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Title: Positive expiratory pressure therapy improves inspiratory capacity and physical activity in patients with chronic obstructive pulmonary disease

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Body: Background: Dynamic hyperinflation results in exercise limitation in chronic obstructive pulmonary disease (COPD). Breathing techniques with a positive expiratory pressure (PEP) may be used to improve pulmonary function. Objectives: A study was undertaken to investigate whether PEP device could improve lung function, exercise tolerance and quality of life in COPD patients. Methods: Eight COPD patients received the 20-minute breathing training with a PEP device twice daily (PEP group) and 8 COPD patients did not take any breathing training as a control group. The pulmonary function, including inspiratory capacity (IC), exercise capacity (6 minute walk test), limb muscle strength and the quality of life (SF-12 test) were measured for each patient before and following 2-month study period. Results: The IC of COPD patients receiving PEP training was significantly increased from 1.2 ± 0.3 to 1.3 ± 0.3 L ($n=8$, $p<0.05$). After 2 months, patients in the PEP group improved their walking distance (413.8 ± 59.3 meter) compared to baseline (373.4 ± 91.6 meter, $n=8$, $p<0.05$). The strength of limb muscles was significantly greater compared to baseline at 1 and 2 months in the PEP group. The score of SF-12 test was also significantly improved in PEP group (from 43.0 ± 7.7 to 50.0 ± 7.4 , $p<0.05$). There was no significant change in IC, walking distance, limb muscle strength and quality of life in the control group. Conclusions: Breathing control with a PEP device will not only improve the lung function, especially inspiratory capacity, but also better exercise capacity and physical activity of daily life in COPD patients.