

THE EFFECT OF SHAVASANA ON CARDIOVASCULAR PARASYMPATHETIC FUNCTIONS IN HEALTHY ADULTS

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ABSTRACT

Background: The fast pace of competitive modern life has induced many problems like stress, anxiety, insomnia, irritability and other psychosomatic disorders leading to cardiovascular problems with unexpected mortalities at younger age. The Shavasana is one of the important relaxation techniques in yoga practice which leads to total relaxation of both body and mind thereby reducing the stress-related problems like blood pressure, coronary heart disease and cerebrovascular accidents (CVA).

Aim: The present study was taken up to evaluate the effect of shavasana on cardiovascular parasympathetic functions like the basal heart rate, heart rate response to standing (30:15) and Valsalva maneuver in healthy adults.

Materials and methods: The present study consists of 65 healthy medical students of Mysore Medical College and Research Institute. The shavasana training was given by expert yoga teacher for eight weeks. The basal heart rate, 30:15 ratio and Valsalva ratio before and after yoga training were recorded and statistically analysed by ANOVA and "t" test.

Results: It was found that there was a significant reduction in all parameters, basal heart rate p-value was 0.000 ($p < 0.001$), 30:15 ratio p-value was 0.043 ($P < 0.05$) and Valsalva ratio p-value was 0.040 ($P < 0.05$) after shavasana training.

Conclusion: The regular practice of shavasana results in a gradual shift of autonomic equilibrium towards a relative parasympathetic dominance leading to decreased heart rate. Hence the practicing of shavasana will reduce the stress and help to overcome stress-related problems.

Key words: Heart rate, Shavasana, Stress, 30:15 ratio, Valsalva ratio

INTRODUCTION

In India yoga has been practiced from ancient days. Shavasana is a method of physical posture for total relaxation of mind and body. Shavasana is easy to learn,

this asana plays an important role in stress-related diseases like Hypertension, coronary artery disease, insomnia etc. Most of Yoga practices focus on the physical postures called "asanas," breathing exercises called "pranayama," and meditation.^[1] Yoga allows practitioners to focus on the physical, psychological or spiritual wellbeing, or a combination of all three.^[2] In these days stress is considered a major contributing factor in heart disease. Stressful situations lead to sympathetic dominance as evidenced by a rise in heart rate and release of stress hormones, which all can damage the heart and the blood vessels, especially during prolonged or repeated exposures.^[3] Shavasana is known for its ability to reduce stress and promote a calm relaxed state helping to control and prevent cardiovascular disease.^[4] Shavasana is a pose of total relaxation of both body and mind helping psychosomatic relaxation.^[5] Normal homeostatic conditions can be achieved by proper conditioning of the regions of the nervous system.^[6] Many studies have shown that practicing of savasana decreases the heart rate, improves the compliance of the blood vessels, regulates cardiac rhythm, and increases the stroke volume.^[7] Madanmohan et al., have found decreased oxygen consumption, decreased heart rate and blood pressure after shavasana training.^[8]

MATERIALS AND METHODS

The present study was undertaken in the department of physiology, Mysore Medical College and Research Institute Mysore. The study was approved by the Ethical committee of Mysore Medical College. All the subjects gave their informed consent for the study. The present study consists of 65 healthy medical students including 38 males and 27 females in the age group of 18-20 years. The study was carried out to know the effect of Yogic Relaxation (Shavasana) on basal heart rate, heart rate response to standing (30:15 ratio) and Valsalva ratio among healthy volunteers. The details of personal,

medical and family history regarding their health status were collected. These subjects were not practiced yoga previously and their cardio respiratory parameters were within normal limits. those who are suffering from chronic illness , any congenital or acquired deformities, smokers and alcoholic were excluded from the study.

The basal heart rate, heart rate response to standing and valsalva ratio were recorded before the savasana training by non-invasive method using ECG machine in lead II. They were given shavasana training for eight weeks by a trained yoga teacher. These sessions were conducted daily for fifteen minutes under supervision throughout the study period. After the completion shavasana training all the above mentioned parameters were recorded.

1. Basal heart rate;

The subjects were asked to sit comfortably on a chair and the resting ECG was recorded for fifteen seconds in lead II before and after shavasana practice.

2. Heart response to standing (30:15 ratio).

This test was performed with subjects lying down quietly on the bed for about five minutes and then was asked to stand up unaided immediately. The point at starting to stand was marked on the continuous ECG recording from this point for one minute. The result was expressed as the 30th / 15th beat ratio calculated from the following formula.

The R-R interval between 30th-31st

30th / 15th beat ratio = -----

The R-R interval between 15th -16th

3. Heart rate response to Valsalva maneuver (Valsalva ratio) VR .

The subjects were asked to blow the mercury manometer up to 40 mmHg and to maintain mercury column (40 mmHg) for fifteen seconds, by continued blowing into the mouth piece connected to mercury manometer while continuous ECG recording was done. ECG was again carried out for 15 seconds after the release of pressure. The result was expressed as the valsalva ratio derived from the following formula

Longest R-R interval after the release

VR = -----

Shortest R-R interval during the blowing .

The data collected were analysed and discussed for basal heart rate, 30: 15 ratio and Valsalva ratio, before and after Shavasana by Descriptive statistics, ANOVA-Repeated Measures and Independent samples't' test. All the statistical operations were done through SPSS. The mean values of basal heart rate,30:15 ratio and valsalva ratio along with their SD, SEM were documented. The "t" test was applied to find out the significance of reduction in parameters before and after shavasana.

Table 1. Show the effect of Shavasana on Basal Heart Rate.

HR beats / min	Male subjects		Female subjects		All subjects	
	Pre yoga	Post yoga	Pre yoga	Post yoga	Pre yoga	Post yoga
No. of subjects	38		27		65	
Mean \pm SD	72.16 \pm 10.66	62.18 \pm 9.41	76.15 \pm 10.32	58.07 \pm 9.37	73.8 \pm 10.63	60.8 \pm 9.50
Std. Error mean	1.733	1.53	1.99	1.79	1.32	1.18
"t" Test	5.475		9.352		9.430	
Sign. (p value)	0.000*(p<0.001)		0.000*(p<0.001)		0.000* (p<0.001)	

*- Significant, SD; Standard Deviation, HR; Heart Rate.

RESULTS

1. Basal heart rate: The mean \pm SD of basal heart rate of all the subjects before Shavasana was 73.82 ± 10.63 and after Shavasana was 60.48 ± 9.50 , p value is 0.000 ($p < 0.001$).

2. Heart rate response to standing (30:15 Ratio): The

mean \pm SD of 30:15 ratio of all the subjects before Shavasana was 1.2837 ± 0.19 and after Shavasana was 1.22 ± 0.22 . p value is 0.043 ($p < 0.05$).

3. Valsalva ratio: The mean \pm SD of valsalva ratio of all the subjects before Shavasana was 1.6143 ± 0.29 and after Shavasana it was 1.48 ± 0.31 . p value was 0.040 ($p < 0.05$).

Table 2. Showing the effect of Shavasana on 30:15 ratio.

30:15 Ratio	Male subjects		Female subjects		All subjects	
	Pre yoga	Post yoga	Pre yoga	Post yoga	Pre yoga	Post yoga
No. of subjects	38		27		65	
Mean \pm SD	1.2782 ± 0.17 96	1.2584 ± 0.21 58	1.2915 ± 0.21 33	1.1630 ± 0.215 2	1.2837 ± 0.192 8	1.2188 ± 0.21 90
Std. Error mean	0.02914	0.0350	0.041	0.0414	0.02391	0.02717
"t" Test	0.482		2.709		2.061	
Sign. (p value)	0.633** ($p > 0.05$)		0.012* ($p < 0.05$)		0.043* ($p < 0.05$)	

** not significant, * Significant, SD ; Standard Deviation

Table 3. Showing the effect of Shavasana on Valsalva ratio.

Valsalva ratio	Male subjects		Female subjects		All subjects	
	Pre yoga	Post yoga	Pre yoga	Post yoga	Pre yoga	Post yoga
No. of subjects	38		27		65	
Mean \pm SD	1.6350 ± 0.3213	1.5132 ± 0.3575	1.5852 ± 0.2429	1.4452 ± 0.2290	1.6143 ± 0.2903	1.4849 ± 0.3100
Std. Error mean	0.05212	0.05800	0.04675	0.04406	0.03600	0.03850
"t" Test	1.886		2.678		2.989	
Sign. (p value)	0.067** ($p > 0.05$)		0.013* ($p < 0.05$)		0.040* ($p < 0.05$)	

** not significant, * Significant, SD ; Standard Deviation

DISCUSSION

Yoga means a “state of equilibrium or steadiness to any circumstances”. Many studies on effect of regular practice of yogasana have revealed physical and mental wellbeing.^[4] The aim of shavasana is to achieve the complete physical and mental wellbeing of an individual. The main advantage of shavasana is that it produces no untoward effects and does not need any complex equipment. Regular practice of shavasana, the sub cortical regions of the brain dominate while conventional physical exercises, the cortical regions of the brain dominate.^[9] During stress, increased release of neuro-humoral agents by the sympathetic nervous system activates the enzyme adenylyl cyclase present in the cell membrane of each cell of the body. This adenylyl cyclase activates 3-5 cyclic-AMP, which in turn converts ATP to ADP and releases energy. The energy thus released stimulates functioning of each cell. So the heart beats more rapidly, endocrine glands release more hormones and generalized vasoconstriction occurs due to stimulation of smooth muscle of blood vessels. The most notable feature of Shavasana is the capability of inducing a coordinated psycho physiological response, which is anti-thesis of stress response. This “Relaxation response” consists of generalized reduction in both cognitive and somatic arousal as observed in modified activity of hypothalamic -pituitary axis and autonomic nervous system.^[10] Regular practice of shavasana are associated with reduction in catecholamine secretion, a decrease in sympathetic and corresponding increase in parasympathetic Activity,^[11] reduction in metabolic rate and oxygen consumption and salutary effects on cognitive therapy. With this background information, the implications of savasana on basal heart rate, heart rate response to standing (30:15 ratio) and valsalva ratios were studied.

1. Heart rate:

There was significant reduction in heart rate after the shavasana training. In the present study 92.3% of the subjects showed a decrease in heart rate. The inference from these findings may be that regular practice of shavasana results in a gradual shift of autonomic

equilibrium towards a relative parasympathodominance leading to decrease heart rate.

Our study result is comparable with Madan Mohan, U.C.Rai et al,^[8] they have observed significant reduction in heart rate and oxygen consumption after shavasana training. In another study by Bhavanani A.B, Madan Mohan et al,^[12] have observed significant reduction in heart rate in shavasana group after six weeks of training. Bera TK, Gore MM, Oak JP^[13] have compared the recovery from induced physiological stress in Shavasana (a yogic relaxation posture) and two other postures (resting in chair and resting supine posture), immediately after completing the scheduled treadmill running. The recovery was assessed in terms of Heart Rate (HR). HR was measured before and every two minutes after the treadmill running till they returned to the initial level. The results revealed that the effect of stress was reversed in significantly ($p < 0.001$) shorter time in Shavasana, compared to the resting posture in chair and a supine posture. Indla Devasena, Pandurang Narhare,^[14] have observed that significant reduction in the heart rate in healthy volunteers above the age of 40 years after 6 months of yoga practice. In a study by Vempati RP and Telles.S,^[15] for the yoga-based guided relaxation and supine rest the assessments of autonomic variables were made before, during, and after the practices. There were comparable reductions in heart rate during both types of relaxation. Telles.S, Joshi.M, Dash M, Raghuraj , Naveen KV, Nagendra HR^[16] found the ability to reduce their heart rate voluntarily after 30 days of yoga training which has possible therapeutic applications.

2. 30:15 Ratio

It is a good index of cardiovagal response. In the present study 55.38% of the total subjects (both males and females) have shown a borderline decline in 30:15 ratio after shavasana training, but the values are within the normal range. This suggests that good reflex parasympathetic response. Our study is comparable with a study by G.K.Pal et al,^[17] in which decrease in 30:15 ratio was reported.

3. Valsalva Ratio:

It is an index of parasympathetic activity. In the present

study 70.76% of the total subjects have shown a borderline decline in Valsalva ratio after shavasana training, but the values are within the normal range. This suggests parasympathetic activity and it is well integrated and well preserved. Bharshankar JR, Bharshankar RN, Deshpande VN, et al,^[18] conducted a study to examine the effect of yoga on cardiovascular function in subjects above 40 yrs of age. Pulse rate and Valsalva ratio were studied in 50 control subjects (not doing any type of physical exercise) and 50 study subjects who had been practicing yoga for 5 years. They found that the Valsalva ratio was significantly higher in yoga practitioners than in controls, indicating that yoga reduces the age related deterioration in cardiovascular functions. Our study is different from study by Khanam. A.A et al^[19] and G.K. Pal et al,^[17] in which no change in VR was reported.

CONCLUSION

The present study clearly indicates that after shavasana training there was significant reduction in basal heart rate, 30:15 ratio and Valsalva ratio. These findings lead to arrive at conclusions that there was a Shift in autonomic nervous equilibrium towards parasympathetic dominance. Shavasana is a yogic relaxation technique which is acceptable and beneficial especially for people who are living in a stressful environment. Finally it can be concluded that shavasana is a useful tool to incorporate as a part of our life style in prevention of stress related cardiovascular complications.

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