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| **Smokers with asthma/hayfever have lower post-bronchodilator lung function during the pollen season** |
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| **Introduction/Aim:** No population-based study has examined the impact of the grass pollen season on post-bronchodilator spirometry or DLCO in adults. We assessed these relationships, and potential effect modification by individual, lifestyle, and environmental factors. **Methods:** We modelled the Tasmanian Longitudinal Health Study data from participants aged 51-53 years (n=2471) using multivariable linear regression to compare lung function tested in or out of the grass pollen season. Potential effect modification by self-reported allergic disease in the last 12 months (hay fever, asthma, grass pollen allergy symptoms, eczema), grass pollen sensitisation (SPT$\geq $3mm), inhaled corticosteroid (ICS) use, residential greenness, urbanisation, smoking, and traffic-related air pollution (TRAP) exposures were also investigated.**Results:** Grass pollen season was associated with lower pre- and post-bronchodilator (BD) FEV1/FVC and FEF25-75% in multiple at-risk groups (p-value for 3-way interaction<0.1) i.e. smokers with asthma/hay fever (e.g. smokers with asthma: Mean difference [95% CI] for post-BD zFEV1/FVC = -0.85 [-1.32, -0.28] and zFEF25-75% = -0.83 [-1.4, -0.2]), people with co-existing allergic diseases (e.g. eczema plus hay fever: post-BD zFEV1/FVC = -0.6 [-0.1, -0.2] and zFEF25-75% = -0.56 [-1.0, -0.1]), poor adherence to ICS, or living in urban areas within 200m of major roads. There was no strong evidence for interaction with grass pollen sensitisation (p-value for 3-way interaction ranged from 0.1 to 0.3). No evidence of an association was observed with DLCO.**Conclusion:** Distinct from classic asthma, lung function was lower during the grass pollen season in smokers with allergic respiratory disease, those with co-existing allergic diseases, poor ICS adherence or higher TRAP exposure. These individuals may need to be more closely monitored and possibly treated for lung function impairment during this period. **Grant Support:** National Health & Medical Research Council **Word count:** 280/300**Declaration of interest statement**: None**Key words**: Adults, grass pollen, lung function |