


# openheart Comparison of cardiac CT angiography coronary artery dimensions and ethnicity in Trinidad: the CADET pilot study

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## ABSTRACT

**Background** This study aimed to determine if there were any significant differences in coronary artery (CA) dimensions at prespecified segments during cardiac CT angiography (CCTA) compared with ethnicity at an academic tertiary medical centre in Trinidad and Tobago.

**Methods** Patients (n=170) who underwent CCTA from July 2016 to June 2021 at the Eric Williams Medical Sciences Complex were selected based on predefined selection criteria. The size of the left main and proximal, mid and distal diameters of the left anterior descending, left circumflex and right coronary artery (RCA) were measured using quantitative coronary angiography, syngo. CT Coronary Analysis (Siemens Healthineers AG, Erlangen, Germany). Routine medical history, cardiovascular medications and anthropometric data were also recorded. Comparisons were performed using an independent sample t-test and analysis of variance for continuous variables.

**Results** One hundred and seventy participants were enrolled in this study. There were no statistically significant associations between gender and CA dimensions; however, there were significant associations between South Asian and Caribbean black ethnicities for almost all CA dimensions except for the distal RCA segment. These findings were replicated when the analysis was adjusted for body surface area with the addition of the mid-RCA segment, which was bordering near-significance (p value 0.051).

**Conclusions** Significantly smaller CA dimensions were observed in South Asian patients compared with Caribbean black patients undergoing CCTA. This pilot study could be clinically significant for Trinidadian patients at risk of developing coronary artery disease.

**Trial registration number** NCT04774861.

## INTRODUCTION

Cardiovascular disease (CVD) is the leading cause of mortality in Trinidad and Tobago, accounting for approximately one-quarter of deaths annually.<sup>1</sup> Within the last decade, more than half of adult mortality was attributed to the vascular disease spectrum in Trinidad and Tobago.<sup>1</sup> CVD is also the principal cause of death among high-income countries

## Key questions

### What is already known about this subject?

► Currently, there is no published data to our knowledge that assesses differences in coronary artery dimensions, an independent risk factor for coronary artery disease among the various ethnicities in multiethnic Trinidad and Tobago.

### What does this study add?

► Significantly smaller coronary artery dimensions were observed in South Asian patients compared with Caribbean black patients undergoing cardiac CT angiography.

### How might this impact on clinical practice?

► In low-resource settings without the widespread accessibility of advanced intravascular imaging such as intravascular ultrasound, optical coherence tomography or coregistration, baseline anatomical coronary artery dimensions in these ethnic subgroups may prove highly informative and pertinent for percutaneous coronary intervention. This pilot study could be clinically significant for Trinidadian patients at risk of developing coronary artery disease.

and is projected to be the leading cause of death globally by 2030 with an anticipated colossal socioeconomic impact.<sup>2</sup>

Atherosclerosis is a time-dependent process affecting vascular walls, driven by a complex interplay of environmental and genetic risk factors that gradually progresses to CVD.<sup>3</sup> Coronary CT angiography (CCTA) has been progressively used as an imaging modality to diagnose CVD due to cutting-edge technological advancements in spatial and temporal resolution. With the advent of high-slice (64-slice and higher) CT scanners, it is regarded as an accurate and reliable alternative to conventional invasive coronary angiography (ICA).<sup>4</sup>

Several studies have demonstrated a varying prevalence of coronary artery disease



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(CAD) among diverse ethnic groups. South Asians demonstrated a comparatively higher incidence of CAD when compared with Caucasian populations.<sup>5678</sup> Trinidad and Tobago is an ethnically diverse Caribbean island, comprising approximately one-third of Caribbean black, one-third of South Asian and the remainder of mixed ethnicity by the 2011 national census.<sup>910</sup> A major implicated theory for the increased prevalence of CAD in South Asians has been the relatively innate smaller diameter of CAs compared with other ethnicities.<sup>111213</sup> Currently, there is no published data to our knowledge that assesses differences in CA dimensions, an independent risk factor for CAD among the various ethnicities in multiethnic Trinidad and Tobago. This study aimed to determine any significant differences in coronary artery (CA) dimensions at prespecified segments during CCTA compared with ethnicity at an academic tertiary medical centre in Trinidad and Tobago.

## METHODS AND MATERIALS

### Study design and patient population

This was a retrospective, cross-sectional study that aimed to determine if there were any significant differences in CA dimensions at prespecified segments during CCTA when compared with ethnicity at an academic tertiary medical centre in Trinidad and Tobago. Patients who underwent CCTA between July 2016 and June 2021 were screened at the Radiology Department at the Eric Williams Medical Sciences Complex (EWMSC). They were considered eligible for the study if they were above 18 years of age and underwent previous CCTA for an approved cardiovascular indication such as atypical angina, chronic coronary syndrome or suspected non-ischaemic cardiomyopathy and CAC score <10, which is considered minimal.<sup>14</sup> Exclusion criteria for this study included an acute coronary syndrome (ACS), prior percutaneous coronary intervention (PCI) and/or coronary artery bypass grafting, anomalous coronary arteries, aneurysmal or ectatic coronary arteries, coronary artery fistulas, arrhythmias, active bleeding, clinical instability, serum creatinine >1.3 mg/dL, pregnancy and prior allergic reaction to contrast media. They were followed up via telephone to assess whether they experienced any serious adverse events (SAEs). Routine medical history, cardiovascular medications, and anthropometric data (height and weight) via a seca 777 measuring station (seca GmbH & Co KG, Hamburg, Germany) were also recorded. Of note, ethnicity was self-reported at the time of CCTA.

### CCTA acquisition and interpretation

CCTA was performed in accordance with the Society of Cardiovascular Computed Tomography (SCCT) guidelines committee.<sup>15</sup> As per our institution's standard operating procedures and protocols, the initial diagnostic test performed was a 12-lead ECG to ensure sinus rhythm, followed by an unenhanced sequence used to assess the

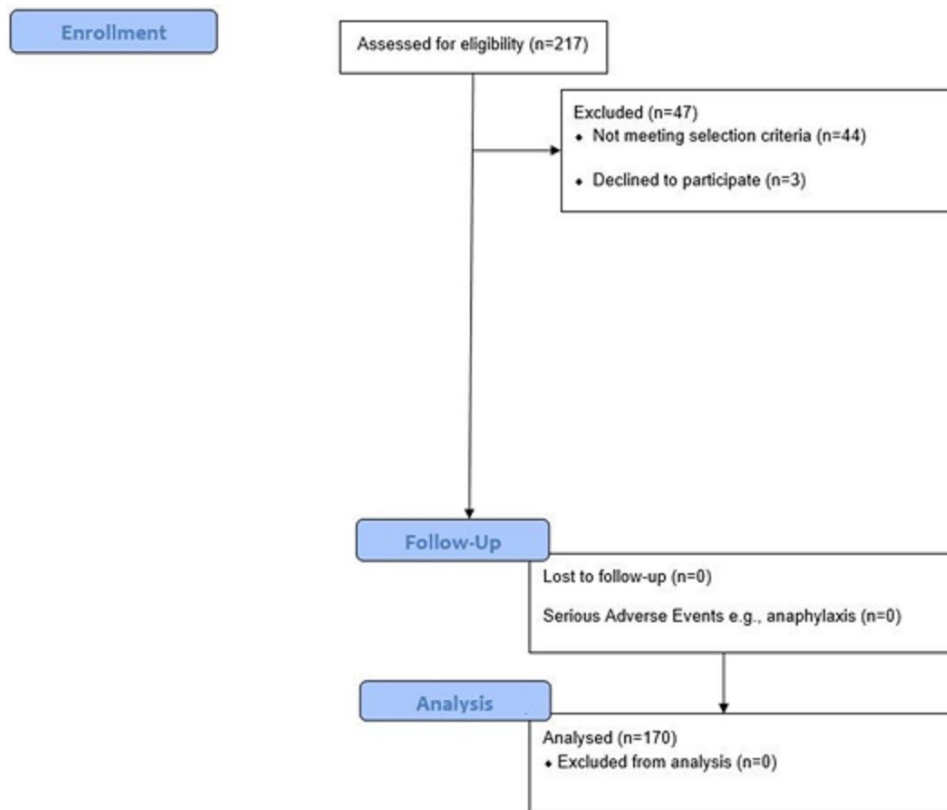
coronary artery calcium (CAC) score. Patients were usually administered either oral or intravenous metoprolol or oral ivabradine to achieve a resting heart rate of 50–60 beats per minute. They were also administered a single sublingual spray of glyceryl trinitrate before the procedure, both by the supervising radiology resident. After a technically adequate unenhanced sequence, non-ionic, iodinated intravenous contrast media (iopromide, Ultravist 370, Bayer Healthcare AG, Leverkusen, Germany) was power injected (MEDRAD Stellant, Bayer Health AG, Leverkusen, Germany) at 5 mm per second via pressurised tubing into an 18-gauge AngioCath (BD, New Jersey, USA) in the right (preferred) antecubital fossa. CCTA was performed retrospectively, which involved volumetric imaging with data acquisition in several phases (systole and diastole) of the cardiac cycle with cine-imaging and simultaneous electrocardiographic-gating based on the R-R interval.<sup>16</sup> These images were then uploaded to the syngo.flow Picture Archiving and Communication System (Siemens Healthineers AG). Diastolic measurements of coronary artery vessel diameter for this study were recorded in real time on a consensual basis by the principal investigator, a senior radiology resident supervised by a board-certified radiologist in CCTA using the intrinsic QCA software syngo.CT Coronary Analysis (Siemens Healthineers AG) for image processing based on modified 18-segment SCCT prespecified points (10 segment dimensions were recorded) based on the following report: (left main – segment 5, proximal, mid and distal left anterior descending artery – segment 6, 7 and 8, respectively, proximal, mid and distal left circumflex – segment 11, 12 and 13, respectively, and proximal, mid and distal right coronary artery (RCA) – segments 1, 2 and 3, respectively).<sup>1517</sup>

### Sample size calculation

The sample size was estimated by comparison with similar studies. Mahadevappa *et al*<sup>18</sup> published a study in which 168 participants were used. Similarly, Lip *et al* enrolled 119 patients.<sup>18 19</sup> The sample size was calculated as 170 patients based on a paired-proportion sample, an alpha ( $\alpha$ ) value of 0.05, power ( $\beta$ ) of 80%, estimated mean proximal left anterior descending (LAD) dimension of 3 mm and absolute delta ( $\Delta$ ) of 25%.

### Statistical analysis

The data were analysed using the Statistical Package for the Social Sciences (SPSS V.25.0) software. Descriptive data were presented using frequencies and percentages for categorical data and means with SD for continuous variables. Comparisons were made using an independent sample t-test and analysis of variance for continuous variables across two and three categories. General linear models were used for estimated mean vessel size, adjusting for categorical and covariates. Assumption testing was done to verify the normality of residuals for regression models. Means and mean differences were



**Figure 1** Methodology outline.

presented with 95% CIs, and a p value of <0.05 was used to indicate statistical significance.

## RESULTS

A total of 170 patients who underwent CCTA were enrolled in the study (figure 1). Online supplemental table 1 shows the demographics of the study participants. The mean age was 50.7 years. Almost two-thirds of the patients were female, and half were South Asian in ethnicity, with Caribbean black more than one-third represented. The prevalence of type 2 diabetes mellitus (T2DM) was 15%, hypertension was more than two-fifths, and dyslipidaemia was one-third. The mean body mass index (BMI) was 26.5 kg/m<sup>2</sup>, and the body surface area (BSA) was 1.81/m<sup>2</sup>. There was also a prevalence of almost one-fifth of the use of ACE inhibitors, angiotensin receptor blockers and neprilysin inhibitors, and one-quarter of patients were using aspirin and moderate to high-intensity statins. One-sixth of patients were on calcium-channel blockers, with 4% and 6% on nitrates and clopidogrel, respectively. Two per cent of patients were on insulin and sulfonylurea therapies, while almost one-eighth was on metformin. The mean average CAC score was 9.2. No patients experienced SAEs, such as moderate or severe contrast media reactions.

The mean dimensions for the left main and proximal, mid and distal segments of each CA are outlined in table 1. There was no statistically significant disparity of any CA segment dimension for male versus female

gender (table 2). All segments displayed a statistically significant difference in CA dimension between South Asian and Caribbean black ethnicity, with the exception

**Table 1** Coronary artery dimensions

Coronary artery segment	Mean diameter (mm)	SD
LM	4.502	0.8144
LAD Proximal	4.009	0.8368
LAD Mid	3.085	0.8088
LAD Distal	2.202	0.7305
LCx Proximal	3.587	0.8504
LCx Mid	3.001	0.8139
LCx Distal	2.291	0.7294
RCA Proximal	3.784	0.8303
RCA Mid	3.093	0.7208
RCA Distal	2.478	0.7171

LAD, left anterior descending; LCx, left circumflex; LM, left main; RCA, right coronary artery.

**Table 2** Comparison of coronary artery dimensions and gender

Coronary artery segment	Gender	n	Mean (mm)	SD	P value*
LM	Male	61	4.428	0.8433	0.43
	Female	109	4.109	0.7604	
LAD Proximal	Male	61	4.134	0.7939	0.14
	Female	109	3.939	0.8554	
LAD Mid	Male	61	3.113	0.7288	0.74
	Female	109	3.070	0.8532	
LAD Distal	Male	61	2.157	0.7208	0.55
	Female	109	2.228	0.7380	
LCx Proximal	Male	61	3.713	0.8113	0.15
	Female	109	3.517	0.8673	
LCx Mid	Male	61	3.151	0.8217	0.07
	Female	109	2.917	0.8010	
LCx Distal	Male	61	2.330	0.7448	0.60
	Female	109	2.269	0.7231	
RCA Proximal	Male	61	3.851	0.9736	0.44
	Female	109	3.747	0.7404	
RCA Mid	Male	61	3.115	0.7307	0.77
	Female	109	3.081	0.7183	
RCA Distal	Male	61	2.430	0.6624	0.51
	Female	109	2.505	0.7476	

\*Independent t-test

LAD, left anterior descending; LCx, left circumflex; LM, left main; RCA, right coronary artery.

of the proximal RCA) (table 3). These findings were replicated when the analysis was adjusted for BSA with the addition of the mid-RCA segment, which was borderline near-significant (p value 0.051) (table 4).

## DISCUSSION

The advent of modern-day CCTA has heralded a paradigm shift in evaluating chest pain, especially with cutting-edge technology with respect to spatial and temporal resolution.<sup>20</sup> Currently, there is mounting evidence for the clinical utility of CCTA within the CVD spectrum, ranging from subclinical detection of CAD to ACS. It is also a versatile technique in that it can non-invasively quantify plaque burden, including those with high-risk features such as thin-capped fibroatheroma, with high accuracy. Additionally, accrued information on haemodynamic indices and further plaque characterisation may contribute to individualised risk assessment and influence management and treatment options.<sup>21</sup> In low-resource settings without the widespread accessibility of advanced intravascular imaging such as intravascular ultrasound (IVUS), optical coherence tomography or coregistration, baseline anatomical CA dimensions in

these ethnic subgroups may prove highly informative for PCI.

Several intrinsic and extrinsic factors impact vessel dimensions in patients, including gender, heart size, muscle tone, growth factor hormone, BSA and ethnicity.<sup>19,22,23,24</sup> This study uses CCTA to measure CA vessel diameter, often considered a superior assessment technique to ICA. Initially, autopsy studies were considered the gold standard of assessment; however, it was discovered that these measurements were affected by fixation and preservation techniques, thus drawing their validity into question.<sup>22,25,26</sup> CAD occurs within the intima with initially endothelial dysfunction and subsequent injury involving a complex milieu of leucocyte and macrophage proliferation and vascular smooth muscle thickening.<sup>27</sup> As a result, the early phase of the inflammatory, immunological process of atherosclerosis can be easily missed with conventional ICA.<sup>26</sup> CCTA incorporates the entire vessel diameter inclusive of the vessel lumen and wall thickness, which reflects a more accurate measurement.<sup>28,29</sup> The results of this study indicate that almost all segments of the coronary vasculature are significantly smaller in South Asians compared with the Caribbean black populations. The findings are concordant with previous studies, which allude to the smaller CAs in South Asians, although the vessel dimensions were overall of a larger calibre, with the caveat that these studies used conventional ICA.<sup>19,30</sup> Compared with a similar study with CCTA, the respective mean vessel diameters are greater.<sup>11,28,30</sup> To the authors' knowledge, there is no published data comparing CA dimensions between these two ethnicities in the English-speaking Caribbean. However, in studies evaluating other vascular beds such as the carotid arteries, evidence suggests black populations' vascular dimensions may be larger.<sup>31</sup> Several factors may play a contributory role in these observations. The analyses were adjusted based on BSA. Although BMI may be a predictor for CAD, as Kim *et al* demonstrated, several other studies refute this relationship with conflicting results.<sup>32,33,34,35</sup> Obesity can be overestimated when BMI is used for adjusted analysis as it does not account for the mass and surface area and different tissue characteristics of adipose and muscle.<sup>36,37</sup> There is also mounting evidence that BSA may be a more accurate predictor of CAD, as reported by Sion *et al*.<sup>38</sup> This study used this rationale for BSA to mitigate any confounding effects. BSA independently predicts the lumen size of the LAD and left circumflex arteries.<sup>39</sup> Previous studies demonstrated that BSA was largely responsible for this ethnic size difference of coronary vessels.<sup>19,28</sup>

In this study, there were no significant differences in gender (male and female) for any CA dimensions for all segments. Yang *et al*<sup>40</sup> reported that females have generally smaller CAs, approximately 0.3 mm less than men. In that study, other potential confounders such as BSA, T2DM and left ventricular hypertrophy were adjusted, and the statistically significant gender association remained. Other studies, while displaying a similar signal, were



**Table 3** Comparison of coronary artery dimensions and ethnicity

Coronary artery segment	n	Mean (mm)	SD	95% CI for mean		P value*	
				Lower bound	Upper bound		
Left main	South Asian	85	4.226	0.7433	3.903	4.583	<0.001
	Caribbean Black	67	4.512	0.8207	4.228	4.957	
LAD Proximal	South Asian	85	3.716	0.8056	3.543	3.890	<0.001
	Caribbean black	67	4.361	0.8172	4.162	4.561	
LAD Mid	South Asian	85	2.826	0.8090	2.651	3.000	<0.001
	Caribbean black	67	3.400	0.7422	3.219	3.581	
LAD Distal	South Asian	85	2.035	0.8074	1.861	2.209	0.003
	Caribbean black	67	2.427	0.6131	2.277	2.576	
LCx Proximal	South Asian	85	3.366	0.7543	3.203	3.529	<0.001
	Caribbean black	67	3.909	0.8682	3.697	4.121	
LCx Mid	South Asian	85	2.793	0.6955	2.643	2.943	0.001
	Caribbean black	67	3.284	0.8828	3.068	3.499	
LCx Distal	South Asian	85	2.105	0.6030	1.975	2.235	<0.001
	Caribbean black	67	2.548	0.8057	2.351	2.744	
RCA Proximal	South Asian	85	3.672	0.7659	3.507	3.837	0.221
	Caribbean black	67	3.915	0.9074	3.694	4.136	
RCA Mid	South Asian	85	2.962	0.7232	2.806	3.118	0.044
	Caribbean black	67	3.249	0.7195	3.074	3.425	
RCA distal	South Asian	85	2.354	0.6584	2.212	2.496	0.029
	Caribbean black	67	2.657	0.7656	2.470	2.843	

\*Post-hoc Bonferroni analysis adjusted for difference in means

LAD, left anterior descending; LCx, left circumflex; RCA, right coronary artery.

limited by relatively small sample sizes and suggested that these observations may be attributed to BSA.<sup>23 41 42 43</sup> Hormonal differences are postulated to affect vessel size. Estradiol promotes remodelling and growth both in physiological and pathological processes.<sup>44 45</sup> Furthermore, estradiol accentuates endogenous vascular endothelial growth factor (VEGF).<sup>44 45</sup> VEGF and basic fibroblast growth factor are pivotal in the migration and proliferation of endothelial cells and play an integral role in angiogenesis and vessel size.<sup>44 45 46</sup> Oestrogen and its receptors can also initiate repair to endothelial dysfunction and injury areas.

T2DM is more prevalent in developing countries, with a reported prevalence of 50% compared with 20% in developed countries.<sup>47 48</sup> In a patient with diabetes, there is a complex milieu of proinflammatory cytokines, VEGF, activated protein C, platelet-derived growth factor and advanced glycation end-products, resulting in endothelial dysfunction. Subsequently, there is macrophage and vascular smooth muscle cell proliferation leading to atheroma formation.<sup>27 49</sup> As this process becomes more advanced, the lumen becomes compromised, detected on CCTA.<sup>27</sup> Coronary artery remodelling is a phenomenon by which vessel dimension changes in response to atherosclerotic plaque accumulation. This pioneering concept was initially described by Glagov *et al* in a postmortem

histopathological study and confirmed by in vivo IVUS analysis.<sup>50 51</sup> Two different patterns of coronary remodelling have been described: a compensatory enlargement of the vessel in response to an increased burden of atherosclerotic plaque (positive remodelling) and a failure to enlarge or even vessel attenuation (negative remodelling).<sup>52</sup> The latter is a common finding in coronary stenosis of diabetic patients. In cross-sectional studies, negative remodelling has been associated with coronary risk factors, such as hypertension, tobacco use, the type of plaque (calcified, hard plaques) and metabolic control in diabetic patients.<sup>51 53 54 55</sup> Initially developed in the early 1990s, the Agatston CAC score is a powerful radiographic marker instrumental in CAD stratification and prognostication. The presence of any degree of CAC in patients with diabetes mellitus translates to a higher risk of all-cause mortality than in patients without diabetes.<sup>56</sup> The absence of CAC indicates a low risk of death in the short term, and the annual mortality rate is similar to that of individuals without diabetes.<sup>56</sup> Central to the “power of zero” philosophy (CAC score of 0) is whether it reliably excludes CAD and would lead to restratification of low-risk patients with clinical sequelae of less cardiovascular diagnostic testing.<sup>57</sup> Current cardiovascular risk stratification using clinical risk score systems and biomarkers is less than ideal in identifying patients at risk for major

**Table 4** Comparison of coronary artery dimensions and ethnicity, adjusted for body surface area

Coronary artery segment	n	Mean* (mm)	Mean difference (mm)	SE of difference	95% CI for difference in adjusted means†		P value‡	
					Lower bound	Upper bound		
Left main	South Asian	85	4.195	−0.368	0.123	3.961	4.602	<0.001
	Caribbean black	67	4.563					
LAD Proximal	South Asian	85	3.733	−0.615	0.129	−0.92	−0.30	<0.001
	Caribbean black	67	4.348					
LAD Mid	South Asian	85	2.813	−0.598	0.126	−0.90	−0.29	<0.001
	Caribbean black	67	3.410					
LAD Distal	South Asian	85	2.021	−0.417	0.117	−0.70	−0.13	0.001
	Caribbean black	67	2.438					
LCx Proximal	South Asian	85	3.393	−0.495	0.132	−0.81	−0.18	0.001
	Caribbean black	67	3.888					
LCx Mid	South Asian	85	2.815	−0.451	0.128	−0.76	−0.142	0.002
	Caribbean black	67	3.266					
LCx Distal	South Asian	85	2.105	−0.443	0.116	−0.724	−0.162	0.001
	Caribbean black	67	2.548					
RCA Proximal	South Asian	85	3.684	−0.221	0.136	−0.551	0.108	0.319
	Caribbean black	67	3.905					
RCA Mid	South Asian	85	2.964	−0.284	0.118	−0.569	0.001	0.051
	Caribbean black	67	3.248					
RCA Distal	South Asian	85	2.363	−0.287	0.117	−0.569	−0.005	0.044
	Caribbean black	67	2.650					

\*Estimated marginal means adjusted for mean body surface area of 1.81.

†Post-hoc Bonferroni adjusted analysis

LAD, left anterior descending ; LCx, left circumflex; RCA, right coronary artery.

adverse cardiovascular events (MACE). Machine learning algorithms are also expected to enhance the capabilities of CCTA further. The amalgam of anatomical, functional and biological information accrued by CCTA offers a multifaceted risk stratification of patients for targeted prevention strategies.<sup>58</sup>

### Limitations

This study has several limitations. Observer bias could potentially impact the accuracy of CA measurements. Although the radiology team involved an SCCT certified consultant radiologist supervising a senior radiology resident, inconsistencies in technical reporting aspects may have occurred, for example, lumen-only measurement in some instances as opposed to transmural dimensions or inaccurate site measurement as not outlined by the SCCT. Ideally, these studies could have been ‘over-read’ or double-checked by another consultant to verify values and overall mitigate measurement bias. This would have been challenging in our setting as there are no other formally trained radiologists to interpret CCTA. There is only a paucity of high-fidelity CT scanners within our radiological environment with the relatively novel capability of performing CCTA. As aforementioned, this is

a monocentric study as the other medical facilities lack the requisite technology and personnel to perform these studies successfully. This site is the primary referral base for all CCTA requests within the island. Similarly, with respect to reporting bias, database input by the resident could have been compromised when fatigued, although the data was cleaned and quality checked by the biostatistician.

Although this study incorporated patients with cardiovascular symptoms with an inherent selection bias, patients with CAC scores >10 were excluded to prevent inaccurate measures due to artefacts and negative remodelling of calcification. Thus, this study attempted to evaluate CAs with minimal, non-obstructive CAD to achieve reference population baseline values that would require future validation. These results may not hold external validity when applied or generalised to patients with moderate or severe CAD. It would, however, be considered unethical to expose patients to unnecessary radiation risks to truly establish normal baseline values when there were no compelling indications for CCTA. CCTA remains limited in spatial and temporal resolution. Other tests are preferable for patients with multiple stents,

extensive calcifications or lesions of uncertain haemodynamic significance.<sup>21</sup> Special attention is paid to a CAC score of zero (the so-called ‘power of zero’) which, in a specific setting, may influence management decisions with respect to excluding CAD or initiating preventive therapies such as statins.<sup>59</sup>

Despite the relatively low prevalence of T2DM in this study (15%) compared with other local studies of bordering almost 50%, no adjusted analyses were performed to assess the effects of this metabolic condition on native CA size.<sup>10 60</sup> As aforementioned, T2DM is implicated in negative remodelling, resulting in smaller CA size and may allude to heterogeneous results. The study also did not adjust for cardiovascular medications, which may impact CA sizes, such as calcium channel blockers and long-acting nitrates. As aforementioned, patients were administered beta-blockers and nitrate therapies to ensure optimal visualisation of the coronary arteries, which may not have reflected a real-time picture. There is also recent evidence to suggest that statin therapy may accentuate vascular calcification.<sup>61 62</sup>

Ethnicity in the study was also patient reported. As this study examined the ethnic-related differences in CA dimensions, the classification of such should be sensitive to the source of race/ethnicity data. Patients may be unaware of the subtle but essential differences between ethnicity, race and ancestry, leading to reporting bias.

These findings are impactful both locally and regionally as it alludes to significant differences in coronary artery dimensions between the two most common ethnicities in Trinidad and, to a wider extent, the Caribbean region, which is considered a ‘melting pot’.<sup>910</sup> Due to inefficient supply chain issues in this geographical sector, it would be prudent to justify a cardiac catheterisation armamentarium with respect to PCI to serve a diverse patient population.

The current reference ranges for coronary artery dimensions and their respective segments are based on seminal papers from Dodge Jr *et al* and Austen *et al*.<sup>63 64</sup> However, these reference ranges are predominantly based on Caucasian populations. In this era of individualised medicine, the philosophy of ‘one size fits all’ may not be prudent with subtle ethnic-related differences in coronary artery dimensions. While a pilot study should provide insightful information about whether a full-scale study is feasible and specific enhancements, there is a caveat that this small pilot study is monocentric and situated in Trinidad. Although it reflects clinically pertinent findings, it may not be generalisable or applicable to other subpopulations. Further large-scale, multicentric studies are required to confirm these exploratory findings.

## CONCLUSION

Significantly smaller CA dimensions were observed in South Asian patients compared with Caribbean black patients undergoing CCTA. This study could be clinically significant for Trinidadian patients at risk of developing

CAD. Further studies are required to confirm these exploratory findings.

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**Patient consent for publication** Consent obtained directly from patient(s)

**Ethics approval** The study complied with the Declaration of Helsinki, International Conference on Harmonization, Good Clinical Practice and was both approved by the Campus Research Ethics Committee (CREC-SA.0451/08/2020) of the University of the West Indies, St. Augustine, and the Public Health Observatory of the North Central Regional Health Authority at the Eric Williams Medical Sciences Complex. The Collaborative Institutional Training Initiative course was completed by all investigators. The cardiac CT angiography studies all had appropriate indications referred by the primary cardiologist and underwent a risk-benefit analysis discussed by the radiology team with the patient prior to imaging. All participants provided informed consent to participate in the CADET study. Patient confidentiality was ensured as data was anonymized and digitally stored on password-protected desktop computers located within a secured room within the Radiology Department. No specific identifiers were used for the collection or assessment of data. Participants gave informed consent to participate in the study before taking part.

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**Data availability statement** Data are available on reasonable request.

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