Original Article

Arterial Intima-Media Thickness, Endothelial Function, and Apolipoproteins in Adolescents Frequently Exposed to Tobacco Smoke

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Background: Exposure to tobacco smoke is associated with markers of preclinical atherosclerosis in adults, but its effect on arterial structure in adolescents is unknown.

Methods and Results: Healthy 13-year-old adolescents from the atherosclerosis prevention trial STRIP were studied. Maximum carotid and aortic intima-media thickness and brachial artery flow-mediated dilation were measured in 494 adolescents using high-resolution ultrasound. Serum lipid, lipoprotein, and apolipoprotein (Apo) A-I and B concentrations were determined using standard methods. Exposure to tobacco smoke was measured annually between ages 8 and 13 years using serum cotinine concentrations, analyzed with gas chromatography. To define longitudinal exposure, cotinine values of children having serum cotinine measured 2 to 6 times during follow-up were averaged and divided into tertiles (exposure groups): low (n=160), intermediate (n=171), and high (n=163). Adolescents with higher longitudinal exposure to tobacco smoke had increased carotid intima-media thickness (exposure groups [mean±SD]: low, 0.502±0.079 mm; intermediate, 0.525±0.070 mm; high, 0.535±0.066 mm; P<0.001) and increased aortic intima-media thickness (exposure groups: low, 0.527±0.113 mm; intermediate, 0.563±0.139 mm; high, 0.567±0.126 mm; P=0.008). The flow-mediated dilation decreased when cotinine level increased (exposure groups: low, 10.43±4.34%; intermediate, 9.78±4.38%; high, 8.82±4.14%; P=0.004). Moreover, ApoB (P=0.014) and ApoB/ApoA-I ratio (P=0.045) increased with increase in cotinine level. The associations between tobacco smoke exposure and ultrasound variables were unchanged after adjusting for traditional atherosclerosis risk factors and for ApoB.
Conclusions: Frequent exposure to tobacco smoke is independently associated with arterial changes of preclinical atherosclerosis and increased ApoB levels among healthy adolescents.

**Key Words:** apolipoproteins • atherosclerosis • passive smoking • pediatrics • vasodilation