

Background

Various inhaled steroids exist that are differentiated by particle size, delivery vehicle, lung deposition, bioavailability, and important practical considerations like cost and relative ease of use.

Recent studies [1,2] have shown that inhaled Budesonide reduces time to COVID-19 recovery and urgent care requirements. Ciclesonide has been shown to prevent replication of COVID-19 in cultured cells [3]. Inhaled steroids also decrease SARS-CoV-2 receptor ACE2 through suppression of type I interferon [4].

Hypothesis: The routine use of specific inhaled steroids provides a protective advantage and prevents the development of COVID-19 infection as defined by a positive PCR test.

Methods

To test this hypothesis, I investigated the COVID-19 positivity rates in children and adults with diagnosis of Asthma on therapy with inhaled steroids. I obtained this tally data using the SlicerDicer reporting tool in Epic.

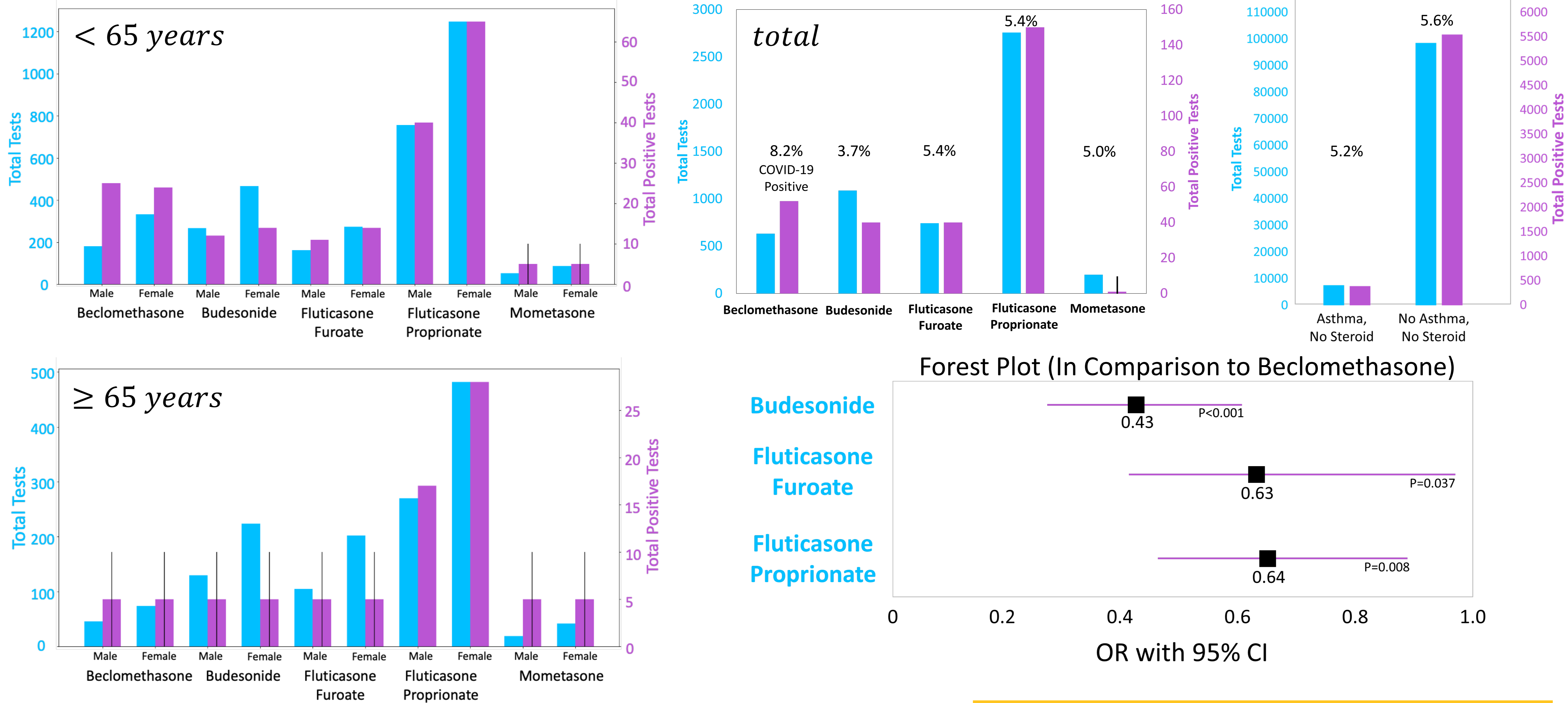
Inclusion Criteria

- ICD10 diagnosis of Asthma (J45) made within UCLA Health system.
- Outpatient prescription for either inhaled Beclomethasone, Budesonide, Fluticasone Propionate, Fluticasone Furoate, or Mometasone Furoate.
- One established follow/up visit within the past 2 years in the UCLA Health system.
- COVID-19 PCR testing obtained between January 1, 2020 and December 31, 2020.

Exclusion Criteria

- Prescription written for more than 1 inhaled steroid within a 2-year time period.
- Comorbid Cystic Fibrosis or COPD

Results



Discussion

All inhaled steroids, except for Mometasone (OR CI 0.01-1.18), were associated with lower odds compared to Beclomethasone of testing positive for COVID-19.

Beclomethasone is differentiated from the analyzed steroids by its extra-fine particle size and high systemic bioavailability with low first pass hepatic metabolism. The small particle size allows Beclomethasone to reach the alveoli where it can interact directly with SARS-CoV-2. Further studies assessing ACE2 expression and M1 alveolar macrophage polarization could determine if these risk factors are in any way worsened with the use of Beclomethasone. A direct comparison of in-vivo use of Beclomethasone and Ciclesonide (both extra-fine particles) may help determine if particle size alone is a risk factor for SARS-CoV-2 infection.

Limitations

- Unable to reliably ascertain or obtain:
- Severity of asthma
 - Associated biomarkers and PFT Data
 - Treatment adherence (routine follow/up used as surrogate for adherence).
 - Data on Ciclesonide (low n)

References

[1] Ramakrishnan *et al.*, 2021, *The Lancet*
 [2] Schultze and Douglas, 2021, *The Lancet*
 [3] Matsuyama *et al.*, 2020, *Journal of Virology*
 [4] Finney *et al.*, 2021, *Journal of Clinical Immunology*