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The Cardiovascular Effects of Upper-Limb Aerobic Exercise in Hypertensive Patients

Timm H. Westhoff[a], Sven Schmidt[a], Viola Gross[a], Marian Joppke[a], Walter Zidek[a], Markus van der Giet[a,*], Fernando Dimeo[b,*]

Background: Aerobic exercise is broadly recommended as a helpful adjunct to obtain blood pressure control in hypertension. Several hypertensive patients, however, are limited by musculoskeletal complaints or vascular occlusive disease from lower-limb exercise such as jogging or cycling. In the present randomized-controlled study, we evaluate whether an aerobic arm-cycling program provides a measurable cardiovascular benefit.
Methods: Twenty-four probands were randomly assigned to sedentary activity or a heart rate controlled 12 week exercise program, consisting of arm-cycling at target lactate concentrations of 2.0 ± 0.5 mmol/l. Endothelial function was assessed by flow-mediated dilation of the brachial artery. Augmentation index and large/small artery compliance (C_1 and C_2) were measured by computerized pulse-wave analysis of the radial artery.
Results: The exercise program led to a significant reduction in systolic (134.0 ± 20.0 to 127.0 ± 16.4 mmHg; $P=0.03$) and diastolic blood pressure (73.0 ± 21.6 to 67.1 ± 8.2 mmHg; P U 0.02) accompanied by a significant improvement in C_2 (3.5 ± 1.6 to 4.8 ± 2.0 ml/mmHg T 100; $P=0.004$). Flow-mediated dilation, augmentation index, and C_2 were not significantly affected ($P>0.05$). Physical performance as derived from lactate and heart rate curves of lower-limb stress tests was unchanged, whereas maximal workload in an upper-limb ergometry significantly increased ($P=0.005$). Blood pressure and vascular parameters remained unchanged in the control group.
Conclusion: Regular arm aerobic exercise leads to a marked reduction in systolic and diastolic blood pressures and an improvement in small artery compliance. Arm-cycling is a reasonable option for hypertensive patients who want to support blood pressure control by sports despite having coxarthrosis, gonarthrosis, or intermittent claudication.
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Keywords: arm, arterial compliance, endothelial function, exercise, hypertension.

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Abbreviations: AI, Augmentation index; BP, Blood pressure; C_1, Large artery compliance; C_2, Small artery compliance; FMD, Flow-mediated dilation

[a]Department of Nephrology and [b]Section of Sports Medicine, Charite – Campus Benjamin Franklin, Hindenburgdamm, Berlin, Germany

Correspondence to Dr. med. Timm H. Westhoff, Charité – Campus Benjamin Franklin, Department of Nephrology, Hindenburgdamm 30, 12200 Berlin, Germany
phone: +49 30 8445 641420; fax: +49 30 8445 4235;
e-mail: timm.westhoff@charite.de

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