Asian Americans: Diabetes Prevalence Across U.S. and World Health Organization Weight Classifications

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OBJECTIVE — To compare diabetes prevalence among Asian Americans by World Health Organization and U.S. BMI classifications.

RESEARCH DESIGN AND METHODS — Data on Asian American adults (n = 7,414) from the National Health Interview Survey for 1997–2005 were analyzed. Diabetes prevalence was estimated across weight and ethnic group strata.

RESULTS — Regardless of BMI classification, Asian Indians and Filipinos had the highest prevalence of overweight (34–47 and 35–47%, respectively, compared with 20–38% in Chinese; $P < 0.05$). Asian Indians also had the highest ethnic-specific diabetes prevalence (ranging from 6–7% among the normal weight to 19–33% among the obese) compared with non-Hispanic whites: odds ratio (95% CI) for Asian Indians 2.0 (1.5–2.6), adjusted for age and sex, and 3.1 (2.4–4.0) with additional adjustment for BMI.

CONCLUSIONS — Asian Indian ethnicity, but not other Asian ethnicities, was strongly associated with diabetes. Weight classification as a marker of diabetes risk may need to accommodate differences across Asian subgroups.

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In 2005–2006, the U.S. Asian population grew by 3.2%, to 14.9 million, the highest percentage growth of any race/ethnic group during that time period (1). Compared with other race/ethnic groups, Asians have higher adiposity per unit of BMI (2), leading to increased risk of type 2 diabetes at lower BMIs (3). This led to the 2002 consensus statement from the World Health Organization (WHO) on BMI in Asian populations, which uses lower cut points for BMI standards among Asians (normal weight 18.5–22.9 kg/m^2, overweight 23.0–27.4 kg/m^2, and obese ≥27.5 kg/m^2) compared with the traditional standards (normal weight 18.5–24.9 kg/m^2, overweight 25.0–29.9 kg/m^2, and obese ≥30.0 kg/m^2) (3). Despite continued attention to this issue, the utility of the WHO Asian BMI standard as a marker of diabetes risk remains unresolved.

RESEARCH DESIGN AND METHODS

— Data on 7,414 Asian American and 140,291 non-Hispanic white adults aged 18–74 years were pooled from the nationally representative National Health Interview Survey (NHIS) for the years 1997–2005. One randomly selected adult per household was asked detailed information on use of health care services, health-related behavior, and health status (including height, weight, and diabetes).

Data were pooled to improve reliability of statistical estimates (4) by merging the adult person-level files for each year surveyed. National Center for Health Statistics (NCHS) guidelines were applied to combine NHIS data with the same sample design from years 1997–2005 into one dataset (4). For this analysis, estimates represent the midpoint of the time interval of the pooled data (2001) (4). Sample weights provided by NCHS were used to account for the sampling design and nonresponse.

The proportions of overweight, obesity (using each BMI standard), and diabetes were age- and sex-standardized to the 2000 U.S. population. Proportions were then compared across Asian subgroups and with non-Hispanic whites. Multivariable logistic regression was used to calculate odds ratios (ORs) for diabetes among Asian subgroups compared with non-Hispanic whites. Two-tailed P values of ≤0.05 were considered significant for all analyses. All analyses were done using SAS-callable SUDAAN software (version 9.0; Research Triangle Institute, Research Triangle Park, NC).

RESULTS

— Overweight and obesity prevalence were higher in all Asian subgroups and among non-Hispanic whites when using the WHO Asian standard compared with the general standard. Regardless of standard, Asian Indians and Filipinos had statistically similar proportions of overweight and obese subjects but significantly higher proportions than either the Chinese or other Asian categories ($P < 0.05$) (supplemental table available in an online appendix at http://care.diabetesjournals.org/cgi/content/full/dc09-0573/DC1). Non-Hispanic whites had the highest proportions of obese individuals ($P < 0.05$) (supplemental table).

Across either BMI standard, Asian Indians had the highest diabetes prevalence compared with all other Asian subgroups and non-Hispanic whites ($P < 0.05$ for each) (Table 1). Diabetes prevalence in other Asian subgroups and non-Hispanic whites was statistically similar within the different weight categories.

Adjusted only for age and sex and compared with non-Hispanic whites, Asian Indians were more likely to report diabetes (OR 2.0 [95% CI 1.5–2.6]), but other Asian groups were not (Table 1). After adjusting for BMI, Asian Indians

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(3.1 [2.4–4.0]), Chinese (1.5 [1.1–2.1]), and Filipinos (1.6 [1.3–2.2]) were each more likely to report diabetes than non-Hispanic whites.

CONCLUSIONS— Although the prevalence of overweight and obesity are a function of the BMI standard used, a consistent pattern of higher overweight prevalence was demonstrated in Asian Indians and Filipinos compared with Chinese. Regardless of the BMI standard used, higher proportions of Asian Indians reported diabetes compared with other Asian subgroups and whites. In addition, compared with non-Hispanic whites, Asian Indian ethnicity alone was associated with diabetes, and other Asian ethnicities were not. After adjusting for BMI, all Asian subgroups were more likely to have diabetes than non-Hispanic whites.

Associations between BMI and diabetes have been previously shown to be modified by ethnicity (5). Studies have shown that Filipinos have higher diabetes prevalence than Chinese (6). Asian Indians have higher prevalence of diabetes than several other subgroups, and the risk increases at lower BMI thresholds (5). Although we do not know why there are differences in diabetes prevalence across Asian subgroups, a possible explanation is the differential associations between quantity and distribution of adiposity and metabolic risk. For example, increased susceptibility to diabetes in Asian Indians compared with Europeans (7) despite lower BMIs (8) is attributed to central adiposity, which may be due to lifestyle and/or genetic/intrauterine pre-disposition.

The use of BMI as a measure of body proportion is a limitation because of its inability to provide information on body fat distribution and central adiposity. Continued routine use of BMI in research and clinical practice is related to logistical ease in collecting height and weight (measured or self-reported) data. The WHO Asian weight standard is viewed as acceptable when more precise measures of adiposity are not available; however, this study indicates that for Asian Indians, ethnicity alone may be as informative as BMI with regard to diabetes risk.

A limitation of this study is the use of self-reported data, including self-reported height, weight, and diabetes. Although undiagnosed diabetes cannot be assessed using NHIS, a study in New York found that Asians had a rate of undiagnosed diabetes similar to that of non-Hispanic whites (9). As a result, the current study most likely underestimates the total diabetes prevalence in these populations. Furthermore, NHIS is a cross-sectional survey and does not include body weight at the time of diabetes diagnosis. The main strength of this study is the use of nationally representative data with a relatively large Asian sample.

In conclusion, this study demonstrates that Asian Indian ethnicity alone is associated with diabetes risk. We also find that the utility of the WHO Asian weight standard as a marker of diabetes risk may not be equivalent across different Asian subgroups. Prospective studies assessing the complex relationships between body shape, size, fat distribution, and development of cardiometabolic diseases across heterogeneous Asian groups are needed.

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Table 1—Diabetes prevalence by BMI standard and OR (95% CI) for diabetes by ethnic group

		Diabetes prevalence						OR (95% CI)			
		Normal weight		Overweight		Obese					
	n	General: 18.5–24.9 kg/m^2	WHO: 18.5–22.9 kg/m^2	General: 25.0–29.9 kg/m^2	WHO: 23.0–27.4 kg/m^2	General: ≥30.0 kg/m^2	WHO: ≥27.5 kg/m^2	Model 1*	Model 2†	Model 3‡	Model 4§
White	140,291	2.4 ± 0.1	2.2 ± 0.1	4.2 ± 0.1	3.1 ± 0.1	10.8 ± 0.2	8.7 ± 0.1	1.0	1.0	1.0	1.0
Asian Indian	1,357	6.8 ± 1.5	6.5 ± 1.9	8.8 ± 1.8	8.3 ± 1.7	32.9 ± 4.4	19.4 ± 3.5	2.0 (1.5–2.6)	3.1 (2.4–4.0)	3.0 (2.0–4.5)	3.5 (1.9–6.6)
Chinese	1,510	2.7 ± 0.6	2.2 ± 0.7	5.2 ± 1.5	3.8 ± 0.8	16.8 ± 4.3	11.2 ± 3.2	0.8 (0.6–1.2)	1.5 (1.1–2.1)	1.6 (1.0–2.4)	2.3 (1.1–4.5)
Filipino	1,485	4.4 ± 0.9	5.9 ± 3.7	6.2 ± 1.1	3.7 ± 0.7	10.9 ± 3.0	11.3 ± 2.0	1.2 (0.9–1.5)	1.6 (1.3–2.2)	1.6 (1.1–2.5)	2.2 (1.2–4.0)
Other Asian	3,062	3.3 ± 0.5	2.7 ± 0.5	5.2 ± 0.8	4.1 ± 0.6	11.7 ± 2.8	9.0 ± 1.7	0.8 (0.7–1.0)	1.3 (1.0–1.7)	1.3 (1.0–1.7)	1.3 (0.8–2.2)

Data are prevalence estimates age and sex standardized to the 2000 U.S. population ± SEM unless otherwise indicated. Adjusted for *sex and age (continuous), †model 1 + BMI (continuous), ‡model 2 + education and poverty income ratio, and §model 3 + physical activity, smoking, and alcohol drinking status.

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