Original Article

Frequency And Severity Of Undiagnosed Peripheral Arterial Disease Using Ankle Brachial Index In Diabetic Patients Undergoing Coronary Angiography

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Abstract

Background: PAD is characterized by stenosis of non-coronary arteries such the aorta, its visceral branches, and extremity arteries. This is multifocal atherosclerosis. PAD increases the risk of myocardial infarction, stroke, and mortality as well as intermittent claudication and critical limb ischemia. Research shows that people with both coronary artery disease (CAD) and PAD have a greater risk of unfavorable outcomes than those with CAD alone.
OBJECTIVE: To determine the frequency and severity of undiagnosed peripheral arterial disease using ankle brachial index in patients undergoing coronary angiography.
Study design: A cross sectional study.
Place and duration of study. Department of Cardiology Lady Readings Hospital did the six-month study from 05-jan 2020 to 05-july 2020
MATERIALS AND METHODS: Department of Cardiology Lady Readings Hospital did the six-month study. The study was descriptive and cross-sectional. PAD prevalence in CAD patients having coronary angiography was 69. WHO formula determined sample size. Continuous non-probability sampling was employed to collect samples with 95% confidence, p= 12.86, and 5% absolute precision.
RESULTS: Our study included 69 diabetics with a mean age of 53 years + 8.761. **CONLCUSION:** Our study concludes that the incidence of PAD (using ankle brachial index) was found to be 15% in which 65% patients had mild PAD (ABI score (0.9-0.75), 25% patients had moderate PAD (ABI score (0.74 to 0.41), 10% patients had severe PAD (ABI score (<0.40).

Keywords: Peripheral Arterial Disease, Ankle Brachial Index, Diabetic Patients, Coronary Angiography, Undiagnosed.

INTRODUCTION

PAD is a manifestation of multifocal atherosclerosis. It is a common but often undiagnosed condition that significantly increases the risk of cardiovascular events and mortality. Peripheral artery disease (PAD) means stenosis of the non-coronary arteries i.e, aorta, its visceral branches and arteries of the extremities[1]. Despite its prevalence and clinical significance, PAD remains underdiagnosed, leading to missed opportunities for appropriate management and

intervention.. Besides causing intermittent claudication and critical limb ischemia, PAD is also associated with an elevated risk of developing myocardial infarction, stroke and death[2].It is an established fact from literature that combined coronary artery disease (CAD) and PAD patients are at a higher risk of adverse outcomes compared to those with isolated CAD. In patients with combined PAD and CAD the one year mortality, myocardial infarction and stroke is significantly higher (23.1%) compared to those with isolated CAD (13%)[3].

Anatomy of Coronary Vessels: Coronary arteries are the initial aortic branches, typically originating from two of the three Valsalva sinuses. Right coronary artery and left coronary artery main stem in normal heart. Thus, the Valsalva aortic sinuses are called the right, left, and non-coronary sinuses.8

Before branching into the LAD and LCx arteries, the left major coronary artery (LMCA) has a varied course. The LAD artery supplies most of the LV anterolaterally. Lateral diagonal branches serve the LV free wall. Most of the interventricular septum, atrioventricular bundle, and proximal bundle branch are supplied by septal branches that travel medially. In the left atrioventricular groove, the LCx artery forms obtuse marginal branches, also called lateral branches. The LCx artery and its branches supply the left ventricular free wall and a varying amount of anterolateral papillary muscle. It produces posterolateral and posterior descending artery (PDA) branches that nourish the left ventricle diaphragm.

The RCA originates from the right coronary sinus and travels through the right atrioventricular groove to the heart's crux. About 50-60% of patients have a conus artery as the first branch of the RCA. The conus artery can also originate from the aorta (30%–35%). Conus artery provides right ventricular outflow tract. The sinoatrial nodal artery originates from the RCA in 58% of patients and the LCx in 42%.

Once a coronary artery is blocked or narrowed, collateral channels may arise from neighboring arteries to provide blood to the hypo-perfused myocardium. Collaterals form between adjacent heart arteries, but a cardiac chamber prevents them. Oppressed LAD and PDA arteries often produce collateral via septal perforators. A secondary conus branch near the RCA may supply collaterals to the LAD; identification is critical for bypass surgery targets. Bridging collaterals can arise from the same coronary artery over a total vascular obstruction. Bridging collaterals and chronic complete blockage must be identified. Although rare, pericardial or bronchial arteries may provide coronary collaterals. Competitive flow from several collateral sources may cause inadequate opacification of the target vessel and the false impression of a substantial luminal obstruction at the point where the two collateral flows meet.11

ABI tests are easy to administer in any patient care setting and help diagnose PAD. Traditional blood pressure cuffs and 5-7 MHz continuous-wave Doppler ultrasound instruments assess arterial systolic pressure. Synstolic pressure at the ankle (the higher of the tibial artery pressures) divided by the arm (the higher of the brachial artery pressures) gives the ABI.

An ABI <0.90 indicates PAD diagnosis with 95% sensitivity and nearly 100% specificity.[21] ABI values between 0.50 and 0.90 are typical in intermittent claudication patients, but their link to severity is unclear. Aortoiliac stenoses can cause moderate to severe symptoms, although some may have few or no symptoms. The ABI is an objective measure of disease severity and may assist identify patients at risk for nonhealing wounds or amputation. The risk of coronary or cerebral atherosclerotic disease increases with a lower ABI. Thus, the ABI goes beyond PAD diagnosis. It can objectively measure systemic atherosclerosis.

PAD-specific instruments like the Walking Impairment Questionnaire (WIQ) assess walking handicap severity. The WIQ grades community-based walking ability based on distance, speed, stair climbing, and intermittent claudication symptoms to assess functional status. In individuals without conventional claudication symptoms but with walking limitations that may indicate PAD, the WIQ can be beneficial. The WIQ helps assess treatment-induced walking capacity alterations. Broader functional status questionnaires, such as the Medical Outcomes Study Short Form-36 (SF-36), may be used for office patient evaluation, although they are more common in clinical trials and outcome studies.

This study aimed to investigate the prevalence of undetected peripheral arterial disease in diagnostic coronary angiography patients. Literature review indicated that PAD is common in coronary angiography and angioplasty patients6, Clinicians use ankle brachial index (ABI) to rule in or rule out PAD and determine its severity. This will assist clinicians identify early PAD, which increases mortality when paired with CAD3, and promote early treatment and secondary prevention. Early diagnosis of PAD in CAD patients helps identify high-risk individuals and allow for

more aggressive therapy to avert bad outcomes**.**This study will provide us with local statistics of the frequency and severity of combined PAD and CAD. It also provides an opportunity to the cardiologist to devise a timely plan for revascularization for PAD in the form of stenting or bypass grafting to prevent limb loss due to severe ischemia. Once the results are obtained, these will be shared with other locally available health care providers and future guidelines will then be formulated for patients with combined PAD and CAD. Such a data is mandatory to establish the magnitude of the problem and to reinforce the screening of PAD in routine clinical practice.

MATERIALS AND METHODS

A six-month descriptive cross-sectional research was undertaken at Lady Readings Hospital Peshawar's cardiology department. Patients receiving coronary angiography for CAD had 12.8% PAD prevalence.WHO formula determined sample size. Keeping 95% confidence, p= 12.86, absolute precision 5%, sample size 172. We used non-probability sequential sampling. Diabetic men and women aged 30–60 who had coronary angiography were included. ER or OPD patients with stable or unstable angina, NSTEMI, or STEMI and coronary angiography were also admitted to the cardiology unit. Patients suffering shock (systolic blood pressure below 90 mmHg and needing inotropic support) could not reliably measure blood pressure. Patients having previously identified PAD by peripheral angiography, doppler ultrasonography, or CT angiogram or graft surgery or stenting for PAD were excluded from the trial.

Collection of data: Hospital ethics committee approval was obtained. Patients gave informed written permission (Annexure-A) and the research was private. I recorded the data on Annexure-B. Patients received sequential serial numbers. A hand-held doppler assessed the ankle brachial index (ABI) per procedure.PAD is diagnosed with a cutoff value below 0.9. ABI measurements classified peripheral artery disease as mild, moderate, or severe. All data was recorded in Performa for analysis.PAD frequency and severity were stratified by age, gender, diabetes, and smoking to control effect modifier. Chi square test was employed for post-stratification, with a significance level of < 0.05 Tables and charts/graphs showed all outcomes.

Results:

The angiography indications for 172 patients were 85 (49%) unstable angina, 49 (29%) NSTEMI, 20 (12%) STEMI, and 18 (10%) stable angina. Table 7 shows

PAD status was examined in 172 individuals using ankle brachial index. ABI score < 0.9 indicated PAD, whereas ABI score > 0.9 indicated no PAD. Table 8 shows Among 26 patients, 17 (65%) had mild PAD (ABI score (0.9-0.75)), 7 (25%) had moderate PAD (0.74-0.41), and 2 (10%) had severe PAD (ABI score <0.40). Table 9 shows

TABLE NO 1. AGE DISTRIBUTION
(n=172)

AGE	**FREQUENCY**	**PERCENTAGE**
30-40 years	8	5%
41-50 years	57	33%
51-60 years	107	62%

Total	**172**	**100%**

Mean age was 53 years + 8.761

TABLE NO 2. GENDER DISTRIBUTION
(n=172)

GENDER	FREQUENCY	PERCENTAGE
Male	107	62%
Female	65	38%
Total	**172**	**100%**

TABLE NO 3. DIABETES
(n=172)

DIABETES	FREQUENCY	PERCENTAGE
Yes	69	40%
No	103	60%
Total	**172**	**100%**

TABLE NO 4. HBA1C
(n=69)

HBA1C	FREQUENCY	PERCENTAGE
< 7	22	32%

≥7	47	68%
Total	**69**	**100%**

TABLE NO 7. INDICATION FOR ANGIOGRAPHY
(n=172)

INDICATIONS	FREQUENCY	PERCENTAGE
Unstable angina	85	49%
NSTEMI	49	29%
STEMI	20	12%
STABLE ANGINA	18	10%
Total	**172**	**100%**

TABLE NO 8. PAD (USING ANKLE BRACHIAL INDEX)
(n=172)

PAD	FREQUENCY	PERCENTAGE
Yes (< 0.9)	26	15%
No (≥0.9)	146	85%
Total	**172**	**100%**

TABLE NO 9. SEVERITY OF PAD
(n=26)

SEVERITY OF PAD	FREQUENCY	PERCENTAGE
Mild (0.9-0.75)	17	65%
Moderate (0.74 to 0.41)	7	25%
Severe (<0.40)	2	10%
Total	**26**	**100%**

DISCUSSION:

Peripheral artery disease (PAD) means stenosis of the non-coronary arteries i.e, aorta, its visceral branches and arteries of the extremities. PAD is a manifestation of multifocal atherosclerosis. Besides causing intermittent claudication and critical limb ischemia, PAD increases the risk of myocardial infarction, stroke, and mortality. The research shows that patients with CAD and PAD have a greater risk of bad outcomes than those with CAD alone. One-year mortality, myocardial infarction, and stroke was 23.1% higher in mixed PAD and CAD patients than in isolated CAD patients (13%).

Our research included 172 individuals with a mean age of 53 years + 8.761. The patient population was 62% male and 38% female. Patients were 40% diabetes. Only 18% of patients smoked, whereas 82% did not. Forty-nine percent had unstable angina, 29% NSTEMI, 12% STEMI, and 10% stable. Over 15% of individuals had PAD, with 65% having mild PAD (ABI score 0.9), 25% having moderate PAD (ABI score 0.9 to 0.75), and 10% having severe PAD (ABI score <0.75).

Other studies revealed 17.7% frequency of mixed CAD and PAD.5. PAD prevalence in CAD patients having coronary angiography is 12.8%.6.

Ankle brachial index (ABI) measurements show mild PAD in 60.5% of CAD patients and moderate to severe in 38.7%.7.

Depending on the technique of peripheral disease diagnosis and population investigated, PAD in CAD patients ranges from 15% to 35%. Detecting clinically apparent illness is different from subclinical or silent disease. Nikolsky et al.8 identified 18.9% symptomatic PAD. In 1045 acute myocardial infarction patients, Narins et al.9 observed 7.5% had intermittent claudication. Age and severity of CAD determine prevalence in the research population.10 Ness et al.10 identified PAD in 26% of 80-year-old CAD patients. Depending on CAD severity, Atmer et al11 identified 14% in individuals with little or few atheromatous lesions and 32% in severe disease.Our research and the PIPS study (Detection of Peripheral Arterial Disease in Patients Presenting for Coronary Angiography and/or Intervention Patients research) identify PAD from the ABI.12 Moussa et al. reported early findings for 88 patients at the 2003 American College of Cardiology Congress.13 We also identified 26% PAD prevalence.Finding patients with PAD and CAD is intriguing. Over time, PAD patients (with or without symptoms) had worse survival rates than controls.14,15 PAD with coronary disease has a poor prognosis.16, 17 .The fact that PAD patients had 65% carotid plaques compared to 24% shows a more widespread atherosclerotic disease in these individuals, which may explain

their poorer prognosis. Carotid involvement in CAD patients is prevalent, however estimates vary..[18,19] A recent study published by our group showed the high incidence of asymptomatic lesions in other vascular territories ap

CONCLUSION:

Our research indicated that the incidence of PAD (using ankle brachial index) was 15%, with 65% patients having mild PAD (ABI score (0.9-0.75), 25% having moderate PAD (ABI score (0.74 to 0.41), and 10% having severe PAD (ABI score (<0.40).art from the territory that was clinically involved.[20]

Disclaimer: Nil

Conflict of Interest: There is no conflict of interest.

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