



# THE INTERNATIONAL ASSOCIATION OF YOGA THERAPISTS

## Research Summary for Yoga Therapists: Yoga Therapy for Heart Disease

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*Research Summaries for Yoga Therapists are a service provided by IAYT to help yoga therapists navigate the twists and turns of the research landscape. The full reference can be found here:*

Cramer, H., Lauche, R., Haller, H., Steckhan, N., Michalsen, A., & Dobos, G. (2014). Effects of yoga on cardiovascular disease risk factors: A systematic review and meta-analysis. *International Journal of Cardiology*, (173)2, 170–183.

### Definition of the disease

Types of cardiovascular disease include heart attacks, stroke, heart failure, arrhythmia, and heart valve problems. The most critical modifiable risk factors for cardiovascular disease (CVD) include high blood pressure (hypertension), hyperlipidemia (elevations of cholesterol and triglycerides), hyperglycemia (high blood sugar), and abdominal obesity (fat between the internal organs, the kind most linked to CVD).

### Prevalence (How common are the various conditions?)

CVD is the leading cause of mortality, morbidity, and disability worldwide. According to the World Health Organization (WHO) an estimated 17.7 million people died from CVDs in 2015, representing approximately 31% of all global deaths. The WHO estimated that by 2030, this number will increase to 23.3 million deaths.

### Etiology (What are the suspected causal factors?)

Several modifiable risk factors are associated with CVD, including hyperlipidemia, hypertension, hyperglycemia, diabetes mellitus, smoking, and obesity. According to the WHO, 80% of CVD is due to modifiable risk factors.

### Treatment options

Treatment may include lifestyle changes, drugs, medical and surgical procedures, pacemakers, and cardiac rehabilitation.

### Rationale for yoga

Current treatment options are not without limitations given the cost of treatment and side-effects. Yoga therapy as a complement to standard treatment may offer a cost-effective strategy with minimal side-effects. Yoga has been shown to reduce stress and to lead to improvements in cardiovascular response and recovery.

### General methods

The authors conducted a review of published randomized controlled trials (RCTs) on yoga for modifiable risk factors for CVD in relevant databases. Modifiable risk factors include: blood pressure, heart rate, respiratory rate, abdominal obesity, blood-lipid levels, insulin resistance, oxidative stress, inflammatory markers, and atherosclerosis. Forty-four RCTs were identified and included in this review. Nonrandomized and single-group studies were excluded.



### *Who was studied?*

The population groups of the studies targeted in this review included healthy participants ( $n = 21$ ), nondiabetic participants with high risk for CVD (including hypertension, prehypertension, metabolic syndrome, obesity, dyslipidemia, or impaired insulin resistance [ $n = 12$ ]), and participants with type 2 diabetes mellitus ( $n = 11$ ). Participants' mean age ranged from 10.8 to 75.4 years with a median of 48.2 years. (Note: 11 RCTs did not report mean age.)

### *How were the studies in the review conducted?*

- Yoga styles included Hatha, Iyengar, Sudarshan Kriya, Viniyoga, Kundalini, Restorative, Silver, Ashtanga, Vinyasa, and the Yoga Synergy Water Sequence.
- Control groups included no treatment, usual care, or active controls. Thirty RCTs compared yoga to usual care or no treatment. For trials with active control, 12 RCTs used exercise interventions and six used psychological or educational interventions.
- RCTs that included at least one of the following primary outcomes were included: blood pressure (systolic, diastolic); heart rate; respiratory rate; waist circumference; waist-hip ratio; blood lipid levels (e.g., levels of total cholesterol, LDL, HDL, VLDL, triglycerides); insulin resistance (assessed as fasting blood insulin levels, fasting blood glucose, etc.); oxidative stress; inflammatory markers; and atherosclerosis.
- Sample sizes ranged from 16 to 420 with a total of 3,168 participants.
- Most RCTs involved 20 to 60 minutes of daily home practice. The duration of the yoga intervention ranged from 3 days to 1 year with 39 RCTs including programs of 8 weeks or longer. Frequency of yoga classes ranged from once per week to 2, 3, or 5 times per week. Class duration ranged from 30 to 120 minutes.

### *What did the researchers find?*

Note that this review reports the results of a meta-analysis, which is a synthesis of the results from individual studies according to specific group. Usually the groups are clustered by defined conditions and similar outcomes. In this case, the groupings for analysis are yoga as compared to type of control and by subgroups (i.e., healthy, at-risk, and diabetics). The meta-analysis then looks at the overall effects by combining the statistical results of each individual study. This overall effect has greater statistical power than the statistical findings of an individual study alone.

- For all study populations and outcomes, studies that compared yoga to usual care or no treatment showed significant improvements (as summarized by overall effect sizes in a meta-analysis of included studies) for systolic ( $n = 17$  studies) and diastolic blood pressure ( $n = 17$  studies), heart rate ( $n = 9$  studies), respiratory rate ( $n = 3$ ), waist circumference ( $n = 5$ ), waist-to-hip ratio ( $n =$

3), total cholesterol ( $n = 12$ ), HDL ( $n = 12$ ), VLDL cholesterol ( $n = 3$ ), triglycerides ( $n = 13$ ), and insulin resistance ( $n = 2$ ). Overall evidence for LDL cholesterol, fasting blood glucose, fasting blood insulin, and HbA1c (a measure of long-term control of blood sugar) did not reach an overall significant effect.

- For studies that compared yoga to exercise, there were significant overall improvements for blood levels of HDL. Other outcomes in studies comparing yoga to exercise did not achieve statistical significance.
- In RCTs that included healthy participants, significant effects of yoga as compared to usual care or no treatment were found for respiratory rate and triglycerides.
- In RCTs that included healthy participants, significant effects of yoga as compared to exercise were found in overall improvements for systolic blood pressure.
- In RCTs that included nondiabetic participants with high risk of CVD, significant effects of yoga as compared to usual care or no treatment were found for systolic and diastolic blood pressure, waist circumference, triglycerides, and insulin resistance.
- In RCTs that included type 2 diabetes participants, significant effects of yoga as compared to usual care or no treatment were found for waist-to-hip ratio, total cholesterol, triglycerides, and fasting blood glucose. Significant effects of yoga compared to exercise, in this population, were found for HDL and LDL.
- No further significant group differences were found in the remaining outcomes and subgroups.

### *Were adverse events reported?*

Out of 44 RCTs, only 11 reported safety-related information. For those 11 trials, no serious adverse events were reported. Overall, yoga is a relatively safe intervention in these populations.

### *What were the limitations of the studies?*

This systematic review and meta-analysis included a critical appraisal of the quality of evidence, namely, assessing the risk of bias in the studies. The critical appraisal found a risk of selection bias (lack of randomization), detection bias (inadequate blinding), and publication bias (only positive results reported) for the included studies. Although the accumulated number of studies on yoga for CVD is larger (with 44 RCTs) than most other diseases or conditions, due to the potential for bias robust benefits for yoga on CVD risk factors cannot be determined.

### **What is the take-away message from this review?**

This systematic review and meta-analysis was conducted on the best available evidence for yoga on a spectrum of modifiable risk factors in CVD. The evidence supports clinically important effects of yoga on a number of CVD outcomes, including safety, as an adjuvant or ancillary intervention for

healthy people and for participants at risk for CVD. It is important to note that given the risk of bias found in the methodology, a conclusive statement cannot be made.

### **Clinical relevance**

Practicing yoga regularly appears to improve a number of risk factors for CVD, and numerous studies report benefits. These studies aside, from the success of Dr. Dean Ornish's comprehensive lifestyle program for heart disease, which included a number of yogic elements like stress reduction, group support, and a plant-based diet, we can conclude that a multifaceted yoga intervention appears to be both safe and effective

in not only arresting—but reversing—the progression of blockages in coronary arteries. Furthermore, that program has proved cost-effective, and is now reimbursed by the U.S. government and some private insurers. Although methodological problems in the studies to date limit the conclusions scientists can reach about yoga's effectiveness, there is abundant evidence—both experimental and experience-based (among yoga teachers and therapists)—to move forward with efforts to employ yoga to help those with or at risk for CVD. It should be noted that the yoga practices in the Ornish program are mild. A cautious yoga therapy approach, done if possible in conjunction with the client's healthcare practitioners, seems prudent.