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Association Between Marijuana Exposure and Pulmonary Function Over 20 Years

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Abstract

Context Marijuana smoke contains many of the same constituents as tobacco smoke, but whether it has similar adverse effects on pulmonary function is unclear.

Objective To analyze associations between marijuana (both current and lifetime exposure) and pulmonary function.

Design, Setting, and Participants The Coronary Artery Risk Development in Young Adults (CARDIA) study, a longitudinal study collecting repeated measurements of pulmonary function and smoking over 20 years (March 26, 1985-August 19, 2006) in a cohort of 5115 men and women in 4 US cities. Mixed linear modeling was used to account for individual age-based trajectories of pulmonary function and other covariates including tobacco use, which was analyzed in parallel as a positive control. Lifetime exposure to marijuana joints was expressed in joint-years, with 1 joint-year of exposure equivalent to smoking 365 joints or filled pipe bowls.

Main Outcome Measures Forced expiratory volume in the first second of expiration (FEV₁) and forced vital capacity (FVC).

Results Marijuana exposure was nearly as common as tobacco exposure but was mostly light (median, 2-3 episodes per month). Tobacco exposure, both current and lifetime, was linearly associated with lower FEV₁ and FVC. In contrast, the association between marijuana exposure and pulmonary function was nonlinear ($P < .001$): at low levels of exposure, FEV₁ increased by 13 mL/joint-year (95% CI, 6.4 to 20; $P < .001$) and FVC by 20 mL/joint-year (95% CI, 12 to 27; $P < .001$), but at higher levels of exposure, these associations leveled or even reversed. The slope for FEV₁ was -2.2 mL/joint-year (95% CI, -4.6 to 0.3 ; $P = .08$) at more than 10 joint-years and -3.2 mL per marijuana smoking episode/mo (95% CI, -5.8 to -0.6 ; $P = .02$) at more than 20 episodes/mo. With very heavy marijuana use, the net association with FEV₁ was not significantly different from baseline, and the net association with FVC remained significantly greater than baseline (eg, at 20 joint-years, 76 mL [95% CI, 34 to 117]; $P < .001$).

Conclusion Occasional and low cumulative marijuana use was not associated with adverse effects on pulmonary function.