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Cochrane Corner

A systematic Cochrane Review of autogenic drainage (AD) for airway clearance in cystic fibrosis

Description of the condition

Cystic fibrosis (CF) is an autosomal recessive genetic condition affecting the gene that codes for the cystic fibrosis transmembrane conductance regulator (CFTR). This in turn interferes with the movement of chloride across the apical membrane of respiratory epithelial cells. Abnormal chloride transport affects the production of airway surface liquid, which disturbs the ability of the cilia to clear the airways [1]. This important physiological process (the mucociliary escalator) protects the airways and disruption of this process makes the airways vulnerable to the infections characterising CF lung disease. Once established, airway infection and inflammation exacerbate poor airway clearance. Together with increased mucus production, this leads to a cycle of chronic infection, inflammation and airway damage [2,3].

Description of the therapeutic intervention

Evidence from systematic reviews, including Cochrane Reviews, shows that exercise and airway clearance are important for maintaining respiratory health, even during early stages of the condition [4]. With more established airway infection, airway clearance techniques (ACTs) are critical to maintaining respiratory function and preventing the deterioration associated with infection and inflammation. Jean Chevaillier developed autogenic drainage (AD) as an ACT in 1967 [5]. It is characterised by breathing control using expiratory airflow to mobilise secretions from smaller to larger airways. Secretions are cleared independently by adjusting the depth and speed of respiration in a sequence of controlled breathing techniques during exhalation. The technique requires training, concentration and effort from the individual.

Why it is important to do this review

All ACTs are time-consuming and require effort and commitment from the individual [6]. Whilst AD initially requires training and support from therapists, it is popular with many people with CF as it allows independence from carers, is recognised to be effective in the modulation of airflow and is capable of augmenting the physiological process of the body's mucociliary escalator. It is important that interventions which have cost implications and are a burden on the time of people with CF are systematically reviewed for evidence of efficacy.

What comparisons were made in this review?

This review compared the clinical effectiveness of AD in people with CF with other physiotherapy ACTs. The primary outcomes were lung function testing (FEV1) and quality of life (QoL). Secondary outcomes included patient preference, exercise tolerance, adverse events, admissions to hospital and extra treatment, other lung function testing, oxygen saturation, sputum weight and survival.

Our review included randomised and quasi-randomised controlled studies comparing AD to all other ACTs or no therapy in people with CF for at least two sessions. Two review authors independently searched relevant databases, extracted data, and assessed the risk of bias of included studies using the Cochrane risk of bias tool [7].

Main results

Searches identified 21 studies (35 references) and we included seven studies [8–14]; six were published as full papers and one as an abstract. The authors of the abstract have kindly provided the full study report [9]. Included studies compared AD to one or more recognised ACTs including positive expiratory pressure (PEP) [9,13,14], active cycle of breathing technique (ACBT) [11,14], conventional physiotherapy (postural drainage and percussion (PD&P)) [9–11], and oscillatory devices (Flutter® [8,14], Cornet® [14], and high frequency chest wall oscillation (HFCWO) [14]). These techniques have been evaluated by other reviews [15–18]. Exercise is commonly used as an alternative therapy by people with CF; however, no identified study compared exercise

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with AD. Included studies reported on 208 randomised participants (sample size between 17 and 75). Study duration ranged from four days to two years. One study was of parallel design [14] with the remaining six being cross-over studies; five of which used a two-arm design [8,10–13] and one used a three-arm design [9]. Participant age ranged from seven to 63 years with a wide range of disease severity reported. Six studies enrolled participants who were clinically stable, whilst participants in one study had been hospitalised with an infective exacerbation [12].

Heterogeneity between studies meant data meta-analysis was not possible for most outcomes. The quality of the evidence was generally low or very low. The main reasons for downgrading the level of evidence, using the GRADE approach [19], were the frequent use of cross-over design, outcome reporting bias and the inability to blind participants.

All seven studies reported the review's primary outcome FEV1. Changes in FEV1 were not significantly different for AD compared to other ACTs. Three studies measured the impact of airway clearance on health-related QoL. However only one study used validated scales [14] and found measures of QoL (e.g., dyspnoea) in the AD group were comparable with those observed in other treatmen groups. Two studies assessed personal preference in older children or adults; in one study participants preferred AD over PD&P [10], but the second study showed no difference between AD and ACBT [11]. Regarding the secondary outcomes, one study reported adverse events and described a decrease in oxygen saturation levels whilst performing ACBT with PD, but not with AD [11]. Six studies measured FVC and three studies measured mid peak expiratory flow (% predicted). Six studies reported sputum weight. Less commonly used outcomes included oxygen saturation levels, personal preference, hospital admissions or intravenous antibiotics.

Authors' conclusions

AD is challenging and requires commitment from the individual. As such, it is important that AD is reviewed to ensure its effectiveness for people with CF. From the studies assessed, AD was not found to be superior to any other form of ACT on the outcomes measured. It is comparable to other ACTs and may be considered as an alternative technique in individuals who are well-motivated and want to explore techniques that support their independence. It is important to consider the age-appropriateness of ACTs, particularly in younger people with CF who may find AD challenging. Furthermore, individual preference and acknowledgement of personal health beliefs are important factors in optimising adherence to airway clearance regimens suggested or offered [4].

Incorporating a validated personal preference tool, measures of adherence and health-related QoL in future research would promote a patient-centred approach to clinical practice and provide the clinical insight to respond to an individual's needs. Meaningful data from further long-term, randomised controlled studies utilising large cohorts to control for participant variability when comparing ACTs is required to rigorously evaluate AD and other ACTs.

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