Internalized Racism Is Associated with Elevated Fasting Glucose in a Sample of Adult Women but not Men in Zimbabwe

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Objectives: Internalized racism (INR) is associated with metabolic abnormalities among African Caribbean women. The current study was conducted to determine if similar associations exist among Black women living in Africa.

Methods: In 2003, a stratified random sample of Black adults ages ≥18 years was drawn from four high-density suburbs of the city of Bulawayo, Zimbabwe. A total of 318 persons (90% of those recruited) participated. Face-to-face interviews were used to gather information on demographic variables, health history, internalized racism, anthropometric measurements and blood pressure. Internalized racism, the extent to which individuals agree with racist stereotypes about their race, was measured with a standardized questionnaire. A fasting blood sugar level was also measured for each participant. Persons with diagnosed diabetes or incomplete data ($n=44$) were excluded from analyses.

Results: Women ($n=188$) and men ($n=86$) did not differ significantly by age, INR score, waist circumference or fasting glucose level. The mean body mass index of women (23.6 kg/m^2) was higher ($P<.05$) than that of men (22.3 kg/m^2). INR was significantly correlated with waist circumference, diastolic blood pressure and fasting glucose among women but not among men. In multiple logistic regression analyses using the data for women, a high INR remained independently associated with abnormal fasting glucose (odds ratio=2.74, $P=.0085$) after adjusting for potential confounders including adiposity.

Conclusions: These findings show the consistency of the association of high INR with metabolic abnormalities among Black women in the Diaspora. (*Ethn Dis*. 2007;17:731–735)

Key Words: Zimbabwe, Internalized Racism, Glucose Intolerance

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Introduction

Psychosocial distress may contribute to lifestyle behaviors, such as poor diet and physical inactivity, that increase the risk of developing obesity and related metabolic disorders.[1,2] In addition, psychosocial distress is thought to contribute independently to increased risk of metabolic diseases like diabetes mellitus.[3] Ethnic differences in the degree of psychosocial distress experienced at the population level may be mediated by sociocultural factors.[4,5] In recent years, one sociocultural factor, internalized racism (INR), ie, the extent to which Blacks agree with racist stereotypes about Blacks, has been associated with increased psychosocial distress, abdominal obesity and glucose intolerance among Blacks living on different islands in the Caribbean basin.[6–8] It remains unclear whether INR might also be associated with adverse metabolic health outcomes among Black people living in Africa.

This report describes the results of a study that was conducted to determine if INR is associated with abdominal obesity and abnormal fasting glucose among Black men and women living in Zimbabwe.

Materials and Methods

Data collection was conducted between May 29 and July 27, 2003 in Zimbabwe, located in Southern Africa. The study population comprised 317 individuals, ≥18 years of age, who resided in neighborhoods surrounding the city of Bulawyo in the province of Matebeleland, Zimbabwe. To obtain the sample, four of 13 neighborhoods including Mzilikazi, Nkulumane, Nketa, and Ntumbane (also known as high-density areas) were randomly selected as the sampling frame. Within each neighborhood, clusters of housing units were randomly selected and each household within a cluster was approached for participation. All individuals within each household who were ≥18 years of age were eligible for participation. The participation rate for the study was 90%. Prior to participation in the study, each individual signed consent forms approved by a US National Institutes of Health biomedical ethics review board, which is affiliated with the Medical Research Council of Zimbabwe.

Demographic data and information about smoking and alcohol consumption, internalized racism and psychosocial distress were collected by interview from participants. INR was measured using the Nadanolitization (NAD) Scale.[9] This scale was developed to measure the extent to which Blacks endorse racist claims that Blacks are mentally defective (intellectually, mor-

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ally and emotionally) and physically gifted (sexually, athletically, artistically). Internal consistency of the scale is good with a reported Cronbach alpha of .85.[9] Pilot-testing and translation of the psychosocial questionnaires to make them culturally and linguistically acceptable to the local population were performed under the supervision of faculty of the Zimbabwe Medical Research Council prior to the scale's use in the study.

For each participant, blood pressure was measured, anthropometric (weight, height, waist circumference) measurements were taken, and a blood sample was taken by finger-stick. Blood pressure was measured after an initial five-minute rest using a standard mercury sphygmomanometer. Weight was measured on a balance beam scale without shoes and height was measured with a wall mounted ruler. The waist circumference was measured at the umbilicus with a Gullic tape using standard procedures.[10] Body mass index was calculated as weight in kilograms (kg) divided by height in meters squared (kg/m^2). Personnel who collected clinical data were trained in standardized techniques utilized by the University of Pittsburgh Obesity and Nutrition Center.

Measurement of blood glucose was performed with an Accucheck Easy portable glucose analyzer (Boehringer Mannheim Diagnostics, Indianapolis, Indiana) using capillary blood samples collected after a minimum fast of three hours. Clinical studies have shown that the Accucheck portable system can accurately determine blood glucose within ±10% of the true value with an average coefficient of variation of 2.4%,[11] and that capillary blood samples can accurately approximate serum glucose in fasting blood samples.[12] Individuals with fasting glucose ≥6.1 mmol/L (110 mg/dL) were classified as having abnormal fasting glucose. Any participant with a fasting glucose value ≥ 7.0 mmol/L (≥126 mg/dL) was suspected of having diabetes in accordance with American Diabetes Association criteria[13] and was referred to the local health clinic for followup.

Statistical Analyses

Statistical analyses were conducted using Statistical Analysis System (SAS) software.[14] Pair-wise comparisons of means and frequencies for variables were performed using the *t* test and chi-square tests, respectively. Spearman correlation coefficients were used to examine the strength of relationships between psychosocial, anthropometric and metabolic variables. The distribution of INR scores was separated into tertiles and analysis of co-variance procedures were used to compare mean fasting-glucose values across tertiles of INR while adjusting for age and other demographic variables. Individuals with INR scores in the upper third of the distribution were classified as having "high" INR. Multiple logistic regression models were computed to evaluate the independence of the relationship of high INR to abnormal fasting glucose while controlling for potential confounding factors.

RESULTS

A total of 317 Black Zimbabwians, ≥18 years of age, including 96 men and 221 women, were recruited into the study. Of these, five (5) persons had previously diagnosed diabetes and were excluded from further analyses. An additional 38 individuals, including 30 who had incomplete information on INR and eight with missing anthropometric data, were also excluded. The final sample consisted of 86 men and 188 women. The median age for men was 29 years, with a range from 18 to 75, and the median age for women was 28 years, with a range from 18 to 79. Those excluded from analyses did not differ significantly by age, fasting glucose level, or anthropometric parameters compared to those who were included.

Examination of the characteristics of the study sample showed that there were no significant differences between men and women in mean age (32.8 years vs 33.4 years, respectively; $P=.732$), mean waist circumference (men=79.9 cm vs. women=78.8 cm, $P=.445$) or fasting glucose level (men=5.06 mmol/L vs women=5.31 mmol/L; $P=.166$). The mean systolic blood pressure (men=125.1 mm Hgvswomen=124.5 mm Hg) and diastolic blood pressure (men=81.2 mm Hg vs women=78.8 mm Hg) were also similar between the sexes. However, men were more educated than women, with men being significantly more likely ($P<.05$) to have a high school equivalent education (84.9% vs 68.6%, respectively), to consume alcohol in the past month (40.1% vs 7.9%, respectively) and to be current smokers (30.2% vs 5.3%, respectively). The mean BMI for women (23.6 kg/m^2) was higher ($P<.05$) than the BMI for men (22.3 kg/m^2). There was no significant difference between men and women in the mean INR score (34.2 vs 33.6, respectively; $P=.7793$).

The results of Spearman correlation analyses relating INR score to demographic, behavioral, anthropometric and clinical variables in men and women are presented in Table 1. Significant relationships were observed only among women. These data showed that among women, INR was positively ($P<.05$) correlated with age, waist circumference, fasting glucose and diastolic blood pressure and was inversely correlated ($P<.05$) with educational attainment. The positive relationship of INR to the number of alcoholic beverages consumed during the past month approached significance ($P=.0536$).

Table 2 shows the mean levels of blood pressure and fasting glucose, waist circumference and BMI adjusted for age across increasing tertiles of INR score. These data indicate that, after adjusting

Table 1. Spearman correlations relating internalized racism to demographic, behavioral and anthropometric indices among men and women, ≥18 years of age, in Zimbabwe, Southern Africa

Variables	Men (*n*=86)	Women (*n*=188)
Age (years)	−.029	.269†
Education (highest grade level achieved)	−.167	−.282†
Number of drinks/day	−.021	.141‡
Weight (kilograms)	−.018	−.017
BMI (kg/m^2)	.011	.041
Waist circumference (cm)	.118	.199*
Fasting glucose (mmol/L)	.086	.182*
Systolic blood pressure (mm Hg)	.143	.127
Diastolic blood pressure (mm Hg)	.080	.180*

Values are significant at *=$P<.05$; †=$P<.005$; ‡=value approached significance ($P=.0536$).

for age, only the fasting glucose level among women continued to show a significant relationship to INR. The trend for increasing fasting glucose within each higher tertile of INR score was significant.

The results of multiple logistic regression analyses relating a high level of internalized racism to the odds of having abnormal fasting glucose among women are presented in Table 3. In the model where adjustment was made for possible confounders, including alcohol consumption, age, educational level, family history of diabetes, and BMI, internalized racism remained independently associated (odds ratio=2.74; $P=.0085$) with having abnormal fasting glucose. When waist circumference was substituted for BMI in the model, the relationship of high internalized racism to abnormal fasting glucose was slightly attenuated (odds ratio=2.54; $P=.0163$) but remained significant.

DISCUSSION

In our study of Black Africans living in the province of Metabeleland, Zimbabwe, INR showed a stronger association to lifestyle and metabolic variables among women compared to men. The reason for this sex differential is unclear. Similar results were found among adolescents on the Caribbean island of Barbados, where a significant relationship of INR to waist circumference and fasting insulin levels were found for girls but not boys.[15] One possible explanation for the observed sex differential is that men in the current study were more likely than women to possess factors that buffer the impact of internalized racism. Men in the study were far more educated than women and a significant inverse association between education and internalized racism was observed among the women. It is possible that the men's higher educational level may have exposed them to more positive life experiences that helped to buffer the effects of internalized racism. In a recent study conducted on the Caribbean island of Dominica,[16] compared to women with low levels of internalized racism, those with a high level of INR were more likely to exhibit the use of poor coping strategies that were associated with abnormal secretion patterns for the hormone cortisol. Abnormal cortisol levels are known to influence both abdominal fat accumulation and glucose metabolism.[17] Perhaps women in the current study were far more likely to employ poor coping strategies compared to men. It should be noted, however, that the sample size for the men in the study was half that of women and may not have been sufficiently large enough to detect similar relationships as those observed among the women.

In our study, INR was more strongly correlated with waist circumference

Table 2. Age-adjusted mean levels of fasting glucose and blood pressure across increasing tertiles of internalized racism scores for men and women ≥18 years of age in Metebeleland, Zimbabwe

Variable	Tertile 1	Tertile 2	Tertile 3	*P* for Trend
Men				
n	29	28	29	
Fasting Glucose (mmol/L)	5.02 (4.51–5.53)	5.06 (4.52–5.60)	5.07 (4.55–5.57)	$P=.9075$
Systolic BP (mm Hg)	127.7 (120.0–133.4)	129.0 (122.1–135.8)	127.8 (121.0–134.5)	$P=.8254$
Diastolic BP (mm Hg)	83.0 (78.2–87.8)	78.6 (73.7–83.5)	81.3 (76.5–82.2)	$P=.6369$
Waist circumference (cm)	79.8 (75.3–84.3)	79.6 (75.9–83.4)	79.7 (75.2–84.2)	$P=.9658$
Body mass index (kg/m^2)	23.3 (21.3–25.1)	21.6 (20.1–23.2)	22.2 (20.4–24.0)	$P=.4208$
Women				
n	63	62	63	
Fasting Glucose (mmol/L)	5.09 (4.73–5.45)	5.18 (4.82–5.54)	5.67 (5.30–6.04)	$P=.0319$
Systolic BP (mm Hg)	123.9 (119.5–128.3)	125.8 (121.4–130.2)	123.9 (119.5–128.5)	$P=.9874$
Diastolic BP (mm Hg)	77.5 (73.4–81.5)	81.9 (77.9–85.8)	77.4 (73.3–81.5)	$P=.9855$
Waist circumference	78.3 (75.4–81.1)	79.8 (76.7–82.8)	78.7 (75.2–81.6)	$P=.8447$
Body mass index (kg/m^2)	23.8 (22.6–24.9)	24.2 (22.9–25.4)	22.9 (21.7–24.2)	$P=.3796$

Table 3. Multiple logistic regression models, which related a high level of internalized racism to abnormal fasting glucose, while adjusting for demographic factors, behavioral factors, and body mass index (BMI) (Model 1) and while substituting waist circumference for BMI (Model 2) among women participants from Zimbabwe ≥18 years of age

Variable	Model 1		Model 2	
	Odds Ratio	*P* value	Odds Ratio	*P* value
Internalized racism (1=high, 0=low)	2.74	.0085	2.54	.0163
Number of drinks per day	.987	.7458	.986	.7368
Age (years)	1.00	.6752	1.00	.7973
Education (1= ≥secondary school, 0= <secondary school	1.02	.9558	1.18	.6965
Family history of diabetes (1=yes, 0=no)	1.06	.8871	1.15	.7500
BMI (kg/m^2)	1.08	.0389	—	—
Waist (cm)	—	—	1.04	.0115

than BMI in unadjusted analyses among the women. While consistent with results found among studies of African Caribbean women on the islands of Barbados[6] and Dominica,[8] this finding was surprising given the small average body size and waist circumference measurements of the Zimbabwe women. In contrast to results for African Caribbean women, however, after adjusting for age, the relationship of INR to waist circumference was no longer significant in our Zimbabwe sample. This suggests that the factor(s) associated with INR, which influence abdominal fat accumulation, were age-dependent in our study sample of women from Zimbabwe.

Another observation consistent with earlier reports from Caribbean studies[7,11] is that a high level of internalized racism was significantly associated with fasting blood glucose, independent of age and other potential confounders.

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Bjorntorp and colleagues[17] have argued that chronic arousal of the hypothalamic-pituitary-adrenal axis, possibly due to a chronic defeated response to life stressors, results in dysregulation of the stress response hormone cortisol. The dysregulation of cortisol results in an abnormal circulating level of cortisol, which contributes to insulin resistance and a rise in blood sugar level.[18] A high level of INR was associated with the use of a ''defeated'' coping style, which was linked to an abnormal cortisol secretion pattern[16] among African Caribbean women. The results from the current study, taken together with other studies showing a relationship of a high level of INR to abdominal obesity,[6,8] hyperinsulinemia,[15] abnormal cortisol secretion pattern,[16] and elevated fasting glucose[7,11] support Bjorntorp's hypothesis.

Several study limitations temper the strength of the significant relationships observed in the current study. The study sample is small and limits the analyses and conclusions that can be drawn about possible sex differences. The study is cross-sectional in design and therefore inferences to causality cannot be made. Another limitation is that the determination of fasting glucose level was based on capillary blood samples using portable glucose analyzers rather than venous blood and laboratory analyzers. The most likely drawback of this would be an underestimated number of persons with abnormal fasting glucose.

In conclusion, the results from this study support the hypothesis that a high level of INR is an important indicator of metabolic health risk, particularly risk for glucose intolerance, among Black people in the African Diaspora.

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