



# Characteristics and Ethnic Distribution of Aortic Aneurysms in a Caribbean Cohort

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## Abstract

**Background** There is a paucity of data regarding relationships between patient demographics and aneurysm characteristics in the West Indies. With this in mind, a retrospective cross-sectional review was conducted analyzing the computed tomography aortogram reports/images of 273 aortic aneurysms.

**Methods** Data were collected and analyzed on ethnicity, size, type, morphology, presence and maximum size of thrombus and aneurysm location, demographics, and clinical presentation with correlations.

**Results** There were 273 patients with aortic aneurysms giving an incidence rate of 4.33 per 100,000 people per annum. Statistically significant associations were noted with age, gender, and ethnicity. All false aneurysms were male ( $p = 0.004$ ). The average size of aortic aneurysms being 0.7 cm larger in males than females ( $p < 0.001$ ). Females were more likely to present with rupture ( $p = 0.001$ ). Thrombus was more likely in males, Black and mixed races, and in the 8th decade ( $p < 0.001$ ). Mean age of presentation was the highest in East Indians at 78 than the other ethnicities (Chinese: 65, Black: 70, mixed: 71, White: 73).

**Conclusion** Aortic aneurysmal disease is increasing in Trinidad and the Caribbean. Infrarenal fusiform aneurysms are the most common types with many significant differences based on age, gender, and ethnicity in the Caribbean population.

## Keywords

- aorta/aortic
- aneurysm
- vascular science

## Introduction

The global volume of abdominal aortic aneurysm (AAA) was recently analyzed in a major systematic literature review conducted by Sampson et al in 21 regions of the world and analyses done on 26 high-quality studies to estimate AAA prevalence and incidence. The global age-specific prevalence rate per 100,000 in 2010 ranged from 7.8 in the 40 to 44 to 2,275 in the 75- to 79-year age groups with higher prevalence rates in developed versus developing nations.<sup>1</sup> Australasia and North America had the highest prevalence in 2010

with an increasing regional prevalence in Oceania, Tropical Latin America, Asia Pacific high income, Southern and Western Sub-Saharan Africa, and South and Central Asia. The AAA global prevalence and incidence rates have decreased over the past 20 years. However, rising rates in some regions highlight the need for policies to enhance global disease surveillance and prevention.<sup>1</sup> Further to this the same working group estimated the global mortality which was 2.78 per 100,000 population in 2010 with the highest mean death rates in Australasia and Western Europe. Of note, the largest

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increases were in Asia Pacific high income, Southeast Asia, Latin America tropical, Oceania, South Asia, and Central Sub-Saharan Africa with women driving the increase in the Asia Pacific high-income region.<sup>2</sup>

Information is limited in the Caribbean population with only three studies published the first two from Jamaica in 1968 by Talermin et al<sup>3</sup> followed by Leake et al in 2011<sup>4</sup> whose endpoint was 30-day mortality in a cohort of 83 patients and the third from Vázquez Muñiz et al in Puerto Rico with a cohort of 16 patients with acute dissections.<sup>5</sup>

Trinidad is the southern-most island in the Caribbean close to the South American Coastline with a rich ethnic history. As of 2011 the population is estimated to be 1.328 million with 37.6% East Indians, 36.3% Africans, 24.2% mixed/Dougl, 0.63% White, 0.3% Chinese, 0.1% Amerindian, 0.2% Syrian/Lebanese/Arab with South American Spanish and other races accounting for the remainder.<sup>6</sup> It is with this in mind that this study was conducted at a major catchment hospital for vascular disease and demographic data collected on aortic aneurysms with dissections specifically excluded. Subanalyses were done patterns of disease, ethnicity, size, location/morphology, thrombus, and clinical presentation.

## Patients and Methods

A retrospective analysis was conducted on all cases of thoracic and AAAs and dissections imaged with a computed tomography aortogram (CTA) presenting for the period January 1, 2009 to December 31, 2017 at the Port-of-Spain General Hospital (PoSGH), Trinidad. Patient medical records were retrieved and demographic data, ethnicity, type of aneurysm, size, thrombus presence, and clinical presentation were recorded. Cases of poor diagnostic quality, incomplete aortograms, noncontrast scans and those with dissecting aneurysms or chronic dissections were excluded. All finalized CTA reports were stored on a computer database in folders organized by month and year in the radiology department and a list of patients with aortic aneurysmal disease attending the PoSGH during the time period January 1, 2009 and December 31, 2017 were generated from a CTA report database search using the keyword "aneurysm." The images were obtained from the mini PACS (picture archiving and communication system) or archived CDs, DVDs, and MODs and the corresponding patient notes were collected from the medical records department and correlated (► Fig. 1).

Each CTA was reviewed and the following information recorded including: a patient/scan identifier, date of scan, age at the time of the scan, date of birth, gender, whether the aneurysm was single or multiple, type of aneurysm (true or false), morphology, location/extent of the aneurysm in the aorta, and its upper and lower limits. The maximum anteroposterior (AP) and transverse diameters of the aneurysm in the axial plane and the maximum AP diameter in the sagittal plane perpendicular to the long axis of the aorta from each outer wall were measured using the Osirix MD 9.0 measurement tool. The largest value was recorded as well as the maximum thickness of the thrombus in the axial plane. Aortic

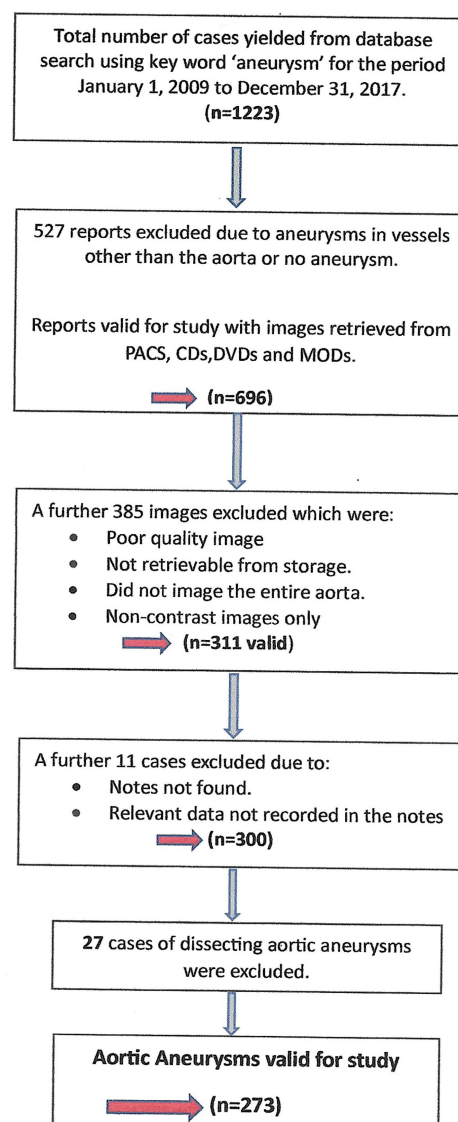


Fig. 1 Flow diagram showing inclusion/exclusion criteria.

aneurysms that fit the criteria were assigned a Crawford Classification under the category "location of the aneurysm." The Crawford Classification was defined as follows: Type I (from the origin of the left subclavian to the suprarenal abdominal aorta); Type II (from the subclavian to the aortoiliac bifurcation); Type III (distal thoracic aorta to the aortoiliac bifurcation), and Type IV (limited to the abdominal aorta below the diaphragm). The minimum resolution of each computed tomography (CT) was 1.25 mm. These images were reviewed by two radiologists independent of each other and an average value calculated for each case and measurement for to obtain an interobserver agreement value. Information on ethnicity, address, and clinical presentation were retrieved from patient notes. Pain was defined as a patient presenting with abdominal pain in the region of the aortic aneurysm or in cases of rupture, loin to groin radiation of pain. A mass was defined as a patient presenting with a pulsatile, expansile mass on clinical examination of the abdomen. Rupture was defined as a patient presenting in shock with a tender, distended abdomen, and a low hemoglobin.

## Statistical Analysis

Data analysis was done using SPSS v29.0 by a statistician. Descriptive statistics (mean, mode, median, frequency, and standard deviation [SD]) were used to evaluate the data. Pearson's chi square was used for categorical data and the one-way analysis of variance (ANOVA) and independent sample *t*-test for continuous data analysis. A 95% confidence interval was used and a  $p < 0.05$  was deemed significant. Multivariate regression analyses were also done for gender and ethnicity against variables including age (decade), size, clinical presentation, and multiple/single aneurysms.

A kappa score was calculated for interobserver agreement regarding aneurysm size and thrombus presence and size with two radiologists reporting on the CTs. Anatomical location was done by one observer, and hence, a kappa score could not be applied for this variable.

## Results

### Patient Selection

The initial word search with the keyword "aneurysm" yielded 1,223-word document reports for the 9-year study period. Reports with aneurysms in vessels other than the aorta, those with no aneurysms and multiple reports for the same patient were excluded leaving 696 reports. Of these 696 reports, 311 images were obtained, and cases of poor diagnostic quality, incomplete aortograms, and noncontrast scans were excluded. Of the 311 images that were usable, 300 patient cases were obtained after excluding those in which the notes could not be found or relevant information missing from the notes. A further 27 cases were excluded with a diagnosis of dissecting aortic aneurysm (►Fig. 1).

The patient cohort analyzed included 273 aortic aneurysms with an age range of 26 to 100, a mean of 71 years (SD = 13.28), a median of 72, and a mode of 70, consisting of 60% ( $n = 165$ ) male and 40% (108) female giving a ratio of 1 female to 1.5 males. The annual incidence rate was calculated at 4.33 per 100,000 population per annum or an incidence rate of 39 per 100,000 population over 9 years. There were 249 (91.2%) patients with single aneurysms and 24 (8.8%) with multiple aneurysms. Most patients were of Black ethnicity ( $n = 162$ ; 59.3%) followed by mixed ethnicity ( $n = 50$ ; 18.3%), East Indian descent ( $n = 43$ ; 15.8%), and the minority being of Chinese ( $n = 12$ ; 4.4%) and Caucasian ( $n = 6$ ; 2.2%) ethnicity. Most patients presented as an incidental finding with CT or ultrasound for another reason ( $n = 205$ ; 75.1%), followed by pain ( $n = 39$ ; 14.3%), a mass ( $n = 16$ ; 5.9%), and rupture ( $n = 13$ ; 4.8%; ►Table 1). Approximately 9% of the cohort of 300 were chronic dissections with a degenerative aneurysm (6% Type A and 3% Type B), but these were excluded from all analyses. Most aneurysms were diagnosed in the 6th ( $n = 75$ ; 27.5%) and 7th ( $n = 106$ ; 38.8%) decades (►Table 1).

Overall, aneurysms ranged in size from 3 to 15 cm with most occurring between 3 and 6 cm, a mean of 5.39 cm (mode = 4 cm; SD = 2.043) and size range and clinical presentation as follows ( $n = 273$ ): incidental ( $n = 205$ ; 3–15 cm;

mean = 4.98 cm; mode = 4 cm), pain ( $n = 39$ ; 3–9 cm; mean = 5.46 cm; mode = 6 cm), mass ( $n = 16$ ; 6–12 cm; mean = 9.44 cm; mode = 10 cm; SD = 1.8), and rupture ( $n = 13$ ; 4–9 cm; mean = 6.62 cm, mode = 6; SD = 1.9).

Interobserver agreement for size of aneurysm using the kappa score gave a value of 0.955 with an approximate significance of  $< 0.001$  (►Table 1)

A comparison of males ( $n = 165$ ) to females ( $n = 108$ ) showed the mean size of aneurysm was 5.67 cm (range = 3–15 cm; SD = 2.3) in males versus 4.95 cm (range = 3–9 cm; SD = 1.4) in females. Aneurysms were found to be 0.7 cm larger in males than females, mean  $\pm$  SD (5.67  $\pm$  2.3 vs. 4.95  $\pm$  1.4,  $p = 0.003$ ). There were also no females with aneurysms larger than 9 cm; however, there were 12 male patients with sizes between 10 and 15 cm and of note, only males presented with false aneurysms ( $n = 12$ ,  $p = 0.004$ ) and also those who were Black or Chinese descent ( $p = 0.002$ ; ►Table 2).

Regarding multiple aneurysms, males had 9.1% (15/165) versus females with 8.3% (9/108). Males had 153 true and 12 false aneurysms versus females 108 true and no false aneurysms. Clinical presentation was as follows: males incidental = 123 (74.5%, pain = 22 (13.3%), rupture = 4 (2.4%), mass = 16 (9.7%) versus females incidental = 82 (75.9%), pain = 17 (15.7%), rupture = 9 (8.3%), and mass = 0. With regard to thrombus presence, males had in 44.8% (74/165) versus females in 50% (54/108) cases. Regarding location, 62.4% (103/165) of males had infrarenal aneurysms versus females with 61.1% (66/108; ►Table 1).

Of note, Blacks, East Indians, and mixed races had a combination of thoracoabdominal and infrarenal aneurysms; however, the White and Chinese groups had only infrarenal aneurysms with no thoracoabdominal types. The Black and mixed race groups presented with thoracic aneurysms, but the other races had none. Overall, after exclusion of the pure infrarenal aneurysms, only 25% (26/104) were able to be classified into the Crawford Classification System (►Table 3).

Males were dominant in all age groups except in the 8th decade where females were more prevalent and most notably only females presented with aneurysms in the 2nd, 3rd, and 10th decades of life as compared with no males in these groups. Notably, when comparing mean age of presentation to ethnicity persons of Chinese descent presented at age 65.3 followed by Black races at age 70, mixed races at 71.3, White races at 73, and lastly East Indians at age 78.5 (►Fig. 2; ►Table 4).

Thrombus was present in 128 patients or 46.9% with an interobserver agreement kappa score of 0.951 with approximate significance of  $< 0.001$  (►Table 1).

A comparison of the various races with all factors revealed males to be dominant in Black and Chinese races except for East Indian and mixed races where females were more dominant. All races presented mainly as an incidental finding. All cases of rupture were confined to Black and East Indian races and all cases presenting as a mass were Black. Approximately 50% of Black and mixed races had thrombus as compared with 30% of East Indians, 25% of Chinese, and no thrombus was found in the White races (►Fig. 3). Finally,

**Table 1** Clinical characteristics of patient cohort by gender (= 273)

Demographic data ( <i>n</i> = 273)	Male ( <i>n</i> = 165) 60%	Female ( <i>n</i> = 108) 40%	Male vs. female
Age range (26–100)	43–97	26–100	Pearson’s chi square < 0.001 Fisher’s exact test < 0.001
Mean (71; SD = 13.28)	71.12 (SD = 10.69)	71.94 (SD = 16.52)	
Median (72)	71	74.5	
Mode (70)	75	79	
Ethnicity			
Black ( <i>n</i> = 162; 59.3%)	115 (69.7%)	47 (43.5%)	Pearson’s chi square < 0.001 Fisher’s exact test < 0.001
White ( <i>n</i> = 6; 2.2%)	3 (1.8%)	3 (2.8%)	
East Indian ( <i>n</i> = 43; 15.8%)	19 (11.5%)	24 (22.2%)	
Mixed ( <i>n</i> = 50; 18.3%)	19 (11.5%)	31 (28.7%)	
Chinese ( <i>n</i> = 12; 4.4%)	9 (5.5%)	3 (2.8%)	
Single vs. multiple aneurysms			
Single ( <i>n</i> = 249 or 91.2%)	150 (90.9%)	99(91.7%)	<i>p</i> < 0.001
Multiple ( <i>n</i> = 24 or 8.8%)	15 (9.1%)	9 (8.3%)	
Clinical presentation			
Incidental ( <i>n</i> = 205; 75%)	123 (74.5%)	82 (75.9%)	
Mass ( <i>n</i> = 16; 5.9%)	16 (9.7%)	0	
Pain ( <i>n</i> = 39; 14.3%)	22 (13.3%)	17 (15.7%)	
Rupture ( <i>n</i> = 13; 4.8%)	4 (2.4%)	9 (8.3%)	
Type of aneurysm			
True ( <i>n</i> = 261; 95.6%)	153 (92.7%)	108 (100%)	
False ( <i>n</i> = 12; 4.4%)	12 (7.3%)	0	
Fusiform ( <i>n</i> = 237; 86.8%)	138 (83.6%)	99 (91.7%)	
Saccular ( <i>n</i> = 36; 13.2%)	27 (16.4%)	9 (8.3%)	
Widest diameter/thrombus			Interobserver agreement
Mean size (5.39 cm; SD = 2.043)	5.67 cm (SD = 2.3)	4.95 cm (SD = 1.4)	Kappa = 0.955 approx. significance < 0.001
Size range (3–15 cm)	3–15 cm	3–9 cm	
Thrombus ( <i>n</i> = 128; 46.9%)	74 (44.8%)	54 (50%)	Kappa = 0.951 approx. significance < 0.001

Abbreviation: SD, standard deviation.

Black males presented with most of the false aneurysms (► **Tables 2** and **4**).

Statistical correlations were done using SPSS v29.0 with regard to age, gender, ethnicity, clinical presentation, size of aneurysm, single versus multiple, true versus false, morphology, thrombus presence and location of aneurysm are explained with *p*-values calculated using Pearson's chi square test (► **Table 2**).

Multivariate regression analysis with regard to gender versus ethnicity, age (decade), multiple/single, size of aneurysm, and clinical presentation revealed an ANOVA *p* < 0.001 with size of aneurysm having strong significance (*p* = 0.012) as well as ethnicity (*p* < 0.001; ► **Fig. 4**).

Multivariate regression analysis between ethnicity and variables including age (decade), size of aneurysm, multiple/single, and clinical presentation revealed an ANOVA *p* = 0.015 with clinical presentation showing strong significance (*p* = 0.002; ► **Fig. 5**).

## Discussion

This study aimed to examine the morphological characteristics of aortic aneurysms in a Caribbean population and to correlate to age, gender, ethnicity with size, clinical presentation, multiple/single aneurysms, false aneurysms, presence of thrombus, morphology, and anatomical location. Some of the findings were in keeping with and others differing from published literature.

The general trend with regard to incidence revealed an overall incidence rate of 4.33 per 100,000 people per annum. Epidemiological studies worldwide show increasing trends<sup>7–10</sup> apart from a Swedish study, which showed a decline.<sup>11</sup>

The presence of single versus multiple aneurysms, type, size, false, morphology, and anatomical location of the aneurysm and the presence of thrombus were the characteristics investigated. Of the 273 patients included in this study, 249 (91.2%) had only one aneurysm, whereas 24 (8.8%) had two

**Table 2** Statistical correlations using Pearson's chi square test *p*-values (*n* = 273)

	Ethnicity	Gender	Age (decade)
Gender: Males were dominant in the Black and Chinese groups; however, females were dominant in the East Indian and mixed groups Most cases presented in the 6th–8th decades, but females had dominance in the 2nd–3rd and 8th decades	<0.001	–	<0.001
Size of aneurysm: Aneurysms were found to be 0.7 cm larger in males than females Blacks had significantly larger aneurysms than other races	<0.001	<0.001	0.566
Single vs. multiple aneurysms	0.252	0.829	0.057
False aneurysms: Only males presented with false aneurysms compared with females Black and Chinese males were more likely to present with false aneurysms Most aneurysms presented in the 6th–8th decades	0.002	0.004	0.014
Morphology: Black males were more likely to have saccular aneurysms Saccular aneurysms were more likely in the 6th–7th decades	<0.001	0.002	0.039
Clinical presentation: Females were more likely to present with a rupture and males more likely to present with a mass Black races more likely to present with pain, mass, or rupture Incidental finding was most common in the 6th–8th decades and rupture more likely in the 8th decade	<0.001	0.001	<0.001
Thrombus: Males were more likely to have thrombus of a larger size than females Black and mixed races were more likely to have thrombus Thrombus more likely in the 6th–8th decades	<0.001	0.001	<0.001
Location: Males presented with more aortic arch aneurysms and conversely females presented with more thoracic aneurysms. No ethnic differences detected Infrarenal aneurysms were most common in the 6th–8th decades	0.066	0.007	<0.001

**Table 3** Details of aneurysm location

Location	Male <i>n</i> = 165	Female <i>n</i> = 108	Black <i>n</i> = 162	East Indian <i>n</i> = 43	Mixed <i>n</i> = 50	White <i>n</i> = 6	Chinese <i>n</i> = 12
AA	17	8	14	6	5	0	0
AA to DT	1	1	0	1	1	0	0
AA to IR	5	0	3	2	0	0	0
AA to SR	3	0	3	0	0	0	0
AS	3	5	3	4	1	0	0
AS to AA	3	3	3	0	3	0	0
C1	13	9	19	0	3	0	0
C4	4	0	4	0	0	0	0
DT	6	0	6	0	0	0	0
IR	103	66	95	29	27	6	12
SR	2	1	1	1	1	0	0
TA	5	15	11	0	9	0	0

Abbreviations: AA, aortic arch; AS, ascending aorta; C1/C4, fitted into the Crawford Classification; DT, descending thoracic aorta; IR, infrarenal aorta; SR, suprarenal aorta; TA, thoracic aorta.





**Fig. 2** Number line illustrating mean age of presentation versus ethnicity ( $n = 273$ ).

**Table 4** Comparison of ethnicity versus all factors

	Black ( $n = 162$ )	East Indian ( $n = 43$ )	Mixed ( $n = 50$ )	White ( $n = 6$ )	Chinese ( $n = 12$ )
Mean age	70	78.5	71.3	73 (SD = 14.2)	65.3 (SD = 4.9)
Median age	71	79	71.5	75	66
Mode	62	88	68	86	60
Range	26–97	65–100	44–94	56–86	58–72
Gender					
Male	115	19	19	3	9
Female	47	24	31	3	3
Clinical presentation					
Incidental	111	33	43	6	12
Pain	29	3	7	0	0
Rupture	6	7	0	0	0
Mass	16	0	0	0	0
Morphology					
Fusiform	135	37	44	6	3
Saccular	18	6	6	0	6
True	153	43	50	6	9
False	9	0	0	0	3
Thrombus present	87 (54%)	13 (30%)	25 (50%)	0	3 (25%)
Single/multiple	150/12	38/5	46/4	6/0	9/3

Abbreviation: SD, standard deviation.

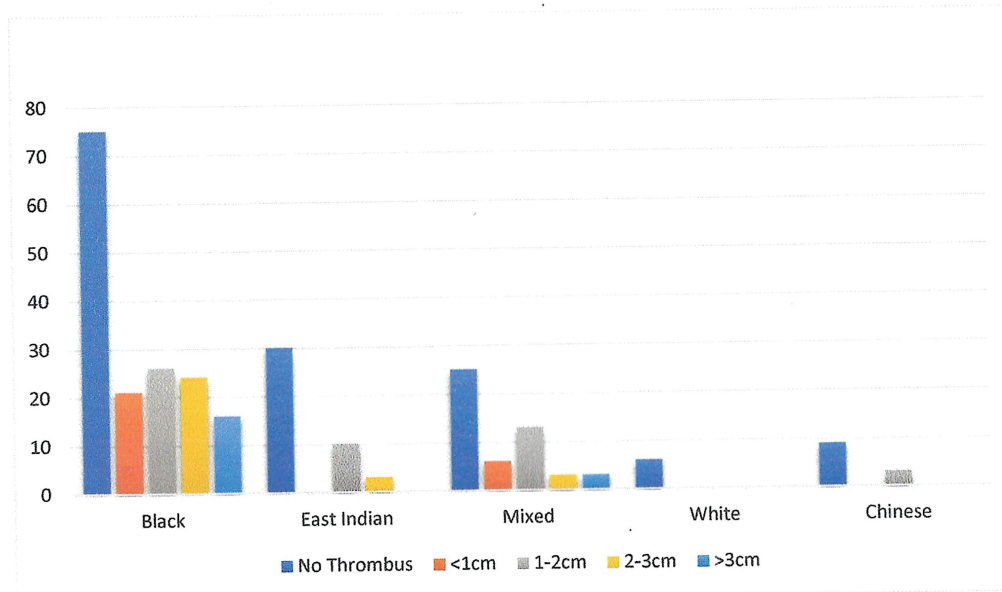
distinct aortic aneurysms. This is in keeping with a 1,510 patients study by Crawford et al in the United States, which found that 191 (12.6%) of the patients in the study had multiple aneurysms.<sup>12</sup>

True aneurysms were noted to be the most common (95.6%). With regard to morphology, 86.8% of the aneurysms were fusiform, whereas 13.2% were saccular. A study conducted by Shang et al in 2013 at The University of Pennsylvania found that saccular aortic aneurysms only represented 1.5% of the total number of aortic aneurysms that are detected radiographically<sup>13</sup> with trauma being a major

cause.<sup>14</sup> The center at which this study was conducted, has a very high incidence of blunt and penetrating trauma accounting for a high incidence of saccular aneurysms.

Of note, the 27 cases of dissecting aortic aneurysms, which were excluded from this analysis and not included in the dataset, 63% were Stanford Type A, whereas 37% were Type B, which corresponds to published findings of 60% Type A and 40% as Type B.<sup>15</sup>

The development of AAAs is associated with a mural thrombus in most patients. Studies done in Ireland and the United States found that 70 to 80% of AAA patients had



**Fig. 3** Distribution of thrombus by ethnicity.

ANOVA <sup>a</sup>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5.456	5	1.091	4.871	<.001 <sup>b</sup>
	Residual	59.818	267	.224		
	Total	65.275	272			

a. Dependent Variable: Gender

b. Predictors: (Constant), Ethnicity, Decade, Multiple/ Single, Size of aneurysm, Clinical Presentation

Coefficients <sup>a</sup>						
		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	.504	.192		2.631	.009
	Size of aneurysm	-.041	.016	-.172	-2.540	.012
	Clinical Presentation	.029	.041	.049	.698	.486
	Multiple/ Single	.006	.102	.004	.062	.951
	Decade	.003	.022	.007	.123	.902
	Ethnicity	.075	.019	.237	3.961	<.001

a. Dependent Variable: Gender

**Fig. 4** Multivariate analysis comparing gender with age (decade), ethnicity, size of aneurysm, clinical presentation, single versus multiple aneurysms.

associated thrombus,<sup>16</sup> whereas only 46.9% of patients in this study had thrombus. Furthermore, thrombus was only present in persons of Black, mixed, and East Indian descent, and little or none was present in Whites and Chinese races.

In terms of patient demographics, our study found several gender differences with respect to age, size of aneurysm, type of aneurysm, morphology, and presentation. With regard to gender and aneurysm the male to female ratio

ANOVA <sup>a</sup>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	28.999	4	7.250	3.142	.015 <sup>b</sup>
	Residual	618.473	268	2.308		
	Total	647.473	272			
a. Dependent Variable: Ethnicity						
b. Predictors: (Constant), Decade, Size of aneurysm, Multiple/ Single, Clinical Presentation						

Coefficients <sup>a</sup>						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.484	.608		2.441	.015
	Size of aneurysm	.004	.052	.006	.083	.934
	Clinical Presentation	-.400	.129	-.216	-3.099	.002
	Multiple/ Single	-.075	.327	-.014	-.230	.818
	Decade	-.034	.072	-.029	-.479	.632
a. Dependent Variable: Ethnicity						

**Fig. 5** Multivariate analysis ethnicity versus size of aneurysm, clinical presentation, single/multiple aneurysms.

was 1.5:1, respectively. An increase in the number of males with aneurysms was noted in the 6th and 7th decades, which was similar to the increase seen in females. Females were dominant in the 2nd, 3rd, 8th, and 10th decades. There are some similarities between these findings and those in a 2009 U.S. study by Scott et al in 2002,<sup>17</sup> which found a higher number of males with aortic aneurysms; however, their male to female ratio was higher at 4:1. They noted males reached a peak prevalence in the 8th decade and females in the 9th, whereas our study found this peak to be earlier in the 7th decade for both males and females. Additionally, Ogeng'O et al described the pattern of aortic aneurysms in the Black Kenyan population and showed that a female predominance occurs 10 to 15 years earlier than in the White population with an associated higher mortality, which has similarities to our study.<sup>8</sup>

With respect to size our study found aneurysms to be 0.7 cm larger in males than females (mean = 5.67 cm; SD = 2.3 vs. 4.95 cm; SD = 1.4). There were also no females with aneurysms larger than 9 cm; however, there were 12 male patients with sizes between 10 and 15 cm. This is consistent with other studies in the United States.<sup>18</sup>

Our data revealed that false aneurysms were seen only in males who also had a higher percentage of saccular types than fusiform. Penetrating trauma with stabblings or gunshot wounds were responsible for these cases.

In terms of clinical presentation, both males and females were most likely to present with an incidental finding with females more likely to present with rupture (8.3 vs. 2.4%).

Studies conducted by Sweeting et al in Boston<sup>19</sup> and another in London by Lo et al<sup>18</sup> showed similar findings.

Notable age differences included first that patients presenting with multiple aneurysms had a lower mean age of 5 years than those with single aneurysms. Second, patients presenting with true aneurysms had a higher mean age of 6 to 7 years than those with false aneurysms.

From an ethnic perspective, our study found that 59.3% of the cases were Black, 15.8% East Indian, 18.3% mixed, 4.4% Chinese, and 2.2% were White Race. In Trinidad Caucasians represent less than 0.3% of the population, whereas Black and East Indians represent approximately 80% of the population in equal ratios. A catchment bias may relate to the Black predominance in our setting.

The relationships between ethnicity and age were noted to be significant with East Indians presenting later than other ethnicities at the age of 78 versus Chinese at 65, Blacks at 70, mixed 71, and Whites at 73. Furthermore, there was a male predominance among Blacks, Chinese, and Caucasian races, but a female predominance in the East Indian and mixed races. No other studies could be found comparing the ethnicity or mean age at presentation differences in East Indians versus Black races.

Finally, the anatomic location of the aneurysms in the aorta revealed 249 aneurysms were located in a single segment. Of the thoracic aneurysms 13.5% were ascending, 24% were arch, and 28.8% involving the descending thoracic aorta. This is in contrast to the literature that found approximately 60% to be located in the ascending aorta and only 10%



in the arch.<sup>20</sup> There were 169 infrarenal AAAs and 104 involving the ascending aorta, aortic arch, descending thoracic aorta, suprarenal segment.

To the best of our knowledge this study is the first detailed analysis in the Caribbean region. Trinidad has a unique population demographic that allows comparisons between multiple races in particular East Indians and Afro-Caribbeans as opposed to many other studies conducted in the United States, United Kingdom, and Australia where comparisons can only be done between Black and White races and Asian groups in the Far East.

The main limitation of this study may be that the images were collected from different quality CT machines with the majority performed on a 16-slice GE machine or a 64-slice Siemens machine, which may have affected the quality of the scanning and therefore interpretation.

## Conclusion

Aortic aneurysmal disease is increasing in Trinidad and the Caribbean. Infrarenal fusiform aneurysms are the most common types with patient age, gender, and ethnicity having influence on presentation, size, and morphology.

### Note

This article was submitted for the thesis for the DM Radiology University of the West Indies, St. Augustine Campus by the second author.

### Conflict of Interest

None declared.

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