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High-Intensity Exercise on the ROM Training Device Improves VO2 Max and Endurance Capacity in Untrained Adults

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The importance of sports and physical activity for the maintenance and improvement of health and physical fitness is increasingly recognized. However, most people do not allow themselves the time to engage in a conventional, high volume – moderate intensity training program. A less time consuming, yet equally effective program could solve this problem.

Purpose: To investigate whether the VO2 Max and endurance capacity of healthy, untrained adults can be improved by a high-intensity – low-volume exercise program using a whole body training device, the so-called ROM machine.

Methods: 16 healthy, untrained subjects (12 men, 4 women, age 36 ±10 years) exercised for 8 weeks, 3 times a week. Net exercise time per session was 8 minutes. In every session, first the upper body was exercised for 4 minutes and then, after a short break, the lower body was exercised for the same length of time. The upper body exercise is more or less similar to rowing, with resistance in both movement directions. The lower body exercise can be described as deep stepping. Subjects were encouraged to train at their maximal intensity. Total net exercise time over 8 weeks was 3 hours and 12 minutes. Before and after the training period, two tests on a cycle ergometer were conducted: one progressive test to determine VO2 max, maximal power output (Wmax) and maximal heart rate (HRmax) and one constant power test until exhaustion at 80% VO2 max to determine endurance capacity.

Results: Both VO2max (39.6 ± 4.7 vs. 41.0 ± 4.8 ml/kg*min,$p=0.01$) and Wmax (248 ± 64 vs. 272 ± 66W,$p<0.01$) increased significantly over the training period, while HRmax (182 ± 8 vs. 181 ± 8 bpm) did not change. There was a significant increase of 72% in endurance time at 80% VO2max (14:51 ± 6:31 vs. 25:31 ± 11.57 min,$p<0.01$).

Conclusion: Whole body, high-intensity training on the ROM training device is a time efficient way to improve VO2max and especially endurance capacity in healthy, untrained adults.

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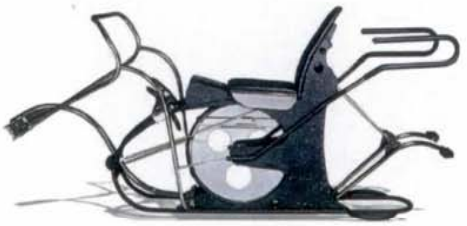


High-intensity exercise on the ROM training device improves VO_2max and endurance capacity in untrained adults

INTRODUCTION

The importance of sports and physical activity for the maintenance and improvement of health and physical fitness is increasingly recognized. However, most people do not allow themselves the time to engage in a conventional, high volume - moderate intensity training program. A less time consuming, yet equally effective program could solve this problem. This study investigated whether the physical fitness of healthy, untrained volunteers in the age group 20-55 years can be improved by a specific kind of high intensity training: the so called Fast Fit concept. The training program consisted of three eight-minute exercise sessions per week on the so called ROM training device.

METHODS

Twelve men and four women (age 36 ± 10 years) trained for eight weeks, three times a week. In every session, first the upper body was exercised for four minutes and then, after a short break, the lower body was exercised for the same length of time. The upper body exercise is more or less similar to rowing, with resistance in both movement directions. The lower body exercise can be described as deep stepping. Subjects were encouraged to train at their maximal intensity. Total net exercise time over eight weeks was 3 hours and 12 minutes. Before and after the training period, two tests on a cyle ergometer were conducted; one progressive test to determine maximal oxygen uptake (VO_2max), maximal power output (Wmax) and maximal heart rate (HRmax) and one constant power test until exhaustion at 80% VO2max to determine endurance capacity.

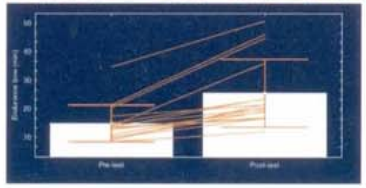
RESULTS

The training induced (see table):

- a significant increase of VO_2max;
- a significant increase of the endurance time in cycling at 80% VO_2max (see fig.);
- a significant increase of maximal external power during a progressive cycling test.

No injuries or other adverse effects were recorded.

	Pre-test Mean ± SD	Post-test Mean ± SD	Relative change	p-value
VO_2max (ml/kg/min)	39.8 ± 4.7	43.0 ± 4.8	+8.0%	0.01*
Endurance time VO_2max test (min)	15:00 ± 01:45	15:50 ± 01:53	+5.5%	0.01*
Maximal power output (Watt)	248 ± 54	272 ± 66	+9.7%	0.00*
HR/R at VO_2max	1.13 ± 0.16	1.10 ± 0.07	-1.6%	0.40
Maximal heart rate (bpm)	182 ± 9	181 ± 8	-0.8%	0.44
Endurance time 80% VO_2max test (min)	14:51 ± 06:31	25:31 ± 11:57	+71.8%	0.00*
Mean VO_2 80% VO_2max test (ml/kg/min)	33.0 ± 4.1	31.0 ± 4.1	-6.3%	0.01*
Mean RER 80% VO_2max test	0.98 ± 0.05	0.96 ± 0.04	-3.7%	0.00*



DISCUSSION

The effect of training depends on the intensity, duration and frequency of training and the length of the training period. In the table below, the training effects in this study are compared to some conventional training schedules. Eight weeks of training on the ROM training device is very time efficient in improving VO_2max. However, the improvement per week of training is more pronounced in training programs with more training time.

Study	Training weeks	Training time (min)	VO_2max increase (%)	Increase per week (%)	Minutes training per 1% increase
Suzuki et al (1998)	12	1800	4.5	0.38	400
McKenzie et al (2000)	7.5	1425	14.8	1.95	231
Tabata et al (1996)	6	1800	8.4	1.57	191
Gorostiaga et al (1991)	8	720	7.6	0.93	97
v Es & vd Loo (2006)	8	432	3.5	0.44	86

Both the increase in VO_2max and the increase in endurance time at 80% VO_2max are comparable with the effects found in other studies on high intensity training (Gorostiaga et al, 1991; Tabata et al, 1996; Burgomaster et al, 2005; Franch et al, 1998).

CONCLUSION

Whole body, high-intensity training on the ROM training device is a time efficient way to improve VO_2max and especially endurance capacity in healthy, untrained adults.

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