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[Intervention Review]

# Water-based exercise training for chronic obstructive pulmonary disease

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## ABSTRACT

### Background

Land-based exercise training improves exercise capacity and quality of life in people with chronic obstructive pulmonary disease (COPD). Water-based exercise training is an alternative mode of physical exercise training that may appeal to the older population attending pulmonary rehabilitation programmes, those who are unable to complete land-based exercise programmes and people with COPD with comorbid physical and medical conditions.

### Objectives

To assess the effects of water-based exercise training in people with COPD.

### Search methods

A search of the Cochrane Airways Group Specialised Register of trials, which is derived from systematic searches of bibliographic databases, including the Cochrane Central Register of Controlled Trials (CENTRAL), MEDLINE, EMBASE, CINAHL, AMED and PsycINFO, was conducted (from inception to August 2013). Handsearching was done to identify further qualifying studies from reference lists of relevant studies.

### Selection criteria

Review authors included randomised or quasi-randomised controlled trials in which water-based exercise training of at least four weeks' duration was compared with no exercise training or any other form of exercise training in people with COPD. Swimming was excluded.

### Data collection and analysis

We used standard methodological procedures expected by The Cochrane Collaboration.

### Main results

Five studies were included with a total of 176 participants (71 people participated in water-based exercise training and 54 in land-based exercise training; 51 completed no exercise training). All studies compared supervised water-based exercise training versus land-based exercise training and/or no exercise training in people with COPD (with average forced expiratory volume in one second (FEV<sub>1</sub>) %predicted ranging from 39% to 62%). Sample sizes ranged from 11 to 53 participants. The exercise training programmes lasted from four to 12 weeks, and the mean age of participants ranged from 57 to 73 years. A moderate risk of bias was due to lack of reporting of randomisation, allocation and blinding procedures in some studies, as well as small sample sizes.

Compared with no exercise, water-based exercise training improved the six-minute walk distance (mean difference (MD) 62 metres; 95% confidence interval (CI) 44 to 80 metres; three studies; 99 participants; moderate quality evidence), the incremental shuttle walk distance

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(MD 50 metres; 95% CI 20 to 80 metres; one study; 30 participants; high quality evidence) and the endurance shuttle walk distance (MD 371 metres; 95% CI 121 to 621 metres; one study; 30 participants; high quality evidence). Quality of life was also improved after water-based exercise training compared with no exercise (standardised mean difference (SMD) -0.97, 95% CI -0.37 to -1.57; two studies; 49 participants; low quality evidence). Compared with land-based exercise training, water-based exercise training did not significantly change the six-minute walk distance (MD 11 metres; 95% CI -11 to 33 metres; three studies; 62 participants; moderate quality evidence) or the incremental shuttle walk distance (MD 9 metres; 95% CI -15 to 34 metres; two studies; 59 participants; low quality evidence). However, the endurance shuttle walk distance improved following water-based exercise training compared with land-based exercise training (MD 313 metres; 95% CI 232 to 394 metres; two studies; 59 participants; moderate quality evidence). No significant differences were found between water-based exercise training and land-based exercise training for quality of life, as measured by the St George's Respiratory Questionnaire or by three of four domains of the Chronic Respiratory Disease Questionnaire (CRDQ); however, the fatigue domain of the CRDQ showed a statistically significant difference in favour of water-based exercise (MD -3.00; 95% CI -5.26 to -0.74; one study; 30 participants). Only one study reported long-term outcomes after water-based exercise training for quality of life and body composition, and no significant change was observed between baseline results and six-month follow-up results. One minor adverse event was reported for water-based exercise training (based on reporting from two studies; 20 participants). Impact of disease severity could not be examined because data were insufficient.

### Authors' conclusions

There is limited quality evidence that water-based exercise training is safe and improves exercise capacity and quality of life in people with COPD immediately after training. There is limited quality evidence that water-based exercise training offers advantages over land-based exercise training in improving endurance exercise capacity, but we remain uncertain as to whether it leads to better quality of life. Little evidence exists examining the long-term effect of water-based exercise training.

## PLAIN LANGUAGE SUMMARY

### Water-based exercise training for people with chronic obstructive pulmonary disease

**Question:** We wanted to compare the safety and effectiveness of water-based exercise (but not swimming) training in people with chronic obstructive pulmonary disease (COPD) versus no exercise or a different kind of exercise in terms of exercise capacity and quality of life.

**Background:** Land-based exercise training (such as walking or cycling) improves exercise capacity and quality of life in people with COPD. Water-based exercise training is an alternative mode of physical exercise training that may appeal to the older population, those who are unable to complete land-based exercise programmes and people with COPD who also have other physical and medical conditions. We did not include swimming interventions.

**Study characteristics:** Five studies were identified up to August 2013. These studies included a total of 176 participants, with 71 people participating in water-based exercise training, 54 people participating in land-based exercise training and 51 people completing no exercise training. The average age of participants ranged from 57 to 73 years. The water-based exercise training programmes varied from four to 12 weeks in duration with attendance two to three times a week for between 35 and 90 minutes. The water-based exercises were designed to be as similar as possible to the exercises conducted in the land-based exercise sessions. The most common types of exercises were walking and cycling-type movements in the water, as well as strength training, most often using floats to increase the intensity.

**Key results:** Participants who completed a water-based exercise training programme could walk an average of 371 metres farther than those who completed no exercise training and 313 metres farther than those who completed land-based exercise training. Quality of life also improved in participants who completed water-based exercise training, and significantly better quality of life was reported in these participants compared with those who completed no exercise training. Little information was provided to show whether these effects last for a long time after training has ceased. The effect that severity of COPD may have on benefits of water-based exercise training needs further examination. Two studies reported on adverse events; one minor adverse event was documented (from 20 people participating in water-based exercise training).

**Quality of the evidence:** The quality of evidence contributing to these results was generally low to moderate. This was mainly a result of poor study design and not enough data.