

## BACKGROUND

- South Asians are among one of the fastest growing subgroups of population in the US. To date, few studies that focused on racial/ethnic differences in stroke have considered this subgroup of population.
- Stroke incidence, prevalence, and mortality vary by race and ethnicity with higher rates for blacks compared with non-Hispanic whites (1-2). While the incidence and death rate from stroke have declined (3) disparities still remain.
- Although it is known that the prevalence of stroke risk factors such as high blood pressure, cigarette smoking and diabetes are more prevalent among blacks and Hispanics than whites (6), their distribution among South Asians is not well documented.
- Additionally, studies that examined racial/ethnic differences in stroke tended to focus solely on comparing the prevalence of risk factors. As the result, little is known about the effect of these risk factors on ischemic stroke subtypes; particularly on large-artery atherosclerosis vs. small-artery occlusions among these racial/ethnic groups.

## OBJECTIVES

- The purpose of this study was to evaluate stroke risk factors among South Asians in the US and to examine whether specific stroke risk factors will allow the prediction of stroke subtypes by race/ethnicity.

## METHODS

- Since 2006, the New Jersey Neuroscience Institute (NJNI) at the JFK Medical Center has prospectively gathered all of the elements of CDC's Coverdell registry as well as TOAST classifications on all stroke victims admitted.
- NJNI serves an ethnically diverse population in central NJ.
- The registry is now part of the New Jersey Acute Stroke Registry (NJASR) which also includes information on the date of stroke onset and time of hospital arrival, stroke types, comorbidities, prior medication use, stroke severity, vital signs and all clinical as well as anthropometric measures.

## METHODS-Continued

- Patient characteristics, socio-demographic variables and prevalence of stroke risk factors as well as clinical and health profile variables are summarized by race/ethnicity using means, standard deviations, and medians for continuous variables and frequencies and proportions for categorical variables.
- All data collected to date were used in a multivariate regression analysis in order to predict the risk of developing large artery atherosclerosis (LAA) by race/ethnicity.

## RESULTS

- Of the 3290 admissions, 1776 (54.0%) were women and only 273 (8.3%) of the patients were South Asian. Although South Asians tended to be slightly older (68.0 (SD±17.0)) than African Americans (AAs) and Hispanics, they were significantly younger than whites (76.0 (SD±21.0)), Table 1.
- Hypertension was the most frequent risk factor for stroke among all racial/ethnic groups, ranging from 82% among AAs to 70% among Hispanics. Whites and South Asians had similar proportions at 76.7% and 75.5%, respectively.
- Although less prevalent than hypertension, comorbidities such as diabetes mellitus, cardiac disease and past history of stroke/TIA were significant risk factors among all racial/ethnic groups (p<0.0001).
- South Asian stroke patients had the highest frequency of diabetes mellitus at 45.5% followed by AAs at 42.2% while this prevalence was considerably lower among whites at 30.7% (p<0.0001).
- The history of diabetic medication use was highest among South Asians at 41.4% followed by AAs at 36.6% .
- Half of South Asian patients admitted for acute stroke had ischemic stroke diagnosis; in addition the frequency of small artery occlusions (SAO) etiology was highest among South Asians, Fig. 1 & 2.
- In the predictive regression model, we found that the history of hypertension increased the risk of developing LAA among white patients while diabetes mellitus was positively associated with this risk in all racial/ethnic groups except among South Asians.

## RESULTS-Continued

- Moreover, a ten unit (mg/dL) increase in the levels of low-density lipoprotein (LDL) was associated with reduced risk of developing LAA among South Asian and Hispanic patients, although this association was only marginally statistically significant (Table 2).
- In a separate logistic model, we used the variable of race/ethnicity as a predictor of developing LAA; though not statistically significant, it showed a clear trend in that while AA and South Asian races increased the risk for the probability of LAA while Hispanic race reduced this risk when compared to

## CHARTS & GRAPHS

Table 1 Socio-Demographic Characteristic of Patients with Acute Stroke by Race/Ethnicity

Variables	White N=2156	African American N=605	South Asian N=273	Hispanic N=256	Total N=3290
Age, yrs					
Mean ± SD	73.0 ± 14.4	64.7 ± 14.5	65.1 ± 14.5	63.8 ± 16.1	70.0 ± 15.
Median (Inter Quartile Range)	76.0 (21.0)	65.0 (21.0)	68.0 (17.0)	64.5 (24.0)	72.0 (22.0)
Gender, %					
Female	55.0	59.7	40.7	46.9	54.0
Health Insurance Status, %					
Medicare Only	23.1	18.0	10.6	21.5	21.0
Medicaid Only	0.7	2.1	2.6	1.6	1.2
Medicare and Medicaid	3.5	8.4	16.5	8.6	5.9
Private/Commercial/VA/Champu	16.6	20.7	25.3	16.4	18.0
Self Pay/No Insurance/Indigent	2.8	12.2	22.3	16.0	7.2
HMO (Blue Cross/Blue Shield)	0.1	0.2	0.0	0.0	0.1
Not Determined	0.1	0.0	0.8	0.0	0.1
Any Combination of the Above	53.1	38.4	21.9	35.9	46.5
Socio Economic Position (Status)					
Unemployed,%	40.6	28.2	5.9	25.3	4.1
House Hold Income, Median* (Inter Quartile Range)	62,964 (11,689)	50,707 (15,374)	78,389 (17,446)	47,708 (23,174)	61,091 (18,805)
House Hold Size, Median **	3.3	1.8	3.0	1.8	2.7
Education Level,%					
Less than High School Graduat	16.8	32.0	17.2	50.3	23.6
High School Graduate	36.2	38.1	14.1	30.3	34.1
College Graduate	47.0	29.9	68.7	19.4	42.3
Below Poverty Line,%	33.0	28.0	6.3	32.7	19.5

\* Median income is in US dollars; \*\* Median house hold size is person per family. SD=Standard Deviation;

HMO=Health Maintenance Organization; VA=Veterans Affairs

χ<sup>2</sup> p-values NS=Not significant at α=0.05;

Table 2 Common Stroke Risk Factors as Predictors of Subtype (LAA)<sup>†</sup> by Race/Ethnicity  
Relative Risk (95% Confidence Interval)

Risk Factors	White N=457	African American N=124	South Asian N=76	Hispanic N=57
Age	0.90 (0.82,0.99)	0.99 (0.85,1.16)	0.80 (0.64,1.00)	1.01 (0.95,1.10)
Hypertension	1.61 (1.03,2.51)	0.94 (0.58,1.53)	0.80 (0.41,1.58)	0.26 (0.12,0.54)
Diabetes Mellitus	1.32 (0.95,1.84)	1.43 (0.94,2.18)	0.74 (0.36,1.55)	2.53 (1.03,6.24)
Smoking	0.76 (0.55,1.05)	1.18 (0.71,1.98)	0.81 (0.41,1.59)	6.27 (1.94,20.28)
Cardiac Diseases	0.68 (0.48,0.96)	0.35 (0.16,0.80)	0.85 (0.36,2.04)	1.05 (0.53,2.07)
Dyslipidemia	1.02 (0.79,1.32)	0.59 (0.30,1.15)	1.02 (0.58,1.78)	0.61 (0.31,1.18)
Stroke/TIA	0.90 (0.82,0.99)	1.16 (0.74,1.82)	0.56 (0.26,1.17)	0.56 (0.25,1.24)
LDL	1.03 (1.00,1.05)	1.01 (0.97,1.05)	0.92 (0.85,1.00)	0.98 (0.92,1.04)
Hba1c	1.13 (0.99,1.30)	0.94 (0.79,1.12)	1.11 (0.89,1.39)	0.87 (0.66,1.15)
Fasting Blood Glucose	0.96 (0.93,0.99)	1.01 (0.96,1.07)	0.97 (0.93,1.01)	1.02 (0.95,1.10)

## CHARTS & GRAPHS-Continued

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<sup>†</sup>LAA=Large Artery Atherosclerosis.

## CONCLUSIONS

- On average, despite being a decade younger than white patients, having more college education, and residing in neighborhoods with the highest median income, South Asians patients had stroke risk factors comparable to those of AAs and worse than those of Hispanics.
- In addition, South Asian patients had the highest frequency of a history of diabetes mellitus and had some of the highest levels of fasting blood glucose and blood pressure measurements on admission when compared to all other racial/ethnic groups.
- Moreover, South Asians ischemic stroke patients had a slightly higher proportion of patients with SAO than LAA.

## PREFERENCES

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Fig. 1 Clinical Diagnosis Related to Stroke by Race/Ethnicity

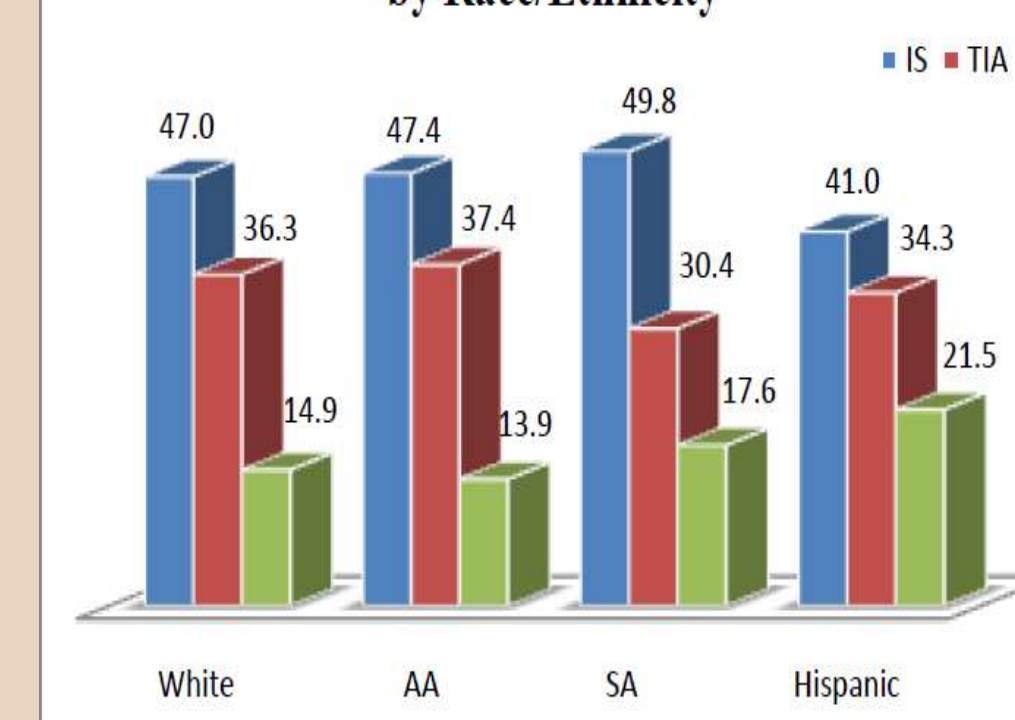


Fig. 2 TOAST Etiologic Classification of Patients with Ischemic Stroke by Race/Ethnicity

