Iyengar Yoga Increases Cardiac Parasympathetic Nervous Modulation Among Healthy Yoga Practitioners

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Relaxation techniques are established in managing of cardiac patients during rehabilitation aiming to reduce future adverse cardiac events. It has been hypothesized that relaxation-training programs may significantly improve cardiac autonomic nervous tone. However, this has not been proven for all available relaxation techniques. We tested this assumption by investigating cardiac vagal modulation during yoga. We examined 11 healthy yoga practitioners (7 women and 4 men, mean age: 43±11; range: 26–58 years). Each individual was subjected to training units of 90 min once a week over five successive weeks. During two sessions, they practiced a yoga program developed for cardiac patients by B.K.S. Iyengar. On three sessions, they practiced a placebo program of relaxation. On each training day they underwent ambulatory 24-h Holter monitoring. The group of yoga practitioners was compared to a matched group of healthy individuals not practicing any relaxation techniques. Parameters of heart rate variability (HRV) were determined hourly by a blinded observer. Mean RR interval (interval between two R-waves of the ECG) was significantly higher during the time of yoga intervention compared to placebo and to control (P<0.001 for both). The increase in HRV parameters was significantly higher during yoga exercise than during placebo and control especially for the parameters associated with vagal tone, i.e. mean standard deviation of NN (Normal Beat to Normal Beat of the ECG) intervals for all 5-min intervals (SDNNi, P<0.001 for both) and root mean square successive difference (rMSSD, P<0.01 for both). In conclusion, relaxation by yoga training is associated with a significant increase of cardiac vagal modulation. Since this method is easy to apply with no side effects, it could be a suitable intervention in cardiac rehabilitation programs.

Keywords: yoga—Iyengar Yoga—heart-rate-variability—cardiac rehabilitation

Introduction

Heart rate variability (HRV) has been established as a non-invasive tool to study cardiac autonomic activity. Reduced HRV has been established as a predictor for increased risk of cardiac mortality and sudden cardiac death (1–6) especially in patients after myocardial infarction. Several relaxation techniques have been established in the

management of patients during cardiac rehabilitation aiming to reduce future cardiac events via cardiac autonomic nervous activity. It has been hypothesized that relaxation training programs may improve the cardiac autonomic nervous tone. However, this has not been proven for all available relaxation techniques, such as yoga. Since more than 60 years, B.K.S. Iyengar has been working therapeutically with patients after myocardial infarction. His method offers more than other techniques for relaxation: the sequence of yoga asanas (postures) and the individuality they are performed with, are adjusted to

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Analysis of HRV

For each subject, time-domain HRV was measured according to the Task Force of ESC and NASPE (2) using a Pathfinder digital analysis system (Delmar Reynolds). Mean RR interval and the following HRV parameters were calculated as hourly values and as 24-h values: square root of the mean of the sum of the squares of differences between adjacent NN intervals (rMSSD), standard deviation of NN intervals (SDNN), mean standard deviation of NN intervals for all 5-min segments (SDNNi), standard deviation of the averages of NN intervals for all 5-min segments (SDANN), absolute count of adjacent successive NN intervals differing by >50 ms/h (sNN50) and geometrical triangular index (TI).

Statistical Analysis

Statistical analyses were conducted with a commercially available software package (SPSS version 12.0; SPSS Inc). Comparisons between groups were performed utilizing a Mann–Whitney U-test. Multiple comparisons were done by Bonferroni corrected analysis of variance for repeated measures. Consecutively, an alpha corrected paired Student’s t-test was performed for interval-to-interval comparisons. HRV-parameters were tested for normal distribution with the Komolgorov-Smirnov
coronary artery disease as an independent predictor for total and cardiovascular mortality. Furthermore, a recently published study introducing deceleration capacity of heart rate – a novel Holter-ECG-based marker for vagal activity – underlines the crucial role of cardiac vagal modulation regarding cardiovascular mortality in post-infarction patients undergoing modern treatment, particularly treatment involving acute revascularization procedures (20).

Further studies are required to investigate whether the demonstrated positive effect of therapeutic yoga on the cardiac vagal modulation can be transferred to cardiac patients and introduced into cardiac rehabilitation programs.

Limitations

The cohort (regular yoga practitioners) warrants drawing conclusions about long-lasting effects of yoga on HRV parameters. However, the 24 h circadian rhythm of the yoga practitioners e.g. for SDNNi and rMSSD was higher in the control group, yet the population was too small to show a significant difference.

Additional studies are required to investigate long-term effects of yoga training on cardiac autonomic nervous modulation.

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References


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