



Menthol Cigarettes and the Cardiovascular Risks of People Living With HIV

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The possibility that menthol cigarettes add to the deleterious cardiovascular effects of smoking has been barely discussed. Although cardiovascular diseases (CVD) are at the forefront of medical concerns of people living with HIV (PLWH), an important, yet unknown, issue for clinicians and public health authorities is whether use of menthol-flavored cigarettes heightens CVD risk factors. Our study aims to assess traditional (10-year risk using the Framingham Risk Model) and nontraditional CVD risk factors and to contrast the effects of menthol-flavored versus non-menthol-flavored cigarettes on these risk factors. Compared to controls, menthol smokers were twice as likely to have hypertension. Users of menthol-flavored cigarettes had higher body mass index values, and increased risk of abdominal obesity. Multivariate analyses indicated that menthol smokers doubled the odds of having moderate to high CVD risk. This finding is highly significant given the widespread use of menthol-flavored cigarettes, particularly among women, minorities, and PLWH.

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Despite notable improvements in prevention, cardiovascular diseases (CVD) continue to cause, on average, one death every 39 seconds in the United

States (Roger et al., 2012). Each year, an estimated 1,000,000 Americans will experience new coronary attacks or silent myocardial infarctions (Roger et al., 2012). For people living with HIV (PLWH), the situation is even worse, as rates of CVD are approximately twofold higher than age-matched people without HIV infection (Das, 2010; Kearney, Moore, Donegan, & Lambert, 2010). Increased rates have been attributed, at least in part, to metabolic problems associated with antiretrovirals, including hyperlipidemia and glucose-related abnormalities (Das, 2010; Kearney et al., 2010).

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Obesity is increasing rapidly as a health complication for PLWH. Along with aging, obesity has contributed to major increases in the rates of hypertension, hypercholesterolemia, and metabolic disorders in PLWH. Of concern, the increased incidence of obesity will overlap with the smoking epidemic (Miguez, 2012). Recent studies have estimated that, in the era of antiretroviral therapy (ART), PLWH lose more life-years to smoking than to HIV (Petrosillo & Cicalini, 2013). The Data Collection on Adverse Events of Anti-HIV Drugs (D:A:D) study confirmed a twofold increased odds of myocardial infarctions in current and former smokers compared to those without these risk factors (Friis-Møller et al., 2010). While these studies corroborated a link between smoking and CVD in PLWH, none assessed whether the type of cigarette smoked had any differential effects.

Data emerging from animal studies and a few human studies have provided evidence that menthol-flavored cigarettes may directly affect cardiovascular parameters. Ciftçi et al. (2009) assessed the plausible effects of menthol and nonmenthol cigarettes on cardiovascular function and found that menthol-flavored cigarettes exerted detrimental effects on systolic velocity, isovolumic contraction time, and cardiac performance index values. These findings are of great concern given that the market share of menthol-flavored cigarettes has significantly increased in recent years (Giovino et al., 2004). Despite this evidence, no study has attempted to validate this information for PLWH (Das, 2010; Kearney et al., 2010).

Our study aims to address this important issue by examining the relationships between use of menthol-flavored cigarettes and well-defined measures of cardiovascular risk, using baseline measures obtained in our ongoing Florida International Liaison for Transdisciplinary and Educational Research on Smoking (FILTERS) cohort. This information is vitally needed to identify high-risk groups and correlates of risk, and to enable planning of effective prevention programs.

Methods

Study Design and Sample

FILTERS is a 3-year longitudinal study based in South Florida. Subjects completed the consent pro-

cess and were assigned into one of four sociodemographically matched groups based on HIV (*positive/uninfected*) and smoking (*smoker/nonsmoker*) status. The main goal of FILTERS is to evaluate biological (cytokines) and behavioral (i.e., use of menthol cigarettes) mechanisms whereby tobacco use may influence the development of tobacco-related diseases (e.g., CVD), particularly in certain racial ethnic groups. The recruitment process started in June 2011 and ended in June 2013 because the Department of Health closed all studies funded in 2011 for political reasons (Lamendola, 2013). At that time, a total of 393 subjects had enrolled in the study. Individuals were recruited primarily by posting study pamphlets with contact information in local clinics. If telephone contact suggested that the candidates knew their HIV status and identified themselves as not using injection drugs and as not dependent on alcohol or any drugs other than tobacco, they were eligible for personal interviews. Individuals with baseline histories of liver cirrhosis, myopathies, malignancies, and immunosuppressive conditions other than HIV were excluded, as were pregnant women. Once enrolled, computerized assessments were conducted by skilled interviewers, brief physical examinations were completed, and blood samples were collected.

Cardiovascular Outcomes

Each FILTERS participant received a brief medical examination that included vital signs and anthropometric measurements. After the participant had rested at least 5 minutes, systolic and diastolic measurements were registered as the first and fifth Korotkoff sounds. Subjects were considered to be hypertensive if they were taking antihypertensive medications, self-reported being diagnosed with hypertension (*yes/no*), and/or registered systolic pressures 140 mm Hg or higher, or diastolic pressures equal to 90 mm Hg or higher. They were then stratified in the Framingham Risk Model and had a Framingham Risk Score (FRS) assessed. The Framingham Heart risk assessment tool predicts a person's chance of having a heart attack in the next 10 years, and higher scores imply greater risk (main study outcome; National Heart, Lung, and Blood Institute, 2004). The risk was

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