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Appraisal

Critically appraised paper: Supplemental oxygen during exercise training provides no benefit over medical air for people with chronic obstructive pulmonary disease who are normoxaemic at rest but who desaturate during exercise

Synopsis

Summary of: Alison JA, McKeough ZJ, Leung RWM, Holland AE, Hill K, Morris NR, et al. Oxygen compared to air during exercise training in COPD with exercise-induced desaturation. *Eur Respir J* 2019 Mar 17 https://doi.org/10.1183/13993003.02429-2018. [Epub ahead of print].

Question: In people with chronic obstructive pulmonary disease who are normoxaemic at rest and desaturate during exercise, does the provision of supplemental oxygen during exercise training when compared with room air optimise the gains in exercise capacity and health-related quality of life? ***Design***: Randomised controlled trial with concealed allocation and blinded participants, therapists and outcome assessors. ***Setting***: Seven tertiary hospitals across Australia. ***Participants***: Inclusion criteria were people: with chronic obstructive pulmonary disease with nadir oxygen saturations $< 90\%$ on the better of two 6-minute walk tests performed on room air; with a more than 10 pack-year smoking history; and who were medically stable (at least 4 weeks after an exacerbation). Exclusion criteria were people: receiving long-term oxygen therapy; with a resting partial pressure of arterial oxygen on room air of < 55 mmHg or a partial pressure of arterial carbon dioxide of > 50 mmHg; who had participated in any supervised exercise training in the last 12 months; and/or who had severe cardiovascular, neurological or musculoskeletal conditions that were likely to adversely affect performance during assessments or exercise training. Randomisation of 111 participants allocated 58 to an intervention group and 53 to a control group. ***Interventions***: Both groups underwent 8 weeks of supervised treadmill walking and stationary cycling performed three times per week. During the training program, the intervention group received intranasal oxygen at 5 l/minute from an oxygen concentrator and the control group received intranasal air at 5 l/minute from an oxygen concentrator modified to deliver air. ***Outcome measures***: The primary outcomes were endurance exercise capacity measured by the endurance shuttle walk test, and health-related quality of life measured by the total score of the Chronic Respiratory Disease Questionnaire. ***Results***: A total of 97 participants completed the study (52 in the intervention group and 45 in the control group). At completion of the exercise program there was no difference between the intervention and control groups for endurance exercise capacity (MD 15 seconds, 95% CI −106 to 136) or health-related quality of life (MD 0.0, 95% CI −0.3 to 0.3). ***Conclusion***: In people with chronic obstructive pulmonary disease who are normoxaemic at rest but who desaturate during exercise, providing supplemental oxygen during exercise training does not offer additional benefit over room air in the magnitude of training-related gains in endurance exercise capacity or health-related quality of life.

Provenance: Invited. Not peer reviewed.

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Commentary

About 30 to 40% of people with chronic obstructive pulmonary disease have exercise-induced oxygen desaturation.[1] These people improve their 6-minute walk distance when receiving supplemental oxygen.[2] Therefore, it seems reasonable to provide supplemental oxygen during exercise training to those who have exercise-induced oxygen desaturation. This would allow an increase in the actual training intensity and, in turn, result in greater improvement in endurance shuttle walk time compared with exercise training on room air.[3]

In a well-designed, multicentre, randomised controlled trial, Alison and colleagues showed that endurance shuttle walk time and health status improved significantly following 8 weeks of exercise training in people with chronic obstructive pulmonary disease that presented exercise-induced oxygen desaturation. No greater benefit was found from training with supplemental oxygen compared with medical air. These findings were unanticipated.[4] Does the exercise training stimulus overpower the small-to-moderate physiological benefit of supplemental oxygen? The answer remains unknown. However, participants in the 'oxygen group' did not achieve higher training loads. Indeed, both groups increased the training dose per treadmill session, and there was no between-group difference in mean training dose over the 24 training sessions. Interestingly, participants in the 'oxygen group' had significantly higher mean oxygen saturation in the last 5 minutes of the 20-minute treadmill training session compared with the 'air group', and significantly lower dyspnoea and rate of perceived exertion scores. This may, at least in part, be due to the fact that the training intensity was fixed at the level of 'moderate-to-somewhat severe' dyspnoea or rate of perceived exertion (a score of 3 to 4 on the modified 0 to 10 scales).

To conclude, life without oxygen is impossible; but exercise training without supplemental oxygen is possible in people with chronic obstructive pulmonary disease who have exercise-induced oxygen desaturation.

Provenance: Invited. Not peer reviewed.

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