The Risk of Hospitalization for Ischemic Heart Disease among Asian Americans in Northern California

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ABSTRACT

To supplement sparse data about ischemic heart disease in Asian Americans, hospitalization risk was prospectively examined in a group of Asian Americans living in Northern California. Analyses used Cox models with ischemic heart disease risk traits as covariables. With Whites as the referent category, relative risks by ethnic group were as follows: Chinese, 0.6 ($P = .001$); Japanese, 1.0 ($P = .97$); Filipinos, 1.0 ($P = .95$); South Asians, 3.7 ($P < .001$); other Asian Americans, 0.8 ($P = .55$). Thus, unexplained differences in ischemic heart disease risk exist among Asian-American ethnic groups, with Chinese Americans at lowest risk and persons of South Asian origin at highest risk. (*Am J Public Health.* 1994;84:1672–1675)

Introduction

Considering the recent rapid increase in numbers of Asian Americans, data about health risks in this group remain scanty.[1–3] Prospective data about ischemic heart disease incidence are limited to epidemiological surveys among Japanese Americans residing in the United States.[4–6] These surveys show more ischemic heart disease among Japanese Americans than among Japanese living in Japan, a finding attributed to life-style changes. Studies of ischemic heart disease risk factors among Chinese Americans suggest that their risk is probably low.[7,8] Two reports suggest a high prevalence of hypertension among Filipino Americans.[9,10] Reports of a high ischemic heart disease prevalence among overseas Asian Indians in various countries have appeared.[11–18] To address the clear need for more data about ischemic heart disease in Asian-American ethnic groups, we here report prospective data about hospitalization for this condition.

Methods

We used data from 13 245 Asian Americans who voluntarily took health examinations offered by a Northern California prepaid health care program from 1978 through 1985. The self-administered questionnaire included the question "What is your race?" (Options: Black, White, Oriental [Asian], Latin, Mixed, and Other.) Subheadings under Oriental (Asian) were Chinese (n = 6064), Japanese (n = 1718), Filipino (n = 4283), and Other Asian (n = 1180). A separate query about birthplace yielded 274 South Asians ("Other Asians" born in India or Pakistan); the remainder are called "Other Asians" in this paper. The study population and examination procedure, which included health measurements and blood tests, have been described elsewhere.[8,19] Hospitalizations for ischemic heart disease were identified primarily by hospital discharge codes 410 through 414 (*International Classification of Diseases,* Ninth Revision[20]) in records of hospitals used by the health care program.

The subjects were followed from the date of first examination until December 1989, termination of health plan membership, or first hospitalization for ischemic heart disease (whichever was earliest). This procedure yielded 207 persons with such hospitalizations (99 for acute myocardial infarction and 108 for other ischemic heart disease diagnoses). Cox proportional hazards models were used for analyses, with age, sex, smoking (never smoker, ex-smoker, <1 pack/day, ≥1 pack/day), body mass index, marital status (married, never married, formerly married), education (no college, some college, college graduate), and alcohol intake (never drinker, ex-drinker, <1 drink/day, ≥1 drink/day) as covariates. Systolic blood pressure, total serum cholesterol, and random blood glucose were also included in some models. The use of these two models enabled study of the role of these established ischemic heart disease risk factors in the results. Comparisons were made between each Asian-American group and Whites (using a 10% random sample of Whites as the referent; n = 7206, of which 212 had been hospitalized for ischemic heart disease) and between the Asian-American groups themselves (using the largest subset, Chinese, as the referent). The results are expressed as relative risks (RRs) for hospitalization for ischemic heart disease.

Of the 13 245 Asian-American subjects, 33.1% terminated membership in the health care program by December 1989. By ethnic group, the percentages were Chinese, 33.8%; Japanese, 33.8%; Filipinos, 28.3%; South Asians, 44.5%; other Asians, 46.4%; Whites, 35.9%.

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TABLE 1—Traits of Subjects in Asian-American Ethnic Groups and Whites

	Chinese	Japanese	Filipinos	South Asians	Other Asians	Whites (10% Sample)
No. (% of total)	6064 (46)	1718 (13)	4283 (32)	274 (2)	906 (7)	7206 (. . .)
Mean age, y (SD)	39.1 (13.9)	41.5 (13.7)	37.7 (12.4)	35.6 (9.5)	34.5 (10.5)	42.5 (15.6)
Male, %	46.3	40.6	41.0	58.8	42.5	47.4
US-born, %	42.5	78.5	8.3	0[a]	11.3	88.3
Current smokers, %	10.9	20.1	18.7	13.9	23.1	23.1
College graduates, %	46.8	51.3	50.3	65.0	40.9	44.2
Married, %	61.8	60.7	68.3	79.9	66.0	49.0
Lifelong alcohol abstainers, %	34.1	15.9	35.2	29.2	31.6	6.2
Mean cholesterol, mmol/L	5.45	5.74	5.48	5.34	5.25	5.57
Mean glucose, mmol/L	5.3	5.4	5.4	5.4	5.2	5.3
Mean body mass index[b]	22.2	22.8	23.3	23.4	22.8	24.3
Mean systolic blood pressure, mm Hg	120.2	120.6	122.9	119.6	117.0	125.3
Ischemic heart disease risk "yes,"[c] %	26.5	30.4	40.2	29.9	31.1	32.8
Mean follow-up, y	7.3	7.4	7.4	6.4	6.2	7.1

[a]All persons in this subset stated that they were Asian and were born in India or Pakistan.
[b]Weight in kilograms divided by height in meters squared.
[c]See Methods for definition.

We attempted to identify persons who were free of or at low risk for ischemic heart disease. A person was considered at risk if he or she answered "yes" to any of 12 health history questions suggesting lifetime history of ischemic heart disease, symptoms of ischemic heart disease, or risk factors for ischemic heart disease (hypertension, diabetes, hypercholesterolemia).

Results

Tables 1 and 2 present descriptive data and age-adjusted hospitalization rates for the Asian-American groups. Age-specific rates for Chinese men were roughly half those of Whites; rates for South Asian men were two to four times those of Whites. For example, rates per 1000 person-years among men aged 45 through 59 years were 5.6 for Whites, 2.9 for Chinese, and 21.9 for South Asians; among men aged 60 years or older, rates were 16.0 for Whites, 8.3 for Chinese, and 34.7 for South Asians.

The risk of hospitalization, adjusted for risk factors, was similarly lower in Chinese Americans and higher in South Asians than in Whites (Table 3). Separate analyses by sex showed the following statistically significant relative risks (with 95% confidence intervals [CIs]): Chinese vs White men, 0.6 (0.4, 0.8); South Asian vs White men, 4.4 (2.1, 8.7); Filipino vs White women, 2.3 (1.2, 4.2). Other comparisons by sex of Asian subsets vs Whites were not significant; there were no cases of ischemic heart disease among South Asian women and therefore no risk ratios. The covariates showed expected relationships to ischemic heart disease risk. In the model with Whites as the referent, the following relative risks were found: age, 1.8 per 10 years ($P < .001$); male sex, 3.5

TABLE 2—Age-Adjusted Rates of Hospitalization[a] for Ischemic Heart Disease in Asian Americans and Whites, by Sex

	Men			Women		
Ethnicity	n	No. Hospitalized	Rate	n	No. Hospitalized	Rate
Chinese	2805	55	1.6	3259	17	0.4
Japanese	697	28	2.8	1021	9	0.6
Filipino	1756	55	3.4	2527	27	1.3
South Asian	161	9	9.0	113	0	. . .
Other Asian	385	7	2.9	521	0	. . .
White	3414	145	3.0	3792	67	1.0

[a]Age-adjusted rate per 1000 person-years, using age distribution of all Asians as standard population.

TABLE 3—Adjusted Relative Risk of Hospitalization[a] for Ischemic Heart Disease: Asian Americans vs Whites

Ethnicity	Relative Risk	95% Confidence Interval	*P*
White (referent)	1.0	. . .	. . .
Chinese	0.6	0.4, 0.8	.001
Japanese	1.0	0.7, 1.4	.97
Filipino	1.0	0.7, 1.4	.95
South Asian	3.7	1.8, 7.4	<.001
Other Asian	0.8	0.3, 1.8	.55

[a]Computed by Cox proportional hazards models controlled for age, sex, smoking, body mass index, marital status, education, alcohol intake, systolic blood pressure, total serum cholesterol, and blood glucose.

TABLE 4—Adjusted Relative Risk of Hospitalization[a] for Ischemic Heart Disease: Asian-American Ethnic Groups vs Chinese Americans

Ethnicity	Relative Risk	95% Confidence Interval	P
Chinese (referent)	1.0	...	...
Japanese	1.8	1.2, 2.7	.006
Filipino	1.9	1.3, 2.7	<.001
South Asian	6.6	3.2, 13.6	<.001
Other Asian	1.3	0.6, 3.1	.49

[a]Computed by Cox proportional hazards models controlled for age, sex, smoking, body mass index, marital status, education, and alcohol intake.

($P < .001$); body mass index, 1.1 per unit (kg/m^2) ($P < .001$); current smoking of 1 or more packs per day (vs never smoking), 1.8 ($P = .002$); current alcohol intake of 1 or more drinks per day (vs never drinking), 0.4 ($P < .001$); systolic blood pressure, 1.1 per 10 mm Hg ($P < .001$); total cholesterol, 1.1 per 0.25 mmol/L ($P < .001$); glucose, 1.03 per 0.5 mmol/L ($P < .001$). Compared with the Chinese, the Japanese, Filipino, and South Asian groups were all at higher risk, with a striking relative risk for South Asians vs Chinese (Table 4). The confidence intervals were wide for the comparisons of South Asians vs Whites and South Asians vs Chinese because of small numbers, but the P values for both comparisons were <.001. These results were little affected by inclusion of cholesterol, blood pressure, and glucose in the analyses. Addition of the ischemic heart disease risk variable (for "yes" vs not "yes," RR = 2.6, 95% CI = 2.1, 3.4) to the multivariate model resulted in only minor changes in relative risk estimates: for example, for Chinese vs Whites, RR = 0.6 either way; for South Asians vs Whites, RR = 3.7 with no control for ischemic heart disease risk and 3.8 with control for ischemic heart disease risk.

Discussion

To our knowledge, this is the first report of differences in ischemic heart disease risk that includes data for most of the major Asian-American ethnic groups living in the United States. Hospitalization represents only part of the clinical ischemic heart disease spectrum. This could be an important limitation if there are ethnic differences in the decision to hospitalize a patient who has experienced an ischemic heart disease event. We believe this is unlikely because of probable, similarly high identification of ischemic heart disease events among ethnic groups in this study sample. All subjects were sufficiently health conscious to take a health examination. In this study the ischemic heart disease risk of Japanese and Filipino Americans was similar to that of Whites. The data for Japanese Americans are consistent with extrapolation of the apparent effects of acculturation on ischemic heart disease risk in this group seen in previous studies.[4–6] Nearly 80% of Japanese Americans in this study population were US-born, and their traits were similar to those of US Whites.[8,19] Although 90% of the Filipino Americans in this study were born in the Philippines, the high prevalence of hypertension[9,10] and relatively high levels of ischemic heart disease risk factors in this group[8] seem sufficient to explain their ischemic heart disease risk. Efforts toward ischemic heart disease risk factor control in these groups should probably parallel those among US Whites and Blacks.

A lower ischemic heart disease risk in overseas Chinese has been reported in a multiethnic Singaporean population, without explanation.[13] A prediction of lower risk in Chinese Americans in this study population[8] was based on its lower prevalence of established ischemic heart disease risk factors. Our finding of lower risk for the Chinese Americans in the present study, independent of the controlled risk factors, does not rule out this explanation. Measurement of traits at a single point in time does not control for lifelong risk. Uncontrolled factors (e.g., high-density lipoprotein [HDL] cholesterol, physical activity, psychological traits) may be involved. We hope that others will explore these aspects. With further follow-up, larger numbers of subjects with ischemic heart disease will enable separate study of Chinese Americans born in China, Taiwan, Hong Kong, Hawaii, and the mainland United States and may provide further clues about ischemic heart disease risk in this ethnic group.

Our data show that Asian Americans of South Asian origin are at very high risk for ischemic heart disease. Although the number of cases is small (with resultant wide confidence intervals), the validity of the finding is strongly supported by reports from other countries.[10–18] Consistency in diverse environments suggests that an intrinsic genetic or cultural trait is involved. An explanation in terms of established risk factors is not yet clear. There seem to be large disparities in incidence of ischemic heart disease in various portions of India.[18] Others have considered the most promising explanatory hypothesis to be high prevalence of diabetes mellitus, central obesity, and insulin resistance.[12,15–18] Our data, controlled for blood glucose and body mass index, do not support this hypothesis, but we unfortunately have no data about HDL cholesterol, apolipoproteins, lipoprotein(a), or other possible lipoprotein factors. Our control for body mass index is also an inadequate test of this hypothesis, in the absence of data about skinfold thickness or waist-to-hip ratios. It is apparent that further research about the epidemic of ischemic heart disease in overseas South Asians is an urgent public health need. Whatever the explanation may prove to be, aggressive evaluation and modification of risk for ischemic heart disease in South Asian Americans seems appropriate. □

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The Effects of Denturism: New Zealand Dentists' Response to Competition

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ABSTRACT

The New Zealand Dental Act of 1988 allowed clinical dental technicians to deal directly with the public in fitting and supplying dentures. This study tested the hypothesis that dentists responded to competition from dental technicians by lowering their fees. The results indicate that there was no significant change in the fees charged by dentists for dentures. The apparent failure of deregulation to produce the expected outcome could be due to the competitive pressure imposed by dental technicians practicing illegally prior to 1988, to consumers' lack of information, or to barriers to "consumer search" imposed by the act itself. (*Am J Public Health.* 1994;84:1675–1677)

Introduction

Adult dental care in New Zealand is provided mainly by self-employed, privately practicing dentists and is financed predominantly by out-of-pocket payments by consumers; few state subsidies exist and coverage by insurance plans is minimal.[1] In 1988 the New Zealand government changed the legal provisions regarding the practice of dentistry.[2] Regulations that were viewed as conferring "monopoly rights" on dentists were removed, allowing clinical dental technicians ("denturists") to deal directly with the public in supplying and fitting complete and partial dentures ("denturism").

New Zealand legislators expected deregulation to lead to an increase in the supply of dental services, which would, all other relevant variables remaining unchanged, lead to a decrease in the price of these services. It seems plausible to assume that these effects would be evident 4 years after the change in competitive environment. Owing to the use of "grandfather rights" in the registration of previously practicing dental technicians as "clinical dental technicians," the increase in the legal supply of dental services took place within a relatively short time frame. The number of clinical dental technicians registered under the Dental Act was 129 in 1993 (around 4 per 100 000 population); the number of dentists issued annual practicing certificates in that year was approximately 1300. The introduction of the Dental Act increased the total dental work force (those able to deal directly with the public) by around 10%, although the increase in the effective supply of denture services would be larger than 10% because dentists spend a relatively small proportion of their chairside time on dentures (6% in 1988). Fee data from annual surveys of dental practices were used to test the following hypotheses:

1. That the fees charged by dentists for full and partial dentures would increase at a different rate from the fees charged for other services after 1988. As competition from nondentists principally affected the market for dentures, there should be an observable difference between dentists' pricing of dentures and their pricing of other services.

2. That the spread of fees charged by dentists for dentures would narrow in the

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