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Review Article

Breathing slower to live longer



Ashish Chaddha MD*

University of Wisconsin Hospital and Clinics, Department of Internal Medicine and Cardiology, USA

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ABSTRACT

Heart disease continues to be the leading cause of death in both the United States and worldwide. Stress likely plays a prominent role in the development of cardiovascular disease, especially coronary heart disease and hypertension. Yoga is an ancient Indian discipline with the goal of bringing balance and health to the physical, mental, emotional, and spiritual dimensions of an individual. It is a holistic science which is likely one of the best methods for managing stress, reducing anger and hostility in response to daily life events, and preventing overall stress-induced illness. Pranayama is a component of yoga and is a form of breathing exercise, consisting of slow breathing (roughly 6 breaths per minute). It is one of the most practical and effective relaxation techniques. The purpose of this commentary is to further explore the cardiovascular and blood pressure lowering benefits of pranayama. It is plausible that a prescription of yoga, or pranayama in itself, in addition to pharmacotherapy may be even more effective in primary and secondary cardiovascular disease prevention and risk factor modulation than pharmacological intervention alone, given its mental health benefits and thus impact on non-traditional cardiovascular risk factors such as anxiety, depression, hostility, anger, and overall stress, its effects on blood pressure, and its minimal side effects.

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1. Introduction

Heart disease continues to be the leading cause of death in both the United States and worldwide. Stress likely plays a prominent role in the development of cardiovascular disease, especially coronary heart disease and hypertension.¹ Yoga is an ancient Indian discipline with the goal of bringing balance and health to the physical, mental, emotional, and spiritual dimensions of an individual. It is a holistic science which is

likely one of the best methods for managing stress, reducing anger and hostility in response to daily life events, and preventing overall stress-induced illness. Pranayama, a component of yoga and a form of breathing exercise, consisting of slow breathing (roughly 6 breaths per minute), is one of the most practical and effective relaxation techniques. There are several different forms of pranayama with slightly different techniques, some of which utilize alternate nostril breathing (Table 1). The purpose of this commentary is to further explore

* 600 Highland Avenue, Madison, WI 53726, USA. Tel: +1 6082622122.

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the benefits of pranayama on cardiovascular disease risk factors and hypertension.

2. Pranayama and cardiovascular risk factor and blood pressure benefits

Consistent pranayama practice for a period of one year may decrease the number of angina episodes per week in patients with coronary artery disease.² Follow up angiography in patients randomized to perform pranayama showed that significantly more coronary artery disease lesions had regressed and less cardiac catheterizations were performed in this group compared to the control group.² Pranayama may also lower total cholesterol, LDL cholesterol, triglyceride levels, and decrease total body fat as well as abdominal fat.³ In patients with non-insulin dependent diabetes mellitus, consistent pranayama may lower fasting plasma glucose and reduce hyperglycemic episodes.⁴ Pranayama also improves mood and is therapeutic for depression and anxiety.⁴ Thus, pranayama may benefit a wide variety of coronary artery disease risk factors.

Pranayama may acutely lower blood pressure and heart rate. In a study with 39 healthy adults, subjects sat in an easy and steady posture (sukhasana) on a soft seat on the floor, keeping head, neck, and trunk erect, eyes closed, and other muscles reasonably loose.⁵ The subject was directed to inhale through both nostrils slowly up to the maximum for about four seconds and then exhale slowly through both nostrils up to the maximum for about 6 s. The breathing must not be abdominal. This is known as one cycle of slow pace bhastrika pranayama (respiratory rate 6/min). During this practice subjects were asked not to think about inhalation and exhalation, but were asked to imagine the open blue sky. Blood pressure and heart rate were measured before starting the breathing exercise and again five minutes after bhastrika pranayama. Ten subjects were part of another group where they consumed 20 mg of hyoscine-N-butylbromide and then performed bhastrika pranayama, in order to better assess the effects of parasympathetic blockade on the hemodynamic effects of pranayama. After pranayama, for the group which did not

receive parasympathetic blockade, SBP decreased from average 115 to 108 mmHg, DBP from 77 to 73, and HR from 74 to 72. However, in the group which received parasympathetic blockade, there was no significant change in resting SBP, DBP, and HR, suggesting that the parasympathetic system plays a role in the hemodynamic effects of pranayama.⁵

In another study, 23 hypertensive patients performed sukha pranayama for five minutes at a rate of 6 breaths per minute. SBP decreased from an average of 136 mmHg to 126, HR from 79 to 76, and MAP from 97 to 93.⁶ This suggests that the benefits of pranayama may be even more potent in hypertensives than normotensives, and possibly even greater in uncontrolled vs. controlled hypertensives. Aerobic exercise also leads to a lower resting blood pressure and heart rate immediately after completion of exercise, known as “post-exercise hypotension.” Pranayama has a similar effect, although the duration of this phenomenon is unclear. Other forms of slow breathing and alternate nostril pranayama have shown similar effects^{5–8} (Table 2). In addition to acutely lowering blood pressure, consistent pranayama and slow breathing practice also lowers resting blood pressure over time^{9–15} (Table 3).

3. Potential mechanisms of health benefits of pranayama

Depression and anxiety likely lead to a worse prognosis and outcome in patients with cardiovascular disease as well as increase the risk of cardiovascular mortality.¹ The relationship between depression and anxiety and cardiovascular disease is bi-directional; depression and anxiety can increase the risk of developing cardiovascular disease, and cardiovascular disease can increase the risk of developing depression and anxiety. The prevalence of depression in patients with cardiovascular disease is three times higher than in the general population.¹⁶

Anger and hostility have received much attention as being potential risk factors for coronary heart disease (CHD). The very first studies to analyze this topic were in the 1950s by Rosenman and Friedman with their work on type A behavior pattern (TABP).¹⁷ Type A behavior pattern describes the individual with a chronic sense of time urgency, impatience, competitiveness, anger, hostility, and a high need to show competency and to maintain control. Their work suggested that after controlling for traditional risk factors, initially healthy individuals who were classified as type A were more than twice as likely to develop clinical symptoms of CHD at an average of 8.5 years of follow-up compared to individuals who did not exhibit the type A behavioral pattern.¹⁷ However, further studies failed to demonstrate an association between CHD and type A behavioral pattern.¹⁸ Further analysis suggested that of the various traits of the type A behavioral pattern, it was specifically anger and hostility which were associated with increased risk of CHD.¹⁷

In another study, comparing 250 coronary heart disease (CHD) patients with 500 control subjects, after 8.5 years of follow-up, the hostility trait was associated with a risk ratio (RR) of 1.9 for cardiac death, myocardial infarction, and angina after controlling for the traditional risk factors.^{18,19} CHD

Table 1 – How to perform alternate nostril pranayama (slow breathing).

Alternate nostril breathing

- 1 Sit in an easy and steady posture on a soft seat on the floor (or wherever possible).
- 2 Keep the head, neck, and trunk erect, eyes closed, and other muscles reasonably loose.
- 3 Use the thumb of the right hand to close the right nostril, and inhale for about 6 s. Then, use the index finger to close the left nostril, and exhale through the right nostril for about 6 s. This is one cycle.
- 4 Alternate which nostril does the inhalation and exhalation with each cycle.
- 5 The breathing must not be abdominal.
- 6 During this practice, do not think much about the inhalation and exhalation. Rather, think about something calming, such as the blue sky, trying to minimize thoughts.
- 7 Do this for at least five minutes per day.

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