



Original Research Article

Effect of Yoga Therapy on Body Weight in Coronary Artery Disease Patients

Author

Dr Rastogi Priyank MD

Assistant Professor of Medicine, Department of Medicine, North DMC Medical College and Hindu Rao Hospital, Delhi, India

Corresponding Author

Dr Priyank Rastogi

261, Aravali apartments, Alaknanda, New Delhi- 110019 Delhi India

Email: monty_rastogi@yahoo.com, Mobile no: +91-9654839709

Abstract

Objectives: *The study was conducted to find out the effect of yoga on body weight in CAD patients.*

Methods: *This prospective, controlled study included the CAD patients between the ages 30 to 70 years who were randomised to yoga group (group A, n=51) and control group (group B, n=51). The yoga group patients were prescribed a family based yoga programme including dietary modifications, stress management and asanas in addition to the conventional drug treatment for CAD. The control group received conventional drug therapy alone. The patients were assessed at baseline and thereafter, at the end of 3 and 6 months.*

Results: *At the end of six months group A patients showed significantly greater improvement in clinical parameter of body weight (reduction of 5.23% paired t-test p-value < 0.05) at the end of six months vis-à-vis the control group B patients.*

Conclusions: *In the present study, we witnessed a substantial and significant beneficial effect of yoga on clinically significant parameter like body weight in CAD patients.*

Keywords: *Yoga, Coronary Artery Disease (Cad), Body Weight.*

INTRODUCTION

There has been an alarming increase over the past two decades in the prevalence of CAD and cardiovascular mortality in India and other south Asian countries. With increasing understanding about the role of stress, anxiety and depression in causation of lifestyle related disorders like CAD, there has been a renewed interest in age old remedies like yoga among medical practitioners and researchers alike in their management.

The word yoga means "union" in Sanskrit and implies the union occurring between the mind, body and spirit. It is a systematic way of lifestyle, health and spirituality that evolved over a period of some 5000 years in Indian peninsula. The mainstay of yoga practice involves the adoption and maintenance of specific body postures and associated controlled breathing techniques.

Body weight is an important predictor of cardiovascular and all-cause mortality in the

general population. Numerous disorders and coronary artery disease risk factors such as dyslipidemia, hypertension (HTN), reduced insulin sensitivity, diabetes mellitus, left ventricular (LV) hypertrophy, certain cancers, and sleep apnea are associated with increased body weight^(1,2,3). Obesity has significant negative impact on cardiovascular disease, including hypertension, coronary artery disease, heart failure, and arrhythmias via its maladaptive effects on individual cardiovascular disease risk factors and cardiac structure and function⁽⁴⁾. Studies have also demonstrated that obesity is an independent risk factor (CAD) and heart failure (HF) and is associated with an increased risk of morbidity and mortality^(5,6,7). The Framingham Heart Study, a large scale prospective study that reported follow-up data for more than 2 decades has documented that obesity is an independent predictor of clinical CAD⁽⁸⁾. Thus, the totality of evidence indicates a strong association between increased body weight and CAD.

Obesity affects basically all stages of the cardiovascular disease and has therefore evolved as a relevant risk marker and goal of therapy in cardiovascular prevention and disease. The underlying pathophysiologic mechanisms with overweight and obesity that might confer an increased risk for CAD include accelerated progression of atherosclerosis⁽⁹⁾, increased circulating blood volume and systemic vascular resistance⁽¹⁰⁾, induction and promotion of a hyperinflammatory state⁽¹¹⁾, an increase in vascular thromboxane receptor gene expression⁽¹²⁾, and obesity-mediated reduction in insulin sensitivity.

Objectives

Against this backdrop, studies are being conducted to explore the role of age-old Indian concept of yoga as a viable, inexpensive and relatively safe tool in the management of CAD worldwide. The objective of this study was therefore to find out whether yoga has a positive effect on the body weight which in turn has a

significant bearing on the outcome in patients of CAD.

MATERIAL AND METHODS

The study was a prospective, controlled trial in which patients of angina and myocardial infarction (MI) were enrolled and followed for six months conducted in 2008-2010 at Department of Medicine, LLRM Medical College, Meerut. The survey of literature was done using resources in the library of North DMC medical college, Delhi and documents, publications and correspondence with some of the leading yoga research institutes in India like Morarji Desai National Institute of Yoga (MDNIY), New Delhi and internet resources. Among the internet resources, relevant literature on 'yoga in cardiac disease', 'body weight and cardiac health' were extensively referred. The citations of relevance were selected and reviewed.

Inclusion Criteria

Patients of Stable Angina and post MI, Patients of both sexes between the ages of 30 and 70 years, Patients who consented for completing the entire span of project within six months, Patients who were mentally and physically fit up to a minimum level required to participate in the study were included.

Exclusion Criteria

Patients aged less than 30 years, Patients with history of acute MI in recent past (within last 2 months) and unstable angina pectoris, Patients with clinically significant Cardiac failure, Patients with LV Ejection fraction (LVEF) <20%, Patients who had already undergone coronary angioplasty or bypass surgery, Any substance abuse, mental illness or conditions, which in the opinion of investigator would make it difficult for the potential participant to participate in the intervention were excluded.

Detailed history was recorded and thereafter, all the patients participating in the study were subjected to thorough clinical assessment and routine investigations. The patients were randomly assigned to one of the following two groups with enrolment of 51 patients in each group:

Group A (Study Group/ Yoga Group): Patients of MI and angina on conventional drug treatment for CAD and undergoing yoga therapy.

Group B (Control Group): Patients of MI and angina on conventional drug treatment for CAD and not undergoing yoga therapy.

Patients in the study group were advised strict yoga based lifestyle modification. Concept of yoga which includes correct routines and positive attitudes, yogic diet were explained to the participants. They were trained in yogic techniques and asanas useful for heart like *tadasana*, *padhastasana*, *vajrasana*, *shashankasana*, *pawanmuktasana*, *shavasana* and *pranayama*. Techniques and illustrations of these alongwith the necessary precautions were given to each participant in the form of *yog pustika*, published in Hindi, the local language. Participants were told to practice yoga regularly for at least 60-80 minutes a day. All asanas were not mandatory (especially for patients with LV Ejection Fraction between 20-30%). Patients with LVEF 20-30% were prescribed only mild asanas which they could perform without discomfort.

Patients were assessed at baseline and at the end of six months for clinical parameter like body weight. Mean and standard deviation alongwith change on this parameter were calculated for each group at baseline and at 6 months. Significance of difference within each group was calculated by paired t-test and between yoga and control groups was calculated by independent t-test. The significance level of 5% has been considered for reporting the results. The calculations were done either manually or using SPSS (Statistical Package for Social Sciences) software.

A total of 102 patients were randomly allocated to either Group A (Study Group/ Yoga Group) or Group B (Control Group). A fairly large number of them (91 patients) completed the study. While in Group A (patients undergoing yoga therapy in addition to conventional drug treatment for CAD), out of 51 patients who were enrolled, 46 patients (90.2%) completed 6 months follow up and the rest were lost in the follow up, in the Group B

(patients on conventional drug treatment for CAD not undergoing yoga therapy), out of 51 enrolled patients, 45 patients (88.2%) completed their 6 months follow up (Table 1).

RESULTS

The baseline characteristics of the patient population are detailed in Table 2. It can be seen from the Table that there was no significant difference between the study and the control groups at baseline in any of the characteristics examined (independent t-test p-value > 0.05) and thus it can be inferred that both the groups reflect the same population.

It can be concluded from Table 3 that there is a significant reduction of 5.23% (paired t-test p-value < 0.05) in mean weight of the patients in the yoga group (Group A) at the end of six months. The mean body weight in study group decreased from 64.41.kg at baseline to 61.04 kg at the end of 6 months of study giving a net improvement of 3.37 kg in mean body weight. In the control group patients, there was no statistically significant change from baseline value (paired t-test p-value > 0.05). It is also evident from the same Table that while at baseline, there was no statistically significant difference between the yoga and control groups (independent t-test p-value > 0.05), the difference became significant at the end of six months (independent t-test p-value < 0.05). This can be attributed to the significantly beneficial impact of yoga on body weight.

Table 1: Study and control group distribution

Group	Patients enrolled	Patients who completed 6 months follow up
Group A (Study Group)	51	46 (90.2%)
Group B (Control Group)	51	45 (88.2%)
Total	102	91

Table 2 Baseline characteristics of study and control groups

S.N	Parameter	Study group	Control group	P-value (independent t-test)
	Mean weight (kg)	64.41 ± 7.74	63.62 ± 5.61	0.58
12	Mean age (years)	52.89 ± 8.83	54.36 ± 11.64	0.50
13	Percentage of males	76.09	73.33	0.76*
14	Percentage of females	23.91	26.67	0.76*

NYHA= New York Heart Association; BP= Blood Pressure; *= Chi-square Test P-value

Table 3 Weight at baseline and 6 months

Group	Pre study (baseline)	Post study (at 6 months)	Mean difference	Difference in percentage	P- value within the group (paired t-test)
	Mean weight (kg)	Mean weight (kg)			
Yoga group (Group A)	64.41 ± 7.74	61.04 ± 6.46	-3.37	-5.23%	<0.001
Control group (Group B)	63.62 ± 5.61	63.71 ± 5.67	+0.09	0.14%	0.67
P- value (independent t-test)	0.58	0.04			

DISCUSSION

In the last few decades, numerous studies have been conducted to evaluate the effect of exercise training and yoga on clinical parameters like body weight. It was with the landmark study conducted by Ornish *et al.* in 1983 that the world started to look into the role of yoga and lifestyle modification on CAD risk factors with interest⁽¹³⁾. Thereafter, a study done by Schmidt and colleagues, demonstrated a decrease of 5.7 kg of average body weight in healthy adults after 3 months of yoga practice⁽¹⁴⁾. Similarly, Mahajan et al reported a significant loss in mean body weight from 72.26 to 70.48 kg among subjects with risk factors for CAD after 4-day residential yoga practice followed by 14 weeks of 1 h daily home practice⁽¹⁵⁾. Thus, most studies have demonstrated beneficial effect of yoga therapy on body weight. However, studies examining the role of yoga on body weight in the patients of established CAD have been limited. A notable study among them was conducted by Manchanda et al which showed a 7% loss of body weight among adult men with CAD after 1 year of yoga practice⁽¹⁶⁾. In another study done by Yogendra et al, all overweight adult CAD patients reached a normal weight within 1 year after initiating yoga-based lifestyle modifications⁽¹⁷⁾.

The results of our study are consistent with those of the above mentioned studies. The patients in the yoga group *vis-à-vis* control group showed a

significant improvement in clinical parameters like body weight (reduction of 5.23% paired t-test p-value < 0.05) at the end of 6 months of study. In absolute terms, the mean body weight of study group decreased by 3.37 kg from baseline mean body weight of 64.41 kg to 61.04 kg at the end of 6 months.

Studies looking at the impact of weight reduction in overweight and obese cardiac patients have been controversial, some suggesting better clinical outcomes, whereas others indicating no benefits and, in fact, some studies have even suggested detrimental effects citing the so called 'obesity paradox'. A potential explanation for this paradox may be that the obese patients present with CAD and undergo revascularisation procedures at a younger age than their non obese counterparts and consequently may present with low risk coronary anatomy⁽¹⁸⁾. Moreover, in a recent study, marked improvements were noted in CAD risk factors, including C-reactive protein, lipids, and glucose, among patients with CAD who lost weight; this group had a trend for lower mortality^(19,20). Therefore, these data indicate that the goal of weight reduction in obese CAD patients should not be ignored as a risk factor just because an obesity paradox exists.

LIMITATIONS OF THE STUDY

The mechanism of the beneficial effect of yoga in the management of hyperlipidemia and obesity cannot be explained by simple excess caloric expenditure since the practice of asanas does not bring about increased, rapid large muscle activity and energy generation. Hence further studies are needed to elucidate the mechanisms involved in weight reduction through yoga.

CAD has a chronic course and studies may be done over longer period of time to demonstrate the effect of yoga therapy on natural history of the disease. We recommend further large scale and multi-centric trials for longer follow up with intensive investigative approach to calibrate the benefits of yoga therapy in patients of angina and MI and to determine the optimal duration and intensity required to maximize the effectiveness of yoga.

CONCLUSIONS

Obesity is a powerful risk factor in CAD. Yoga therapy (in conjunction with conventional drug treatment for CAD) has a significant beneficial effect in reducing body weight in patients of CAD and improving overall prognosis. Thus, purposeful weight reduction with the help of yogic lifestyle and exercise training should be emphasized, particularly for the more obese patients with CAD.

ACKNOWLEDGEMENTS

1. Dr TVS Arya, Dr G.K. Aneja, Dr. Abha Gupta, Professors of Medicine, LLRM medical college, Meerut for their guidance and support in completing the research.

2. All patients who participated in the study.

REFERENCES

1. Artham SM, Lavie CJ, Milani RV, Ventura HO. The obesity paradox: impact of obesity on the prevalence and prognosis of cardiovascular diseases. *Postgrad Med.* 2008;120:34–41.
2. Klein S, Burke LE, Bray GA, et al. Clinical implications of obesity with specific focus on cardiovascular disease: a statement for professionals from the American Heart Association Council on Nutrition, Physical Activity, and Metabolism: endorsed by the American College of Cardiology Foundation. *Circulation.* 2004;110:2952–2967.
3. Lavie CJ, Milani RV, Ventura HO. Obesity and cardiovascular disease: risk factor, paradox, and impact of weight loss. *J Am Coll Cardiol.* 2009;53:1925–1932.
4. Artham S, Lavie C, Milani R, Ventura H. Obesity and Hypertension, Heart Failure, and Coronary Heart Disease— Risk Factor, Paradox, and Recommendations for Weight Loss *The Ochsner Journal* 2009 9:124–132.
5. Kenchaiah S, Evans JC, Levy D, et al. Obesity and the risk of heart failure. *N Engl J Med.* 2002;347:305–313.
6. Jousilahti P, Tuomilehto J, Vartiainen E, et al. Body weight, cardiovascular risk factors, and coronary mortality: 15-year followup of middle-aged men and women in eastern Finland. *Circulation.* 1996;93:1372–1379.
7. Miller MT, Lavie CJ, White CJ. Impact of obesity on the pathogenesis and prognosis of coronary heart disease. *J Cardiometab Syndr.* 2008;3:162–167.
8. Hubert HB, Feinleib M, McNamara PM, Castelli WP. Obesity as an independent risk factor for cardiovascular disease: a 26-year follow-up of participants in the Framingham Heart Study. *Circulation.* 1983;67:968–977.
9. McGill HC Jr, McMahan CA, Herderick EE, et al. Pathobiological Determinants of Atherosclerosis in Youth (PDAY) Research Group. Obesity accelerates the progression of coronary atherosclerosis in young men. *Circulation.* 2002;105:2712–2718.
10. Rahmouni K, Correia ML, Haynes WG, et al. Obesity-associated hypertension: new

- insights into mechanisms. Hypertension. 2004;45:9–14.
11. Festa A, D'Agostine R Jr, Williams K, et al. The relation of body fat mass and distribution to markers of chronic inflammation. *Int J Obes Relat Metab Disord.* 2001;25:1407–1415.
 12. Traupe T, Lang M, Goettsch W, et al. Obesity increases prostanoid mediated vasoconstriction and vascular thromboxane receptor gene expression. *J Hypertens.* 2002;20:2239–2245.
 13. Ornish D et al. Can lifestyle changes reverse heart disease? The lifestyle heart trial. *Lancet* 1990; 336:129-133.
 14. Schmidt T, Wijga A, Von Zur Muhlen A, Brabant G, Wagner TO. Changes in cardiovascular risk factors and hormones during a comprehensive residential three month kriya yoga training and vegetarian nutrition. *Acta Physiol Scand Suppl* 1997;640:158–62.
 15. Mahajan AS, Reddy KS, Sachdeva U. Lipid profile of coronary risk subjects following yogic lifestyle intervention. *Indian Heart J* 1999;51:37–40.
 16. Manchanda SC, Narang R, Reddy KS, Sachdeva U, Prabhakaran D, Dharmanand S, et al. Retardation of coronary atherosclerosis with yoga lifestyle intervention. *J Assoc Physicians India* 2000;48:687–94.
 17. Yogendra J, Yogendra HJ, Ambardekar S, Lele RD, Shetty S, Dave M, et al. Beneficial effects of yoga lifestyle on reversibility of ischaemic heart disease: caring heart project of International Board of Yoga. *J Assoc Physicians India* 2004;52:283–9.
 18. Oreopoulos A, Padural R, Norris CM et al. Effect of obesity on short and long term mortality post coronary revascularisation: a meta analysis. *Obesity* 2008, 16:442-450.
 19. Lavie CJ, Milani RV, Artham SM. Combating the obesity paradox— benefits and safety of purposeful weight loss in overweight and obese coronary patients. *J Am Coll Cardiol.* 2008;5(10 suppl A):A107.
 20. Lavie CJ, Morshedi-Meibodi A, Milani RV. Impact of cardiac rehabilitation on coronary risk factors, inflammation, and the metabolic syndrome in obese coronary patients. *J Cardiometab Syndr.* 2008;3: 136–140.