

Beneficial Effects of Arm Ergometry Exercise Training for Severe Claudication and Ischemic Rest Pain: Preliminary Data

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Background: Patients with severe PAD are often unable to engage in walking exercise due to activity-induced ischemic pain. Arm ergometry offers a pain-free and possibly better-tolerated exercise alternative, but its efficacy has not been demonstrated in this population.

Purpose: To determine the feasibility and efficacy of 12 weeks of arm ergometry exercise on upper extremity aerobic capacity, walking, and tissue oxygenation of the feet (TCpO₂) in patients with severe PAD.

Methods: Participants (n=7) with severe claudication or ischemic rest pain and an ABI < 0.5 completed 12wks, 3 times/week, of supervised arm ergometry exercise training. Treadmill walking distance (1mph/0%grade), upper body aerobic capacity, change in TCpO₂ from seated to supine, resting and exercise heart rate, blood pressure, and VO₂, were assessed at baseline and after 12 weeks of training.

Results: Preliminary data (Wilcoxon Signed Ranks) demonstrate significant (Z=2.4, p=.018) post-exercise training improvements in median walking distance (107 m, range=26-148 m; 31-224% increase) and upper body exercise time (5.6 min., range= 3-9 min.). From baseline to 12 weeks, median supine TCpO₂ increased 10mmHg (range=6 to 58mmHg; Z=2.2, p=.03). Resting SBP also trended toward improvement (-18mmHg range=+4 to -34mmHg; p=ns), as did submaximal VO₂, SBP, HR, and peak VO₂ during upper body exercise, indicating a systemic influence on leg outcomes.

Summary: Arm ergometry exercise training is feasible for participants with severe PAD and is effective in improving walking distance and exercise ability in this population. Aerobic arm exercise may offer an exciting new approach for exercise in this population whose claudication limits their ability to exercise.

Demographic and Medical Variables	
<u>Variable</u>	<u>Mean (sd)</u>
Age in Years	76 (6.6)
Lowest Resting ABI	0.39 (.07)
Pack Years	55.8 (22.2)
<u>Variable</u>	<u>Percent</u>
Male	86%
Diabetes	57%
Hypertension	100%
Dyslipidemia	85.7%
Past/Current Smoking	100%
Leg Revascularization	50%
Coronary Heart Disease	100%

Change in Major Outcome Variables Before and After 12 Weeks of Exercise Training (n=7)

Variable	Change: Median (Range)	Variable	Change: Median (Range)
Walk Distance (meters)	107.3 (26.8-148.4)* Z=2.4; p=.02	Resting SBP (mmHg)	-18 (-34-4)
Exercise Time (minutes)	5.6 (3-9)* Z=2.4; p=.02	Stage1 SBP (mmHg)	-14 (-22-22)
Supine TcPO ₂ (mmHg)	9.5 (6-58)* Z=2.2; p=.03	Resting HR (BPM)	0 (-17-14)
Stage 1 Vo ₂ (mg/kg)	-18.0 (-85-60)	Stage 1 HR (BPM)	0 (-22-9)
Peak VO ₂ (mg/kg)	82.5 (-114-254)		

*Wilcoxon Matched Pairs from Baseline to 12 weeks p<.05