Neural respiratory drive (NRD) among patients with COPD with mild or moderate airflow limitation: consistency, reliability, and association with other markers of breathlessness

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Background:

- Assessment of neural respiratory drive through activation of the respiratory muscles, provides a proxy measure of the central control of breathing.
- It describes the balance between respiratory muscle load and capacity.
- It is a novel objective measurement of breathlessness. It is predictive of clinical deterioration in hospitalized COPD patients.
- It correlates with the subjective measure of breathlessness in severe COPD in stable and exacerbating states.
- It is obtained by measurement of electrical activity (EMG) of parasternal muscles
- Its application in mild or moderate COPD (FEV₁ ≥ 50% predicted) and within primary care has not been researched in detail.

Aim:

To assess the feasibility of the measurement in primary care of NRD in patients with mild or moderate COPD.

To assess the consistency and reliability of NRD assessment and its association with subjective markers of breathlessness

Method:

- Confirmed COPD diagnosis and FEV₁ ≥ 50% predicted
- Use of inhaled corticosteroids ≥ 400mcg beclomethasone dipropionate equivalent daily.
- Exclusions: asthma diagnosis, severe airflow limitation, ≥2 moderate and ≥1 severe exacerbations in past
- Follow up at 3 and 6 months
- Outcome measures: Root Mean Squared (RMS) EMG max, NRDI, spirometry, quality of life measures (CAT, CRQ, mBorg, mMRC)

Results:

- 40 participants recruited to study from primary care
- NRD parameters (EMG rms max, NRDI) stable across three assessments over six months
- High intra-rater & inter-rater correlation across both NRD parameters (intraclass correlation coefficient >0.9)

Correlations between NRD parameters and airflow limitation across three assessments:

- EMG rms max & FEV₁ % predicted (r= -0.42, p= 0.01)
- NRDI & FEV₁ % predicted (r= -0.35, p= 0.04)

No consistent relationship between NRD parameters and measures of quality of life or breathlessness, over six months

Conclusion:

- Neural respiratory drive measurement feasible in primary care
- Acceptable and tolerated by participants
- Moderate correlation with degree of airflow limitation