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Stemming the tide: Rising diabetes prevalence and ethnic subgroup variation among Asians in Los Angeles County

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ABSTRACT

Objective. The primary objective of this analysis was to examine the burden of diabetes among Asians and Asian subgroups in Los Angeles County, which has the largest county population of Asians in the U.S.

Method. Data were analyzed from 6 cycles of the Los Angeles County Health Survey, 1997–2011 (n = 47,282). Asian adults (n = 4672) were categorized into the following ethnic subgroups: Chinese, Filipino, Korean, Japanese, Vietnamese, South Asian, and Other Asian. Descriptive and multivariable logistic regression analyses were conducted to examine trends in prevalence, prevalence among Asian subgroups, and factors associated with diabetes.

Results. In 2005, we observed a rapid increase in diabetes prevalence among Asians compared to whites despite consistently lower BMI relative to other racial/ethnic groups. Diabetes prevalence was significantly higher among Filipinos and South Asians (>10%) compared to East Asians and Vietnamese (<7%). After adjusting for all covariates, Asians who were older, non-drinkers, insured, and overweight or obese were found to have increased odds of diabetes.

Conclusion. Diabetes prevalence is increasing more rapidly among Asians compared to whites despite overall lower BMI. The significant heterogeneity among Asian subgroups highlights the need for disaggregated data and additional research to develop culturally appropriate interventions for diabetes prevention and control.

Introduction

Diabetes is a well-recognized global public health crisis. The number of people affected worldwide is projected to increase from 366 million in 2011 to 552 million in 2030, with the largest increases expected in China and India (Chan et al., 2009; Danaei et al., 2011; International Diabetes Federation, 2011). Asians are the fastest growing race in the United States (US Census Bureau, 2012), and like other racial/ethnic groups, have been experiencing an increase in diabetes rates (Lee et al., 2011). However, the increase in diabetes among Asian Americans may be under-recognized.

The lack of attention to diabetes as an increasing problem among Asians in the United States may partly be because Asians with diabetes are less likely to present with overt obesity. Obesity, clinically defined among adults as having a Body Mass Index (BMI) of ≥ 30 kg/m^2 (WHO, 1995), is a major risk factor for diabetes. However, the appropriateness of this definition for identifying individuals with a high percentage of body fat has been questioned. Asians have a higher percentage of body fat than whites of the same age, sex, and BMI (Deurenberg et al., 2002; He et al., 2001; Wang et al., 1994; WHO Expert Consultation, 2004), and experience greater obesity-related health problems at lower BMIs relative to other racial/ethnic groups (Deurenberg-Yap et al., 2002; Lee et al., 2011; McNeely and Boyko, 2004; Yoon et al., 2006). These observations led the World Health Organization (WHO) to convene the *Expert Consultation on BMI in Asian populations* in 2002, which recommended retaining existing international BMI classifications of weight status, but adding additional (lower) cutoffs for informing and triggering public health and clinical actions among Asians (WHO, 2000; WHO Expert Consultation, 2004). However, there is still considerable controversy regarding BMI cutoffs, and these lower cut-points have not been officially adopted. Additionally, the extreme heterogeneity of the Asian population has made their burden of diabetes difficult to assess. Although there is increased recognition of the need for disaggregated ethnicity data, few studies in the United States report disaggregated data for Asians, and there has been a lack of standardized reporting on the prevalence of diabetes among Asian subgroups (Lee et al., 2011; Staimez et al., 2013).

The primary objective of this analysis was to examine the burden of self-reported diabetes among Asians and Asian subgroups in Los

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Angeles County, which has the largest county population of Asians in the United States. We examined trends in diabetes prevalence among Asians and non-Asians and report on the prevalence of diabetes among Asian ethnic subgroups and factors associated with diabetes among Asians overall.

Methods

Data source

We used data from the Los Angeles County Health Survey (LACHS), a periodic, random-digit-dial telephone survey of the non-institutionalized population of Los Angeles County (Simon et al., 2001). The survey collects information on demographics, health conditions, health-related behaviors, health insurance coverage, and access to care among county residents. Due to the diversity of the population, interviews were conducted in English, Spanish, Mandarin, Cantonese, Korean, and Vietnamese, with one adult randomly selected from each household. Details regarding the survey design and weighting methodology are reported elsewhere (Simon et al., 2001). For this study, we analyzed data from the adult component of six iterations of the LACHS: 1997, 1999, 2002, 2005, 2007, and 2011. Two methodologic changes were made to the 2011 LACHS to maintain survey representativeness and validity. A dual frame sampling approach was used to incorporate cell phones into the sample, and a more sophisticated raking (i.e. sample balancing) procedure was adopted for weighting the survey (Los Angeles County Health Survey Methodology Report, 2012). These changes were similar to those made to the Behavioral Risk Factor Surveillance System in 2011 (CDC, 2012).

Study population

From 1997 to 2011, a total of 42,610 non-Asian (white, Latino, black) and 4672 Asian adults (aged 18 years or older) residing in Los Angeles County were surveyed and included in this analysis. The Asian adults were categorized into the following subgroups: Chinese (n = 1693), Filipino (n = 737), Korean (n = 786), Japanese (n = 558), Vietnamese (n = 313), South Asian (n = 269) and Other Asian (n = 316). 'South Asian' included Asian Indians, Sri Lankans, Pakistanis, and Bangladeshis. 'Other Asian' included, but was not limited to, southeast Asians (i.e. persons from Cambodia, Thailand, Laos, etc.) and Asians who did not specify any ethnicity. Native Hawaiians and Pacific Islanders were excluded from the analysis. Statistical weighting was utilized to generalize the sample survey data to the overall Los Angeles County population (Los Angeles County Health Survey Methodology Report, 2012).

Variables

Diabetes

Individuals were classified as having diabetes if they gave a positive response to the following question: "Have you ever been told by a doctor or other health professional that you have diabetes or sugar diabetes?"

Covariates

Independent variables that have previously been demonstrated to be associated with diabetes were included as covariates in the analysis. Sociodemographic variables examined included age group (18–49, 50–64, 65+ years), gender (male, female), education (<high school, high school graduate, some college, college graduate+), and household income (0–99% of the Federal Poverty Level (FPL), 100–199% FPL, ≥200% FPL). Other covariates of interest included nativity and years living in the U.S. (US born, foreign born living in the US for 0–9 years, foreign-born living in the US for ≥10 years), smoking status (non- or former smoker, current smoker), alcohol use (nondrinker, low-moderate drinker, heavy or binge drinker), insurance status (uninsured, insured), physical activity [meets national physical activity guidelines (US DHHS, 2000), some activity but not meeting guidelines, inactive], and weight status (under-to-normal weight, overweight, obese). For non-Asians, weight status classifications were defined using standard BMI cutoffs recommended by the CDC and WHO (BMI < 25, 25 ≤ BMI < 30, BMI ≥ 30 kg/m^2) (WHO, 1995). For Asians, we applied these standard cutoffs and also the recommended Asian-specific BMI cutoffs (BMI < 23, 23 ≤BMI < 27.5, BMI ≥ 27.5 kg/m^2) (WHO Expert Consultation, 2004).

Statistical analyses

We examined trends in diabetes prevalence by race/ethnicity using the Cochran–Armitage test for trend. We also compared diabetes prevalence and mean BMI between Asians and whites, controlling for age. For comparisons among Asian subgroups, we merged all 6 cycles of the LACHS and examined diabetes prevalence among Chinese, Filipinos, Korean, Japanese, Vietnamese, South Asians, and Other Asians compared to whites. We used logistic regression modeling to compare odds of diabetes by Asian subgroups using whites as the reference group and adjusting for age, gender, and BMI.

To investigate factors associated with diabetes among the full sample of Asians, we constructed additional logistic regression models to obtain crude and adjusted odds ratios (ORs). For this stage of modeling, we merged 4 cycles of the LACHS (2002–2011), excluding the 1997 and 1999 surveys because comparable data on smoking status, insurance, and physical activity were not available for these earlier survey years. Education level was not found to be significant in preliminary models and was not included in the final models. A significance level of $\alpha = 0.05$ was used throughout. The Hosmer–Lemeshow Goodness-of-Fit test was used to assess model fit. All analyses were performed in SAS version 9.3 (SAS Institute, Inc., Cary, NC).

Results

Summary characteristics

In 2007–2011, proportionately more Asians than non-Asians were aged ≥65 years (15.2% vs. 13.9%); this pattern was not observed in 1997–1999 (Table S1). For all survey years, a higher percentage of Asians than non-Asians had a college degree and a household income greater than 200% FPL, while a lower percentage of Asians were born in the U.S. than non-Asians; at the same time, among those who were foreign-born, proportionately more Asians had lived in the U.S. for ten years or more than non-Asians. Compared to non-Asians, Asians were also less likely to be current smokers and heavy or binge drinkers, more likely to have health insurance, and less likely to meet physical activity guidelines. When using Asian-specific BMI cutoffs, 46% of Asians were categorized as overweight or obese compared to only 26% when using CDC/WHO standard cutoffs.

Trends in diabetes prevalence and BMI among Asians vs. non-Asians

The age-adjusted prevalence of diabetes increased from 1997 to 2011 for all major racial/ethnic groups ($p < 0.005$). Among Asians overall, the prevalence of diabetes increased by 66%, from 5.8% in 1997, to 9.6% in 2011 (Table 1). The prevalence of diabetes among Asians was lower than that of Latinos and blacks, and was similar to that of whites from 1997 to 2005, after which it appeared to increase more rapidly and was significantly higher among Asians compared to whites (Fig. 1). Mean BMI also increased among Asians during this period, but it remained the lowest compared to other racial/ethnic groups for all years, and was significantly lower than that of whites, who had the second lowest mean BMI (Table 1).

Factors associated with diabetes among Asians

Diabetes prevalence among Asians was highest among adults who were aged 65 years or older, living below poverty, foreign-born but living in the U.S. for 10 years or more, non-drinkers, insured, physically inactive, and overweight or obese (Table 2). Asians with diabetes who were categorized as overweight and obese using either Asian-specific or CDC/WHO standard BMI cutoffs were two times and five times more likely to be diagnosed with diabetes, respectively, than those who were under-to-normal weight. After adjusting for all covariates, Asians who were older, non-drinkers, insured, and overweight or obese were found to have increased odds of diabetes.

Asian adults who were 65 years or older were 13 times more likely to report being diagnosed with diabetes compared to those aged 18–