Cardiovascular Responses to Immersion in a Hot Tub in Comparison with Exercise in Male Subjects with Coronary Artery Disease

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Relaxing in a hot tub is a common activity in the United States with more than 2 million residential units and thousands of tubs at hotels and fitness facilities. A small number of deaths have been associated with hot tub use (usually in situations where the water temperature was excessive) and the U.S. Consumer Products Safety Commission recommended a maximal water temperature of 40°C and a maximal immersion duration of 20 to 30 minutes. At public facilities a warning sign is usually posted near the hot tub indicating that persons with heart disease or other conditions should receive medical clearance before entering the tub. In addition, the user is usually advised to limit immersion to 15 minutes. Data concerning the cardiovascular system’s response to hot tub use, especially in patients with heart disease, is very limited and the risks may be exaggerated. In Finland, sauna use is almost universal, including patients with documented coronary artery disease. Data suggest that sauna use is not associated with cardiac events either during or immediately after exposure to the high temperatures of the sauna.

The purpose of this study was to determine the body temperature and cardiovascular responses to hot tub immersion in a group of heart patients and compare these responses to those during aerobic exercise. Subjects were 15 men (average age 59 years) with documented coronary artery disease, with the majority having a history of myocardial infarction or coronary bypass surgery. Patients received standard cardiac medications. Left ventricular ejection fractions ranged from 31% to 71% (mean: 55%). All subjects underwent treadmill exercise testing not more than 1 month prior to the study. Average exercise capacity was approximately 8 metabolic equivalents. Three subjects exhibited definite ischemic electrocardiographic findings during exercise testing. The subjects were immersed in a standard hot tub (400°C) for 15 minutes. A continuous electrocardiogram was measured in addition to periodic blood pressure, skin temperature (non-immersed skin), and body core temperature (tympanic temperature). Blood was removed by a venous access line for catecholamine determination. On a different day, at the same time of day, subjects performed cycle ergometer exercise at an intensity requiring 60% to 70% of heart rate reserve for 15 minutes. The same physiologic measurements were made. The order of the hot tub and cycle ergometer trials was randomized for each subject. For hot tub immersion, body temperature increased 10°C compared with exercise. Skin temperature decreased slightly during exercise and increased 0.8°C with immersion. Peak heart rate was lower during hot tub immersion than for exercise (85 vs 112 beats/min) as was the blood pressure (106/61 vs 170/83, on average). As subjects stood to leave the hot tub, systolic blood pressure decreased by an average of 11 mmHg. Three subjects reported slight light-headedness. Plasma norepinephrine concentration increased during exercise but not during immersion. No electrocardiographic evidence of ischemia or clinical complications occurred during exercise or immersion.

The authors concluded that the physiologic responses differed between hot tub immersion and moderate cycle exercise for the same duration. Cardiovascular responses to immersion were less severe than for moderate exercise. Patients with stable coronary artery disease who can exercise without difficulty are unlikely to experience problems while using a hot tub for 15 minutes at a temperature of 40°C. Hot tub users should be aware of possible transient hypotension when they stand to exit the tub. Patients with hypotension at rest or orthostatic hypotension should probably not use hot tubs.