EFFECT OF SHAVASANA TRAINING ON CARDIOVASCULAR RESPONSE TO EXERCISE IN YOUNG HEALTHY VOLUNTEERS.

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ABSTRACT

Effect of shavasana training on cardiovascular response to exercise in young healthy volunteers.

Background and objective: The effect of physical training on cardiovascular response to exercise is a well known concept. But there are limited studies done on the effect of yoga training on cardiovascular response to exercise. Yogic techniques in general and shavasana in particular are known to combat stressful situations. Therefore in the present study, the effect of shavasana on cardiovascular response to exercise was performed on young healthy volunteers.

Methods: A total of 40 young healthy male volunteers aged between 17–20 years of first year MBBS were selected from Mysore Medical College and Research Institute, Mysore. Basal HR, Basal BP and Basal RPP was recorded before Shavasana training and after Shavasana training. Shavasana training was given for 30 minutes daily for 3 months duration by a yoga teacher. Cardiovascular response to exercise (Heart rate, blood pressure, rate pressure product) using Harvard step test are recorded before shavasana training and after shavasana training.

Results: Results were analysed and statistically treated paired 't' test was applied between pre shavasana¸ and post shavasana values. It was found that there was reduction in basal HR, BP and RPP after shavasana training. And also after three months of shavasana training, exercise induced changes in these parameters were significantly reduced except DBP. Overall, the study suggested that there was probable increase in parasympathetic activity and decrease in sympathetic activity.

Interpretation and conclusion: The findings of the present study shows that practice of shavasana may probably shift autonomic equilibrium towards parasympathetic dominance leading to milder cardiovascular work to exercise. This physiological change could be a suitable clinical application for individuals with coronary artery disease.

Keywords: Shavasana; Sympathetic activity, Parasympathetic activity, Rate pressure product.

INTRODUCTION

Nowadays exercise is a must, since most us are leading a sedentary life style due to improved standard of living, literacy etc. Most of them land up in coronary artery disease, bypass surgery and prosthesis implant. Such individuals need reduced work load on heart during physical exercise.

Yoga, developed thousands of years ago, is recognized as a form of mind–body medicine[1]. In yoga, physical postures and breathing exercises improve muscle strength, flexibility, blood circulation and oxygen uptake as well as hormone function. In addition, the relaxation induced by shavasana and meditation helps to stabilize the autonomic nervous system with a tendency towards parasympathetic dominance[1].Yoga is effective for prevention as well as management of bronchial asthma[2], stress due to exams[3], anxiety and depression[4], stress in hypertensive patients[5], and in cure/control of essential hypertension[6].Yoga is also known to improve subjective well being [4].The physiological benefits which follow, help yoga practitioners to become more resilient to stressful conditions. One such yogic exercise which enhances one's ability to combat stressful situation is SHAVASANA. Shavasana can enhance the parasympathetic activity, blunt the sympathetic activity and reduce the load on heart[4].

In a study by Vijayalakshmi P, etal[7] showed that yogic relaxation training optimizes the sympathetic responses to stressful stimuli like isometric handgrip test and restores the autonomic regulatory reflex mechanisms in

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hypertensive patients. One of the studies done by Madan Mohan etal[8] showed that shavasana can enhance one's ability to withstand stress induced by cold pressor test and this ability can be achieved even with seven days of shavasana training.

The effect of physical training on cardiovascular response to exercise is well known. However, there are limited studies on the effect of yoga training on cardiovascular response to physical stress. Hence the present study had been taken up to study the cardiovascular response to exercise by yoga training (shavasana).

METHODS

The present study was conducted in the department of physiology, MMC&RI,Mysore. Permission from the institute ethics committee was obtained prior to the commencement of the study. The study was undertaken to observe the effects of shavasana on the cardiovascular response to exercise in 40 young healthy volunteers of 1st year MBBS course aged between 17 and 20 years.

For each subject, the following physical parameters were recorded.

1) Height (in centimeter): This was measured with subject standing without his shoes, nearest to 0.1 cm.
2) Weight (in kilogram): The subjects are weighed in standardized machine nearest to 0.1 kgs.
3) Body mass index (kilogram/meter square): This was calculated for each subject from his height and weight.

In each subjects following physiological parameter were recorded in pre-exercise condition.

1. Heart rate (beats per minute)

The subject was asked to rest in supine position for 15 minutes. After fixing the leads the subject was asked to lay quietly for 3 minutes. At the end of 3 minutes resting heart rate is recorded using ECG.

ECG was recorded in lead 2, which is run for one full minute for each test. The R-R peaks indicated the heart rate and the calculation was done noting the speed of the ECG paper in unit time. Since 25 mm/second is the speed normally used, the heart rate is counted with the following calculation

$$\text{Heart rate/minute} = \frac{1500}{\text{Distance between two consecutive R-R waves in mm}}$$

2. Systolic and diastolic blood pressure (mmHg) by using sphygmomanometer

The subject was asked to rest in supine position for 15 minutes. The blood pressure was recorded by means of sphygmomanometer by auscultatory method. Three BP recordings at one minute interval were taken and the lowest of these values was included for the study. The subjects were asked to relax during the procedure.

The work done by heart is calculated by using the formula.

$$RPP = \frac{HR \times SBP}{100}$$

Rate Pressure Product is an easily measurable index, which correlates well with myocardial oxygen consumption and defines the response of the coronary circulation to myocardial metabolic demands[9].

Then cardiovascular response to exercise was determined by Harvard step bench using a platform of 18 inch height. The subjects were asked to step up and down the platform at a rate of 30/minute for a total duration of 5 minutes or until fatigue, which ever is earlier. Heart rate and blood pressure was measured in supine position at 1 min after the exercise. And the work done by heart is calculated using the above formula for RPP. All the subjects were given training on shavasana for two weeks by yoga teacher. Then they practiced the same under direct supervision daily for 30 minutes for a total duration of 3 months. Then at the end of 3 months of shavasana training, again basal HR and blood pressure are recorded. Then cardiovascular response to exercise was determined. HR and BP are measured in supine position at 1st minute after the exercise. And the work done by heart was calculated using the above formula. Statistical analysis using paired samples 't' test was employed. Statistical software SPSS version 16.0 was used for the analysis of the data. The calculated value was compared with the table value for corresponding degree of freedom

at 0.05 level of significance. Thus P > 0.05 was considered not significant and P<0.05 was considered significant.

Results: In the present study, the selected 40 young male medical students of Mysore Medical College and Research Institute, were investigated for cardiovascular response to exercise before and after Shavasana. The data collected have been statistically analysed and discussed

Table I : Showing comparison of basal HR before shavasana and after shavasana. And also showing change in the HR due to exercise before shavasana and after shavasana training.

	Parameters	Pre shavasana (Mean±SD)	Post Shavasana (Mean±SD)	't' test	'P'value
I.	Basal HR	73.25 ± 3.62	59.85 ± 3.96	21.36	.000
	Change in HR (basal to HR at 1st min after exercise)	-42.27 ± 6.34	-40.35 ± 4.32	-2.024	.05

Table II : Showing comparison of basal SBP before shavasana and after shavasana. And also showing change in the SBP due to exercise before shavasana and after shavasana training.

	parameters	Preshavasana. (Mean±SD)	Post Shavasana (Mean±SD)	't' test	'p' value
II.	Basal SBP	118.25 ± 8.65	112 ± 7.68	8.908	.000
	Change in SBP (Basal SBP to SBP at 1st min after exercise)	-38.6 ± 9.33 .	-25.65 ± 6.30	-9.031	.000

Table III : Showing comparison of basal DBP before shavasana and after shavasana. And also showing change in the DBP due to exercise before shavasana and after shavasana training.

	Parameters	Pre shavasana (Mean±SD)	Post Shavasana (Mean±SD)	't' test	'p' value
III.	Basal DBP	68.3 ± 5.53	64 ± 4.55	7.781	.000
	Change in DBP(Basal DBP to DBP at 1st min after exercise)	2.8 ± 1.41	2.8 ± 1.91	.000	1.000

Table IV : showing comparison of basal RPP before shavasana and after shavasana. And also showing change in the RPP due to exercise before shavasana and after shavasana training.

	parameters	Pre shavasana (Mean±SD)	Post Shavasana (Mean±SD)	't' test	'p' value
IV	Basal RPP	86.66 ± 8.46	67.7 ± 7.63	20.07	.000
	Change in RPP (Basal RPP to RPP at 1st min after exercise)	-95.41 ± 17.37	71.24 ± 10.86	-9.46	.000

DISCUSSION

For a long time medical professionals have laid much more emphasis on the curative aspect, and only relatively recently the preventive aspect is also being stressed. But the promotive aspect has so far not been given its due importance. On the other hand, in yogic practices the stress is mainly on the promotive aspects[10] .Yoga is a system of physical and mental discipline. By practising regular yogic asanas, it is possible for the human body to become a finely tuned instrument with better capacity for development of mind and consciousness. Among the asanas, shavasana involves lying motionless as a corpse. It enables us to absorb and overcome the debilitating effects of everyday hassles,stress ,anxiety and hypertension. Shavasana literally means the "corpse posture"(Shava means corpse and asana means posture in sanskrit). The fundamental effect of this posture is to make our blood flow evenly all across our body by negating the discriminatory effect that gravity has on blood circulation.

In our present study basal HR,SBP,DBP and RPP was significantly reduced after shavasana training when compared to before shavasana training. This may probably suggests that yoga training has produced a shift of autonomous equilibrium towards parasympathetic dominance. Also exercise induced changes in HR, SBP and RPP was significantly reduced after shavasana training when compared to before shavasana training. Since work was same, but the work done by the heart is reduced(in the form of reduced RPP) after shavasana training. Hence there is better cardiovascular adjustment to exercise

after Shavasana training. There was no significant change in DBP after exercise before Shavasana training and after Shavasana training since the exercise given was of mild to moderate type.

Our study is consistent with study done by Muralidhara and Ranganathan [11] who showed that yoga training improves physical efficiency as indicated in cardiac recovery index measured by Harvard step test .However our study did not check for the exercise recovery. Our study also corroborate well with the study done by Vijayalakshmi P, etal who showed that yogic relaxation training optimizes the sympathetic responses to stressful stimuli like isometric handgrip test and restores the autonomic regulatory reflex mechanisms in hypertensive patients. But in our study exercise given was isotonic type and the subjects included were normotensives.

LIMITATIONS

1. A suitable test like heart rate variability needs to be done in this study to confirm parasympathethetic dominance.
2. Further study needs to be done like effect of shavasana on exercise recovery and exercise performance(vo^2 max) and blood lactate estimation.

CONCLUSION

Cardiovascular response to exercise was measured in 40 healthy male volunteers before shavasana training and after shavasana training in the Department of Physiology, Mysore Medical College and Research Institute, Mysore. The following conclusions were drawn based on the analysis of the result.

1. The basal readings of all the variable parameters like HR, SBP, DBP, RPP,after shavasana training is significantly less when compared to before shavasana training value. These findings suggest that probably there is shift in autonomic nervous equilibrium towards parasympathetic dominance after shavasana training. However further studies in the form recording a heart rate variability could be done in order to confirm the parasympathodominance.
2. Exercise induced changes in HR,SBP,RPP are significantly less in post-shavasana training as compared to pre-shavasana training, suggesting better cardiovascular adjustments to exercise after shavasana training
3. Finally, shavasana – a yogic relaxation technique is associated with a significant blunting of sympathetic response to exercise and as this method is easy to apply with no side effects, could be a suitable intervention for the patients who have undergone cardiac surgeries.

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