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[Intervention Review]

Pulmonary rehabilitation for chronic obstructive pulmonary disease

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ABSTRACT

Background

Widespread application of pulmonary rehabilitation (also known as respiratory rehabilitation) in chronic obstructive pulmonary disease (COPD) should be preceded by demonstrable improvements in function (health-related quality of life, functional and maximal exercise capacity) attributable to the programmes. This review updates the review reported in 2006.

Objectives

To compare the effects of pulmonary rehabilitation versus usual care on health-related quality of life and functional and maximal exercise capacity in persons with COPD.

Search methods

We identified additional randomised controlled trials (RCTs) from the Cochrane Airways Group Specialised Register. Searches were current as of March 2014.

Selection criteria

We selected RCTs of pulmonary rehabilitation in patients with COPD in which health-related quality of life (HRQoL) and/or functional (FEC) or maximal (MEC) exercise capacity were measured. We defined 'pulmonary rehabilitation' as exercise training for at least four weeks with or without education and/or psychological support. We defined 'usual care' as conventional care in which the control group was not given education or any form of additional intervention. We considered participants in the following situations to be in receipt of usual care: only verbal advice was given without additional education; and medication was altered or optimised to what was considered best practice at the start of the trial for **all** participants.

Data collection and analysis

We calculated mean differences (MDs) using a random-effects model. We requested missing data from the authors of the primary study. We used standard methods as recommended by The Cochrane Collaboration.

Main results

Along with the 31 RCTs included in the previous version (2006), we included 34 additional RCTs in this update, resulting in a total of 65 RCTs involving 3822 participants for inclusion in the meta-analysis.

We noted no significant demographic differences at baseline between members of the intervention group and those who received usual care. For the pulmonary rehabilitation group, the mean forced expiratory volume at one second (FEV_1) was 39.2% predicted, and for the usual care group 36.4%; mean age was 62.4 years and 62.5 years, respectively. The gender mix in both groups was around two males for

each female. A total of 41 of the pulmonary rehabilitation programmes were hospital based (inpatient or outpatient), 23 were community based (at community centres or in individual homes) and one study had both a hospital component and a community component. Most programmes were of 12 weeks' or eight weeks' duration with an overall range of four weeks to 52 weeks.

The nature of the intervention made it impossible for investigators to blind participants or those delivering the programme. In addition, it was unclear from most early studies whether allocation concealment was undertaken; along with the high attrition rates reported by several studies, this impacted the overall risk of bias.

We found statistically significant improvement for all included outcomes. In four important domains of quality of life (QoL) (Chronic Respiratory Questionnaire (CRQ) scores for dyspnoea, fatigue, emotional function and mastery), the effect was larger than the minimal clinically important difference (MCID) of 0.5 units (dyspnoea: MD 0.79, 95% confidence interval (CI) 0.56 to 1.03; N = 1283; studies = 19; moderate-quality evidence; fatigue: MD 0.68, 95% CI 0.45 to 0.92; N = 1291; studies = 19; low-quality evidence; emotional function: MD 0.56, 95% CI 0.34 to 0.78; N = 1291; studies = 19; mastery: MD 0.71, 95% CI 0.47 to 0.95; N = 1212; studies = 19; low-quality evidence). Statistically significant improvements were noted in all domains of the St. George's Respiratory Questionnaire (SGRQ), and improvement in total score was better than 4 units (MD -6.89, 95% CI -9.26 to -4.52; N = 1146; studies = 19; low-quality evidence). Sensitivity analysis using the trials at lower risk of bias yielded a similar estimate of the treatment effect (MD -5.15, 95% CI -7.95 to -2.36; N = 572; studies = 7).

Both functional exercise and maximal exercise showed statistically significant improvement. Researchers reported an increase in maximal exercise capacity (mean Wmax (W)) in participants allocated to pulmonary rehabilitation compared with usual care (MD 6.77, 95% CI 1.89 to 11.65; N = 779; studies = 16). The common effect size exceeded the MCID (4 watts) proposed by Puhan 2011(b). In relation to functional exercise capacity, the six-minute walk distance mean treatment effect was greater than the threshold of clinical significance (MD 43.93, 95% CI 32.64 to 55.21; participants = 1879; studies = 38).

The subgroup analysis, which compared hospital-based programmes versus community-based programmes, provided evidence of a significant difference in treatment effect between subgroups for all domains of the CRQ, with higher mean values, on average, in the hospital-based pulmonary rehabilitation group than in the community-based group. The SGRQ did not reveal this difference. Subgroup analysis performed to look at the complexity of the pulmonary rehabilitation programme provided no evidence of a significant difference in treatment effect between subgroups that received exercise only and those that received exercise combined with more complex interventions. However, both subgroup analyses could be confounded and should be interpreted with caution.

Authors' conclusions

Pulmonary rehabilitation relieves dyspnoea and fatigue, improves emotional function and enhances the sense of control that individuals have over their condition. These improvements are moderately large and clinically significant. Rehabilitation serves as an important component of the management of COPD and is beneficial in improving health-related quality of life and exercise capacity. It is our opinion that additional RCTs comparing pulmonary rehabilitation and conventional care in COPD are not warranted. Future research studies should focus on identifying which components of pulmonary rehabilitation are essential, its ideal length and location, the degree of supervision and intensity of training required and how long treatment effects persist. This endeavour is important in the light of the new subgroup analysis, which showed a difference in treatment effect on the CRQ between hospital-based and community-based programmes but no difference between exercise only and more complex pulmonary rehabilitation programmes.

PLAIN LANGUAGE SUMMARY

Pulmonary rehabilitation for chronic obstructive pulmonary disease

Chronic obstructive pulmonary disease (COPD) describes a chronic lung condition that prevents the air supply from getting to the lungs. Symptoms include breathlessness, coughing, tiredness and frequent chest infection. Worldwide, COPD is a major cause of ill health.

Pulmonary rehabilitation programmes include exercise as a key component; some programmes contain other interventions such as assessment, education, psychological support and dietary advice. Pulmonary rehabilitation is one of the key recommended approaches in the treatment of COPD. This review compared the impact of pulmonary rehabilitation versus usual care on the health-related quality of life of people with COPD. We included 65 studies involving 3822 participants. Participants were randomly assigned to receive pulmonary rehabilitation or usual care. The quality of the studies was generally good.

This review highlights that pulmonary rehabilitation improves the health-related quality of life of people with COPD. Results strongly support inclusion of pulmonary rehabilitation as part of the management and treatment of patients with COPD.

Future studies should concentrate on identifying the most important components of pulmonary rehabilitation, the ideal length of a programme, the intensity of training required and how long the benefits of the programme last.