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# A cross-sectional study on coronary artery disease diagnosis in patients with peripheral artery disease

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## ABSTRACT

**Purpose:** Compared with healthy individuals, patients with peripheral artery disease (PAD) generally have a very high risk of subclinical Coronary artery disease (CAD) and cardiovascular events. To determine the correlation between CAD in PAD patients, thereby promoting the lifetime of PAD patients and reducing the serious impacts of CAD.

**Methods:** This clinical-based cross-sectional study comprised 100 consecutive patients in India from 2014 to 2016. In this research, PAD patients were screened for CAD by treadmill stress test and cardiac colour Doppler examination. In addition, this study performed coronary angiography followed by peripheral angiography for patients who could not perform the treadmill test.

**Results:** With the statistical results, the study observed a high prevalence of CAD in PAD patients that can be detected only with angiography. Further, 30.93% of asymptomatic CAD prevalence was observed in PAD patients. The study strengthens the need for coronary angiography in all symptomatic lower limb PAD cases to detect early CAD, particularly in patients with diabetes and dyslipidemia.

**Conclusion:** There exists a strong correlation between PAD and CAD. Hence, precise diagnosis followed by supervision of PAD patients is significant for avoiding local progression of cardiovascular risk.

## 1. Introduction

PAD is an occlusive disease of the artery distal to the aortic bifurcation. Despite poor prognosis and higher incidence, Peripheral artery disease (PAD) is still underrated and not recognized.<sup>1</sup> Furthermore, adherence to treatment, exercise, therapy, modification of risk factors, and feasible outcomes recognition of the disease is a significant key to a successful PAD treatment. These aspects hugely depend upon the patient's illness perception.<sup>2</sup> The ratio between asymptomatic and symptomatic patients changes from 1:6 to 1:1; more patients have higher risk levels without any symptoms.

Moreover, PAD reduces atherosclerotic artery blocking in the lower extremities and is considered a major Cardiovascular disease (CVD).<sup>3</sup> Irrespective of symptoms, PAD is connected with a substantially increased CVD risk, representing serious health concerns.<sup>4</sup> Additionally, PAD is the third most frequent clinical manifestation after stroke and Coronary artery disease (CAD). Despite its comorbidities and implications, PADS possesses much less attention, and limited research articles have covered PAD compared to other diseases. CAD is one of the severe

CVDs, adversely impacting the worldwide human population.<sup>5</sup>

The following is a comprehensive summary of the prevailing works according to the research. The results<sup>6</sup> also highlighted the significance of CAD evaluation in PAD patients. For this, the study investigated seven hundred and sixty-five patients with PAD. Patients underwent a successful Percutaneous Transluminal Angioplasty (PTA), in which six hundred and seventy-four patients were monitored with Coronary Artery Angiography (CAG). CAD has been described as angiographic stenosis ( $\geq 70\%$ ) in this case. The study believed that patients with PAD and CAD would not survive the long term since they showed no long-term prognosis, such as mortality, compared to patients with only PAD patients. Hence, the strategy of routine CAG with successive PCI would be reasonable for reducing the mortality risk in patients with PAD and characterizing the cohort of patients with indecent PAD, incident CAD or both PAD and CAD was performed.<sup>7</sup> Furthermore, the prevalence of PAD or CAD is related to higher morbidity and hospitality rate, particularly in the first year post-diagnosis.

The PAD/CAD was considered an incident if it was not diagnosed in the first 1.5 years. Additionally, the study estimated the annual incidence

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rate and prevalence rate of PAD/CAD between 2008 and 2016 for patients above 18. The change in CAD and its risk factors in patients over the past two decades was investigated.<sup>8</sup> The study surveyed adults aged 30 and above in a rural population of Punjab. Furthermore, CAD has been diagnosed by clinical and Epstein criteria, such that the study calculated blood pressure (BP), anthropometry, and ECG and carried out the biochemical analysis. From the outcomes of surveys, the study stated a prevalence of multiple risk factors of CAD-like hypercholesterolaemia, obesity, diabetes, hypertension, and sedentary lifestyle, which increased over two decades. These add-ons in the risk factors were related to the modest increase in the incidence of CAD.

The incidence of PAD and its risk factors in the elderly population of North Kerala was examined by.<sup>9</sup> From the prospective observational survey viewpoint, the study evaluated women and men aged 60 to 79 from northern parts of Kerala. Furthermore, the study performed electrocardiograms, biochemical investigations, and anthropometric measurements. The PAD diagnosis was performed with an ABI index of less than 0.9, and CAD was performed utilizing Seattle Angina Questionnaire (SAQ) and electrocardiographic criteria. The study stated that Kerala had high PAD incidence and risk factors from these evaluations. This prevalence was similar in urban and rural populations.

Furthermore, the characteristics and incidence of CAD by utilizing the prospective systematic method were determined.<sup>10</sup> This study employed a method in which one hundred sixty-four patients with HFmEF were subjected to angiography assessment. In this analysis, most patients (64%) had higher coronary stenosis with CAD incidence of about 80%. Furthermore, it has been observed that the CAD prevalence was similar to HFmEF, the left coronary artery showed high stenosis, and 39% of the patients had 2 or 3 vessel disease. The coronary stenosis rate was not higher in patients with CAD history. The home patients and the patients without CAD and with CAD did not clinically differ regarding echocardiography results. Incidence of Coronary artery anomalies (CAAs) and their corresponding subtypes based on Angelini et al. was performed by.<sup>11</sup> This study analyzed the population of Southern India by utilizing 64 slices of dual-source multi-detector computed tomography and coronary angiography (MDCT CA). From the analysis, it has been stated that there was no significant difference in CAA incidence in the Indian population.

Furthermore, CAAs were more common in the male population than in the female population, in which most of these patients were asymptomatic during their past 30 years of life. The myocardial bridging was frequently MDCT-CA and ACOIS. The RCA of LCS is considered as frequently ACOIS.

The prevalence of CAD and its associated risk factors were accessed by<sup>12</sup> in the North Indian population. This study depicted that the overall incidence of smoking percentage was about 10.9%, whereas the incidence percentage of smokeless tobacco was about 37.5%. Furthermore, it was stated that about 21.4% of participants consumed alcohol. The Hypertension incidence was about 20.2%, whereas the prevalence of diabetes was about 6.3%. About 36% of participants possessed higher levels of triglycerides. Finally, the study concluded that the CAD prevalence in the rural population was generally higher. The US Preventive Services Task Force (USPSTF) screened for CVD and PAD risks with an Ankle-brachial index (ABI). USPSTF investigated the evidence on screening PADS with ankle-brachial index in asymptomatic adults. This study expanded by investigating patients with diabetes and interventions, which included physical therapy and supervised exercise for improvising the results in the lower limbs. Furthermore, certain kinds of literature address the advantages of treating screen-detected PAD patients, in which two studies depicted zero benefits from exercise therapy. Thus, USPSTF concluded that the present evidence was inadequate, and the screening for PAD with ankle-brachial index cannot be determined in asymptomatic adults.<sup>13</sup>

CVD risks were investigated<sup>14</sup> in different PAD patients diagnosed in a hospital in Sweden. The study retrieved the data by linking mortality, medication use, and morbidity data from the Swedish registries. Furthermore, the primary cardiovascular results are composite ischemic

stroke (IS), myocardial infarction, and cardiovascular death. The Cox proportional hazards and Kaplan Meier analysis described relative risks. PAD diagnosed in hospitals deliberated a higher risk, such that 1 of 8 patients underwent CV events, and 1 of 6 patients died within a year. Despite its significant risk and age factors, the patients with PAD had received less intense drug therapy. The clinical efficiency of Non-Contrast Magnetic Resonance Coronary Angiography (NC-MRCA) with Invasive Coronary Angiography (ICA) has been compared by<sup>15</sup> in CAD patients utilizing meta-analysis as well as a systematic review. According to the meta-analysis, the MRA with no contrast has led to adequate screening in CAD patients with higher specificity and sensitivity. The variability and rates in invasive and noninvasive imaging for PAD patients were described by.<sup>16</sup> This study utilized hierarchical logistic regression methods to estimate the referral rates for invasive and noninvasive imaging tests. Furthermore, the study also measured the Medical Odds ratio (MOR) to examine the variability between providers and sites.

Effective revascularization of peripheral artery disease by VO2 (Oxygen delivery) while cardiopulmonary exercise testing (CEPT) has been examined by.<sup>17</sup> This study performed a prospective cohort study on thirty patients who have undergone CEPT before and after iliofemoral PAD treatment. Furthermore, the immediate result was the difference in oxygen delivery at the Lactate threshold (LT) before and after revascularization. The secondary result measure was the association between changes in oxygen delivery at the lactate threshold and peak exercise. However, the study did not demonstrate significant improvements in oxygen delivery and lactate threshold. The capacity of CT-leSc for assessing the long-term prognosis of CAD patients was evaluated by.<sup>18</sup> From these evaluations, the results were nonfatal Myocardial Infarction (MI). It has been stated that the CT LeSc was an independent predictor of acute cardiac disease; thereby, it improvises the prognostic stratification of CAD patients. A cross-sectional descriptive study was conducted by,<sup>19</sup> in which the study interviewed the patients who were already detected with PAD or CAD. Furthermore, ninety-four patients with CAD and 63 patients with PAD have completed the questionnaire. The study analyzed the data, and from the analysis, it has been understood that patients with PAD were less educated and less aware of the risk factors, which might adversely impact the overall management of a disease.

Furthermore, CAD was the main reason for death in developing and developed countries. Genetic, environmental, and lifestyle factors are risk factors in CVD development. Various existing trials and studies determined the management and eradication of CAD. Ranolazine, calcium antagonists,  $\beta$ -blockers, nitrates, and antiplatelet agents were considered therapeutic agents to relieve symptomatic Angina related to CAD. Therefore, our study aimed to evaluate the awareness and attitude towards CAD and PAD among patients already detected with either. The present study hypothesized that patients with PAD were less aware of risk factors when compared to patients with CAD, where they share similar risk factors and results of the disease. Therefore, cardiovascular physicians must assume a proactive clinical role in encouraging novel therapeutic opportunities for treating arterial diseases affecting vascular beds. The study's main contribution is to evaluate the attitude and awareness toward CAD in PAD patients and to signify the importance of its diagnosis by angiography.

## 2. Materials and methodology

This study attempted to signify the importance of diagnosing CAD in PAD patients. For this purpose, the overall architecture of the study with the processed details has been described below.

**Sample size:** Our study evaluated a total number of hundred PAD patients referred for peripheral angiography.

**Study design:** Our study's design was a clinical-based cross-sectional study.

**Study area:** Department of Cardiology and Vascular surgery, Ruby Hall, Pune, Maharashtra.

**Study duration and period:** The time duration of our study was from February 2014 to February 2016.

**Source of Data:** Patients with symptomatic PAD were referred for peripheral angiography by a vascular surgeon during the study period.

**Sampling method:** In our study, we generally subjected the PAD patients to screening for CAD, followed by the department of vascular surgery. This screening generally includes cardiac colour Doppler examination and treadmill stress test. The patients who cannot complete a treadmill stress test are referred to the Department of Cardiology for an invasive coronary angiogram, which is generally performed along with the peripheral angiogram if deemed necessary. The treadmill stress was performed to observe the physical consequence. The sample size was worked out considering 80% of the average angiographies conducted on patients fulfilling the selection criteria for PAD during the past three years in the Department of Cardiology, Ruby Hall, and Pune. Hence, a sample size of 100 was considered for the present study.

### 2.1. Selection Criteria

#### Inclusion criteria.

- Patients presenting with peripheral arterial disease were referred for peripheral angiography. Peripheral artery disease was diagnosed by clinical history, clinical examination, and peripheral arterial Doppler, CT-angiography and peripheral arterial angiography. The significant PAD has been determined as more than and equal to fifty per cent diameter of stenosis in major vessels.

#### Exclusion criteria.

- Patients were not willing to participate in the study.

**Ethical clearance and informed consent:** Before commencement, we obtained the ethical clearance from the Ethical committee in Maharashtra. Furthermore, the patients were provided with knowledge about our study's nature, and we obtained a written informed consent form from patients.

**Data collection and investigation:** Patients willing to participate in the study were enrolled. The patients were interviewed for demographic data and detailed history. A thorough clinical examination was done. Furthermore, evaluations for risk factors and clinical presentation were performed. From these evaluations, the results have been recorded on pre-designed and pre-tested proforma.

After a joint consultation session involving the vascular surgeon, cardiac anesthesiologist, and cardiologist, coronary angiography (route decided by consensus) was performed after the peripheral angiogram (using the same access). The CAD was evaluated using quantitative coronary angiography (QCA). Moreover, CAD progression has been determined by the number of diseased vessels with stenosis of more than seventy-five per cent of diameter, count of significant lesions, and non-significant lesions.

**Statistical analysis:** Under statistical analysis, the obtained data has been coded and then entered into SPSS. In this application, the categorical data has been represented as percentages, ratios and rates, such that the comparisons were performed by utilizing the chi-square test. Moreover, the continuous data were represented as the mean  $\pm$  SD. Consequently, the P-value < 0.05 was found to be significant.

### 3. Results and discussion

The outcome of this study has been described in detail in the following comprises demographic and correlative analysis with SPSS.

#### 3.1. Demographic studies

Table 1 illustrates the following. The distribution of the study

**Table 1**  
Demographic details of the presented study.

Parameters	Distribution		
Age	30–40 years - 12 patients		
	41–50 years - 11 patients		
	51–60 years - 15 patients		
	61–70 years - 34 patients		
	More than 70 years - 28 patients		
Gender	Male - 84		
	Female –16		
The severity of PAD is based on ABI (Ankle Brachial Index)	Categorization	Right	Left
	Normal (>1.30)	10	0
	Mild (0.91–1.30)	35	39
	Moderate (0.41–0.90)	54	54
	Severe (<0.40)	1	7
Ejection fraction-based distribution	less than 60% - 67 patients		
Distribution based on the number of vessels	more than 60% - 33 patients		
	Single - 37%		
	Double - 40%		
Renal artery stenosis-based distribution	Triple - 23%		
	Yes - 15		
	No - 85		
Clinical Presentation	Chest pain - 28		
	Gangrene - 9		
	Claudication –81		
	Syncope - 1		
Distribution based on the non-modifiable risk factors	IHD (ischaemic heart disease) - 7		
	DLP (Dyslipidemia) - 14		
	Angina –17		
	Hypertension - 48		
CAD	PAD with CAD - 56		
	PAD only - 44		

population by age, in which the median age ranged between 30 and 85 years. It is observed that 34% of the total population were aged between 61 and 70 years. The incidence of CAD substantially increased by about 19.59% in patients aged 61 and 70. The gender-wise distribution of the study population depicted that about 16% of the patients were females, and 84% were males.

Nevertheless, the incidence of CAD was 49.48% in males, whereas the incidence in females was only 8.25%, but there was no significant difference because  $p = 0.598$ . The distribution of the study population by the severity of PAD is based on ABI. It is noticed that most patients possessed moderate PAD, such that the ABI ranged between 0.41 and 0.90. Nevertheless, severe and mild PAD were observed in 1% and 35% of patients on the right side, whereas 7% and 39% of patients with severe and mild PAD were on the left side. The distribution of patients to the ejection fraction. It is observed that the ejection fraction was less than 60% in almost 67% of the patients, whereas 33% of patients possessed an ejection fraction of more than 60%.

The distribution is based on the number of vessels. In the present study, the angiographic findings revealed single-vessel disease in 37.5% of the patients, double vessel disease in 39.29%, and triple vessel disease in 23.21% of the patients. In the distribution of patients with renal artery stenosis, it is observed that it was not observed among 85% of patients. In contrast, renal artery stenosis prevailed among 15% of patients. The distribution of the study population concerning clinical presentation. It was determined that about 81% of patients had claudication, followed by 28% with chest pain and 9% with gangrene. In addition, 1% of the total patient population had syncope. The distribution of the study population follows the non-modifiable risk factors. It is noted that the most common comorbid condition was diabetes mellitus (DM), which represented about 54%. Furthermore, other conditions were IHD, which represented about 7%, DLP (14%), Angina (17%), as well as hypertension (48%). The incidence of CAD from which it is noticed that about 56% of patients had PAD and CAD, whereas 44% of patients had only PAD.

Table 2 represents the association of clinical presentation with CAD. From this table, it is noted that, when considering chest pain, there was high significance in the patients with CAD and PAD as the p-value was

**Table 2**  
Clinical and Biochemical profiles.

Parameters	Mean (n = 100)		Median		Range		p value
	Mean	SD	Median	IQR	Min	Max	
Age (Years)	58.04	11.08	58.00	16.00	36.00	85.00	0.200
Pulse rate (/Min)	80.36	13.10	80.00	20.00	54.00	106.00	<b>0.010</b>
Respiratory rate (/Min)	18.11	2.02	18.00	2.00	14.00	26.00	<b>&lt;0.001</b>
Systolic	132.12	16.29	130.00	16.00	90.00	178.00	<b>&lt;0.001</b>
Diastolic	82.53	8.80	80.00	11.00	60.00	100.00	<b>&lt;0.001</b>
Total cholesterol	181.25	55.04	169.00	92.00	90.00	300.00	<b>0.003</b>
LDL	117.17	43.18	102.00	69.00	27.00	232.00	<b>&lt;0.001</b>
HDL	36.73	9.39	37.00	8.00	14.00	96.00	<b>&lt;0.001</b>
Triglycerides	163.88	96.28	143.00	75.00	16.00	791.00	<b>&lt;0.001</b>
Blood sugar (mg/dL)	151.70	67.20	130.00	102.00	67.00	421.00	<b>&lt;0.001</b>
BUN(mg/dL)	18.14	9.50	15.00	12.00	6.00	50.00	<b>&lt;0.001</b>
Sr. Creatinine(mg/dL)	1.09	0.30	1.00	0.20	0.50	2.10	<b>&lt;0.001</b>
K (meq/L)	4.58	3.85	4.00	1.00	1.30	42.00	<b>&lt;0.001</b>
RT ABI	0.77	0.30	0.80	0.40	0.00	1.30	<b>&lt;0.001</b>
LT ABI	0.79	0.30	0.90	0.40	0.00	1.22	<b>&lt;0.001</b>

lesser than 0.001. Whereas, when considering syncope, gangrene and claudication, there was no significance in the patients who had PAD and both CAD and PAD.

Tables 3 and 6 depicts the association of factors with CAD. It is observed that the non-modifiable risk factors like hypertension, diabetes mellitus and Angina were highly significant in patients with both CAD and PAD since the p-value was less than 0.05. In comparison, DLP and IHD had no significance in PAD, CAD, and PAD patients. Furthermore, family history, alcohol consumption and smoking were highly significant in CAD and PAD patients. However, RAS and urine albumin had no significance in patients with only CAD and both PAD and CAD.

Tables 4 and 7 deliberates the correlation of ABI with the number of vessels involved. The study showed 23.21% of single vessel diseases patients, 39.29% of double vessel disease patients and 37.5% of triple vessel diseases patients. From this table, it is understood that the ABI on the left and right had no significant difference in the patients with single-vessel disease, double vessel disease, and triple vessel disease since the p-value was greater than 0.05.

Tables 5 and 8 represents the clinical and biochemical profiles of patients with CAD and PAD. In the study population of n = 100, 56% of the patients were affected by both CAD and PAD, and the remaining 44% were affected with PAD. This table shows that variables such as blood sugar and age were highly significant in the patients who had both CAD and PAD since the p-value was less than 0.05. However, all other variables had no significance for patients with PAD and CAD.

#### 4. Discussion

CAD globally affects millions of people. Several studies from the USA stated that CAD is considered the major reason for death. Our present study has performed a study in vascular surgery and the Cardiology department in Maharashtra from 2014 to 2016. 100 PAD patients were evaluated for peripheral angiography during the study period. These patients with PAD were at higher risk of CVD, and most of the patients would eventually die because of cerebrovascular or cardiac aetiology. Severe symptomatic PAD patients will have ABI. In our research, about 54% of patients possessed very moderate PAD with ABI ranging between 0.41 and 0.90 on both right and left sides.

**Table 3**  
Comparison of Mean age.

Parameters	Final diagnosis				p value
	PAD		PAD with CAD		
	Mean	SD	Mean	SD	
Age (Years)	54.45	11.05	61.2	10.46	<b>0.003</b>

**Table 4**  
Diagnosis result of PAD and PAD with CAD Patients.

Parameters	Final diagnosis				p value
	PAD		PAD with CAD		
	Median	IQR	Median	IQR	
Pulse rate (/Min)	80.00	19.50	78.50	22.00	0.778
Respiratory rate (/Min)	18.00	2.75	18.00	2.75	0.078
Systolic	130.00	16.00	130.00	16.00	0.634
Diastolic	83.00	10.00	80.00	10.00	0.323
Total cholesterol	162.00	93.50	175.50	87.75	0.588
LDL	104.50	74.75	104.00	65.75	0.851
HDL	37.50	11.00	37.50	8.25	0.233
Triglycerides	139.00	77.00	150.00	73.50	0.775
Blood sugar (mg/dL)	116.50	68.75	174.00	111.50	<b>0.003</b>
BUN(mg/dL)	15.00	14.50	15.00	10.75	0.738
Sr. Creatinine(mg/dL)	1.00	0.30	1.00	0.28	0.378
K (meq/L)	4.00	0.70	4.10	1.00	0.053
RT ABI	0.90	0.30	0.70	0.40	<b>0.020</b>
LT ABI	0.90	0.30	0.70	0.40	0.315

Similarly,<sup>20</sup> suggested the ratio between the PAD patients who were asymptotically diagnosed with ABI and those who presented asymptomatic claudication. Nevertheless, severe and mild PAD were observed in 1% and 35% of patients on the right side, whereas 7% and 39% of patients with severe and mild PAD were on the left side. Likewise,<sup>21</sup> depicted the stage-wise distribution of ABI, in which 37% of the patients observed mild, 24% of the patients observed moderate, and 2% of patients observed severe PAD. Furthermore, the Colour Doppler echocardiography depicted an ejection fraction of less than 60% in most patients (67%), whereas 33% possessed an ejection fraction of more than 60%. Similarly,<sup>22</sup> showed that, even though the incidence of PAD detection by ABI seemed to be significantly higher, about 19.4%, the difference was insignificant when patients were dichotomized by ejection fraction. Furthermore, various factors might clarify this phenomenon, including the distribution of IHD rates. In our present study, the incidence of CAD was significantly higher, as most patients (56%) had both PAD and CAD. Additionally, the angiographic findings from our study showed 23.21%, 39.29% and 37.5% of patients with single, double and triple vessel diseases.

Similarly,<sup>23</sup> stated that the prevalence of PAD in patients was approximately 6.8%, 13%, 10.2% in 8.2% in the corresponding vessel diseases among DM patients. Correspondingly, the prevalence of PAD patients among non-DM patients was 6.1%, 8.4%, 6.0% and 4.8% in corresponding vessel diseases. Additionally, 85% of patients did not observe renal artery stenosis, whereas Renal Artery Stenosis (RAS) prevailed among 15% of patients. However, ABI of the left and right arteries was almost similar in vessel disease patients. This suggested that there is



**Table 5**

Association of clinical presentation with CAD.

Variables	Findings	PAD only (n = 44)		CAD with PAD (n = 56)		$\chi^2$	DF	p-value
		No	%	No	%			
Claudication	No	8	16.67	11	11.34	0.034	1	0.531
	Yes	36	75.00	45	46.39			
	<b>Total</b>	<b>44</b>	<b>91.67</b>	<b>56</b>	<b>57.73</b>			
Gangrene	No	41	85.42	50	51.55	0.457	1	0.378
	Yes	3	6.25	6	6.19			
	<b>Total</b>	<b>44</b>	<b>91.67</b>	<b>56</b>	<b>57.73</b>			
Syncope	No	44	91.67	55	56.70	0.794	1	0.560
	Yes	0	0.00	1	1.03			
	<b>Total</b>	<b>44</b>	<b>91.67</b>	<b>56</b>	<b>57.73</b>			
Chest pain	No	42	87.50	30	30.93	21.44	1	<0.001
	Yes	2	4.17	26	26.80			
	<b>Total</b>	<b>44</b>	<b>91.67</b>	<b>56</b>	<b>57.73</b>			

**Table 6**

Association of factors with CAD.

Variables	Findings	PAD only		CAD with PAD		$\chi^2$	DF	p-value
		No	%	No	%			
Diabetes mellitus	No	27	56.25	19	19.59	0.794	1	<b>0.006</b>
	Yes	17	35.42	37	38.14			
	<b>Total</b>	<b>44</b>	<b>91.67</b>	<b>56</b>	<b>57.73</b>			
Hypertension	No	29	60.42	23	23.71	8.049	1	<b>0.011</b>
	Yes	15	31.25	33	34.02			
	<b>Total</b>	<b>44</b>	<b>91.67</b>	<b>56</b>	<b>57.73</b>			
Angina	No	42	87.50	41	42.27	8.638	1	<b>0.003</b>
	Yes	2	4.17	15	15.46			
	<b>Total</b>	<b>44</b>	<b>91.67</b>	<b>56</b>	<b>57.73</b>			
DLP (Dyslipidemia)	No	36	75.00	50	51.55	1.141	1	0.218
	Yes	8	16.67	6	6.19			
	<b>Total</b>	<b>44</b>	<b>91.67</b>	<b>56</b>	<b>57.73</b>			
IHD	No	43	89.58	50	51.55	2.697	1	0.104
	Yes	1	2.08	6	6.19			
	<b>Total</b>	<b>44</b>	<b>91.67</b>	<b>56</b>	<b>57.73</b>			
Smoking	No	0	0.00	56	57.73	100	1	<0.001
	Yes	44	91.67	0	0.00			
	<b>Total</b>	<b>44</b>	<b>91.67</b>	<b>56</b>	<b>57.73</b>			
Alcohol consumption	No	37	77.08	38	39.18	3.463	1	<b>0.050</b>
	Yes	7	14.58	18	18.56			
	<b>Total</b>	<b>44</b>	<b>91.67</b>	<b>56</b>	<b>57.73</b>			
Tobacco consumption	No	34	70.83	44	45.36	0.024	1	0.0533
	Yes	10	20.83	12	12.37			
	<b>Total</b>	<b>44</b>	<b>91.67</b>	<b>56</b>	<b>57.73</b>			
Family history	No	40	83.33	42	43.30	4.23	1	<b>0.040</b>
	Yes	4	8.33	14	14.43			
	<b>Total</b>	<b>44</b>	<b>91.67</b>	<b>56</b>	<b>57.73</b>			
Urine albumin	No	36	75.00	41	42.27	1.03	1	0.310
	Yes	8	16.67	15	15.46			
	<b>Total</b>	<b>44</b>	<b>91.67</b>	<b>56</b>	<b>57.73</b>			
RAS	No	39	81.25	46	47.42	0.815	1	0.367
	Yes	5	10.42	10	10.31			
	<b>Total</b>	<b>44</b>	<b>91.67</b>	<b>56</b>	<b>57.73</b>			

**Table 7**

Correlation of ABI with the number of vessels involved.

Vessels	Mean ABI			
	Left (n = 100)		Right (n = 100)	
	Mean	SD	Mean	SD
Single vessel	0.72	0.38	0.65	0.33
Double vessel	0.84	0.31	0.79	0.29
Triple vessel	0.67	0.25	0.71	0.29
F value	1.102		1.287	
p value	0.339		0.284	

no correlation between ABI and the involvement of coronary vessels. Likewise, the objective<sup>24</sup> was to establish medical determinants and the prevalence of RAS in patients who underwent Digital subtraction

angiography (DSA) to assess PAD and estimate its prognostic significance. In the current study, it has been reported that about 18% of patients had a family history of CAD. This was even higher in the patients having both PAD and CAD. Nevertheless, no similar studies supported this hypothesis related to our study.

The study faces some limitations, such as the total number of patients considered being less and the lack of reviewing the patient's surgery details.

Overall, we depicted a significant relationship between PAD and CAD, specifically in the geriatric population. Similarly,<sup>25</sup> stated that CAD and PAD have a significant relation.

## 5. Conclusion

Considering the burden of PAD and the risk of developing CAD, the

**Table 8**

Clinical and biochemical profiles (CAD and PAD).

Variables	Only PAD		CAD with PAD		P-value
	Absent (n = 44)		Present (n = 56)		
	Mean	SD	Mean	SD	
Age (Years)	54.45	11.05	61.20	10.46	<b>0.003</b>
Pulse rate (/Min)	80.50	11.38	79.89	14.56	0.815
Respiratory rate (/Min)	18.27	1.45	17.93	2.40	0.378
Systolic BP (mm Hg)	134.00	15.95	130.79	16.44	0.326
Diastolic BP (mm Hg)	83.55	7.25	81.79	9.78	0.304
Total cholesterol (mg/dL)	178.39	56.78	183.45	53.54	0.651
LDL (mg/dL)	118.82	47.20	115.70	39.72	0.726
HDL (mg/dL)	36.07	12.40	37.39	6.13	0.519
Triglycerides (mg/dL)	170.20	126.25	158.20	63.41	0.567
Blood sugar (mg/dL)	129.32	53.58	168.68	71.62	<b>0.002</b>
BUN (mg/dL)	19.45	11.60	17.04	7.29	0.231
Sr. Creatinine (mg/dL)	1.06	0.31	1.10	0.28	0.530
Sr. Potassium (mg/dL)	4.09	0.48	4.28	0.71	0.127
RT ABI	0.83	0.29	0.72	0.31	0.077
LT ABI	0.83	0.25	0.76	0.33	0.242

present study was undertaken to determine the prevalence of CAD in patients with PAD to understand the epidemiology, which will help understand the disease pattern and treatment. The present study states a high prevalence (56%) of CAD in patients with symptomatic lower limb PAD, of which a large percentage is generally not detectable without invasive angiography in the overall study population. Furthermore, the prevalence of asymptomatic CAD is 30.93% in PAD patients, and smoking has been observed in 57% of the population. Additionally, Diabetes Mellitus and dyslipidemia highly predict the presence of concomitant CAD in PAD patients. Consequently, PAD patients are more susceptible to multi-vessel CAD, particularly those with extensive PAD. Therefore, this study strengthens the need for coronary angiography in all symptomatic lower limb PAD cases to detect early CAD, mainly in patients with diabetes and dyslipidemia. Furthermore, this research observed that chest pain is the classical clinical feature which prompts the physician to evaluate the presence of CAD in patients with PAD. In addition to that, PAD in patients with advancing age, the presence of diabetes mellitus, hypertension, and Angina are important risk factors which hint the physician to screen for the presence of CAD.

### Clinical implication

The study observed a high prevalence of CAD in PAD patients that can be detected only with angiography. It also strengthens the need for coronary angiography in all symptomatic lower limb PAD cases to detect early CAD, particularly in patients with diabetes and dyslipidemia. By this, CAD can be detected in patients with PAD.

### Declaration of interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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