

Effects of Exercise Training on Sleep Apnoea in Patients with Coronary Artery Disease:

A Randomised Trial

Supplemental material

2. METHODS

2.3 Cardio-pulmonary exercise test (continued)

The cardio-pulmonary exercise test was performed on a treadmill in 11 and 10 subjects in the exercise and control groups, respectively and on a cycle ergometer in 6 and 7 subjects in the exercise and control groups, respectively. Four weeks later this test was repeated using the same modality as at baseline. $\text{VO}_{2\text{peak}}$ and peak heart rate were taken as the highest attained 20-s average values. For the cycle-ergometer protocol, the workload was increased by 16.7 watts every minute and breath-by-breath gas samples were collected and averaged over a 20 s period via calibrated metabolic cart (VMAX Encore and Spectra - CareFusion). The Bruce protocol was used for patients being tested on the treadmill [1]. $\text{VO}_{2\text{peak}}$ and the anaerobic threshold (AT) were determined, the latter by the V-slope method [2]. A 12 lead electrocardiogram (Quinton – Q-Stress system) was monitored continuously.

2.5 Objective assessment of physical activity (continued)

This included all formal exercise sessions both in- and out-of-centre, as well all steps taken at other times during the entire 4 weeks. Before wearing the pedometer, it was programmed for the subject's stride length and weight to ensure accuracy of the step count obtained. Subjects were asked to wear the pedometer on their right hip for all waking hours of the day for 7 consecutive days at baseline prior to randomization. The total number of steps per day was

added across the 7 days and divided by 7 to obtain the average number of steps-per-day.

Following randomization, participants in the exercise group wore the pedometer during the 4-week intervention to objectively measure their compliance with the exercise training and to monitor unsupervised activity.

For the IPAQ, metabolic equivalent task (MET) minutes were computed by multiplying predefined MET scores by the minutes of a specific activity performed to weigh each type of activity by its energy requirement (i.e. for walking, 3.3 was used as the MET score).

Table S1. Polysomnographic data in men only.

	Exercise (n=16)		Control (n=14)		Between- Groups P value
	Baseline	Follow-up	Baseline	Follow-up	
AHI (events/h of sleep)	31.4 ± 13.3	21.4 ± 10.7	28.0 ± 14.1	26.1 ± 16.1	0.079
Obstructive AHI (events/h of sleep)	25.2 ± 13.8	18.9 ± 10.2	20.3 ± 12.2	19.2 ± 14.5	0.33
Central AHI (events/h of sleep)	7.2 ± 10.2	3.8 ± 5.1	8.4 ± 15.7	12.5 ± 25.7	0.26
REM AHI	36.0 ± 21.6	31.5 ± 19.3	38.7 ± 22.5	32.4 ± 14.2	0.50
NREM AHI	37.2 ± 33.1	23.7 ± 20.0	26.0 ± 16.3	26.0 ± 18.0	0.05
Supine AHI (events/h of sleep)	51.7 ± 28.5	39.7 ± 26.5	41.0 ± 16.1	40.8 ± 27.6	0.48
Non-supine AHI (events/h of sleep)	22.7 ± 25.2	14.7 ± 10.5	19.3 ± 17.8	29.8 ± 27.8	0.055

Data expressed as mean ± standard deviation.

* p < 0.05 between baseline and follow-up (within group).

Abbreviations: REM: rapid-eye movement; AHI: apnoea-hypopnoea index; NREM: non-rapid eye movement; SaO₂: arterial oxygen saturation; OSA: obstructive sleep apnoea; CSA: central sleep apnoea.

Table S2. Changes in fluid volumes and upper-airway cross-sectional area in men only.

	Exercise (n=16)		Control (n=14)		Between Groups P-value
	Baseline	Follow-up	Baseline	Follow-up	
Evening body weight (kg)	80.1 ± 13.5	80.2 ± 14.9	85.2 ± 15.0	84.9 ± 14.9	0.52
Overnight change in weight (kg)	-0.7 ± 0.2	-0.8 ± 0.2	-0.7 ± 0.3	-0.9 ± 0.3	0.46
Evening CC (cm)	36.4 ± 2.8	36.2 ± 2.9	36.7 ± 2.9	36.5 ± 2.9	0.88
Overnight change in CC (cm)	-1.2 ± 0.4	-0.8 ± 0.4	-1.3 ± 0.4	-1.1 ± 0.6	0.16
Evening LFV (ml)	4930.6 ± 805.4	4581.0 ± 919.1	4714.1 ± 1353.1	4574.0 ± 1130.4	0.18
Morning LFV (ml)	4333.3 ± 676.6	4254.7 ± 676.4	4264.2 ± 1200.1	4219.2 ± 113.6	0.66
Overnight change in LFV (ml)	-597.3 ± 218.1	-468.6 ± 168.5*	-449.9 ± 174.6	-415.1 ± 138.8	0.021
Evening TFV (ml) ^a	1632.2 ± 410.9	1567.3 ± 445.8	1715.7 ± 643.8	1559.8 ± 669.2	0.68
Morning TFV (ml) ^a	1751.8 ± 444.9	1705.2 ± 444.0	1836.3 ± 685.0	1692.1 ± 713.4	0.77
Overnight change in TFV (ml) ^a	119.5 ± 93.3	138.1 ± 73.7	120.6 ± 93.8	137.0 ± 80.7	0.96

Evening NC (cm)	42.0 ± 2.7	41.9 ± 2.8	40.1 ± 2.1	40.2 ± 2.2	0.11
Morning NC (cm)	43.1 ± 2.7	42.7 ± 2.7	40.8 ± 2.2	41.0 ± 2.4	0.06
Overnight change in NC (cm)	1.1 ± 0.5	0.8 ± 0.3*	0.7 ± 0.4	0.8 ± 0.3	0.03
Evening NFV (ml) ^a	366.3 ± 70.9	321.0 ± 88.5	318.6 ± 79.7	307.4 ± 78.8	0.29
Morning NFV (ml) ^a	401.1 ± 77.8	350.0 ± 93.1	342.6 ± 78.4	328.1 ± 87.4	0.29
Overnight change in NFV (ml) ^a	39.2 ± 16.0	29.0 ± 18.5	24.0 ± 10.5	20.6 ± 11.5	0.47
Evening UA-XSA (cm ²) ^c	2.64 ± 0.66	2.81 ± 0.47	2.89 ± 0.50	2.77 ± 0.52	0.21
Morning UA-XSA (cm ²) ^c	2.44 ± 0.59	2.90 ± 0.46*	2.67 ± 0.59	2.51 ± 0.64	0.006
Overnight change in UA-XSA(cm ²) ^c	-0.20 ± 0.22	0.09 ± 0.23*	-0.20 ± 0.21	-0.26 ± 0.53	0.07

Baseline and follow-up values are mean ± standard deviation.

* p < 0.05 between baseline and follow-up (within group).

^aData for 13 and 11 participants in the exercise and control groups, respectively.

^cData for 11 and 10 participants in the exercise and control groups, respectively.

Abbreviations: CC: calf circumference; LFV: leg fluid volume; TFV: thoracic fluid volume; NC: neck circumference; NFV: neck fluid volume; UA-XSA: upper-airway cross-sectional area.

REFERENCES

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