Determinants of Inflammatory Markers in a Bi-ethnic Population

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INTRODUCTION

Ethnic differences in chronic disease incidence have been widely studied, with Blacks having a higher risk of hypertension, stroke and renal failure compared to Whites.1 The reason for this disparity has not been completely elucidated but may be due to increased prevalence of disease risk factors among Blacks. Inflammation has been determined to be an important factor associated with chronic diseases, and is often indexed by elevated circulating levels of C-reactive protein (CRP) and pro-inflammatory cytokines.2 Behavioral factors have a direct impact on inflammatory processes.3

The association between ethnicity and inflammation has been analyzed as well, showing that Blacks often have higher CRP than Whites.4-6 Other inflammatory molecules include interleukin-6 (IL-6) and tumor necrosis factor-alpha (TNF-α) which are associated with a pro-inflammatory response while IL-10 has anti-inflammatory effects.7 Some studies have shown that Blacks have higher IL-6 levels than Whites,6,8 but it is unclear whether IL-10 and TNF-α levels vary according to ethnic background.8-10

Ethnic specific differences in inflammation may have diverse determinants. For instance, low socioeconomic status (SES) has been associated with increased levels of CRP, IL-6 and TNF-α.11-12 It is therefore possible that SES may partially explain why certain ethnicities are at higher risk for inflammatory problems. Health behavior factors also play a role in inflammation. Physical activity has been associated with lower circulating levels of CRP and IL-6 in both healthy and patient populations13 and has been shown to increase concentrations of anti-inflammatory cytokines (such as IL-1 receptor antagonist and IL-10) to lower the inflammatory response.14 In addition, diets rich in fruits, vegetables, whole grains and nuts have been associated with reductions in CRP and IL-6 levels, while diets high in red meat and high fat dairy have been directly correlated with increased inflammation.15-16

Among other lifestyle factors, alcohol consumption has been associated with lower levels of CRP among moderate drinkers compared to non-drinkers and heavy drinkers, a U-shaped pattern.17-18 Cigarette smoking has been found to be a potent risk factor for increased levels of low-grade inflammation based on elevated CRP and IL-6 levels.19-20

One of the populations in which determinants of chronic disease have been studied is Seventh-day Adventists, a conservative religious group whose members normally abstain from alcohol and tobacco.21-22 Thus, the population avoids some of the major identified factors involved in increasing inflammation and may provide the opportunity to illuminate the role of other factors, including ethnicity and lifestyle variables. In our study, ethnic differences in inflammation were assessed among a population of church-going Adventists. We also determined whether the ethnicity-inflammation relationship is affected by demographic, SES, behav-

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Background: Inflammation is a common pathophysiological pathway for a number of chronic diseases, and is strongly influenced by sociodemographic factors and lifestyle. Less is known about factors that may influence the inflammatory response in individuals of distinct ethnic backgrounds. Therefore, this study examined the relationship between ethnicity and blood levels of inflammatory markers in a sample of non-smoking church-goers.

Methods: In a cross-sectional investigation, 508 men and women (>35 years old, 62% White, 38% Black) participated in the Biopsychosocial Religion and Health substudy of the Adventist Health Study 2. The contribution of socioeconomic status (education level and difficulty meeting expenses for basic needs) and health covariates (exercise, vegetarian or other type of diet, body mass index, and presence of inflammatory conditions) toward serum levels of C-reactive protein (CRP), interleukin-6 (IL-6), and tumor necrosis factor-alpha (TNF-α) was assessed with linear regression models. Levels of interleukin-10 (IL-10), an anti-inflammatory marker, were also assessed.

Results: Blacks showed higher levels of CRP and IL-6 than Whites. Controlling for sociodemographic and health variables attenuated the ethnic difference in CRP while IL-6 levels remained higher in Blacks than in Whites (β=0.118; 95% confidence interval=0.014–206; \( P=0.025\)). Ethnic differences in IL-10 and TNF-α were not found. Vegetarian diet was associated with lower CRP levels while exercise frequency was associated with higher IL-10 levels.

Conclusion: Higher susceptibility of Blacks to inflammatory diseases may reflect higher IL-6, which could be important in assessing health disparities among Blacks and Whites. Vegetarian diet and exercise may counteract effects of disparities. (Ethn Dis. 2011;21(2):142–149)

Key Words: Inflammatory Markers, Ethnicity, Health Behavior, Adventists

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We also determined whether the ethnicity-inflammation relationship is affected by demographic, SES, behavioral or health status variables.