the world have shown that yoga has beneficial effect on our physiological and psychological functions [4, 5]. However, there are studies analysing the physiological effects of long-term yoga practice. Effects of short-term yoga practice on anthropometric and cardiovascular functions still need to be consolidated.

So, this study is done for analysing the physiological effects of regular yoga practice for

duration of 3 months. In this study, the effects on various anthropometric & cardiovascular parameters like weight, BMI, waist-hip ratio, Pulse rate (PR), and Systolic blood pressure (SBP), Diastolic blood pressure (DBP) are studied.

## MATERIALS AND METHODS

An interventional study is done to evaluate the effect of yoga on weight, BMI, waist-hip ratio, pulse rate (PR), systolic blood pressure (SBP), diastolic blood pressure (DBP). The study was conducted in 40 healthy volunteers at the yoga village, Andhra University after obtaining institutional ethics committee approval and valid volunteer consent. The schedule of training lasted for a minimum period of three months. Volunteers recruited belonged to either gender, age 20–60 years. The gender distribution of the study population were as male  $n=19$  and female  $n=21$  with minimum 85% attendance in yoga sessions and practicing yoga for a minimum period of 75 min/day, 6 days/week, for a period of 3 months. Data is presented as mean  $\pm$  standard deviation. Results were analysed using SPSS software version 18. Student Paired T-test was done for comparison of values within same group before and after regular yoga practice. Safety data will be presented as proportions.

## RESULTS

### Cardiovascular parameters after practicing yoga

There was a significant reduction in the resting pulse rate from  $77.13 \pm 7.917$  to  $74.05 \pm 8.184$  ( $P=0.001$ ), systolic BP from  $120.68 \pm 8.547$  to  $117.28 \pm 7.809$  mmHg ( $P=0.001$ ), diastolic BP from  $81.20 \pm 5.090$  to  $79.00 \pm 4.956$  ( $P=0.001$ ) as depicted in Table 1.

**Table-1: Pre and post-yoga intervention variables in cardiovascular functions**

GROUP	MEAN	Std. Deviation	T	P VALUE
Comparison of resting pulse rate(mean+/-SD in beats/min)				
Before yoga	77.13	7.917	12.476	0.001*
After yoga	74.05	8.184		
Comparison of systolic BP(mean+/-SD in mmHg)				
Before yoga	120.68	8.547	9.146	0.001*
After yoga	117.28	7.809		
Comparison of diastolic BP(mean+/-SD in mmHg)				
Before yoga	81.20	5.090	4.956	0.001*
After yoga	79.00	4.956		

### Anthropometric parameters after practicing yoga

The mean weight of all participants was found to reduce significantly from  $68.88 \pm 13.259$  to  $64.888 \pm 12.9849$  ( $P = 0.001$ ), the mean BMI of all participants was found to reduce significantly from

$26.255 \pm 4.6299$  to  $25.515 \pm 4.4938$  ( $P = 0.001$ ) and there were no significant changes observed in Waist-Hip ratio with means of it remaining the same before and after yoga practice ( $P= 0.426$ ) as depicted in Table-2.

**Table-2: Pre and Post yogic intervention variables in Anthropometric parameters**

GROUP	MEAN	STD DEVIATION	T	P VALUE
Comparison of weight(mean+/-SD in kg)				
Before yoga	66.88	13.259	7.763	0.001*
After yoga	64.888	12.9849		
Comparison of BMI(mean+/-SD in kg/mt2)				
Before yoga	26.255	4.6299	6.221	0.001*
After yoga	25.515	4.4938		
Comparison of W/H ratio(mean+/-SD)				
Before yoga	0.8578	0.06837	-0.804	0.426
After yoga	0.8578	0.06319		

## DISCUSSION

Yoga, a traditional mind-body medicine originated in India. To enhance the physical activity in individuals, regular practice of yoga is a convenient alternative. Yoga sadhana (The practice of yoga) is comprised of asanas, pranayama, meditation, kriyas and mudras. The main objective of yoga practice is living with freedom in all walks of life, health and harmony. The three types of yoga i.e bhakthi yoga, karma yoga, gyana yoga which was elaborately presented in Bhagavad-Gita are still the highest example of human wisdom and even today people find peace by following the methods as shown in Gita.

The present study reveals the effect of yoga on various anthropometric parameters such as weight, BMI, waist-hip ratio, cardiovascular functions like pulse rate, SBP, DBP of healthy volunteers over a period of three months. There was a significant decrease in resting heart rate, systolic and diastolic blood pressure, weight, BMI, after the regular yoga practice for three months in our study which is in

accordance with findings of other studies on physiological effects of yoga practice in healthy individuals. There was no significant decrease in waist-hip ratio.

The reduction in resting heart rate, systolic blood pressure, diastolic blood pressure in our study were attributed to modulation of autonomic activity where there is parasympathetic predominance and relatively reduced sympathetic tone. This autonomic modulation in yoga is mediated through modification of breathing patterns, which triggers various central and autonomic mechanisms along with mechanical and hemodynamic adjustments causing both tonic and phasic changes in cardiovascular functioning [6]. The asanas calm the mind, regularize and balance the nervous system, the centre that controls stress. This stress-free state of mind evokes relaxed response in which parasympathetic nerve activity overrides sympathetic activity [7]. Further, sympathetic and parasympathetic nervous system stabilizes in the practice of asanas resulting in the regulation of BP.

Meditation by modifying the state of anxiety reduces stress-induced sympathetic over activity thereby decreasing arterial tone and peripheral resistance resulting in lowering of diastolic blood pressure and heart rate[8].

Yoga has a role in maintaining good health and physical fitness. In the present study, a significant reduction in body weight and BMI was noted after 12 weeks of yoga training. The reduction in body fat might be because the volunteers underwent a high level of yogic exercise over a period, which resulted in a lowering of body weight and BMI. Yoga involves varieties of physical activity, change of postures, repeated contractions, and relaxations of the abdominal muscles might be the cause of reduction of body weight. Similar observations were noted by many authors where the reduction in body fat was noted after yoga training [9, 10].

## CONCLUSION

Based on the data collected and statistical tests done, it is concluded that after regular yoga practice for duration of 3 months, there was a significant reduction in the resting pulse rate, systolic bloodpressure, and diastolic blood pressure of the participants. A significant reduction in weight and BMI was observed. There was no significant change in the waist-hip ratio. So Yoga has a role in maintaining good health and physical fitness.

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