A Comparison of Lifestyle and Behavioral Cardiovascular Disease Risk Factors between Asian Indian and White Non-Hispanic Men

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Objective: We compared lifestyle CVD risk factors between Asian Indian and White non-Hispanic men within categories of BMI.

Design/Setting/Participants: Participants included 51,901 White non-Hispanic men and 602 Asian Indian men enrolled in the California Men's Health Study cohort. Men were aged 45–69 years and members of Kaiser Permanente Southern or Northern California at baseline (2001–2002).

Main Outcome Measures: Lifestyle characteristics including diet, physical activity, alcohol intake and smoking were collected from a survey. Multivariable logistic regression, adjusting for demographics, was performed.

Results: Asian Indians more often reported a healthy BMI (18.5–24.9), and consumed <30% calories from fat within each BMI category (healthy weight and overweight/obese). Among healthy weight men, Asian Indians were less likely to eat ≥5 fruit and vegetables a day. Overall, Asian Indians were more likely to have never smoked and to abstain from alcohol. Asian Indians were less likely to report moderate/vigorous physical activity ≥3.5 hours/week. No differences were found in sedentary activity.

Conclusions: We identified health behaviors that were protective (lower fat intake, lower levels of smoking and alcohol) and harmful (lower levels of physical activity and fruit and vegetable intake) for cardiovascular health among the Asian Indians in comparison to White non-Hispanics. Results stratified by BMI were similar to those overall. However, the likelihood of consuming a low fat diet was lower among healthy weight men, while fruit and vegetable consumption, physical activity and alcohol intake was greater. These results suggest risk factors other than lifestyle behaviors may be important contributors to CVD in the Asian Indian population. (*Ethn Dis*. 2012;22(2): 168–174)

Key Words: Cardiovascular Disease, Health Behaviors, Asian Indian, White Non-Hispanic, Health Disparities

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Introduction

Cardiovascular disease (CVD) is the number one cause of death among all major racial/ethnic groups in the United States.[1,2] Although CVD mortality is decreasing nationally, it is decreasing at a much slower rate among the South Asian population compared to other groups.[3] According to the 2010 US Census, Asian Indians, a subset of the South Asian population, became the second fastest growing Asian population in California, with an estimated 550,000 people.[4,5] A recent study found that the leading cause of death among Asian Indians in California is CVD.[6] There have been few population-based studies conducted in the United States evaluating clinical and lifestyle CVD risk factors in the Asian Indian population.[7–15] Researchers have reported disproportionately higher rates of CVD and CVD clinical risk factors including diabetes mellitus (DM), hypertension, and dyslipidemia in Asian Indians.[10–12,15,16] Explanations for these increased rates have not been well elucidated and the Asian Indian population may have a different set of susceptibility factors.

Examining modifiable lifestyle risk factors and health behaviors is important because increasing physical activity, decreasing red meat and increasing fruit, vegetable, fish, and whole grain consumption can help prevent, control or delay CVD, DM, hypertension, and dyslipidemia onset.[17] Although many Asian Indians may have a healthy lifestyle, they disproportionately suffer from peripheral vascular disease, coronary heart disease and stroke.[18] Furthermore, migrant studies of Asian Indians into Western countries demonstrate that prolonged exposure to known CVD risk factors such as Western diets and sedentary lifestyles result in increased blood pressure, body weight, blood sugars and blood lipids.[19] By contrast, little is known about lifestyle/behavioral CVD risk factors among Asian Indians living in the United States compared to White non-Hispanics.

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The purpose of our study was to evaluate lifestyle/behavioral CVD risk factors in Asian Indian men compared to White non-Hispanic men, the majority racial/ethnic group in the California Men's Health Study (CMHS) cohort and in the nation. The CMHS cohort is based in two large managed care organizations where barriers to health care should be minimized. Thus, this study presents an ideal setting to examine the role of lifestyle factors that may contribute to health disparities among Asian Indians without the confounding effect of insurance coverage. Analyses were conducted among healthy

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weight and overweight/obese men to evaluate the effect of body mass index (BMI) on these behaviors.

METHODS

Study Cohort

This study was a cross-sectional study nested within the CMHS, a large multiethnic cohort of 84,170 men. Details of the study cohort, recruitment, and data collection were reported previously by Enger et al.[20] To be eligible, men had to be members of Kaiser Permanente Southern California (KPSC) or Kaiser Permanente Northern California (KPNC), the two largest managed care organizations in California, for at least one year, and aged 45–69 at recruitment, which took place between January 2002 and December 2003. Men were recruited by direct mailing using a two-step process. Potential participants were first mailed an introductory letter and short screening questionnaire. A 24-page questionnaire was mailed to those who completed the screening questionnaire. The baseline survey obtained information on demographics, height, weight, health status, and lifestyle behaviors. The study was approved by the Institutional Review Boards of KPSC and KPNC.

Race/Ethnicity

The CMHS participants were asked about their racial/ethnic backgrounds and were permitted to select multiple options. For these analyses, the Asian Indian category included men who reported Asian Indian and Asian Indian plus another race. White non-Hispanic race/ethnicity was defined as respondents who selected White-European or White-Middle Eastern and did not report Hispanic ethnicity.

Acculturation

Acculturation, previously defined in this cohort by Ahmed et al[21] was categorized into: first generation (respondent born outside the United States), second generation (at least one parent of the respondent born outside the United States and the respondent was born in the United States) and third generation (parent(s) and respondent born in the United States). Among those who were first generation, duration of residence in the United States was categorized into: ≤15 years, 16–25 years, and >25 years.

Ascertainment of Reported Clinical, Lifestyle and Behavioral Risk Factors

Body mass index was calculated from weight (kilograms) and height (meters) (kilograms/meter^2) and categorized into: underweight (<18.5), healthy weight (18.5–24.9), overweight (25–29.9) and obese (≥30), based on the guidelines established by the National Institutes of Health.[22] Clinical CVD risk factors included reports that a doctor or health professional had told the participant they had one or more of the following conditions: diabetes, high blood pressure, and high cholesterol/ triglycerides. Cardiovascular disease was defined as ever having at least one of the following: angina, aortic aneurysm, congestive heart failure/heart failure, heart attack and stroke.

Diet was assessed using a semi-quantitative food frequency questionnaire developed for the Women's Health Initiative,[23–25] and modified for men's health.[26] The following variables were evaluated: total daily calories (kcal/day); <30% of calories from fat; fruit and vegetable consumption (servings/day); and multivitamin use for 3 days or more/week (yes/no). Frequency of total alcohol consumption included beer, liquor, red wine, and white wine. Smoking status was queried in men reporting having smoked at least 100 cigarettes in their lifetime.

Men reported their frequency and duration of moderate and vigorous recreational, household and work-related physical activities with questions adapted from the CARDIA Physical Activity History (PAH).[27,28] The CARDIA PAH has indirect validity against aerobic capacity and percent fat and a strong inverse relationship with most cardiovascular disease risk factors.[29,30] Moderate/vigorous physical activity was defined as ≥3.5 hours/week in moderate activities or ≥3 METS. Sedentary lifestyle was defined as ≥ 6 hours/day outside of work spent watching television, sitting at a computer, or reading.

Statistics

Frequency distributions were used to describe demographic, dietary and physical activity patterns in the population. Bivariate analyses, using 2-sided *t* tests for continuous variables and 2 × 2 contingency tables for categorical data were used to assess the association between lifestyle/behavioral factors and within categories of BMI (healthy and overweight/obese) by race/ethnicity. Unconditional multivariable logistic regression models were used to estimate adjusted odds ratios and 95% confidence intervals to assess the differences in lifestyle/behavioral CVD risk factors by race/ethnicity within BMI categories. The underweight category was too small to provide stable estimates and results were not reported. The overweight and obese categories were combined due to small numbers. All multivariable models included age, education, income and marital status. Analyses were conducted using SAS, Version 9.2 (SAS Institute, Inc., Cary, North Carolina. 2002–2008).

RESULTS

A total of 52,503 Asian Indians (n=602) and White non-Hispanics (n=51,901) were left in the cohort after excluding men of other race/ethnicities. Among those who reported being Asian Indian, 9% (n=55) reported being of mixed race (data not shown). Table 1 compares Asian Indians with White non-Hispanics on demographic characteristics. While Asian Indians were more

Table 1. Demographic characteristics of Asian Indians and White non-Hispanics in the California Men's Health Study, 2002–2003

	Asian Indian (*n*=602) *n* (%)	White non-Hispanic (*n*=51,901) *n* (%)	*P* [a]
Age, years			
45–49	103 (17.1)	6699 (12.9)	.02
50–54	112 (18.6)	9797 (18.9)	
55–59	115 (19.1)	12,007 (23.1)	
≥60	272 (45.2)	23398 (45.1)	
Education			
High school or less	60 (10.0)	6908 (13.3)	<.001
Vocational/some college	74 (12.3)	17,521 (33.8)	
College	160 (26.6)	11,447 (22.1)	
Graduate degree	305 (50.7)	15,897 (30.6)	
Missing	3 (.5)	128 (.2)	
Household income, annual $			
0–39,999	134 (22.3)	7963 (15.3)	<.001
40,000–60,000	97 (16.1)	9116 (17.6)	
60,000–80,000	85 (14.1)	9355 (18.0)	
≥80,000	272 (45.2)	23,354 (45.0)	
Missing	14 (2.3)	2113 (4.1)	
Marital Status			
Married/living with partner	550 (91.4)	42,037 (81.0)	<.001
Other (divorced, separated, widowed, never married)	48 (8.0)	9696 (18.7)	
Missing	4 (.7)	168 (.3)	
Acculturation			
1st generation ≤15 years	106 (17.6)	346 (.7)	<.001
1st generation 16–25 years	157 (26.1)	680 (1.3)	
1st generation >25 years	305 (50.7)	3209 (6.2)	
2nd generation or higher	27 (4.5)	47,135 (90.8)	
Missing	7 (1.2)	531 (1.0)	

[a]*P* (2-sided) based on x^2 test for heterogeneity.

likely than White non-Hispanics to have a graduate degree (50.7% vs 30.6% respectively), they were more likely to report an annual household income below $40,000 (22.3% vs 15.3%). A higher proportion of Asian Indians were married compared to White non-Hispanics (91.4% vs 81.0%). In contrast to White non-Hispanics, almost all of the Asian Indians (94.4%) reported being first generation immigrants, with over 75% of them having resided in the United States for >16 years. Over 90% of the White non-Hispanics were second generation or higher.

Table 2. Self-Reported clinical characteristics among Asian Indians and White non-Hispanics in the California Men's Health Study, 2002–2003

	Asian Indian (*n*=602) %	White non-Hispanic (*n*=51,901) %	*P*[a]
BMI			
<18.5, underweight	1.5	.5	<.001
18.5 to 24.9, healthy weight	47.0	24.5	
25.0 to 29.9, overweight	42.2	46.1	
≥30, obese	7	26.6	
Diabetes	21.3	9.8	<.001
Hypertension	36.0	36.0	.97
High cholesterol	42.5	41.5	.61
Cardiovascular disease[b]	17.8	11.4	<.001

[a]*P* (2-sided) based on x^2 test for heterogeneity.
[b]Includes angina, aortic aneurysm, congestive heart failure/heart failure, heart attack and stroke.

Self-report of clinical risk factors found more Asian Indians were at a healthy weight compared to White non-Hispanics (47.0% vs 24.5%); whereas White non-Hispanics were almost four times more likely to be obese (26.6% vs 7.0%) (Table 2). Despite similar age distributions, Asian Indians reported higher levels of CVD (17.8% vs 11.4%) and diabetes (20.4% vs 9.7%) compared to White non-Hispanics. The proportion of those reporting hypertension and high cholesterol was similar.

Table 3. Health behaviors in Asian Indians and White non-Hispanics in the California Men's Health Study, 2002–2003

	Healthy weight BMI=18.5–24.9 (*n*=12,990)		Overweight/Obese BMI≥25 (*n*=38,020)		Total	
	Asian Indian (*n*=283) *n* (%)	White non-Hispanic (*n*=12,701) *n* (%)	Asian Indian (*n*=296) *n* (%)	White non-Hispanic (*n*=37,724) *n* (%)	Asian Indian (*n*=579) *n* (%)	White non-Hispanic (*n*=50,425) *n* (%)
Total calories, kcal/day						
Mean (SD)	1409.6 (830.2)	2135.3 (848.1)	1547.0 (995.6)	2210.2 (1023.4)	1479.8 (920.3)	2191.3 (982.7)
P[a]	<.001		<.001		<.001	
<30% calories from fat						
Yes	155 (54.8)	4645 (36.6)	155 (52.4)	9145 (24.2)	310 (53.5)	13,790 (27.4)
No	128 (45.2)	8056 (63.4)	141 (47.6)	28,579 (75.8)	269 (46.5)	36,635 (72.7)
P[b]	<.001		<.001		<.001	
Adj. OR, CI[c]	2.02 (1.58–2.56)		3.39 (2.68–4.30)		2.91 (2.46–3.45)	
Fruit and vegetable consumption, 5/day						
Yes	83 (29.8)	4646 (36.7)	92 (31.2)	11,747 (31.2)	175 (30.5)	16,393 (32.6)
No	196 (70.3)	8018 (63.3)	203 (68.8)	25,853 (68.8)	399 (69.5)	33,871 (67.4)
P[b]	.02		.98		.28	
Adj. OR, CI[c]	.68 (.52–.89)		.84 (.65–1.08)		.78 (.65–.94)	
Multivitamin use for ≥3 days/week						
Yes	134 (47.3)	7114 (56.0)	133 (44.9)	24,645 (48.9)	267 (46.1)	27,307 (54.2)
No	149 (52.7)	5587 (44.0)	163 (55.1)	25,870 (51.1)	312 (53.9)	23,118 (45.8)
P[b]	<.05		<.05		<.001	
Adj. OR, CI[c]	.72 (.56–.91)		.73 (.58–.93)		.74 (.62–.87)	
Sedentary behaviors outside of work						
Yes	67 (25.5)	2835 (23.4)	88 (32.5)	12,216 (34.1)	155 (29.0)	15,051 (31.4)
No	196 (74.5)	9270 (76.6)	183 (67.5)	23,633 (65.9)	379 (71.0)	32,903 (68.6)
P[b]	.44		.58		.24	
Adj. OR, CI[c]	1.30 (.97–1.73)		1.08 (.83–1.40)		1.07 (.88–1.29)	
Moderate/vigorous physical activity, ≥3.5 hrs per week or ≥3 METS						
Yes	154 (55.2)	9606 (75.7)	155 (53.3)	23,580 (62.6)	261 (45.8)	33,186 (65.9)
No	125 (44.8)	3080 (24.3)	136 (46.7)	14,082 (37.4)	309 (54.2)	17,162 (34.1)
P[b]	<.001		<.001		<.001	
Adj. OR, CI[c]	.35 (.27–.45)		.56 (.47–.76)		.52 (.44–.62)	
Total Alcohol						
<1/month	138 (48.8)	3439 (27.1)	127 (42.9)	11,923 (31.6)	265 (45.8)	15,362 (30.5)
1–3/month	34 (12.0)	926 (7.3)	32 (10.8)	3120 (8.3)	66 (11.4)	4046 (8.0)
1–4/week	60 (21.2)	2813 (22.2)	68 (23.0)	8484 (22.5)	128 (22.1)	11,297 (22.4)
≥5/ week	51 (18.0)	5523 (43.5)	69 (23.3)	14,197 (37.6)	120 (20.7)	19,720 (39.1)
P[b]	<.001		<.001		<.001	
Adj. OR, CI, 5+/week[c]	.21 (.15–.29)		.45 (.33–.61)		.33 (.26–.41)	
Smoking status						
Never	192 (67.8)	6264 (49.4)	181 (61.2)	15,317 (40.7)	373 (64.4)	21,581 (42.9)
Current	19 (6.7)	1393 (11.0)	28 (9.5)	3600 (9.6)	47 (8.1)	4993 (9.9)
Former	72 (25.4)	5024 (39.6)	87 (29.4)	18,721 (49.7)	159 (27.5)	23,745 (47.2)
P[b]	<.001		<.001		<.001	
Adj. OR, CI, former vs never[c]	.57 (.34–.94)		.48 (.37–.63)		.46 (.38–.56)	

[a]*P* based on *t* test for continuous variables.
[b]*P* based (2-sided) x^2 test for heterogeneity.
[c]All ORs adjusted for age, education, income, and marital status.

Characteristics of health behaviors by race/ethnicity within BMI category are displayed in Table 3. Overall, Asian Indians reported a lower mean caloric intake and consumption of <30% of calories from fat. Healthy weight Asian Indians were less likely to consume 5 servings of fruit and vegetables a day and take multivitamins. There were no differences in reports of sedentary lifestyle. Asian Indians reported less moderate/vigorous physical activity compared to White non-Hispanics. In addition, Asian Indians reported lower alcohol consumption and results by subtype of alcohol were similar (data not shown). Fewer Asian Indians reported ever having smoked; however

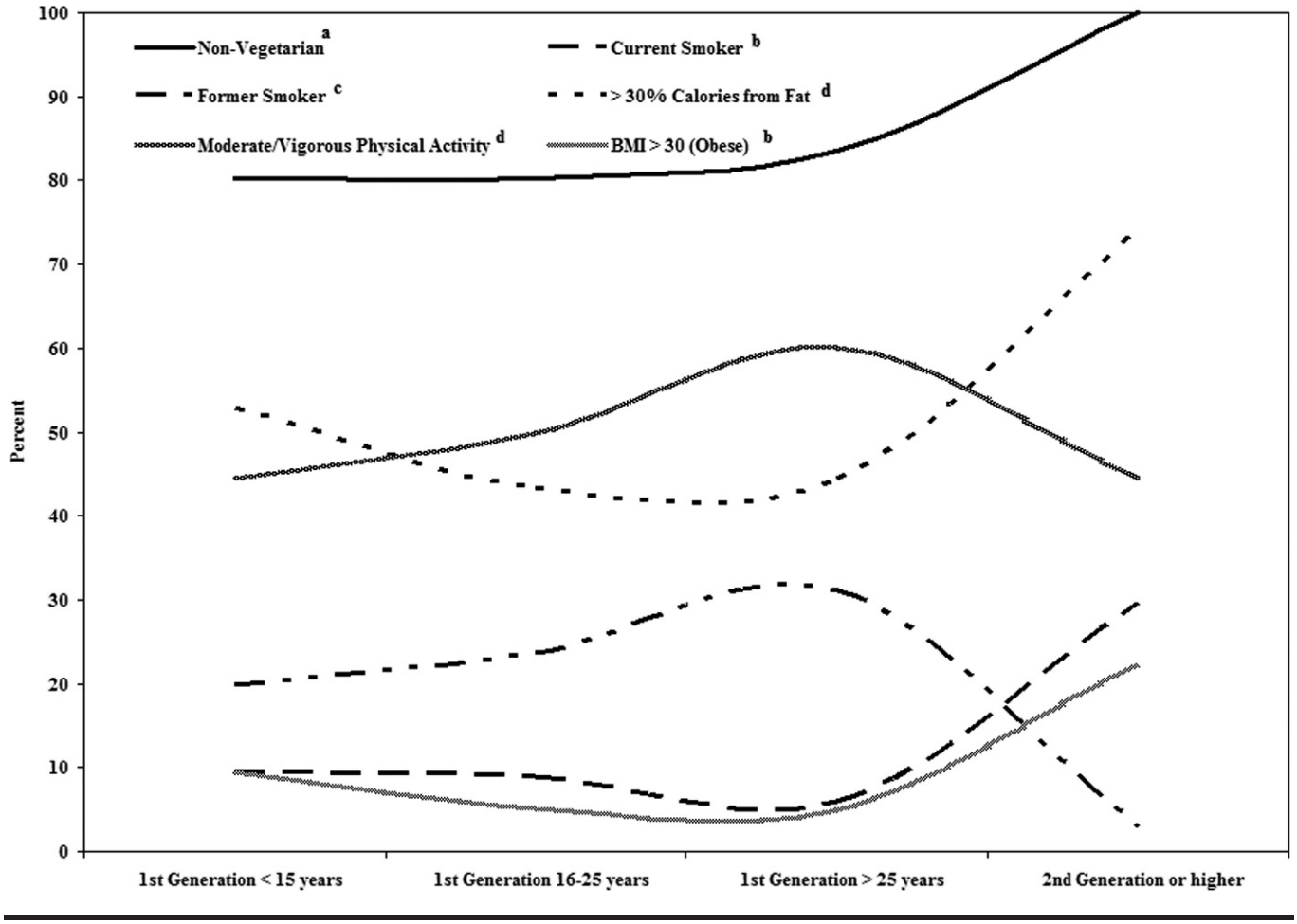

Fig 1. Health behaviors by acculturation status in Asian Indian (*n*=602)
[a]*P*=.03, based (2-sided) x^2 test for heterogeneity.
[b]*P*<.001, based (2-sided) x^2 test for heterogeneity.
[c]*P*=.04, based (2-sided) x^2 test for heterogeneity.
[d]*P*=.01, based (2-sided) x^2 test for heterogeneity

only a narrow difference in current smoking was seen (8.1% vs 9.9%).

Stratification by BMI changed the results slightly (Table 3). Asian Indians of a healthy weight were less likely to consume 5 or more fruits and vegetables a day. Additionally, the adjusted odds ratios for consuming <30% of calories from fat, moderate/vigorous physical activity, and total alcohol intake among healthy weight Asian Indians were attenuated in contrast to overweight/obese men. Among healthy weight men, a larger difference in current smoking was reported (6.7% vs 11.0%).

Health behaviors and lifestyle risk factors were evaluated by acculturation status among Asian Indians (Figure 1). With duration of residence, we found an increase in health behaviors associated with CVD risk. For example, 100% of the second generation Asian Indians reported a non-vegetarian diet, and more second generation Asian Indians reported being current and former smokers vs never smokers. Caloric intake increased with generational status ranging from 1519.3 kcal/day among recent first generation immigrants to 2992 kcal/day in second generation Asian Indians (data not shown). The healthiest lifestyle patterns were observed in the first generation Asian Indians who more often reported eating a low-fat diet and participating in more moderate/vigorous physical activity (60.0%). Similar results were found for all comparisons when the White non-Hispanics included and excluded White Middle Eastern men.

DISCUSSION

As found in previous studies, Asian Indians in the CMHS reported more diabetes and CVD compared to White non-Hispanics despite being substantially thinner. Because these comparisons were made in an insured population with equivalent access to the same source of care, the differences between

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groups are unlikely to be due to differential care or diagnostic labeling. We identified some health behaviors by BMI among Asian Indians that are protective for CVD (lower fat intake, lower levels of smoking and alcohol). On the other hand, lower levels of physical activity and fruit and vegetable consumption may account for some of the disparity found in reported CVD and diabetes prevalence in this Asian Indian population. As in previous reports from migrant populations, longer residence in the United States appears to be associated with the acquisition of a less healthy lifestyle.

Three published studies in the United States have evaluated lifestyle and health behaviors of CVD risk in the Asian Indian population.[11,13,14] Two studies collected information on diet, physical activity, smoking habits, and chronic diseases.[13,14] The third study compared data from two population-based surveys in California.[11] Similar to our results, all studies found Asian Indians reported relatively healthy weights but had low levels of physical activity.[11,13,14] However, these studies had small sample sizes, no comparison group to examine differences in lifestyle CVD risk factors, and did not explore the relationships within BMI categories.[11,13,14] The earlier investigations observed that Asian Indians reported diets high in fat. In our study, Asian Indians had a lower fat diet regardless of BMI status compared to White non-Hispanics. This difference in finding may be due to the cultural diversity within the Asian Indian population. Studies of Asian Indian migration into Canada and England, found that as immigrants acculturate they adopt unhealthy lifestyles, including a Westernized diet high in fat, low in fiber, as well sedentary behaviors.[14] We observed this phenomenon in this cohort as well.

Our study has several strengths. There is a large population of Asian Indians residing in California, and this cohort had a large sample of Asian Indian men to evaluate lifestyle and behavioral CVD risk factors. All of the study participants were enrolled in prepaid health plans known for their commitment to prevention, and had equal access to health care. This study has several potential limitations. This study was limited to men enrolled in a managed care organization, thus limiting the generalizability to the entire Asian Indian population. We did not have longitudinal reports of health behaviors since the survey was conducted at baseline, therefore behavior change cannot be assessed. The survey data was subject to recall bias. Body mass index may not be the best assessment for CVD risk in Asian Indians, since they have been shown to have higher levels of abdominal adiposity compared to other racial/ethnic groups.[31,32] It has been suggested to use lower BMI cutoff points for obesity in the Asian population.[32,33] In addition, the dietary questionnaire may not have captured the Asian Indian diet adequately. For example, differences in ingredients, recipes and cooking methods may not have been captured appropriately for the Indian diet, and consequently may underestimate or overestimate fat and vegetable intake.

Our results may be limited by our assessment of acculturation, which did not include commonly assessed factors such as immigrants' values, beliefs and behaviors. These factors influence lifestyle and behavioral choices, including diet and physical activity. Despite this potential limitation in our measure, we found an increased risk for CVD lifestyle behaviors by acculturation status.

In conclusion, our results add to the very limited literature on Asian Indian health in the United States. Our examination of lifestyle related CVD risk factors found evidence for both potentially protective and harmful health behaviors among Asian Indian men regardless of BMI status. With the fast growing Asian-Indian population in California, health care providers need to be cognizant of the high prevalence of CVD and lifestyle risk factors in the Asian-Indian population. Future research should examine the role of genetics, control of clinical CVD risk factors, CVD incidence and outcomes among the Asian Indian population in the United States.

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