Cochrane Database of Systematic Reviews - - Cochrane Review

Positive expiratory pressure physiotherapy for airway clearance in people with cystic fibrosis

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Study design (if review, criteria of inclusion for studies)

Randomised controlled studies in which PEP was compared with any other form of physiotherapy in people with CF.

List of included studies (28)

Braggion 1995; Costantini 2001; Darbee 1990; Darbee 2004; Darbee 2005; Fainardi 2011; Falk 1984; Falk 1993; Gaskin 1998; Hofmeyr 1986; Kofler 1998; Lagerkvist 2006; Lannefors 1992; McIlwaine 1991; McIlwaine 1997; McIlwaine 2001; McIlwaine 2013; Mortensen 1991; Newbold 2005; Pfleger 1992; Pryor 2010; Rodriguez 2016; Steen 1991; Tannenbaum 2005; Tyrrell 1986; van Asperen 1987; van Winden 1998; West 2010;

Participants

People with CF, of any age, diagnosed on the basis of clinical criteria and sweat testing or genotype analysis, with any degree of disease severity.

Interventions

PEP; Positive expiratory pressure physiotherapy

Outcome measures

Adherence: at least 85% of prescribed treatments performed; Adverse effects: gastro-oesophageal reflux; Adverse effects: gastro-oesophageal reflux sufficient to cause withdrawal; Forced expiratory flow 25 - 75 % (FEF 25-75); Forced expiratory volume in 1 second (FEV1); Forced vital capacity (FVC); Hospitalisations for respiratory exacerbation (number per participant); Participant preference: self-withdrawal due to lack of perceived effectiveness; Radiological imaging: change in Brasfield score; Radiological imaging: increased bronchial markings; Total lung capacity (TLC)

Main results

A total of 28 studies (involving 788 children and adults) were included in the review; 18 studies involving 296 participants were crossâ€•over in design. Data were not published in sufficient detail in most of these studies to perform any metaâ€•analysis. In 22 of the 28 studies the PEP technique was performed using a mask, in three of the studies a mouthpiece was used with nose clips and in three studies it was unclear whether a mask or mouthpiece was used. These studies compared PEP to ACBT, autogenic drainage (AD), oral oscillating PEP devices, highâ€•frequency chest wall oscillation (HFCWO) and BiPaP and exercise. Forced expiratory volume in one second was the review's primary outcome and the most frequently reported outcome in the studies (24 studies, 716 participants). Single interventions or series of treatments that continued for up to three months demonstrated little or no difference in effect between PEP and other methods of airway clearance on this outcome (lowâ€• to moderateâ€•quality evidence). However, longâ€•term studies had equivocal or conflicting results regarding the effect on this outcome (lowâ€• to moderateâ€•quality evidence). A second primary outcome was the number of respiratory exacerbations. There was a lower exacerbation rate in participants using PEP compared to other techniques when used with a mask for at least one year (five studies, 232 participants; moderateâ€• to highâ€•quality evidence). In one of the included studies which used PEP with a mouthpiece, it was reported (personal communication) that there was no difference in the number of respiratory exacerbations (66 participants, lowâ€•quality evidence). Participant preference was reported in 10 studies; and in all studies with an intervention period of at least one month, this was in favour of PEP. The results for the remaining outcome measures (including our third primary outcome of mucus clearance) were not examined or reported in sufficient detail to provide any highâ€•quality evidence; only very lowâ€• to moderateâ€•quality evidence was available for other outcomes. There was limited evidence reported on adverse events; these were measured in five studies, two of which found no events. In a study where infants performing either PEP or PDPV experienced some gastroâ€•oesophageal reflux , this was more severe in the PDPV group (26 infants, lowâ€•quality evidence). In PEP versus oscillating PEP, adverse events were only reported in the flutter group (five participants complained of dizziness, which improved after further instructions on device use was provided) (22 participants, lowâ€•quality evidence). In PEP versus HFCWO, from one longâ€•term highâ€•quality study (107 participants) there was little or no difference in terms of number of adverse events; however, those in the PEP group had fewer adverse events related to the lower airways when compared to HFCWO (highâ€•certainty evidence). Many studies had a risk of bias as they did not report how the randomisation sequence was either generated or concealed. Most studies reported the number of dropouts and also reported on all planned outcome measures.

Authors' conclusions

The evidence provided by this review is of variable quality, but suggests that all techniques and devices described may have a place in the clinical treatment of people with CF. Following metaâ€•analyses of the effects of PEP versus other airway clearance techniques on lung function and patient preference, this Cochrane Review demonstrated that there was highâ€•quality evidence that showed a significant reduction in pulmonary exacerbations when PEP using a mask was compared with HFCWO. It is important to note that airway clearance techniques should be individualised throughout life according to developmental stages, patient preferences, pulmonary symptoms and lung function. This also applies as conditions vary between baseline function and pulmonary exacerbations.

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See also

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Keywords

non pharmacological intervention - devices OR physiotherapy; Airway clearance technique; Airway clearance drugs -expectorants-mucolytic- mucociliary-; Chest physiotherapy; Positive-Pressure Respiration- PEP- pep mask; Active Cycle of Breathing Technique -ACBT-; forced expiration technique; High Frequency Chest Wall Oscillation -HFCWO-; VEST Airway Clearance System; oscillating devices; Acapella; flutter; Intrapulmonary Percussive Ventilation; Vibration; exercise; Autogenic drainage;