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Citation:

Oates GR, et al., Tobacco Smoke Exposure and Socioeconomic Factors Are Independent Predictors of Pulmonary Decline in Pediatric Cystic Fibrosis. J Cyst Fibrosis 2020.

What was your research question?

We wanted to find out whether exposure to tobacco smoke and socioeconomic factors such as household income, parental education, and type of health insurance play a role for lung function decline over time in children with CF from 6 to 18 years of age.

Why is this important?

CF lung disease progresses differently even among people with identical CFTR mutations. Half of this variation is due to socioeconomic factors and environmental exposures. Previous research has found that both income and second-hand smoke play a role in CF lung health. However, studies have reached separate conclusions when trying to understand to what extent such factors affect the lungs of children with CF, and if they are truly independent of each other. For example, smoking in the U.S. is more prevalent among disadvantaged people, but is that the main reason why disadvantaged people with CF have worse health?

What did you do?

From the CF Foundation Patient Registry (CFFPR), we obtained data on all registered U.S. children with CF from 2006 to 2016. We calculated their lung function at each age and conducted statistical analyses to see if, over time, lung function declined differently by exposure to tobacco smoke as reported

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by parents, and by household income, parent education, and health insurance. We considered children smoke-exposed if someone in the family was a smoker or children were around a smoker at least several times weekly. Analyses controlled for age, race, ethnicity, household size, BMI, genotype, CF newborn screening diagnosis, hospitalizations, exacerbations, CFTR modulator use, and bacterial infections.

What did you find?

This is the first such study with data from all children on the CFFPR (10,895 children with CF). More than a quarter of them were smoke- exposed. The risk of exposure was doubled in families with lower income and education. By age 6, smoke-exposed children had lower lung function than unexposed children, and this shortfall persisted through to age 18. Lower income, education, and public health insurance were also associated with pulmonary decline. Socioeconomic factors and smoke exposure each made independent, additive contributions to diminished lung function but, smoke exposure was more damaging to disadvantaged children than to privileged counterparts.

What does this mean and reasons for caution? (100 words maximum)

Results show that the damage of smoke exposure is fully displayed by age 6, therefore smoking cessation in family members and carers should be emphasized at CF diagnosis and restated during infancy and early childhood. Unfavourable socioeconomic factors have a negative effect on lung function, independent of smoke exposure but smoking is more common in disadvantaged families, and it has a more damaging effect. The study was limited in that smoke exposure was based on parent self-report, which may be an underestimation. Future studies may screen for smoke exposure by testing

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saliva or urine for cotinine, produced when the body breaks down the nicotine in tobacco smoke.

What's next?

Quitting smoking should be emphasized in CF care, and best practices to limit exposure should be developed. Patient registries should consider collecting smoke exposure data. To address disparities in CF lung health, interventions should prioritize smoke-exposed low-income children, among whom the adverse effects of smoke exposure are disproportionately large.