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Title: Do severe asthma patients have altered sensitivity to carbon dioxide levels in the control of breathing when compared to healthy individuals?

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Body: Background: An existing theory suggests asthma patients are more sensitive to carbon dioxide (CO₂) and that small changes in CO₂ levels could induce hyperventilation. To date, little is known about the sensitivity of CO₂ in the control of breathing in severe asthma (SA) patients. Aim: To investigate the relationships between changes in end tidal carbon dioxide levels (ETCO₂) and changes in breathing pattern parameters (BPP) in SA patients and healthy individuals. Method: Ten SA patients and ten healthy individuals were recruited. BPP were monitored over 30 minutes of rest by respiratory inductive plethysmography. Changes in ETCO₂ and BPP were assessed by variability. Recorded parameters were: 1. Variability in tidal volume (VVt); 2. Variability in expiration time (VTe); 3. Variability in inspiratory time (VTi); 4. Variability in ETCO₂ levels (V-ETCO₂). Variability was assessed by coefficient of variation. Relationship between V-ETCO₂ and BPP were analysed by Pearson correlation coefficient. Symptom of hyperventilation (SH) was measured by Nijmegen questionnaire (NQ). Results: The SA group was positive for SH (NQ >23) whereas the healthy group was negative (NQ <23). The correlation coefficients were higher in the healthy group than SA group between V-ETCO₂ and VVt, V-ETCO₂ and VTe, and ETCO₂ and VTi. Statistical significant levels were reached in the healthy group but not in the SA group. Conclusion: The results suggest changes in BPP in SA group are less sensitive to changes in ETCO₂ levels than healthy individuals. This contradicts to existing theories and may impact on the design of breathing pattern interventions.