



## Original article

## Heterogeneity in periodontitis prevalence in the Hispanic Community Health Study/Study of Latinos

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## ABSTRACT

**Purpose:** The aim of the study was to examine acculturation and established risk factors in explaining variation in periodontitis prevalence among Hispanic/Latino subgroups.

**Methods:** Participants were 12,730 dentate adults aged 18–74 years recruited into the Hispanic Community Health Study/Study of Latinos (HCHS/SOL) from four U.S. field centers between 2008 and 2011. A standardized periodontal assessment measured probing pocket depth and gingival recession at six sites per tooth for up to 28 teeth. Periodontitis was defined according to the Centers for Disease Control and Prevention and American Academy of Periodontology case classifications developed for population surveillance. Covariates included acculturation indicators and established periodontitis risk factors. Survey estimation procedures took account of the complex sampling design. Adjusted multivariate binomial regression estimated prevalence ratios and 95% confidence limits (CLs).

**Results:** Unadjusted prevalence of moderate and severe periodontitis was 38.5% and ranged from 24.7% among Dominicans to 52.1% among Cubans. Adjusted prevalence ratios for subgroups relative to Dominicans were as follows: (1) 1.34 (95% CL, 1.13–1.58) among South Americans; (2) 1.37 (95% CL, 1.17–1.61) among Puerto Ricans; (3) 1.43 (95% CL, 1.25–1.64) among Mexicans; (4) 1.53 (95% CL, 1.32–1.76) among Cubans; and (5) 1.55 (95% CL, 1.35–1.78) among Central Americans.

**Conclusions:** Heterogeneity in prevalence of moderate/severe periodontitis among Hispanic/Latino subpopulations was not explained by acculturation or periodontitis risk factors.

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## Introduction

People of Hispanic/Latino origin will constitute 29% of the U.S. population by 2050 according to Pew Hispanic Center projections, whereas non-Hispanic whites will constitute less than 50% [1]. This shift in the national demographic profile will likely have public health implications for burden of disease, its distribution and determinants.

Paradoxically given language barriers, high poverty rates, and low health insurance coverage, Hispanics/Latinos enjoy health

advantages. Notably, their life expectancy at birth in 2010 of 81.3 years exceeded 78.8 years for non-Hispanic whites and 74.7 years for non-Hispanic blacks [2]. In addition, according to 2000–2009 cancer registry data, incidence and mortality rates for the four most common cancers—breast, prostate, colorectal, and lung/bronchus—were lower among Hispanics/Latinos than non-Hispanic whites [3].

Nonetheless Hispanics/Latinos bear a greater burden of metabolic syndrome [4,5] and diabetes mellitus [6–8]; conditions associated with periodontitis. Components of metabolic syndrome including obesity, high triglycerides, low high-density lipoprotein cholesterol, hypertension, and high plasma glucose are associated with periodontal parameters of gingival bleeding, periodontal pocket depth, and clinical loss of attachment [9–16]. Likewise,

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diabetes is a major etiologic risk factor for periodontitis [17] and in people with diabetes, periodontal infection is associated with greater carotid artery intima–medial wall thickness and elevated risk of coronary heart disease [18].

Periodontitis is characterized by inflammatory and immune host responses to pathogenic microorganisms and their byproducts. The hallmark of the disease is destruction of connective tissue and alveolar bone surrounding the teeth, which can lead to tooth loss if left untreated.

Prevalence of periodontitis is higher in Hispanic/Latinos than U.S. non-Hispanic whites [19], but little is known about variation in periodontal health among Hispanic/Latino subgroups. Only recently has the non-Mexican component become sufficiently large to yield reliable estimates for country of origin. This reveals substantial heterogeneity in established risk factors for periodontitis including diabetes [20,21] anthropometric characteristics and cigarette smoking history [22]. It is likely that these risk profiles alter with the acquisition of cultural characteristics of United States's society, that is the process of acculturation.

The aims of this epidemiologic study were to compare periodontitis prevalence among Hispanic/Latino subgroups and to determine the extent to which acculturation and established periodontitis risk factors accounted for variation in prevalence.

## Methods

### *Study setting, design, and subjects*

Details of design, implementation methods, and data collection for the Hispanic Community Health Study/Study of Latinos (HCHS/SOL) are published [23,24]. In brief, the HCHS/SOL is a multicenter population-based prospective cohort study of Hispanic/Latino adults, sponsored by the National Heart, Lung, and Blood Institute and other affiliated bodies of the U.S. National Institutes of Health. Its purpose is to investigate prevalence of a wide range of health conditions and to identify disease risk factors including effects of acculturation. The study used a stratified two-stage area probability design in which household addresses were sampled within contiguous census tract districts within each of the four field centers located in the Bronx, NY; Chicago, IL; Miami, FL; and San Diego, CA. Selected households were screened for eligibility by in-person visits or telephone contact. Between March 2008 and June 2011, approximately 4000 individuals aged 18–74 years were recruited from each field center, yielding 16,415 participants. On enrollment, they completed questionnaires, underwent a standardized physical examination, and 15,848 (97%) had a dental examination. The study was approved by Institutional Review Boards of all relevant institutions, and participants gave written informed consent.

### *Periodontal assessment and periodontitis case definitions*

Eighteen dental examiners conducted the periodontal assessments for dentate participants not requiring prophylactic antibiotics. Each site had its own examiners (Chicago [ $n = 8$ ], the Bronx [ $n = 4$ ], San Diego [ $n = 4$ ], and Miami [ $n = 2$ ]). All examiners received calibration training together with one reference examiner. Measures of reliability were made against the standard examiner and between examiners in each center. The examination was conducted in three 1-year waves, and examiners were recalibrated each year (2008–2010) against a gold standard examiner who had participated in National Health and Nutrition Examination Survey (NHANES) examinations. The mean Intraclass Correlation Coefficient, Percent Agreement, and Kappa Statistic for Probing Depths within 1 mm were 0.95, 95.8, and 0.94, respectively. The mean Intraclass Correlation Coefficient, Percent Agreement, and Kappa

for Attachment Loss within 1 mm were 0.86, 92.8, and 0.84, respectively. Probing pocket depth and recession were measured at six sites per tooth (distal-facial, midfacial, mesial-facial, mesial-lingual, midlingual, and distal-lingual) on all permanent teeth, excluding third molars, to calculate clinical loss of attachment. Periodontitis was classified according to the Centers for Disease Control and Prevention and American Academy of Periodontology definitions for mild, moderate, and severe periodontitis based on measurements taken from interproximal sites [25].

Mild: two or more interproximal sites with 3 mm or greater clinical attachment loss and two or more interproximal sites with 4 mm pocket depth (not on the same tooth) or one site with 5 mm or greater pocket depth

Moderate: two or more interproximal sites with clinical attachment loss 4 mm or greater (not on same tooth); or two or more interproximal sites with pocket depth 5 mm or greater (not on same tooth)

Severe: two or more interproximal sites with clinical attachment loss 6 mm or greater (not on same tooth) and one or more interproximal site with pocket depth 5 mm or greater

Individuals not meeting disease criteria for mild periodontitis were defined as having “periodontal health.”

### *Acculturation*

Acculturation was measured using conventional markers of nativity status (U.S.-born and foreign-born), language preference (English and Spanish), and duration of U.S. residence (grouped as <10, 10–19, and  $\geq 20$  years).

### *Sociodemographic characteristics*

Participants self-identified as of Dominican, Central American, Cuban, Mexican, Puerto Rican, South American, or mixed background/other. We use the joint term Hispanic/Latino, noting that Hispanic refers to persons of Spanish-speaking background, whereas Latino refers more generally to Latin American background. Educational attainment was grouped as noncompletion of high school; attainment of a high school diploma or equivalent; or education beyond a high school. Annual household income was grouped as follows: (1) <\$15,000; (2) \$15,000 to <\$30,000; and (3)  $\geq$ \$30,000. Subjective social status was depicted diagrammatically with a ladder on which higher rungs denote more money, higher education, and better jobs [26]. In univariate analysis, the ladder was grouped into rungs 0–3, 4–6, and 7–10.

### *Anthropometric measures*

Body mass index (BMI) and waist-to-hip ratio are markers of generalized adiposity and central adiposity, respectively, and predictive of diabetes [27], coronary heart disease [28], periodontitis [29,30], and periodontal disease progression [31]. Standing height was measured using a stadiometer. The Tanita body composition analyzer measured weight. BMI was categorized using World Health Organization cut-points: underweight or normal (BMI < 25 kg/m<sup>2</sup>); overweight (BMI 25 to <30 kg/m<sup>2</sup>); and obese (BMI  $\geq$ 30 kg/m<sup>2</sup>). Waist and hip circumference were recorded to the nearest centimeter, and the waist-to-hip ratio was dichotomized at sex-specific cut-points of  $\geq 0.85$  for women and  $\geq 0.90$  for men [32].

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