

Pesticides Are Associated With Allergic And Non-Allergic Wheeze Among Male Farmers

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Rationale: Farmers are at high risk for respiratory symptoms that may predict future adverse respiratory outcomes. While hays, grains, and animals are believed to be the primary causes of respiratory symptoms among farmers, evidence is growing that pesticides may also contribute. Our previous work suggested that allergic and non-allergic asthma were associated with exposure to specific pesticides.

Methods: We used data from the 2005-2010 interview of the Agricultural Health Study (AHS), a prospective study of farmers and their spouses in North Carolina and Iowa, to evaluate recent pesticide use and two types of wheeze (allergic and non-allergic) among men in the cohort. We used polytomous regression models adjusted for age, BMI, state, smoking, and current asthma, as well as overall frequency of pesticide application and driving diesel tractors to evaluate 80 specific chemicals reported by > 1% of the 22,134 men who completed the interview. Exposure to individual pesticides were characterized both as dichotomous (current use in the past year– yes/no) and categories of days/year used. Allergic wheeze was defined as reporting both wheeze and current allergy symptoms (n=1310, 6%), while non-allergic wheeze was defined as reporting wheeze but not current allergy symptoms (n=3939, 18%); those without wheeze (76%) served as the referent group.

Results: In models evaluating current pesticide use, 21 pesticides were significantly ($p<0.05$) associated with non-allergic wheeze (2 negative, 19 positive) and 17 pesticides were significantly associated with allergic wheeze (1 negative, 16 positive); ten pesticides were significantly associated with both. Seven pesticides (carbaryl, zeta-cypermethrin, dimethoate, 2,4-D, simazine, fenoxaprop-p-ethyl, and pyraclostrobin) had significantly different odds ratios for allergic and non-allergic wheeze, with all but fenoxaprop-p-ethyl being elevated for allergic wheeze. Associations with wheeze differed by chemical class with some types of herbicides (e.g., acetic acid herbicides) being more likely to be associated with wheeze than other types of herbicides. We saw evidence of a positive exposure response relationship for a number of chemicals.

Conclusion: Because some of the pesticides that our analysis suggested might contribute to wheeze among farmers are widely used in residential settings (permethrin, carbaryl, 2,4-D, glyphosate), future studies should explore the potential respiratory health consequences of these chemicals in residential users.

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