

ORIGINAL RESEARCH**To Compare the effects of Yoga program and Walking Exercise on Cardiac Function in Young Adults****¹Dr. Madhu Chaudhary, ²Dr. Vineeta Chadha, ³Dr. Rashmi Mishra,****⁴Dr. Harvir Singh Sodhi, ⁵Dr. Qazi Rais Ahmed**

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Email: harvirsodhi@gmail.com**Abstract**

Background: Yoga and walking are considered to be more effective than other methods of training in developing physical fitness. The purpose of this study was to compare the effects of yoga and Walking Exercise on Cardiac Function in Young Adults.

Material and methods: The present study was conducted among 100 first year students of Medical College and Hospital in Kanpur. Baseline investigation, were done. They were randomly allocated to Yoga group (Group I; n = 50) and Walking exercise group (Group II; n = 50). Post-intervention investigations were made. The differences between the post-intervention and the baseline measures were calculated. Statistical significance was established at $p < 0.05$. Data were analyzed by using SPSS software version 20.

Results: In the present study 100 participants were randomly allocated to Yoga group (Group I; n = 50) and Walking exercise group (Group II; n = 50). Heart rate decreases from 75.14 ± 10.12 bpm to 68.30 ± 10.55 bpm, systolic blood pressure decreases from 126.18 ± 6.52 mmHg to 119.64 ± 8.75 mmHg, diastolic blood pressure decreases from 79.72 ± 6.58 mmHg to 76.66 ± 5.90 mmHg, mean arterial pressure from 95.21 ± 5.71 mmHg to 90.98 ± 6.19 mmHg, body mass index decreases from 21.95 ± 2.34 to 21.67 ± 1.52 in yoga training group. Results suggest that reduction in blood pressure and heart rate are highly significant ($p < 0.001$) after yoga training. In walking-exercise group as well heart rate decreases from 74.54 ± 12.01 bpm to 69.30 ± 10.34 bpm, systolic blood pressure decreases from 122.40 ± 5.30 mmHg to 120.28 ± 5.73 mmHg, diastolic blood pressure decreases from 77.78 ± 3.18 mmHg to 76.50 ± 4.18 mmHg, mean arterial pressure from 92.7 ± 4.30 mmHg to 91.09 ± 5.36 mmHg, body mass index decreases from 21.95 ± 1.62 to 21.72 ± 1.81 in yoga training group. There is significant ($p < 0.05$) reduction in HR, SBP and MBP whereas reduction in DBP is not significant in walking-exercise group. Between-group analysis showed insignificant difference between yoga and exercise group indicating that yoga and walking exercise both improve cardiac function.

Conclusion: The present study concluded that yoga and walking-exercise both improve cardiac function.

Keywords: Yoga program, Walking Exercise, Cardiac Function

Introduction

Yoga refers to a system of physiology established in India thousands of years ago. It helps to develop spirit of harmony through coordinating mind and body. Yoga is a form of physical activity which may assist in achieving recommended levels of physical fitness.^{1,2} A growing body of research evidence supports the belief that certain yoga techniques may improve physical and mental health through down-regulation of the hypothalamic– pituitary–adrenal (HPA) axis and the sympathetic nervous system (SNS). The HPA axis and SNS are triggered as a response to a physical or psychologic demand (stressor), leading to a cascade of physiologic, behavioral, and psychologic effects, primarily as a result of the release of cortisol and catecholamines (epinephrine and norepinephrine). This response leads to the mobilization of energy needed to combat the stressor through the classic “fight or flight” syndrome. Over time, the constant state of hypervigilance resulting from repeated firing of the HPA axis and SNS can lead to dysregulation of the system and ultimately diseases such as obesity, diabetes, autoimmune disorders, depression, substance abuse, and cardiovascular disease.^{3,4} Conventional exercises (like walking, jogging, running, etc.), which loads the cardiovascular and respiratory systems and test the responses of these systems, are also very popular. On the other hand, proponents of ancient yogic exercises, which claim to benefit human body on multiple fronts are also gaining popularity all over the world.⁵ Thus, the purpose of this study was to compare the effects of yoga and Walking Exercise on heart rate and blood pressure in young healthy adults.

Material and methods

The present study was conducted among 100 first year students of Medical College in Kanpur. The study duration was 1 month. Before the commencement of the study ethical approval was taken from the ethical committee of the institute and informed consent was taken from the students. Participants with SBP < 159 mmHg and DBP < 99 mmHg were taken for the study. Subjects with risk factors such as diabetes mellitus, hypercholesterolemia, high triglyceride level, neuromuscular disorders, alcoholism, and practicing yoga for one hour/day for three days in a week and on any medications were excluded from the study. Volunteers were screened and their heart rate and BP were measured. General examination was done. BMI was calculated from weight (kilograms) divided by height (meters) squared by Quetelet index. The heart rate was assessed by recording the electrocardiogram. (R-R interval) ECG recorded by CARDIART 6108 (BPL) ECG machine. The instantaneous heart rate is measured from the interval between successive R-R interval of ECG. Blood pressure was measured by the auscultatory method in the right arm in supine positions, using a mercury sphygmomanometer with a cuff of 12cm width. All the subjects were made to rest for at least 10mins before taking the readings. The manometer cuff was snugly tied around the arm with tubing on the medial and the lower side. Systolic blood pressure was recorded to the nearest 2mm of Hg at appearance of first Korotkoff sound, and diastolic blood pressure was recorded to the nearest 2mm of Hg at the disappearance of Korotkoff sound. They were randomly allocated to Yoga group (Group I; n = 50) and Walking exercise group (Group II; n = 50). After 1 month yoga or walking program post-intervention investigations were done. All the investigations were done in the morning between 8.00am to 11.00am after supine rest for 10 min. The yoga program included loosening practices, Asanas (maintaining postures), Pranayama (breathing exercises) and cyclic meditation. Asanas were practiced for 15–20 min while pranayama and relaxation technique/meditation for 40– 45 min. Cyclic meditation

(CM) is a guided relaxation technique of about 23 min. During the practice of CM, the subjects followed the instructions with eyes closed. It includes stretching and relaxing the muscles consciously (in various postures) with internal awareness by observing changes in the system. The sequence of practice is as follows: (1): It began by chanting a verse (40s) in supine position with Namaskar Mudra followed by isometric contraction of the muscles from toe to head and relaxation with awareness (1 min); (2) Linear awareness was observed in standing posture (Tadasana) and balancing the weight on both feet at ease (2 min); (3) slowly moving to the next posture (ardhakatichakrasana): bending to the right (1 min 20 s) followed with instructions about relaxation and awareness (1 min 20 s); then bending to the left (1 min 20 s) followed with relaxation (1 min 20 s); (4) slowly lied down in supine posture, right arm stretched, turned to right side with head on the right biceps, (linear awareness) then rested on back, observed the abdominal movements and breathing (3 min); (5) moved to the sitting posture (vajrasana) and observed the changes (1 min 20 s); (6) chanted (MMM.) M-Kara in another sitting posture (Sasankasana) (1 min 20 s); (7) chanted (AAA.) A-Kara in backward bending on knees posture (Ustrasana) (1 min 20 s); (8) Relaxed in supine posture (Shavasana) and chanted A, U, M kara (7 min). The postures were practiced slowly, with awareness of all the sensations that are felt. The protocol for the walking-exercise group consisted of loosening practices like neck rotation, shoulder and hip rotation, wrist and ankle rotation, forward and side bending; and walking (40–50 min) followed by rest (10 min). Intervention for both the groups was given for one hour/day for 6 days in a week in the morning from 06:00 am to 07:00 am for 1 month. Body mass index, blood pressure and ECG were recorded again after yoga program and walking exercise. The obtained data was expressed as mean and standard deviation. The differences between the post-intervention and the baseline measures were calculated using paired 't' test. Analysis of covariance (ANCOVA) was used to find the statistically significant differences in the postintervention values between the two groups. Statistical significance was established at $p < 0.05$. Data were analyzed by using SPSS software version 20.

Results

In the present study 100 participants were randomly allocated to Yoga group (Group I; $n = 50$) and Walking exercise group (Group II; $n = 50$). Heart rate decreases from 75.14 ± 10.12 bpm to 68.30 ± 10.55 bpm, systolic blood pressure decreases from 126.18 ± 6.52 mmHg to 119.64 ± 8.75 mmHg, diastolic blood pressure decreases from 79.72 ± 6.58 mmHg to 76.66 ± 5.90 mmHg, mean arterial pressure from 95.21 ± 5.71 mmHg to 90.98 ± 6.19 mmHg, body mass index decreases from 21.95 ± 2.34 to 21.67 ± 1.52 in yoga training group. Results suggest that reduction in blood pressure and heart rate are highly significant ($p < 0.001$) after yoga training. In walking-exercise group as well heart rate decreases from 74.54 ± 12.01 bpm to 69.30 ± 10.34 bpm, systolic blood pressure decreases from 122.40 ± 5.30 mmHg to 120.28 ± 5.73 mmHg, diastolic blood pressure decreases from 77.78 ± 3.18 mmHg to 76.50 ± 4.18 mmHg, mean arterial pressure from 92.7 ± 4.30 mmHg to 91.09 ± 5.36 mmHg, body mass index decreases from 21.95 ± 1.62 to 21.72 ± 1.81 in walking-exercise group. There is significant ($p < 0.05$) reduction in HR, SBP and MBP whereas reduction in DBP is not significant in walking-exercise group. Between-group analysis showed insignificant difference between yoga and exercise group indicating that yoga and walking exercise both improve cardiac function.

Table 1: Heart rate and Blood pressure: Baseline and post-interventional values in participants and within group changes

Variables	Yoga group		p value	Walking exercise group		p value
	Before Mean± SD	After Mean±SD		Before Mean± SD	After Mean±SD	
HR(bpm)	75.14±10.12	68.30±10.55	0.003	74.54±12.01	69.30±10.34	0.015
SBP (mm Hg)	126.18±6.52	119.64±8.75	0.000	122.40±5.30	120.28±5.73	0.010
DBP (mm Hg)	79.72±6.58	76.66±5.90	0.007	77.78±3.18	76.5±4.18	0.054
MBP (mm Hg)	95.21±5.71	90.98±6.19	0.000	92.7±4.30	91.09±5.36	0.006
Weight (Kg)	54.16±7.05	54.10±7.04	0.961	54.59±5.65	54.18±7.09	0.752
BMI	21.95±2.34	21.67±1.52	0.528	21.95±1.62	21.72±1.81	0.596

Table 2: Heart rate and Blood pressure: Baseline and post-interventional values in participants and between group changes

Variables	Yoga group Mean± SD	Walking exercise group Mean±SD	p value
HR(bpm)	68.30±10.53	69.30±9.60	0.133
SBP (mm Hg)	119.64±8.75	120.28±5.73	0.322
DBP (mm Hg)	76.66±5.90	76.5±4.18	0.322
MBP (mm Hg)	90.98±6.19	91.09±5.36	0.173
Weight (Kg)	54.10±7.04	54.18±7.09	0.659
BMI	21.67±1.52	21.72±1.81	0.949

Discussion

Yoga is an ancient discipline designed to bring balance and health to the physical, mental, emotional, and spiritual dimensions of the individual. Yoga is often depicted metaphorically as a tree and comprises eight aspects, or “limbs:” yama (universal ethics), niyama (individual ethics), asana (physical postures), pranayama (breath control), pratyahara (control of the senses), dharana (concentration), dyana (meditation), and samadhi (bliss).⁶

Vishav G. investigated the effects of yoga on physical fitness including agility, strength, power, cardiovascular endurance and speed. Their results indicated that these variables improved significantly except for cardiovascular endurance.⁷

This study demonstrates that continuous yoga training and walking-exercise are associated with a significant increase of cardiac vagal modulation among healthy practitioners. Since this method is easy to apply with no side effects, and leads to a deep physical and mental relaxation, it could be a suitable intervention during cardiac rehabilitation to shift the autonomic balance towards an increase of vagal activity and possibly decrease cardiac mortality. Effects of yoga on hemodynamic and laboratory parameters in a 6-months pilot study suggest that there is a significant reduction in blood pressure, heart rate, and BMI with yoga.⁸

Tracy et al reported the effects of Bikram yoga training and its effects on isometric dead lift, hand grip strength, lower back-hamstring and shoulder flexibility, blood pressure, resting heart rate, maximal O₂ consumption, lean and body fat mass. After training, all these variables improved significantly except hand grip strength and maximal O₂ consumption.⁹

Arbab-Zadeh et al., evaluated left ventricular compliance in master athletes and sedentary seniors by echocardiography and has shown that prolonged, sustained endurance training preserves ventricular compliance with aging.¹⁰

Patil SG et al compare the effects of yoga program and walking exercise on cardiac function in elderly with increased pulse pressure (PP). The study concluded that Yoga practice for 3 months showed a significant improvement in diastolic function with a minimal change in systolic function and that yoga is more effective than walking in improving cardiac function in elderly with high PP.¹¹

Conclusion

The present study concluded that yoga and walking-exercise both improve cardiac functions.

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