

Development in PaCO₂ over 12 months in chronic hypoxic and hypercapnic COPD patients treated with high flow nasal cannula

- post hoc analysis from a randomized controlled trial

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Background

There is increasing evidence that high flow nasal cannula (HFNC) may reduce dyspnea and exacerbations and improve quality of life in COPD patients with chronic hypoxic failure (1). For patients with stable hypercapnia with PaCO₂ >7.0 kPa treatment with long term non-invasive ventilation (LT-NIV) is recommended.

Aim

To investigate development in PaCO₂ levels in COPD patients with chronic hypoxic and hypercapnic failure treated with HFNC and controls over a 12-month period.

Methods

In a post hoc analysis of a prospective randomized controlled trial of chronic hypoxic COPD patients in long term oxygen treatment, half of the included patients were randomized to HFNC. Patients with stable hypercapnia defined as PaCO₂ > 6.0 kPa were identified and included in this study. Patients were compared at baseline with paired t-test. Change in PaCO₂ was investigated with comparison of means.

Results

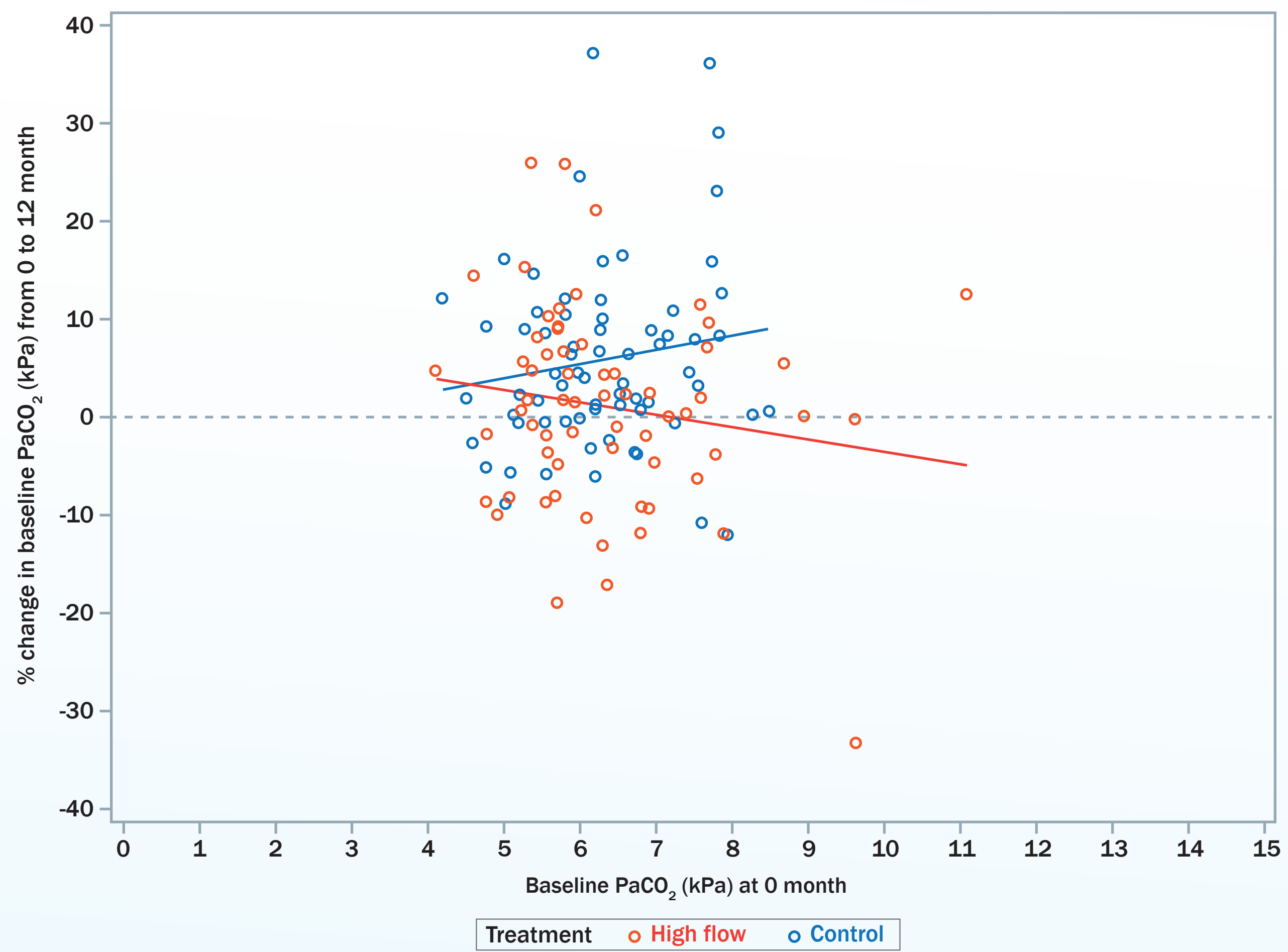
PaCO₂ was > 6.0 kPa in 53 patients treated with HFNC and 63 controls. Of those 31 HFNC patients and 43 controls remained in study for 12 months and were included. Patients were comparable at baseline, apart from mMRC-score (p=0.04) (Table 1). HFNC was used a mean of 6.9 hours/day. Percent changes in PaCO₂ per patient is demonstrated in figure 1. In average HFNC treated patients decreased PaCO₂ with 1.3%, were as controls increased 7.0% (p=0.004).

Table1: Baseline characteristics of patients with pCO₂ >6.0kPa at inclusion

	High flow	Control
Sex (% female)	68	70
Age (years)	67	68
Active smokers %	13	14
BMI	26,6	26
mMRC-score*	3.2	3.7
PaCO ₂ , kPa (on LTOT)	7.3	7.2
FEV1%	24.5	26.1

BMI: body mass index; mMRC-score: modified Medical Research Council score;
PaCO₂: Partial arterial pressure of carbon dioxide; LTOT: Long Term Oxygen therapy;
FEV1%: Forced expiratory volume in the first second, in percent of expected value .
*p=0.04

Figure 1: Change in PaCO₂, in percent, from baseline in the individual patients



Conclusion

PaCO₂ decreased in hypercapnic HFNC treated patients with mean PCO₂-levels within recommendations for LT-NIV, development of means decreased significantly, compared to controls.

Reference

(1) Storgaard LH, Hockey H, Laursen BS, Weinreich UM. Long-term effects of oxygen-enriched nasal high flow treatment in COPD with chronic hypoxemic respiratory failure. Int J Chron Obs Pulmon Dis 2018; 13: 1195–1205