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PRELIMINARY REPORT

Ethnic Differences in Adiponectin Levels

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Adiponectin levels were measured in African American and Caucasian women of varying body mass index (BMI). Plasma adiponectin levels were compared and the relationship between adiponectin and insulin sensitivity was assessed. Adiponectin levels were similar in the Caucasian obese ($7.0 \pm 0.8 \mu\text{g/mL}$), African American obese ($7.3 \pm 3.5 \mu\text{g/mL}$), and African American non-obese women ($7.1 \pm 1.2 \mu\text{g/mL}$), but were significantly higher in Caucasian non-obese women ($12.2 \pm 1.4 \mu\text{g/mL}$). Correlational analyses demonstrated that BMI, insulin, and homeostasis model assessment (HOMA) correlated significantly with adiponectin levels in only the Caucasian women. These results provide support for the notion that what applies to other ethnic populations might not apply to the African American population, and that the association between adiponectin and insulin sensitivity needs to be clarified in the African American population.

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RECENTLY, AN adipocytokine referred to as adiponectin (also known as Acrp 30, AdipoQ, apM-1, and GBP28) has been independently identified and characterized.¹⁻⁴ Adiponectin is reported to be negatively associated with disease states, such as obesity, diabetes, and cardiovascular disease.^{1,5,6} Little work has been done to determine if plasma adiponectin concentrations differ as a result of ethnicity. Weyer et al⁷ examined the relationship between plasma adiponectin levels and insulin sensitivity in Pima Indians and Caucasians. Although plasma adiponectin levels were lower in the Pima Indians, adiponectin levels were positively correlated with glucose utilization in both Caucasians and Pima Indians. The investigators concluded that plasma adiponectin levels are associated with insulin sensitivity irrespective of ethnic origin. To date, there are no reports examining whether a similar relationship between adiponectin and insulin action exist in African Americans. Thus, this study was undertaken with the goal of determining plasma adiponectin levels in African American and Caucasian women of varying degrees of obesity and to examine the relationship between adiponectin levels and insulin sensitivity.

MATERIALS AND METHODS

Patient Characteristics

Twenty-five non-obese women (13 African Americans, 12 Caucasians, body mass index [BMI] < 30) and 60 obese women (24 African Americans, 36 Caucasians, BMI > 30) participated in this study. Written consent was obtained from patients after they were informed of the nature and potential risk of the study. The Institutional Review

Board for human subject research approved the protocols used in this study.

Plasma Analysis

Blood was collected from patients after a 12-hour fast, and a preservative mixture containing sodium azide (50 mg/mL) and aprotinin (1 TIU/mL) was added. Plasma was prepared by centrifugation and the samples were stored at -80°C until analyzed. Plasma adiponectin was measured using a commercially available radioimmunoassay kits (Cat. # HADP-61HK; LINCO Research, St Charles, MO), insulin by micro-particle enzyme immunoassay (Access Immunoassay System, Beckman Coulter, Fullerton, CA), and glucose was analyzed spectrophotometrically (16-UV; Sigma Chemical, St Louis, MO). The homeostasis model assessment (HOMA)⁸ was calculated to evaluate insulin sensitivity.

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Table 1. Physical and Biochemical Characteristics of Study Subjects

	Obese		Non-obese	
	Caucasian	African American	Caucasian	African American
N	36	24	12	13
Age (yr)	42.2 ± 1.9	47.5 ± 2.0	45.3 ± 3.3	46.6 ± 1.5
BMI (kg/m ²)	47.3 ± 1.7	50.8 ± 9.7	24.5 ± 0.5*	26.5 ± 0.8*
Waist-to-hip ratio	ND	ND	0.891 ± 0.02	0.889 ± 0.02
Fasting insulin (pmol/L)	134.0 ± 19.4	113.0 ± 70.3	32.0 ± 6.5*	26.8 ± 4.9*
Fasting glucose (mmol/L)	5.4 ± 0.2	5.6 ± 0.4	4.8 ± 0.2	4.7 ± 0.2
HOMA	4.8 ± 0.8	4.5 ± 3.6	1.0 ± 0.2*	0.8 ± 0.2*
Plasma adiponectin (μg/mL)	7.0 ± 0.8	7.3 ± 3.5	12.2 ± 1.4*†	7.1 ± 1.2

NOTE. Values are expressed as means ± SEM.

Abbreviation: ND, not determined.

*Significantly different from obese ($P < .05$).

†Significantly different from African American ($P < .05$).

Statistics

The main effects of group (non-obese *v* obese) and ethnicity (African American *v* Caucasian) and the interaction between the 2 (group*ethnicity) were determined by a 2-way analysis of variance (ANOVA). Fisher's least significant difference post hoc test was used to identify differences in group-related and ethnicity-related pair wise comparisons. Pearson Product analysis was used to determine relationships between adiponectin, BMI, insulin, glucose, and HOMA. Statistical analyses were conducted using the Statistical Package for the Social Sciences (*v* 10.0, SPSS, Chicago, IL), and results are expressed as means ± SEM. Statistical significance was set at $P < .05$.

RESULTS

Table 1 shows that there were no differences in age, BMI, insulin, glucose, and HOMA within either the non-obese or obese groups irrespective of ethnicity. There were no differences in adiponectin levels between the obese African American and Caucasian women. However, plasma adiponectin levels were significantly lower (−72%) in African American compared with the Caucasian non-obese women, despite the lack of difference in insulin concentration and insulin sensitivity (HOMA). Interestingly, adiponectin levels were not different between the Caucasian obese (7.0 ± 0.8 μg/mL), African American obese (7.3 ± 3.5 μg/mL), and African American non-obese women (7.1 ± 1.2 μg/mL), yet all of these values were significantly lower (∼ −71%) than the Caucasian non-obese women (12.2 ± 1.4 μg/mL).

The correlational analyses that are shown in Table 2 demonstrate that BMI, insulin, and HOMA correlated significantly with adiponectin levels in only the Caucasian women.

Table 2. Pearson Product Correlations Between Adiponectin and BMI, Insulin, Glucose, and HOMA in African Americans and Caucasians

	Caucasians (n = 48)		African Americans (n = 37)	
	Correlation Coefficient	P Value	Correlation Coefficient	P Value
BMI	−.41	.004*	−.15	0.39
Fasting insulin	−.44	.002*	.19	0.31
Fasting glucose	−.24	.10	−.06	0.75
HOMA	−.41	.004*	−.09	0.62

* $P < .05$.

DISCUSSION

Studies have shown that plasma adiponectin levels are negatively associated with the insulin-resistant state irrespective of gender or ethnicity.^{1,6,7,9,10} However, there are no studies demonstrating similar associations in African American subjects despite the prevalence of obesity,¹¹ diabetes,^{12,13} and insulin resistance¹⁴⁻¹⁶ in this population. In the current study, African Americans and Caucasians with varying degrees of obesity and insulin resistance were examined to determine if the same associations between adiponectin and insulin resistance observed in the other ethnic groups are present in African Americans.

Consistent with the previous studies,^{7,10} our results demonstrate statistically significant negative correlations between plasma adiponectin, BMI, insulin concentrations, and insulin resistance (as evaluated by HOMA) in Caucasians, but no such correlations in any of the above parameters in African Americans. An equally intriguing finding was that plasma adiponectin levels were significantly lower in non-obese African Americans compared with the non-obese Caucasians, despite the lack of difference in insulin concentration and insulin sensitivity between the 2 groups.

Although it is generally accepted that adiponectin and insulin sensitivity are correlated, there is evidence that this relationship is not universal. We recently examined plasma adiponectin levels and insulin sensitivity in females in response to 2 interventions known to improve insulin sensitivity, weight-reduction and exercise training.¹⁷ Plasma adiponectin levels were correlated with insulin sensitivity in the weight-reduced females, but not exercise-trained females. Thus, this lack of correlation between adiponectin and insulin sensitivity is not unique to the African American population, and therefore, suggests that other factors may be involved in modulating the association between adiponectin and insulin sensitivity.

The lack of an association between adiponectin and insulin sensitivity is not the only disparity that has been found between African Americans and Caucasians. It is established that alterations in plasma lipid concentrations and/or the subpopulation distribution of plasma lipoproteins are associated with the risk and incidence of cardiovascular disease (CVD). However, we found that similar associations did not apply to the African

Americans.¹⁸ We suggested that specific criteria for evaluating the risk for CVD might be needed for the African American population. Thus, the lack of a relationship between plasma adiponectin, obesity, and insulin sensitivity reported here in the African American subjects provides additional support for the

notion that what applies to other ethnic populations might not apply to the African American population. These data imply that the association between adiponectin and insulin sensitivity may be race-specific, and that studies should be designed to clarify this relationship in the African American population.

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