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Acculturation and chronic kidney disease in the Hispanic community health study/study of Latinos (HCHS/SOL)

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ABSTRACT

Hispanics/Latinos are burdened by chronic kidney disease (CKD). The role of acculturation in this population has not been explored. We studied the association of acculturation with CKD and cardiovascular risk factor control. We performed cross-sectional analyses of 13,164 U.S. Hispanics/Latinos enrolled in the HCHS/SOL Study between 2008 and 2011. Acculturation was measured using the language and ethnic social relations subscales of the Short Acculturation Scale for Hispanics, and proxies of acculturation (language preference, place of birth and duration of residence in U.S.). CKD was defined as estimated glomerular filtration rate (eGFR) < 60 ml/min/1.73 m^2 or urine albumin-to-creatinine ratio ≥ 30 mg/g. On multivariable analyses stratified by age, lower language subscale score was associated with higher odds of CKD among those older than 65 (OR 1.29, 95% CI, 1.03, 1.63). No significant association was found between proxies of acculturation and CKD in this age strata. Among individuals aged 18–44, a lower language subscale score was associated with lower eGFR (β = −0.77 ml/min/1.73 m^2, 95% CI −1.43, −0.10 per 1 SD increase) and a similar pattern was observed for ethnic social relations. Among those older than 65, lower language subscale score was associated with higher log-albuminuria (β = 0.12, 95% CI 0.03, 0.22). Among individuals with CKD, acculturation measures were not associated with control of cardiovascular risk factors. In conclusion, lower language acculturation was associated with a higher prevalence of CKD in individuals older than 65. These findings suggest that older individuals with lower language acculturation represent a high risk group for CKD.

1. Introduction

Hispanic/Latino individuals residing in the U.S. experience a higher incidence of end-stage renal disease (ESRD) than non-Hispanics (United States Renal Data System, 2015). Furthermore, the number of U.S. Hispanic/Latino adults with prevalent ESRD has grown by > 60% in the last decade (United States Renal Data System, 2015). It is well known that Hispanic/Latino individuals face many barriers to health care (Thamer et al., 1997; Harris, 2001). Those with lower acculturation may face even greater barriers that likely contribute to progression of chronic kidney disease (CKD) and may explain the high incidence of ESRD in this population (Lora et al., 2011). However, the association of level of acculturation with CKD has not been well characterized.

Acculturation is the process by which individuals adopt the attitudes, values, customs, beliefs, and behaviors of another culture (LaFromboise et al., 1993). Individuals adopt these cultural attributes to varying degrees. An individual's level of acculturation influences their health practices and beliefs (Ayala et al., 2008; Constantine et al., 2009; Hubbell et al., 1996; Jacobs et al., 2005; Liu et al., 2009; Solis et al., 1990), which can lead to differences in health outcomes. For example, higher acculturation has been associated with increased rates of cardiovascular risk factors (Kandula et al., 2008; Moran et al., 2007). However, the influence of acculturation has not been well studied in the context of CKD (Lora et al., 2011). Understanding the influence of

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acculturation may help to identify individuals who are at risk for the development or progression of CKD. The purpose of this study was to examine the cross-sectional association of acculturation, assessed using an acculturation scale and proxy measures, with prevalent CKD and measures of kidney function in a large and diverse cohort of Hispanics/Latinos residing in the U.S. In addition, given the known association of CKD with cardiovascular risk (Lora et al., 2011), we investigated the association of acculturation with control of cardiovascular risk factors among individuals with CKD.

2. Materials and methods

2.1. Study design and participants

We performed cross-sectional analyses of baseline examination data on non-institutionalized Hispanics/Latinos enrolled in the Hispanic Community Health Study/Study of Latinos (HCHS/SOL). The design and methods of the HCHS/SOL have been previously published (Sorlie et al., 2010; Lavange et al., 2010). Briefly, the HCHS/SOL is a community-based, longitudinal cohort study of 16,415 Hispanic/Latino adults aged 18–74 at baseline examination (2008–2011). The goals of the study are to describe the prevalence of risk and protective factors for chronic conditions and to quantify mortality and disease over time in Hispanic/Latinos living in the U.S. Participants were enrolled through a stratified two-stage area probability sampling of census block groups and households in four U.S. field centers (Chicago, IL; Miami, FL; Bronx, NY; San Diego, CA). This strategy of enrollment included oversampling from certain strata to ensure diversity of Hispanic/Latino background and socioeconomic status. The study protocol was approved by each center's Institutional Review Board, and the research was conducted in accordance with the ethical principles of the Declaration of Helsinki. Study participants provided written informed consent.

2.2. Instruments and measurements

Data was obtained from the baseline in-person visit of the HCHS/SOL Study. During this visit participants completed questionnaires, anthropometric measurements (height, weight) were obtained, and fasting venous blood and urine samples were collected. Hispanic/Latino background group was self-reported; individuals who reported more than one background group were categorized as “other” and were excluded from the analysis. Socioeconomic status factors including income, educational attainment, and insurance status were self-reported. Participants were asked to bring their medications to the visit in order to ascertain medication use. Participants also completed a medical history questionnaire. Cardiovascular disease and tobacco use were self-reported. Hypertension was defined as self-reported history of hypertension, a systolic blood pressure (BP) $\geq$140 mmHg, diastolic BP $\geq$90 mmHg, or use of antihypertensive medications. Diabetes was defined as self-reported history of diabetes, fasting plasma glucose of $\geq$126 mg/dl, 2-hour post-load glucose level of $\geq$200 mg/dl, a glycosylated hemoglobin $\geq$6.5%, or use of anti-diabetes medication. Body mass index (BMI) was calculated by dividing weight in Kg by height in m^2. Three separate seated BP readings were obtained after a 5 min rest using an automatic sphygmomanometer (OMRON HEM-907 XL). BP was defined as the average of the second and third BP measurements.

Acculturation was measured using the Short Acculturation Scale for Hispanics (SASH) which has two subscales, language and ethnic social relations. The original SASH was developed and validated in diverse Hispanic groups and has strong reliability (coefficient alpha = 0.92) (Marin et al., 1987). The language subscale includes five questions regarding what language (English vs. Spanish) participants read, speak, and think in (Supplement). The ethnic social relations subscale has 4 items that measure preference for the ethnicity of social contacts. Scores for each item range from 1 to 5, with higher scores indicating higher levels of acculturation. Responses provided are averaged within scales. Three proxies of acculturation were assessed: language preference, place of birth, and duration of residence in the U.S. mainland. Participants were offered surveys in either Spanish or English, and language preference was determined by the language chosen. Place of birth was self-reported, and participants were categorized as either U.S.-born, if born in the 50 U.S. states or Washington D.C. area; or foreign-born, if born outside the U.S., including Puerto Rico. Foreign-born individuals were asked to report their duration of residence in the mainland U.S. Based on prior studies; participants were categorized as having lived in the US < 10 years or $\geq$10 years (Salinas et al., 2014).

Creatinine was measured in serum and urine on a Roche Modular P Chemistry Analyzer (Roche Diagnostics Corporation) using a creatinase enzymatic method (Roche Diagnostics, Indianapolis, IN 46250). Serum creatinine measurements were isotope dilution mass spectrometry (IDMS) traceable. Albumin was measured in urine using an immunoturbidometric method on the ProSpec nephelometric analyzer (Dade Behring GMBH. Marburg, Germany D-35041). Serum Cystatin C was measured using a turbidimetric method on the Roche Modular P Chemistry Analyzer (Gentian AS, Moss, Norway). The glomerular filtration rate (GFR) was estimated using the Chronic Kidney Disease Epidemiology Collaboration (CKD-Epi) creatinine-cystatin C equation (Inker et al., 2012). CKD was defined as an estimated GFR < 60 ml/min/1.73 m^2 or urine albumin-to-creatinine ratio (UACR) $\geq$30 mg/g. Control of hypertension was defined as systolic BP < 140 and diastolic BP < 90 mmHg (Chobanian et al., 2003), and control of diabetes was defined as the American Diabetes Association goal for glycosylated hemoglobin (A1C) < 7% (http://www.ndei.org/ADA-diabetes-management-guidelines-glycemic-targets-A1C-PG.aspx.html, n.d.). Renin-angiotensin-aldosterone system (RAAS) blocker use was also assessed among individuals with CKD.

2.3. Statistical analyses

Analyses were conducted using complex survey methods with SAS software, version 9.2. All reported values were weighted to adjust for sampling probability and non-response according to guidelines established by the HCHS/SOL Steering and Data Analysis Committees. Using ANOVA, mean language scale score and mean ethnic social relations scale scores were compared by Hispanic/Latino background group, age, sex, education income, health insurance status, tobacco use, BMI, and comorbidities. Descriptive statistics for demographics and clinical variables were summarized as mean (standard error) for continuous variables, and as weighted percentages for categorical variables. We used ANOVA or Chi-square to compare continuous and categorical variables, respectively, by proxy of acculturation category. Multivariable linear and logistic regression were performed using a priori chosen models to examine the association of language subscale score and ethnic social relations subscale score with prevalent CKD, albuminuria and eGFR in the overall cohort, and with control of cardiovascular risk factors among individuals with CKD. Odds ratios were calculated per 1 SD deviation decrease in subscale score. Based on existing literature, potential confounding variables included age, sex, education, income, insurance status, Hispanic/Latino background, hypertension, diabetes, eGFR, and albuminuria (Lora et al., 2011; Lora et al., 2009; Norris and Nissenson, 2008; Hemmelgarn et al., 2010; Fischer et al., 2016). We evaluated age, sex, and education as effect modifiers of the association between acculturation and kidney function. Since the distribution of U.S. Hispanic/Latino individuals tends to concentrate based on background in specific geographic areas, we adjusted for field center, Hispanic/Latino background, and an interaction term between the two variables. All hypothesis tests were 2-sided, with a significance level of 0.05.