



Crackles' sensitivity to pulmonary rehabilitation

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Abstract

FEV₁, despite being the global outcome for chronic obstructive pulmonary disease (COPD), is poorly responsive to pulmonary rehabilitation (PR). Adventitious respiratory sounds, namely crackles, are a promising measure to assess the effectiveness of respiratory interventions on lung function. However, crackles' sensitivity to PR has never been explored. Thus, this study explored the sensitivity of crackles' characteristics to PR.

Sixteen patients with COPD (67±10yrs; 11 male) enrolled in a 12-week PR program. FEV₁ and respiratory sounds were assessed pre/post PR. Respiratory sounds were recorded simultaneously at posterior right/left chest using stethoscopes with microphones in the main tube. Airflow was standardised (1l/s) and recorded with a pneumotachograph. Breathing phases were automatically detected using the recorded airflow and crackles using an algorithm based on Hadjileontiadis & Rekanos (2003) and Sevcik (2010).

After PR, FEV₁ (70±23 vs 71±25pp; p=.472) and crackles' initial deflection width (IDW: 2±0.3 vs 2.3±0.4ms; p=.118), did not change. However, a decrease in the number of inspiratory (1.5±1 vs 1.1±0.7; p=.076) and expiratory (1.3±1 vs 0.5±0.3; p=.017) crackles was observed. Crackles' largest deflection width (LDW: 2.6±0.4 vs 3±0.4ms; p=.002), two cycle duration (2CD: 9.8±1.5 vs 11.2±1.5ms; p=.008) and frequency (183±33 vs 157±23Hz; p=.008) also changed significantly with the intervention.

Crackles' number, LDW, 2CD and frequency seem to be sensitive measures to lung function changes after PR. IDW was not sensitive to change. This may be due to difficulties in determine the beginning of a crackle. Future studies should explore crackles' sensitivity to PR with larger samples and distinct respiratory diseases.