

Effect of Repeated Sauna Treatment on Exercise Tolerance and Endothelial Function in Patients With Chronic Heart Failure

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Repeated sauna treatment, known as Waon therapy, has been shown to improve cardiac function as well as exercise tolerance in patients with chronic heart failure. However, the underlying mechanisms of this therapy regarding these improvements remain to be elucidated. Forty-one patients with chronic heart failure (mean age 68.3 ± 13.5 years old) underwent Waon therapy 5 times a week for 3 weeks. Before and after treatment, a number of assessments were performed in all subjects: 6-minute walk test, echocardiography, determination of neurohumoral factors and number of circulating CD34+ cells, and a flow-mediated dilation (FMD) test of endothelial function. Cardiopulmonary exercise testing was also performed in 20 patients. Waon therapy increased the left ventricular ejection fraction (from $30.4 \pm 12.6\%$ to $32.5\% \pm 12.8\%$, $p = 0.023$) and reduced plasma levels of norepinephrine (from 400 ± 258 to 300 ± 187 pg/ml, $p = 0.015$) and brain natriuretic peptide (from 550 ± 510 to 416 ± 431 pg/ml, $p = 0.035$). Waon therapy increased the 6-minute walk distance (from 337 ± 120 to 379 ± 126 m, $p < 0.001$) in association with an improvement in FMD (from $3.5 \pm 2.3\%$ to $5.5\% \pm 2.7\%$, $p < 0.001$) and an increase in the number of circulating CD34+ cells ($p = 0.025$). Changes in 6-minute walk distance were correlated positively with those in the left ventricular ejection fraction and FMD and negatively with those in plasma levels of norepinephrine and brain natriuretic peptide levels. A multivariate analysis revealed that an increase in FMD was the only independent determinant of 6-minute walk distance improvement. Finally, Waon therapy significantly increased peak Vo_2 , and this increase was also correlated with changes in FMD. In conclusion, repeated sauna therapy in patients with chronic heart failure improves exercise tolerance in association with improvement in endothelial function.

<http://www.sciencedirect.com/science/article/pii/S0002914911025586>