

CORONARY ANGIOGRAPHIC FINDINGS AND CONVENTIONAL CORONARY ARTERY DISEASE RISK FACTORS OF INDO-GUYANESE IMMIGRANTS WITH STABLE ANGINA PECTORIS AND ACUTE CORONARY SYNDROMES

Background: The prevalence of coronary artery disease (CAD) among migrant Indian populations exceeds that of Caucasians. Migrant Indians also suffer from more premature, clinically aggressive and angiographically extensive, (ie, 3-vessel disease). It is not known whether the extent of angiographic CAD or the conventional CAD risk factors of Indo-Guyanese (IG) immigrants differs from that of Caucasians.

Methods: We reviewed the conventional CAD risk factors and angiographic findings of 198 IG and 191 Caucasians who were consecutively referred for cardiac catheterization with a diagnosis of stable angina pectoris or acute coronary syndrome.

Results: Three-vessel CAD was approximately 1.5 times more common among IG than Caucasians (34.8% vs 24.0%; $P=.02$). Age ($P=.01$), male sex ($P=.03$) and diabetes mellitus ($P=.05$) were independently associated with an increased likelihood of 3-vessel CAD and there was a trend towards IG ethnicity predicting 3-vessel disease ($P=.13$). The frequency of diabetes mellitus (51.5% vs 30.9%; $P<.001$), hypertension (82.3% vs 67.0%; $P<.001$) and dyslipidemia (75.5% vs 60.2%; $P=.001$) were significantly greater among IG, however, that of smoking was not. While IG were significantly leaner than Caucasians (27.7 kg/m² vs 30.0 kg/m²; $P<.001$), their mean body mass index fell within the ethnic-specific range for obesity.

Conclusions: We conclude that IG immigrants presenting for coronary angiography have significantly higher rates of 3-vessel CAD as well as higher rates of diabetes mellitus, hypertension and dyslipidemia than Caucasians. Aggressive screening, prevention and treatment may be warranted in this cohort. (*Ethn Dis.* 2012;22(1):12–14)

Key Words: Indo-Guyanese, Guyana, Coronary Artery Disease, CAD Risk Factors, Coronary Angiography

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Migrant Indian populations have a significantly higher prevalence of coronary artery disease (CAD) than Caucasians.^{1–4} They also suffer from more premature, clinically aggressive and angiographically extensive disease.^{5–7} It is not known whether Indo-Guyanese (IG) immigrants living in the United States manifest the same malignant CAD phenotype. Guyana was settled by inhabitants of the central Ganges valley of India between 1845 and 1917 under a system of indentured labor.⁸ Significant emigration to the United States followed passage of the Hart-Celler Immigration Act of 1965⁹ and according to census estimates there are more than 200,000 Guyanese living in the United States.¹⁰ We sought to compare the conventional CAD risk factors and the extent of angiographic CAD of IG immigrants and Caucasians who were referred for coronary angiography with a diagnosis of stable angina pectoris or acute coronary syndrome.

METHODS

This research protocol was approved by the Mount Sinai School of Medicine Institutional Review Board. The study was performed in a teaching hospital that serves a significant IG constituency living in New York City. We reviewed the medical records and coronary an-

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It is not known whether Indo-Guyanese (IG) immigrants living in the United States manifest the same malignant CAD phenotype.

giograms of IG immigrants and Caucasians consecutively referred to our institution's cardiac catheterization laboratory from 2006–2008. The indications for referral were stable angina pectoris and acute coronary syndrome. Angiographic lesion severity was determined by visual estimation performed by an experienced angiographer. The extent of CAD was determined by adding the number of major epicardial vessels with $\geq 50\%$ luminal stenosis. Left main coronary artery disease with $\geq 50\%$ luminal narrowing was regarded as 2-vessel disease. Angiographic disease with $< 50\%$ stenosis was regarded as non-obstructive.

The following data were collected from reviewing each patient's medical record: age, sex, body-mass index (BMI), smoking history and conventional CAD risk factors (diabetes mellitus, hypertension, dyslipidemia). Diabetes mellitus (DM), dyslipidemia and hypertension were considered to be present if patients were prescribed therapy for such, either prior to or following hospitalization. Patients were considered to have a smoking history if they had smoked within the past 2 years, regardless of quantity.

Table 1. Clinical Characteristics of Indo-Guyanese and Caucasians, n (%) or mean \pm SD

	Indo-Guyanese (n=198)	Caucasians (n=191)
Age, years ^a	60.1 \pm 10.0	61.1 \pm 10.7
Male sex ^b	104 (52.5)	134 (70.2)
BMI, kg/m ² ^c	27.7 \pm 6.4	30.0 \pm 6.1
Diabetes mellitus ^c	102 (51.5)	59 (30.9)
Hypertension ^c	163 (82.3)	128 (67.0)
Smoking ^c	18 (9.1)	79 (41.4)
Dyslipidemia ^b	149 (75.2)	115 (60.2)

^a P=not significant.^b P=.001.^c P<.001.

The demographic data and risk factors of both groups were compared using *t* tests for continuous variables and χ^2 analyses for categorical variables. The extent of CAD was compared between the two groups using a χ^2 test. Logistic regression analysis was used to evaluate the effects of age, sex, ethnicity, BMI and each of the conventional cardiac risk factors (DM, hypertension, smoking and dyslipidemia) on the likelihood of having 3-vessel CAD. Statistical analyses were performed using SPSS version 18.

RESULTS

The angiographic findings of 418 patients were reviewed. Of these, 29 (11 IG and 18 Caucasians) were excluded from further analyses because they had no angiographic evidence of CAD. The final study groups consisted of 198 IG and 191 Caucasians whose clinical characteristics are shown in Table 1. There was no significant difference between the two groups with respect to the indication (stable angina pectoris vs acute coronary syndrome) for per-

forming coronary angiography; stable angina pectoris was present in 5.6% of IG and 7.9% of Caucasians. Compared to Caucasians, IG were found to be leaner, less often male and less likely to smoke. They were, however, more likely to have DM, dyslipidemia and hypertension. There was no significant difference in the mean age of the 2 groups.

The frequencies of non-obstructive, 1, 2 and 3-vessel CAD in the 2 groups are presented in Table 2. Three-vessel disease was found to be almost 1.5 times more common among IG compared to Caucasians (34.8% vs 24.0%; *P*=.02). Logistic regression analysis was performed to determine the predictors of extensive CAD (Table 3). Results indicated that 3-vessel disease was independently related to age, male sex and diabetes mellitus, and there was a trend towards IG ethnicity predicting 3-vessel disease.

DISCUSSION

We sought to determine if IG, like other migrant Indian populations studied,⁵⁻⁷ had higher rates of extensive

CAD than Caucasians. Our findings showed that IG referred for coronary angiography with either stable angina pectoris or acute coronary syndrome were approximately 1.5 times more likely than Caucasians to have 3-vessel disease. It was also our impression that CAD was more diffuse among IG. These findings suggest that racial integration into Caribbean society during the last 2 centuries has not attenuated the propensity of IG to extensive CAD. This is not surprising, given the historically low rates of intermarriage between IG and other Guyanese ethnic groups (ie, Afro-Guyanese and Amerindians).¹¹ Intermarriage among IG immigrants living in the United States is also uncommon.¹²

Our study found that DM, dyslipidemia and hypertension were more frequent among IG than Caucasians. The INTERHEART study¹³ affirmed the importance of these conventional risk factors in predicting CAD in South Asians, however, other studies did not.^{5,14} It should be noted that the criteria employed in our study for the designation of hypertension may have resulted in a systematic overestimation of its prevalence because of the commonplace practice of prescribing angiotensin-converting enzyme inhibitors and beta-blocking agents to patients with ischemic heart disease, irrespective of blood pressure. While IG were significantly leaner than Caucasians, their BMI nevertheless exceeded the ethnic-specific cutoff levels for obesity in South Asians, ie, >25 kg/m².¹⁵ It has been suggested, however, that obesity is not

Table 2. Results of coronary angiography

Extent of CAD	Guyanese n (%)	Caucasians n (%)
Non-obstructive	51 (25.8)	39 (20.4)
1-vessel	43 (21.7)	42 (22.0)
2-vessel	35 (17.7)	64 (33.5)
3-vessel	69 (34.8)	46 (24.1)

 χ^2 for 3-vessel disease vs all other categories = 5.41, *P*=.02.

Our study found that diabetes mellitus, dyslipidemia and hypertension were more frequent among IG than Caucasians.

Table 3. Predictors of 3-vessel CAD

	OR	95% CI	P
Guyanese ethnicity	1.64	.87 – 3.07	.13
Age	1.04	1.01 – 1.07	.02
Male sex	2.02	1.08 – 3.79	.03
Diabetes mellitus	1.85	.99 – 3.44	.05
Dyslipidemia	1.12	.56 – 2.25	.75
Hypertension	.66	.31 – 1.42	.29
Smoking	.65	.34 – 1.25	.20
Body mass index	1.02	.97 –1.07	.40

as predictive of CAD as is increased visceral adiposity.¹⁶ Compared to Caucasians, Asian Indians tend to have more visceral adiposity at any level of BMI^{17,18} which may contribute to the excessive CAD risk seen in this cohort. Excess visceral fat has been linked to insulin resistance and increased levels of adipocytokines and other inflammatory markers.¹⁹ Unfortunately, we did not obtain any anthropometric measures of visceral adiposity (eg, waist size) in this study.

This is the first study, of which we are aware, to document the conventional CAD risk factor profiles and coronary angiographic findings of IG immigrants with CAD. The high frequency DM, dyslipidemia and hypertension as well the excess rate of angiographically extensive disease in this cohort suggests that aggressive screening, prevention and treatment strategies may be warranted.

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