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Stroke Disparities: Disaggregating Native Hawaiians from other Pacific Islanders

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Abstract

Objectives—To compare the clinical characteristics of Native Hawaiians (NH) and other Pacific Islanders (PI) who are hospitalized with ischemic stroke.

Design—Retrospective, cross-sectional analysis of medical records.

Setting—Tertiary, Primary Stroke Center in Honolulu, Hawaii.

Patients—Consecutive patients with race/ethnicity identified as NH or PI who were hospitalized for ischemic stroke between January 2006 and December 2012.

Outcome Measures—Age, sex, cardiovascular risk factors, intravenous tissue plasminogen activator (IV-tPA) utilization rate and hospital length of stay.

Results—A total of 561 patients (57% NH and 43% PI) were studied. PI were younger (59 ± 13 years vs 62 ± 14 years, ,*P*=.002), had higher prevalence of diabetes mellitus (58% vs 41%, *P*<. 0001) and prosthetic valve (6% vs 2%, *P*=.007), lower prevalence of smoking (14% vs 21%, *P*=. 03), lower HDL cholesterol (38 ± 11 mg/dL vs 41 ± 13 mg/dL, *P*=.004), and higher discharge diastolic blood pressure (79 ± 15 vs 76 mm Hg ± 14 mm Hg, *P*=.04) compared to NH. No difference was seen in other cardiovascular risk factors. The IV-tPA utilization rate (5% vs 6%, *P*=.48) and the hospital length of stay (10 ± 17 days vs 10 ± 49 days, *P*=.86) were not different between the two groups.

Conclusion—Native Hawaiians and other Pacific Islanders with ischemic stroke have modestly different age of stroke presentation and burden of risk factors compared to each other. Disaggregating these two racial groups may be important to unmask any potential clinical differences in future studies.

Keywords

Ischemic Stroke; Racial Disparities; Native Hawaiians; Pacific Islanders

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Introduction

Stroke is the leading cause of long-term disability in the United States, and ranks fourth among all causes of death when considered separately from other cardiovascular diseases.[1] Racial and ethnic disparities in risk factors and outcomes exist among the ischemic stroke population and remain a growing concern.[2,3] The most extensively studied minority groups are Blacks and Hispanics, who have been shown to have younger age of stroke onset and higher burden of stroke risk factors compared to the non-Hispanic Whites.[3–8] Only recently, a study that consisted of a large number of less well-studied Native Hawaiians and other Pacific Islanders (NHPI) showed a similar stroke disparity in the NHPI population compared with the non-Hispanic Whites.[9]

Historically, Native Hawaiians (NH) and other Pacific Islanders (PI), often known as people with origins in any of the original peoples of the islands of Polynesia, Micronesia, and Melanesia, have been aggregated into a single racial/ethnic category (NHPI) in many clinical studies. However, since NH and PI may have different lifestyles, socioeconomic status and different levels of acculturation to the Western civilization, aggregating them into a single racial group may have masked potentially important differences between the two groups. Therefore, we sought to compare the clinical characteristics of NH and PI who are hospitalized with ischemic stroke in Honolulu, Hawaii. We hypothesized that NH and PI with ischemic stroke have different clinical characteristics compared with each other.

Methods

A single-center, cross-sectional study of ischemic stroke patients with NH or PI race/ethnicity was conducted using the Get with the Guidelines-Stroke (GWTG-Stroke) registry at The Queen's Medical Center (QMC). The GWTG-Stroke registry is a national quality improvement initiative and stroke registry used by many participating hospitals nationwide.[10] Since its inception in 2004, GWTG-Stroke registry has been used at QMC to measure and monitor the quality of hospital-based stroke care delivery. We obtained approval from the QMC Research and Institutional Review Committee to conduct this retrospective study with a waiver of consent.

Patients

The QMC is a 505-bed medical center located in Honolulu, Hawaii, the largest hospital in Hawaii and the tertiary referral center for the Pacific Basin (Hawaii, American Samoa, the Commonwealth of the Northern Mariana Islands, Micronesia and the US territories of Guam). The QMC has the only Joint Commission-certified Primary Stroke Center and the only Neuro-science Intensive Care Unit for the state of Hawaii. All patients hospitalized at QMC with a diagnosis of ischemic stroke between January 1, 2006 and December 31, 2012 were identified using the institutional GWTG-Stroke database. The ischemic stroke cases were identified at the time of hospital admission through imaging results and admission diagnosis, with confirmation of eligibility based on medical record review by a nurse reviewer (SMA).

Baseline Characteristics

Patient demographics and stroke risk factors were obtained through the database. Race and ethnicity data were collected from the hospital's administrative database, and were obtained during the registration or admission process using a two-part question. The first question asked whether or not the patient was ‘‘Native Hawaiian or Part-Hawaiian.’’ The second question was an open-ended question to list one race that the patient most closely associated with, based on patient self-identification or family's identification, if the patient was incapacitated. The NH race was defined as anyone whose race was coded as ‘‘Native Hawaiian or Part-Hawaiian.’’ The PI race was defined as any race or ethnicity associated with Polynesia, Melanesia or Micronesia. Only the patients with NH or PI race/ethnicity were included in the study. Patients with other race/ethnicity were excluded from the study. Data were collected on age of stroke presentation, as well as the prevalence of cardiovascular risk factors including: history of diabetes mellitus; hypertension; atrial fibrillation/atrial flutter; prior stroke; coronary artery disease (CAD) or prior myocardial infarction (MI); heart failure; peripheral vascular disease; prosthetic heart valve; dyslipidemia; carotid stenosis; and prosthetic valve replacement. Additional data on body mass index (BMI), hemoglobin A1c (HbA1c), total cholesterol, low-density lipoprotein (LDL), high-density lipoprotein (HDL), and triglycerides were also collected if available. Systolic and diastolic blood pressure (BP) data on admission and at discharge were also collected if they were available (BP data not available in the database before 2009). The patients were considered obese if BMI was ≥30 kg/m^2.[11] For quality outcome measures, the rate of intravenous tissue plasminogen activator (IV-tPA) utilization and the hospital length of stay were also assessed.

Statistical Analysis

Data were analyzed using commercially available statistical software (SPSS 22.0, Chicago, IL). The PI patients were compared to NH (reference group) patients using chi-square test for categorical data and 2-tailed t-test for normally distributed, continuous variables. Data are presented as means ± SD or *n* (%) and levels of $P<.05$ were considered statistically significant. Missing data were not included in the denominator.

Results

Among a total of 2617 ischemic stroke patients (22% Whites, 52% Asians, 12% NH, 9% PI, 3% other) who were hospitalized for ischemic stroke, 320 NH and 241 PI stroke patients were identified. The specific ethnicity for the PI is described in Table 1. Comparison of clinical characteristics between NH and PI are shown in Table 2 and Table 3. Overall, PI were younger ($P=.002$), had higher prevalence of diabetes mellitus ($P<.0001$) and prosthetic valve ($P=.007$), lower prevalence of smoking ($P=.03$), lower HDL cholesterol ($P=.004$), and higher discharge diastolic BP ($P=.04$) compared with NH. No difference was seen in other cardiovascular risk factors. The IV-tPA utilization rate ($P=.48$) and the hospital length of stay ($P=.86$) were not different between the two groups.

Discussion

Our study showed that other Pacific Islanders with ischemic stroke have slightly younger age of presentation and have slightly higher burden of cardiovascular risk factors compared with Native Hawaiians. The age of stroke presentation for both NH and PI were comparable to the Maori and Pacific people from Auckland, New Zealand,[12] and is much younger than the mean age for the non-Hispanic Whites or Asian Americans with ischemic strokes.[9] The higher prevalence of prosthetic valve in PI may reflect the higher incidence of rheumatic heart disease among the first generation PI who initially resided in their native Pacific countries.[13–16] Overall, the clinical differences seen between NH and PI were not as robust as the observed differences when NHPI were compared with the non-Hispanic Whites.[9] Nonetheless, this is a modest but important observation to report.

Our findings support the idea that, even among similar ethnic groups, a specific race/ethnicity does impact the burden of disease processes.[17] The younger age of stroke onset among PI suggest that they have a longer time spent with disability over their lifetime, with reduced quality of life compared with NH. From an economic perspective, indirect costs after ischemic stroke are estimated to be six times higher for adults <65 years compared with adults ≥65 years.[18] Furthermore, mean per-person lifetime cost of ischemic stroke varies by age, with more than two-fold increase in the lifetime cost among those with first stroke occurring in their mid-50s compared with those in their mid-60s.[19] The high prevalence of PI with first-time stroke in their fifth decade may translate to substantial total financial burden to the Hawaii community.

Reasons for racial disparities in ischemic stroke are complex and likely involve both biological and social determinants of the disease. There may be biological differences in genetic polymorphisms among the different racial groups, which may predispose one racial group to be more susceptible to developing cardiovascular and cerebrovascular diseases compared with another racial group. Furthermore, the response to the prevention drugs may be influ enced by variability in drug metabolism due to genetic polymorphisms.[20] However, more recent studies suggest that gene-environment interactions account for much of the disparities seen in cardiovascular diseases,[21] and emphasize the importance of social environment. For example, significant racial disparities in awareness of stroke symptoms and signs, attitude and beliefs toward health care, health literacy, medication adherence, access to care, and primary prevention have been reported in a number of stroke studies.[2] Socioeconomic differences and insurance status have also been shown to predict variation in health within the minority groups.[22] Compared with NH, PI in Hawaii have lower median household income, higher proportion of poverty, and higher proportion of no health insurance coverage,[23] which may explain the observed differences in our study. Also, residential segregation has been suggested to contribute to racial disparities in health and socioeconomic status.[17] It is possible that PI, who are relatively new immigrants to Hawaii compared with NH, may be experiencing more residential segregation. Although immigrants may initially achieve better health status than the natives of the country, their health deteriorates with longer stay in the United States. This occurs mainly through the process of acquiring chronic diseases such as diabetes, hypertension and obesity due to adaptation of the Westernized sedentary lifestyle.[17,24]

This study has several limitations. First, the data on ischemic stroke subtypes were not available and thus it is unclear if there are racial/ethnic differences in stroke etiologies as seen among the Hispanics and Blacks.[25] Second, the NH was not further specified into "full" NH or "part" NH, and thus it is unclear if there are disparities between "full" and "part" NH. Third, we were unable to assess for potential disparities in long-term outcomes among the NHPI with ischemic stroke as previously shown in Black stroke patients in the United States,[26,27] and the Pacific people in New Zealand.[28] Fourth, our database did not exclude repeat hospitalizations and, it is possible that individual patients were included in the database more than once. Fifth, we did not have sufficient data on socioeconomic and insurance status; thus, we were unable to assess their impact on the observed disparities. Sixth, this study has the limitation of a single-center study; thus, our results may not be generalizable to other populations. Our institution captures approximately 21% of all ischemic stroke hospitalization for the state of Hawaii (data from Hawaii Health Information Corporation). Because our institution is a tertiary referral center, there may have been a referral bias toward more severe stroke patients with more extensive comorbidities. Although we acknowledge the limitation of a single-center study, we believe this is an important first glance at comparing the clinical differences between NH and PI with ischemic stroke.

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We sought to compare the clinical characteristics of NH and PI who are hospitalized with ischemic stroke in Honolulu, Hawaii.

Our study showed that other Pacific Islanders with ischemic stroke have slightly younger age of presentation and have slightly higher burden of cardiovascular risk factors compared with Native Hawaiians.

Table 1

Specific ethnicity for other Pacific Islanders, (*n*=241)

	***n* (%)**
Samoan	99 (41)
Chuukese	53 (22)
“Micronesian” - NS	34 (14)
Tongan	24 (10)
Marshallese	16 (7)
Kosraean	5 (2)
“Polynesian” - NS	3 (1.2)
“Pacific Islander” – NS	3 (1.2)
Chamoru	1 (.4)
Guamanian	1 (.4)
Tahitian	1 (.4)
Pohnpeian	1 (.4)

NS, not specified.

Table 2

Characteristics among native Hawaiians and Pacific Islanders with ischemic stroke: 2006-2012

	NH	PI	*P*
N of patients	320	241	
Risk factors			
Age, years	62 ± 14	59 ± 13	.002
Female	175 (55)	119 (50)	.45
Diabetes mellitus	130 (41)	139 (58)	<.0001
Hypertension	232 (73)	179 (74)	.64
Atrial fibrillation/Atrial flutter	53 (17)	28 (12)	.10
Prior stroke	42 (13)	44 (18)	.10
Coronary artery disease or prior MI	59 (18)	38 (16)	.41
Heart failure	19 (6)	10 (4)	.34
Peripheral vascular disease	11 (3)	6 (3)	.52
Prosthetic heart valve	6 (2)	15 (6)	.007
Dyslipidemia	129 (40)	113 (47)	.12
Carotid stenosis	5 (2)	1 (.4)	.19
Smoking	66 (21)	33 (14)	.03
Obesity	123 (51)	114 (57)	.16
IV t-PA administered	17 (6)	10 (5)	.48
Hospital length of stay, days	10 ± 49	10 ± 17	.86

Data are *n* (%) or mean ± SD.

NH, native Hawaiians; PI, other Pacific Islanders; MI, myocardial infarction; IV t-PA, intravenous tissue plasminogen activator; Obesity = body mass index ≥30 kg/m^2.

Table 3

Comparison of physiologic measures

	NH	PI	*P*
Total cholesterol, mg/dL[a]	174 ± 54	179 ± 92	.42
LDL, mg/dL[a]	107 ± 51	111 ± 39	.32
HDL, mg/dL[a]	41 ± 13	38 ± 11	.004
Triglycerides, mg/dL[a]	140 ± 93	128 ± 88	.17
HbA1C, %[b]	8.0 ± 2.8	8.3 ± 2.4	.37
BMI, kg/m^2[c]	30.7 ± 8.0	31.4 ± 7.7	.33
Initial systolic BP, mm Hg[d]	151 ± 31	153 ± 35	.64
Initial diastolic BP, mm Hg[d]	87 ± 21	87 ± 30	.87
Discharge systolic BP, mm Hg[e]	133 ± 25	138 ± 22	.06
Discharge diastolic BP, mm Hg[e]	76 ± 14	79 ± 15	.04

Data are mean ± SD.

Blood pressure data included in the database since 2009.

NH, native Hawaiians; PI, other Pacific Islanders; LDL, [ow-density lipoprotein; HDL, high-density lipoprotein; HgA1c, Hemoglobin A1C; BMI, body mass index; BP, blood pressure.

[a]Cholesterol data were available in 247 NH and 189 PI.

[b]HbAlc data were available in 150 NH and 151 PI.

[c]BMI data were available in 243 NH and 199 PI.

[d]Initial BP were available in 184 NH and 142 PI.

[e]Discharge BP were available in 175 NH and 140 PI.