

# ANALYSIS OF THE EFFECTS OF YOGA ON BLOOD PRESSURE AND HEART RATE IN COLLEGE ATHLETES FOCUSING ON A SINGLE SESSION

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## **Abstract**

**Background and Aims:** *Yoga's positive effects on human systems have been thoroughly researched in recent years. One of the most essential is the cardiovascular system, therefore would like find out more about it analysis of the effects of yoga on blood pressure and heart rate in college athletes focusing on a single yoga session.*

**Methods and Material:** *Fifty-five men college athletes were selected from Government Arts and Science College (Affiliated to Bharathiar University) Modakkurichi, Erode, Tamilnadu, India. The age ranged between 21-25 years. The participants were calm physically and mentally for 15 minutes. Then the Blood pressure and Heart rate were recorded by sphygmomanometer and pulse oximeter, respectively. After that warm up session and yoga session was carried out. Yoga session included many asanas. After performing all the asanas again measurement of Blood pressure and Heart rate was done. After that 10 minutes relaxation was given and measurement of the Blood pressure and Heart rate were again done.*

**Results:** *One-way repeated measure ANOVA was used to see the analysis of the effects of yoga on blood pressure and heart rate in college athletes focusing on a single yoga session within the group. Bonferroni post hoc test, used to discover which specific means differed. Statistical analysis was performed using SPSS version 16. There was significant differences were found in SBP, DBP and HR at three time interval- Baseline, After Yoga and After Relaxation in college athletes with  $p < 0.05$*

**Conclusion:** *There were reductions in systolic blood pressure, diastolic blood pressure and heart rate in college athletes focusing on a single yoga session at three time interval – baseline, after yoga and after relaxation.*

## 1. Introduction

"Yoga" comes from the Sanskrit word "YUJ," which meaning "to tie," "to unite," or "to apply." "Yoga is the restraint of the mind's process," according to Maharshi Patanjali. The advantages of yoga on human health have been thoroughly researched [1, 2]. Yoga is the connection and harmony of one's thoughts, words, and actions, as well as the union of one's brain, heart, and hands. Yoga is described by Patanjali, the author of the classic yogic work The Yogasutras, as "Complete control over the various patterns or modifications of awareness." Yoga is a type of exercise that provides strength, endurance, balance, flexibility, and relaxation all in one. "Yoga is a system of excellent instruments for seeking oneness as well as healing," says Dr. Dean Ornish, a prominent American cardiologist and popular author who has documented that a yogic lifestyle may reverse cardiac disease [3]. Yoga has been revealed to have protective, therapeutic, and rehabilitative properties, which can be explained by autonomic function regulation, stress reduction, physiological function improvement, and improved quality of life [4, 5, 6]. Yoga has proven to be a relatively low-risk, high-reward technique to boosting general health and wellbeing [7].

## 2. In current study, various asanas were taken

Asana refers to a posture achieved by placing the hands, feet, and body trunk in a specific position. They are numerous, catering to a person's diverse physical and mental needs. The activity is done with the idea of purifying the individual's body and mind. The musculoskeletal, digestive, circulatory, hormonal, glandular, neurological, and other systems of the body are all served by asana. The practitioner overcomes physical impairments and mental disorders by practicing Asana, and the doors to spiritual practice open to him. The feeling of freshness and lightness must be felt in both the body and the mind. To pick up, the mind must be awake, knowledgeable, and truthful.

The asana can be performed in any place but they should be done with an empty stomach. Some of the common asanas are:

- Vrikshasana
- Shashankasana
- Parvatasana
- Bhujangasana
- Pavanamuktasana

Yoga has a wide range of impacts. Yoga reduces pulse rate, respiratory rate, blood pressure, cardiovascular efficiency, respiratory efficiency, gastrointestinal function normalizes, musculoskeletal flexibility and joint range of motion improves, posture improves, strength increases, endurance increases, and energy levels increase. The current study's goal is to assess the cardiovascular health of college athletes. Cardiovascular problems are now being seen in the early young group as a result of increased junk food consumption and other risk factors such as sedentary lifestyle, lack of awareness of physical activities such as yoga and aerobics, and increased consumption of more oily foods and salt intake. People also do not have time to spare for physical work and instead work by sitting in an air-conditioned room. Many literatures are available for its long term effect on cardiovascular system but scarcity regarding its immediate effect. That's why rationale of this study is to determine

analysis of the effects of yoga on blood pressure and heart rate in college athletes focusing on a single yoga session.

### 3. Method

Fifty-five men college athletes participated in this study based on the inclusion and exclusion criteria. All participants willingly decided and signed informed consent form to extend full cooperation and be available for data collection as and when required. The idea of the study and requirement and schedule of the testing procedure were explained to the participants.

#### 3.1 Guidelines followed during yoga session

- Yoga session held in morning before breakfast
- Practice in a warm, quite, clean and airy place
- Mat was used

The method allowed the participants to calm down physically and mentally for 15 minutes. The blood pressure was recorded by using Sphygmomanometer in supine position in the right upper limb by auscultator method. Heart rate was recorded by using Pulse oximeter. (After that warm up session was carried out for 15 minutes. In warm up session, participants performed self-stretching. After that Yoga session was carried out. In yoga session, five asanas were performed which were described below. After performing all the asanas again Blood pressure and Heart rate were measured. After that 10 minutes relaxation was given. In this relaxation period, savasana was carried out and again Blood pressure and Heart rate were considered.

#### 3.2 Procedure for performing Asanas

##### 3.2.1 Vrikshasana

- First start the Tadasana position, stand straight on the ground and take a small gap between your feet. The weight is shifted to one leg, for example, starting with the left leg. The entire sole of the foot remains in contact with the floor. The right knee is bent and the right foot placed on the left inner thigh, or in half lotus position.
- In either foot placement, the hips should be open, with the right knee pointing towards the right, not forward. With the toes of the right foot pointing directly down, the left foot, center of the pelvis, shoulders and head are all vertically aligned. Hands are typically held above the head either pointed directly upwards and unclasped, or clasped together.
- The asana is typically held for 20 to 60 seconds to stretch the spine, returning to Tadasana while exhaling, then repeating standing on the opposite leg.

##### 3.2.2 Parvatasana

- Begin on hands and knees.
- Lift the knees and push the heels back toward the ground.
- Bring the head and shoulders in the direction of the knees.
- Keep the shoulders relaxed the whole time, allowing the body weight to be lifted from the hips.

- Stay for as long as is comfortable.

### 3.2.3 Shashankasana

- Sit in Vajrasana the thunderbolt pose or the kneeling pose. Place your hands on the thighs and breathe in a relaxed manner.
- Raise both your hands above the head, palms facing forward. The arms should be in line with the shoulders.
- Slowly bend down and bring the hands forward, till the hands and forehead touched the ground. Exhale while you are bending forward.
- In the final position the forehead and hands rest on the ground. Rest in this position for as long as you are comfortable. In the final position slow rhythmic and relaxed breathing can be done.
- Exhale slowly and come back to the starting position (Kneeling pose).
- Repeat this process for 5 to 10 rounds depending on time and comfort.

### 3.2.4 Bhujangasana

- From a prone position with palms and legs on the floor, the chest is lifted.

### 3.2.5 Pavanamuktasana

- In the first stage, the yogi lies on their back stretching and legs straight.
- The yogi bends their right knee and holds it with their hands, pressing it towards their abdomen. Breathing out, the yogi lifts up their head and touches their knee with their chin. Breathing in, the yogi stretches their legs straight.
- In the second stage, the yogi presses their abdomen with their left leg. In the third stage, the yogi presses their abdomen with both legs, placing their chin between their knees. From this position, the yogi swings their body back and forth 5 to 10 times, and then swings their body left to right and right to left 5 to 10 times.

## 4. Statistical Analysis

All statistical analysis was performed using SPSS version 16. The one way repeated measure ANOVA was used to compare the means of Systolic Blood Pressure, Diastolic Blood Pressure and Heart rate at three time periods- Baseline, After Yoga and After Relaxation within the group. Results were measured to be significant at  $p < 0.05$  and confidence interval was set at 95 %.

### 4.1 Demographic Data

**Table 1:** Demographic data of the young female (Mean $\pm$  SD)

Variables	Mean $\pm$ SD
Age (year)	20.03 $\pm$ 0.26
Height (m)	168.58 $\pm$ 8.68
Weight (kg)	61.2 $\pm$ 8.06

**Table 1:** represents demographic data of men college athletes which included age (year), height (cm) and weight (kg). Mean  $\pm$ SD were analyzed. Values are given in Table 1.

### Descriptive Statistics

**Table 2:** Descriptive Statistics of Systolic Blood Pressure, Diastolic Blood Pressure and Heart Rate

Variables	N	Mean	Std. Deviation
Systolic BS	55	126.90	9.59798
AY Systolic	55	111.90	7.72747
AR Systolic	55	108.83	6.47149
BS Diastolic	55	87.60	7.97357
AY Diastolic	55	80.01	8.00576
AR Diastolic	55	76.30	9.57209
BS Heart Rate	55	91.49	11.49214
AY Heart Rate	55	86.94	11.89836
AR Heart Rate	55	81.05	12.54388

**Table 2:** represents mean and SD of SBP, DBP and HR at three times interval Baseline, After Yoga and After Relaxation of men college athletes within the group.

BS: Baseline

AY: After Yoga

AR: After Relaxation

SBP: Systolic Blood Pressure

DBP: Diastolic Blood Pressure

HR: Heart Rate

**Table 3:** Repeated measure ANOVA of Systolic Blood Pressure, Diastolic Blood Pressure and Heart Rate within group

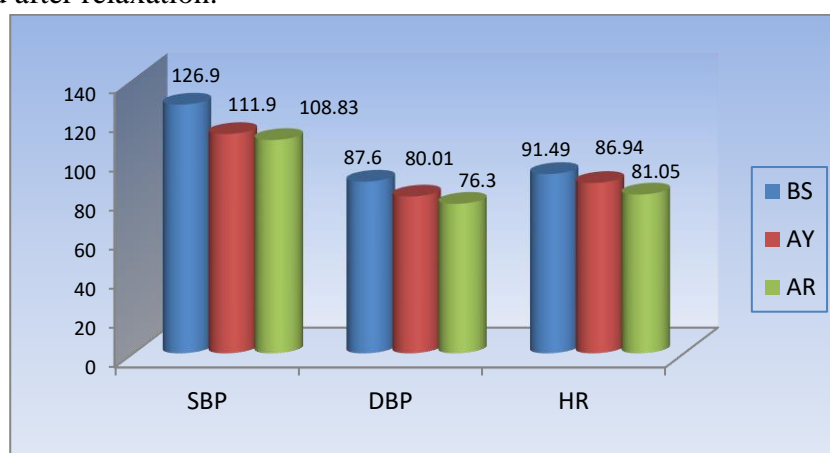
Variables	Type III Sum of Squares	Df	Mean Square	F	Sig. $p < 0.05$
SBP	10286.19	2	5143.09	105.35	.000
DBP	3643.3	2	1821.65	39.11	.000
HR	3011.83	2	1505.91	28.08	.000

**Table: 3** represents the F-ratio assumed for SBP, DBP and HR. The F-ratio of SBP, DBP and HR are 105.35, 39.11 and 28.08, respectively and associated significance value for SBP, DBP and HR is .000 ( $p < 0.05$ ). Therefore, Null hypothesis is rejected. So, the mean SBP, DBP and HR at three time interval- Baseline, after yoga and after relaxation are different.

**Table 4:** Pairwise Comparisons of Systolic Blood Pressure, Diastolic Blood Pressure and Heart Rate

Variables	(I) Effect	(J) Effect	Mean Difference (I-J)	Std. Error	Sig. $p < 0.05$
SBP	BS	AY	15.00*	1.22	.000
		AR	18.07*	1.53	.000
	AY	BS	-15.00*	1.22	.000
		AR	3.07*	1.16	.033
	AR	BS	-18.07*	1.53	.000
		AY	-3.07*	1.16	.033
DBP	BS	AY	7.58*	1.12	.000
		AR	11.29*	1.58	.000
	AY	BS	-7.58*	1.12	.000
		AR	3.71*	1.27	.015
	AR	BS	-11.29*	1.58	.000
		AY	-3.71*	1.27	.015
HR	BS	AY	4.54*	1.55	.015
		AR	10.43*	1.56	.000
	AY	BS	-4.54*	1.55	.015
		AR	5.89*	1.51	.001
	AR	BS	-10.44*	1.56	.000
		AY	-5.89*	1.51	.001

**Table 4:** represents the results of the Bonferroni post hoc test, which allows discovering which specific means differed. In SBP, mean difference between baseline and after yoga was 15.00, between baseline and after relaxation was 18.07 and between after yoga and after relaxation was 3.07 with  $p < 0.05$ . This shows that there is significant reduce in Systolic blood pressure when measure at 3 times interval- Baseline, after yoga and after relaxation. In DBP, mean difference between baseline and after yoga was 7.58, between baseline and after relaxation was 11.29 and between after yoga and after relaxation was 3.71 with  $p < 0.05$ . This shows that there was significant reduce in diastolic blood pressure when measure at three times interval- baseline, after yoga and after relaxation. In HR, mean difference between baseline and after yoga was 4.54, between baseline and after relaxation was 10.44 and between after yoga and after relaxation was 5.89 with  $p < 0.05$ . This shows that there was significant reduce in Heart Rate when measure at three times interval- baseline, after yoga and after relaxation.



**Graph 1:** Mean comparisons of SBP, DBP and HR at BS, AY and AR within group. Graph represents that there is decrease in SBP, DBP and HR within group at three time interval – Baseline, after yoga and after relaxation. In SBP, the values of BS, AY and AR were 126.90, 111.90 and 108.88 respectively, which indicated that the SBP was decreased. In DBP, the values of BS, AY and AR were 87.6, 80.01 and 76.30 respectively, which indicated that the DBP was decreased. In HR, the values of BS, AY and AR were 91.49, 86.94 and 81.05 respectively, which indicated that the HR was decreased. So, Graph concluded that in young female SBP, DBP and HR were decreased at three time interval – Baseline, after yoga and after relaxation.

## 5. Discussion on Findings

The current study was conducted to establish the analysis of the effects of yoga on blood pressure and heart rate in college athletes focusing on a single yoga session between the age of 21 to 25 at three times interval-baseline, after yoga and after relaxation. The sample size was 55. Sphygmomanometer and pulse oximeter used for the measurement of Blood pressure and heart rate respectively. The topic was chosen to assess college athletes' cardiovascular health. Cardiovascular problems are now being seen in the early young group as a result of increased junk food consumption and other risk factors such as sedentary lifestyle, lack of awareness of physical activities such as yoga and aerobics, and increased consumption of more oily foods and salt intake. People also do not have time to spare for physical work and instead work by sitting in an air-conditioned room. Bhavanani, B, A<sup>[8]</sup> conducted the study on single session of integrated, “silver yoga” program which improves cardiovascular parameters in senior citizens. The result of the study showed all parameters witnessed a reduction following the single session. This was statistically more significant ( $p < 0.0001$ ) in HR (Heart Rate), RPP (Rate-Pressure Product) and DOP (Double Product) while it was also significance ( $p < 0.01$ ) and ( $p < 0.05$ ) in SP (Systolic Pressure) and PP (Pulse Pressure) respectively. The decrease in MP (Mean Pressure) just missed significance ( $p = 0.054$ ) while it was not significant in DP (Diastolic Pressure) and concluded that there is a healthy reduction in HR, BP and derived cardiovascular indices following a single yoga session in geriatric subjects. The present study showed the immediate effect of yoga on Blood pressure and Heart rate following single yoga session in young female which showed that there was significant decrease in Systolic Blood Pressure, Diastolic Blood Pressure and Heart Rate. Cohen L. Debbie<sup>[9]</sup> conducted the pilot study and observed significant decreases in 24-hour ambulatory BP (ABP) readings after a 12-week period of yoga participation. Based on this they conducted a larger randomized trial, the Lifestyle Modification and Blood Pressure Study II (LIMBS II), to determine the effects of yoga and enhanced LSM, alone or together, on lowering BP in patients with pre hypertension and stage 1 hypertension. The study concluded that the mean baseline BP was lower in the completers vs non completers (133/81 mm Hg vs 134/82 mm Hg,  $p < .05$ ) and was significantly, but not clinically different. Baseline body mass index and weight were similar. The present study also concluded the significant result ( $P < 0.05$ ) and showed that there were significant reduction in SBP, DBP and HR in college athletes at three times interval period-Baseline, after yoga and after relaxation. This showed the instant outcome which is contrast to this study. Santha Joseph et al.<sup>[10]</sup> focused

on the effect of yoga on heart rate and blood pressure and its clinical significance. In this study the mean values of heart rate, systolic blood pressure and diastolic blood pressure are highly significantly reduce after 6 months of yoga practice. The result of this study is also similar to our study. Reduction in heart rate and blood pressure indicate a shift in the balancing components of autonomic nervous system towards the parasympathetic activity. This modulation of autonomic nervous system activity might have been brought about through the conditioning effect of yoga on autonomic functions and mediated through the limbic system and higher areas of central nervous system were reported by Anand BK et al. <sup>[11]</sup> and Selvamurthy et al. <sup>[12]</sup>. Bodhe, C, D <sup>[13]</sup> conducted the study on Effect of short term pranayama on certain cardiovascular risk factors. The result of study showed a significant decrease in heart rate and systolic blood pressure were observed while diastolic blood pressure, blood total cholesterol and HDL cholesterol levels did not show any significant change after 10 week of pranayama and concluded that short term practice of pranayama shows a significant decrease in heart rate and systolic blood pressure in young healthy volunteers. This study mainly focused on the pranayama which was contrast to our study. The present study showed the effect of asanas on BP and HR. Vijaya Lakshmi et al. <sup>[14]</sup> concluded that regular practice of yoga increases the baro reflex sensitivity and decreases the sympathetic tone; thereby restoring blood pressure to normal level in patients of essential hypertension. This ensures better peripheral circulation. The present study showed the instant result of yoga on Blood pressure and heart rate. Decreased in BP and HR is beneficial for improving the cardiovascular health. In current study, there were significant decrease was found in Blood Pressure and Heart Rate.

## 6. Conclusion

There was healthy decline in Systolic blood pressure, Diastolic blood pressure and Heart rate at three time interval- Baseline, after yoga and after relaxation following single yoga session in men college athletes.

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