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RESEARCH ARTICLE

Effect of *Balasana* on cardiac parameters among healthy medical students

Jabir P K[1], Sadananda B[2], Das K S[3]

[1]Department of Physiology, DM Wayanad Institute of Medical Sciences, Wayanad, Kerala, India, [2]Department of Physiology, Karwar Institute of Medical Sciences, Karwar, Karnataka, India, [3]Department of Physiology, A.J Institute of Medical Sciences and Research Centre, Mangalore, Karnataka, India

Correspondence to: Jabir P K, E-mail: jabspk@gmail.com

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ABSTRACT

Background: Among many professional courses, MBBS found to be difficult to complete, where students are busy with studies throughout the course. They have less chances of relaxation. Sage Patanjali explained two limbs of Ashtanga yoga, Asanas, and Pranayama that integrate individual's mind and body. Effects of yoga practice include low blood pressure and heart rate, boost circulation and muscle tone. Introduction of stress relieving programs already started in many medical colleges worldwide. In yoga, there are a set of postures to do. If medical students are asked to do whole Asanas, it will be inconvenient for them to practice every day due to paucity of time. The present study focuses exclusively on one Asana that can be incorporated as a day-to-day activity in medical student's busy schedule. Balasana is a simple relaxation position. Combined with proper regulation of breath balasana is supposed to soothe the mind. **Aims and Objectives:** To study effect of balasana on cardiac parameters among healthy medical students. To compare the effect of balasana among study and control groups. **Materials and Methods:** Study included 100 medical students, who were selected by volunteer participation and divided into study group (those who do only balasana) and control group (those who lead sedentary life without doing any Asanas). Cardiac parameters such as blood pressure and pulse rate were measured. **Results:** It was found that there is a significant decrease in cardiovascular parameters such as pulse rate, systolic blood pressure, and diastolic blood pressure. **Conclusion:** Results of our study showed that there is a significant reduction in cardiovascular parameters among the balasana group.

KEY WORDS: Yoga; Balasana; Cardiac Parameters; Pulse Rate; Systolic Blood Pressure; Diastolic Blood Pressure

INTRODUCTION

Medical students face higher level of stress and anxiety which is leading to higher incidents of suicidal attempts.[1] The Regulations on Graduate Medical Education 2012 released by Medical Council of India dictate that nearly 4% of total teaching hours in the first 2 years of MBBS course should be allotted for sports and extracurricular activities, including yoga.[2] Asanas and Pranayama are two limbs of Ashtanga yoga of Patanjali which help individual to integrate mind and body.[3] Yoga helps lower blood pressure and heart rate, boost circulation and muscle tone.[4] Studies showed that regular yoga practice reduced stress levels and also reduces stress in the morning hours of exam.[5] Yoga improves cardiac parameters.[6] Yoga is a practical discipline incorporating a wide variety of practices whose goal is the development of a state of mental and physical health and well-being. It includes the practice of meditation, regulation of respiration with a variety of breathing exercises, and the practice of a number of physical exercises and postures, in which the focus is more on isometric exercise and stretching than on aerobic fitness.[7] Yoga practice stabilizes the autonomic balance, controls the

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rate of breathing, and relaxes the voluntary inspiratory and expiratory muscles, which results in decreased sympathetic reactivity.[8]

In yoga, there are a set of postures to do. If medical students are asked to do whole asanas, it will be inconvenient for them to practice every day due to paucity of time. The present study focuses exclusively on one Asana that can be incorporated as a day-to-day activity in medical student's busy schedule. Balasana or the child pose is a simple relaxation position.[9] Since medical students have a sedentary life tendency for cardiac diseases are more.[10] There is reports of high rate of cardiac diseases in doctors, mainly in young doctors. Hence, yoga, especially simple yoga techniques such as balasana, if they are doing routinely along with their busy life can prevent cardiac diseases.

Several studies are conducted on effect of yoga on cardiac parameters[11,12] such as pulse rate,[13] systolic blood pressure (SBP),[14] and diastolic blood pressure (DBP).[15] However, there are only few studies conducted on effect of individual Asanas on these parameters. A study conducted on effect of individual Asanas on blood pressure among 25 medical students showed reduction in blood pressure after performing Sukhasana and Vajrasana.[16] In the present study, cardiac parameters including pulse rate, SBP and DBP are estimated after a period of balasana practice for 90 days.

Since cardiovascular disease is an important cause of mortality and morbidity, especially among populations with sedentary life, it is wise to introduce effective simple Asana like balasana which will improve quality of life. There is a need to study the effect of individual simple relaxing Asana like balsana on cardiac parameters, especially among medical students; hence, study has been taken.

MATERIALS AND METHODS

Participants

The current experimental study included 100 male and female participants after obtaining voluntary informed consent. The study protocol was approved by Institutional Ethical Committee of A.J Institute of Medical Sciences and Research Centre, Mangalore. The following inclusion and exclusion criteria were used for selection of the participants.

Inclusion Criteria

Apparently healthy, willing medical students of age group 17-25 years were included in the study.

Exclusion Criteria

Participants with acute respiratory illness, participants on any form of respiratory medication, congenital heart disease, epilepsy, any injury or immobilization, spinal deformities, ankle problems, eye or ear infections, pregnancy, habit of smoking, practicing yoga for the past 6 months.

After selecting the participants, they were randomly grouped into control and study groups with 50 participants in each group, respectively. The study group practiced balasana for 90 days. Pre- and post-parameters were collected from both control and study group.

Balasana Training

Training was under the supervision of Yoga therapist.

To Perform Child Pose (Balasana)[17]

Select a clean area. Kneel on a mat with two great toes touching, heels spread out, and buttock resting on the heels. Keep chest and back straight and put the arms forward and let the palm rest on the distal part of the thighs or on knees. Raise the hands above with arms touching ears and elbows straight. Start exhaling and bend the body gradually forward with stomach touching thigh and forehead and palm touching the ground. Keep both arms backward in a stretched condition with palms facing upward. Slowly start inhaling and lift head, body, and arms gradually. Come back to original position. Repeat this cycle for 10 times. Then, sit in the original posture. Close the eyes lightly and try to visualize an object behind the lower end of sternum. Then, slowly inhale and exhale through the object and allow it to happen naturally. Stay in this position for 5 min. Then, bend forward resting on right hand and release the knees. All the parameters were measured on day 0 of the study (baseline parameters), and then, every 15 days till day 90. Parameters were taken from both study and control group.

Cardiovascular Parameters

Pulse rate (beats per minute).

Blood pressure (mm of Hg) - both systolic and DBP were measured.

Statistical Analysis

Data were analyzed using SPSS 22.0 version. To compare the significance of difference paired *t*-test was applied. The significance level was accepted at $P < 0.05$.

RESULTS

A randomized controlled study consisting of 100 medical students of AJIMS, divided into study group (who undergo balasana training) and control group (who do not undergo balasana training and is living a sedentary life) was undertaken to study the effect of balasana on cardiac parameters such as heart rate, SBP, and DBP. Parameters of each individual were

recorded at baseline and at day 90. Results were presented in Tables 1-4.

DISCUSSION

Health of medical students is a topic of great concern. For mental and physical recreation extracurricular activities such as yoga is a must.[18] Balasana is one of Asana in yoga which is a relaxing posture. The present study was conducted to evaluate the effect of balasana on cardiac parameters among healthy medical students. It was found in our study that cardiac parameters such as pulse rate, SBP, DBP, PP, MAP, and RPP was significantly reduced in study group who practiced balasana, while there was no significant reduction in these parameters in control group. Till date, lots of studies have been conducted to find out relation between yogic postures and cardiac parameters. However, there are only few studies that conducted on a specific yogic posture and cardiac parameters. To the best of our knowledge, this is the first study examining the effect of balasana on cardiac parameters.

In our study, balasana training for a period of 3 months produced a significant reduction in basal heart rate. Our study was consistent with the study conducted by Indla Devasena[19] which showed that HR and BP significantly reduced after 6 months yoga training. This reduction of pulse rate is due to a decrease in sympathetic activity and increase in parasympathetic activity. Among the Asanas, they trained include Vajrasana. Bhutkar et al.[20] observed that Surya Namaskar practice for 6 months decreased resting pulse rate and blood pressure and increases in cardiorespiratory efficiency and they advocated to improve cardiorespiratory efficiency for patients and healthy individuals.

A study showed that head down position such as head down crooked kneeling in Muslim prayer effect cardiovascular parameters such as reduction SBP and DBP.[21] Authors suggest this can be mediated through baroreceptor reflex.

Blood pressure is mainly dependent on cardiac output and total peripheral vascular resistance. Regulation of blood pressure is normally an involuntary process controlled by sympathetic nervous system and hypothalamus. Stimulation of posterior and lateral parts of hypothalamus activates the sympathetic nervous system. The cerebral cortex can be trained to influence the blood pressure. This effect is likely to be mediated through the hypothalamus. Yoga training blunts the sympathetic response and prolongs the period between successive pacemaker action potentials and results in a decrease in the firing rate.[22]

In the present study, there is greater reduction seen in blood pressure. Stone and DeLeo[23] observed a mean blood pressure reduction in supine and standing positions after practicing meditation alone for 6 months. Early studies by Barnes et al.[24] on meditation reported significant reduction in mean SBP and found improvement in cardiovascular performance of mediators. In this study, the reduction in mean systolic and DBP is found to be more than that obtained by meditation alone. Many studies have shown reduction of blood pressure after meditation.[25-27]

Table 1: Demographic characteristics of control and study group

Characteristics	Study (*n*=50)	Control (*n*=50)
Age (years)	18.26±0.63	18.06±0.59
BMI	23.48±4.31	24.31±2.91

Data were presented as mean±SD. SD: Standard deviation, BMI: Body mass index

Table 2: Gender distribution of individuals studied

Gender	Number (%)	
	Study group	Control group
Male	21 (42)	21 (42)
Female	29 (58)	29 (58)
Total	50 (100)	50 (100)

Data were presented as frequency and percentage

Table 3: Comparison of day 0 and day 90 cardiac parameters in control group (*n*=50)

Cardiac parameters	Mean±SD		*P* value
	Day 0	Day 90	
Pulse rate beat/mt	75.60±2.97	76.60±2.26	0.091
Systolic blood pressure (mm of Hg)	126±2.54	126±2.89	0.334
Diastolic blood pressure (mm of Hg)	86.16±2.24	85.72±2.06	0.334
Mean arterial pressure	99.08±2.22	99.08±2.24	0.334
Rate pressure product	9.42±0.36	9.50±2.24	0.294

P<0.05 is significant

Table 4: Comparison of day 0 and day 90 cardiac parameters in study group (*n*=50)

Cardiac parameters	Mean±SD		*P* value
	Day 0	Day 90	
Pulse rate (beats/mt)	80±4.41	78.64±4.81	0.001
Systolic blood pressure (mm of Hg) (SBP)	120±4.60	114±4.95	0.000
Diastolic blood pressure (mm of Hg) (DBP)	76.12±3.62	73.12±3.34	0.000
Pulse pressure (mm of Hg) (PP)	43.08±3.03	40.96±4.43	0.000
Mean arterial pressure (mm of Hg) (MAP)	91.32±3.70	86.77±3.34	0.000
Rate pressure product (mmHg.bpm) (RPP)	9.09±0.86	8.16±0.83	0.000

P<0.05 is significant

There was a significant reduction of DBP in current study after practicing balasana for 90 days. Brownstein and Dembert[28] also observed in their study, on mild hypertensive patients who had unsuccessful control with thiazides that there was significant reduction in DBP after yoga therapy while Sundar et al.[29] found that the reduction in DBP is more than that of SBP.

Rate pressure product is a valuable marker of cardiac function and stress, value of which is between 7 and 9. Lesser the value of RPP shows better parasympathetic activity. In our study, there is very significant reduction in rate pressure product among study group. This is consistent with study conducted showing effect of yoga on cardiovascular indices in adolescent girls.[30]

It is well evident that practicing Pranayamas such as Sudharshan kriya improve cardiac functions.[31] Even though in our study, there was no session as such for Pranayama, we incorporated meditation and found reduction in cardiovascular parameters those were in consistent with study conducted with Pranava yoga in pre-hypertensive patients.[32]

These effects may be due to its predominant action on muscles alone, without involving the state of mind. This is confirmed by Ather Ali et al.[33] who analyzed various mind body techniques and reported that yoga therapy alone showed significant reduction of DBP while there was a greater reduction seen in SBP after practicing yoga and meditation. While sitting in Vajrasana in an upright comfortable posture breath slows down and heart calms down. A study conducted by Malhotra and Tandon[16] in first MBBS students who did individual Asanas found that there was reduction in both SBP and DBP who performed Vajrasana than those who preformed Dhanurasan. In our study, students practiced Vajrasana posture as a preparatory posture before balasana and after performing balasana for 10 times did meditation during each session. Thus, the present study shows on practicing balasana there is a significant reduction in basal heart rate, SBP, and DBP. Hence, balasana can be incorporated in the busy schedule of medical students as it improves cardiac functions.

Limitations

The major limitation in this study is low-sample size. Further, results may not be generalized as the study was conducted at one centre.

CONCLUSION

In the present study, we have observed a significant reduction in the basal heart rate, SBP, DBP in study group, while there was no significant change in cardiac parameters among control group.

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