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The Impact of Caffeine on Brachial Endothelial Function in Healthy Subjects and in Patients with Ischemic Heart Disease

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Background: Coffee is one of the most widely used pharmacologically active beverages, however, its impact on the cardiovascular system is controversial.

Methods: To explore the impact of acute caffeine ingestion on vascular endothelial function, 80 consecutive subjects [40 healthy volunteers and 40 patients with documented coronary artery disease (CAD)] were assessed on 2 separate mornings, 1-2 weeks apart. Following overnight fasting and discontinuation of all medications for ≥ 12 hours, and absence of > 48 hour caffeine, participants received 200 mg of caffeine tablets or placebo in a prospective, randomized, double-blind, placebo control and cross-over study. An hour after the study drug ingestion, participants underwent brachial artery endothelium-dependent flow-mediated dilation (FMD) and nitroglycerin-mediated dilation (NTG), using high resolution ultrasound.

Results: CAD patients were older, had more diabetes, hypertension and dyslipidemia compared to healthy subjects (all $p<0.01$). Additionally, the use of aspirin, plavix, angiotensine-enzyme inhibitors, beta blockers, and statins was significantly more common in CAD patients compared to healthy controls (all $p<0.01$). At baseline, FMD, but not NTG, was significantly lower in CAD patients compared to controls (5.6±5.1% vs 8.4±2.9%, $p<0.01$ and 13.1±5.2% vs 12.9±3.9%, $p=0.27$, respectively). However, caffeine ingestion significantly increased FMD (CAD: 5.6±5.1% vs. 14.6±5.1%; Healthy: 8.4±2.9% vs. 18.6±6.9%; all $p<0.001$), NTG (CAD: 13.1±5.2% vs. 17.9±6.1%; Healthy: 12.9±3.9% vs. 22.9±10.1%; all $p<0.001$) and significantly reduced high-sensitivity C-reactive protein (CAD: 2.6±1.4 mg/L vs. 1.4±1.2 mg/L; Healthy: 3.5±3.0 mg/L vs. 1.3±1.0 mg/L; all $p<0.001$) in both study groups compared to placebo.

Conclusion: Acute caffeine ingestion significantly improved endothelial function assessed by brachial artery FMD in healthy subjects and CAD patients associated with reduced plasma markers of inflammation.