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How Common Peripheral Arterial Disease is in Patients Undergoing Coronary Angiography?

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ABSTRACT

Background: Cardiovascular disease is the leading cause of death in the world. The detection and treatment of risk factors for CV events is critical to improving health and longevity[1]. The most common among cardiovascular diseases is atherosclerotic coronary artery disease.

Objective: To determine the frequency of previously undiagnosed peripheral arterial disease in patients undergoing coronary angiography.

Material and Methods: This Descriptive Cross-sectional study was conducted in Cardiology Department, Hayatabad Medical Complex Peshawar from 17th June, 2020 to 16th December, 2020. The patients of 40-80 years age of both genders were included through Non probability consecutive sampling. The data was collected through a proforma specially designed for this study and was analyzed through SPSS 22.

Results: A total of 171 patients were included in the study. Age wise distribution among 171 patients was analyzed as 30-40 Years 9(5.3%), 41-50 Years 51(29.8%), 51-60 Years 72(42.1%), 61-70 Years 32(18.7 %), 71-80 Years 7(4.1%). Mean age was 55.56(±9.23) years. Gender wise distribution among patients, Male were 108(63.2%) Female were 63(36.8%). Distribution of Diabetes Mellitus was 50(29.2%). Hypertension was documented in 100 (58.5%). Smoking Status 51(29.8%). Distribution of peripheral arterial disease among 171 patients was analyzed as 22(12.9%). Distribution of Types of ACS was non-ST elevation among patients was 32(18.7%), STEMI was 62(36.3%) and USA was 77 (45%).

Conclusion: The study demonstrated that the frequency of asymptomatic Peripheral arterial disease (PAD) in patients with CAD was 12.9% and was strongly associated with higher incidence of cardiovascular risk factors, and multivessel disease.

Keywords: Peripheral arterial disease, coronary artery disease.

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INTRODUCTION

The leading cause of death in the world is Cardiovascular (CV) disease; So, treatment and detection of all risk factors of CAD is important for improving health.[1] Among cardiovascular diseases atherosclerotic CAD is most common. Atherosclerosis involves multiple vascular beds simultaneously because of its diffuse and progressive nature like Peripheral artery disease (PAD), carotid artery disease and Abdominal aortic aneurysm (AAA).[2] Lower extremities Peripheral arterial disease (PAD) is usually manifesting in accordance with systemic atherosclerotic process like CAD.[3] Those Patients have CAD and PAD simultaneously have bad outcomes as compare to CAD alone. Whether this increased risk of CV events associated with PAD is due to combine risk factors, i.e. those for atherosclerosis such as hypertension or dyslipidemia, smoking, diabetes, elevated C-reactive protein, and hyper-homocysteinemia etc. is unascertained.[4] Asymptomatic PAD is considered to have same worse outcome as symptomatic PAD has.

PAD is important to identify high risk cardiovascular patients.[5] However, risk-stratification based on conventional history and physical examination underestimate the true frequency of Asymptomatic PAD, although cost effective noninvasive ankle-brachial index (ABI) can give us somewhat true picture of Subclinical PAD. ABI is cost effective and easily accessible tool for PAD diagnosis.[6] There is plenty of data which support that aggressive primary and secondary prevention can halt progression of both CAD and PAD and in some cases can regress the atherosclerotic burden in these vascular beds. This further promote the idea of active screening program to identify asymptomatic PAD. So active screening program will reduce the overall risk and will help us to identify patients which need more aggressive management as evidenced by more benefits are achieved from high risk patients disease modifying interventions.[7] It is an acknowledged fact from literature that individuals with combined PAD and CAD have one year mortality, myocardial infarction, and stroke is significantly higher (23.1%) compared to those with isolated CAD (13%). Furthermore,

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Diagnosing PAD in patients with CAD can also assist in changing the exercise regimen advised to these patients in cardiac rehabilitation program to suit both pathologies, along with early treatment and/or intervention if required[3]. Besides this, early detection of PAD in CAD patients help to assort them as a high risk and recommend more aggressive treatment approach to prevent adverse outcomes. This study will come up with local statistics of the frequency and severity of combined PAD and CAD. It will also provide 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.

MATERIAL AND METHODS

This cross-sectional study included patients having undiagnosed peripheral arterial disease while undergoing coronary angiography. Sample Size was 171 using WHO formula with estimated frequency of Associated PAD with CAD of 12%.[9] Sampling technique was Non probability consecutive sampling. The study was carried out at Hayatabad Medical Complex, Peshawar Cardiology division from 17th June, 2020 to 16th December, 2020 (06 months).

Operational Definition:

Peripheral Arterial disease:

Any patient with ABI index less than 0.9 will be labeled as Peripheral arterial disease. 0.70-0.89 ABI is a mild disease, 0.40- 0.69 is moderate disease, and ABI of less than 0.40 will be consider severe PAD.[4] All patients admitted to the cardiology unit from Emergency Department or outpatient department (OPD) with a diagnosis of Un-stable angina, Non-ST Elevation MI(NSTEMI) or ST elevation MI (STEMI) for the last one week undergoing coronary angiography, with Age 40-80 years, both genders were included. Patients with shock and patients with angiographically proven normal coronary arteries were excluded. Also patients with previously diagnosed PAD either by peripheral angiography, Doppler ultrasound or CT angiogram or patients previously undergone graft surgery or stenting for PAD were also excluded. Study was conducted after ethical approval from Institution ethical committee via notification No. 356/HEC/B& PSC/2020. Medical records of all patients admitted in cardiology department were reviewed to obtain medical history, baseline characteristics (Age, Gender, Hypertension, Past History) and contact information. Patients were allotted serial numbers consecutively. The ankle brachial index (ABI) was measured by a cardiologist with 02 years of experience after fellowship according to the protocol (patient will lie flat during the procedure. A blood pressure cuff will be placed above the ankle. Then will place an ultrasound probe over the artery and will use this to listen to the blood flow through the vessel. Then BP cuff will be inflated until the blood stops flowing through the vessel. Then will slowly release the pressure in the cuff. The systolic pressure is the pressure at which the blood flow is heard again. That is the part of the blood pressure measurement needed for the ABI.Then will repeat this process on other ankle and on both of your arms. Then will calculate the ABI by dividing blood pressure found in the ankles by systolic blood pressure found in the arms).

As per Operational definition when Peripheral artery disease(PAD) was Diagnosed it was further categorized as mild and moderate to severe according to the ABI measurements. All the data such as age, gender, diabetes mellitus, smoking status, hypertension, family history of IHD, occupation status, residence, socio-economic status, educational status, life style and previously undiagnosed PAD were recorded in the Performa.

SPSS version 20 was used for statistical Analysis. Frequencies and percentages were calculated for qualitative variables like gender, diabetes mellitus, hypertension, life style, socioeconomic status, smoking status, family history of IHD, residence, educational status, occupation status, type of ACS, and previously undiagnosed PADs. Mean and Standard deviations were calculated for quantitative variables like height, age, and duration of disease and ABI level. Previously undiagnosed PAD was stratified with age, gender, life style, type of ACS, diabetes, smoking, hypertension, occupation status, socio economic status, family history of IHD, and educational status in order to look for effect modifiers. Chi square test post stratification were applied

keeping significant level < 0.05. All the data were presented using tables or graphs.

RESULTS

A total of 171 patients were studied to determine frequency of undiagnosed peripheral arterial disease in patients undergoing coronary angiography. Age wise distribution of PAD among 171 patients was analyzed as 30-40 Years 9(53%) 41-50 Years 51(29.8%) 51-60 Years 72(42.1%) 61-70 Years 32(18.7 %) 71-80 Years 7(4.1%). Mean age was 55.56 (±9.23) years. Male were 108(63.2%) & Female were 63(36.8%) (As shown in Table 01). Distribution of Diabetes Mellitus was 50(29.2%), hypertension Status was 100 (58.5%) smokers 51(29.8%). Distribution of Types of ACS were, USA was 77(45.0%), NSTEMI was 32(18.7%) and STEMI was 62(36.3%) Distribution of family history among patients was 99(57.9%) (As shown in Table No 2). Distribution of PAD status was 22(12.9%). (As shown in Table No 02). Among diabetic patients 11 (50%) had PAD (p=O.O27). In patients presenting with STEMI PAD was seen in 7(11.2%), in NSTEMI 3(9.3%), and in USA 12 (15.5%) (p=0.609). In hypertensive patients PAD was documented in 17(77.3%) (p=O.O55). PAD in smokers was in 7(31.8%) (p=O.827). Among patients with Single vessel CAD PAD was present in 6 (14.6%), in two vessel CAD 6(12%), and in Three Vessel CAD 10 (12.6%) of patients (p-value 0.960) (results are shown in Fig 01).

Table 01. Patient Characteristic

Patient Characteristics	n(%)
Mean Age	55.56 (±9.23)
Gender	Male 108(63.2%) Female 63(36.8%)
Socio-Economic Status	Upper-Class 39(22.8%) Middle-Class 114(66.7%) Lower-Class 18(10.5%)
Life style	Active 92(53.8%) Sedentary 79(46.2%)
Occupation	Employed 55(32.2%) Unemployed 116(67.8%)
Education	Illiterate 102(59.6%) Primary 27(15.8%) Secondary and Above 42(24%)
Family History of IHD	Yes 99(57.9%) No 72(42.1%)
Diabetes Mellitus	Diabetics 50 (29.2%) Non-Diabetics 121 (70.8%)
Hypertension	Hypertensive 100(58.5%) Non-Hypertensive 71(41.5%)
Smoking Status	Smokers 51(29.8%) Non-Smokers 120(70.2%)
Type of ACS	STEMI 62(36.3%) NSTEMI 32(18.7%) USA 77(45%)

Table 02. Stratification of PAD with Various Baseline Characteristics

	PAD (22)		P-Value
	Yes	No	
Type of ACS			0.609
STEMI	7(11.2%)	55(88.7%)	
NSTEMI	3 (9.3%)	29 (90.6%)	
USA	12 (15.5%)	65 (84.4%)	
Diabetes	11(50.0%)	39(26.2%)	0.027
Hypertension	17(77.3%)	83(55.7%)	0.055
Smokers	7(31.8%)	44(29.5%)	0.87

PAD: Peripheral Arterial Disease.

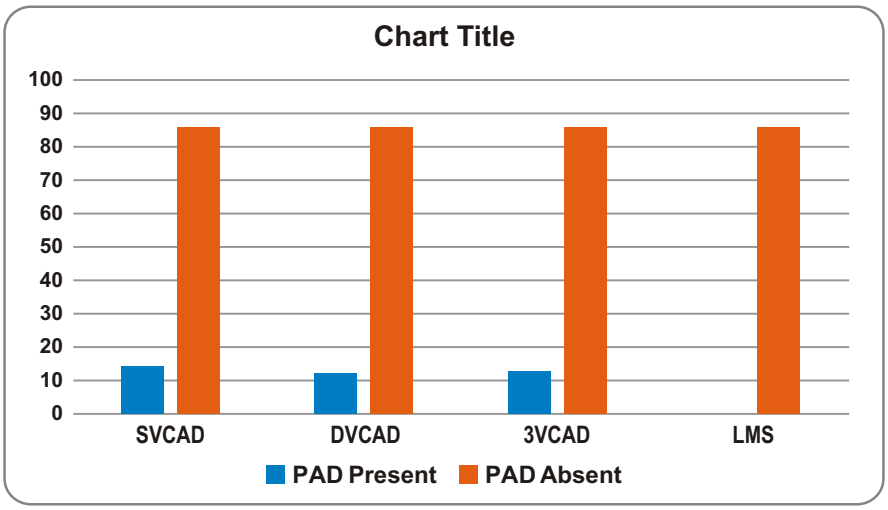


Fig 01. Stratification of PAD and Angiographic Findings (n=171)

DISCUSSION

This study provides true frequency of coexistent CAD and lower limb PAD which is probably the true picture of progressive atherosclerosis. It is the real-world study which shows that the prevalence in our center is 12.9%. This sort of study was the first in our province which shows that PAD is quite Prevalent in our population. Also It was confirmed in our local population that Peripheral arterial disease are more frequent among patients with coronary artery disease. The lower extremity PAD prevalence is 1-18% in different population depending on isolated patient characteristics and existence of other risk factors for systemic atherosclerosis and its prevalence is directly proportional to age.[11,12,15-19] A recent multicenter large population study showed the prevalence of PAD in lower extremities as 9% with statistically significant correlation among PAD & Extent of coronary artery disease.[13] In our study, PAD was present in 12.9% of patients with CAD. Although these patients were managed by cardiac physicians but this finding was not documented previously. The issue is both in physicians and patients as there is less awareness in physicians regarding the true occurrence of PAD and asymptomatic presence of subclinical PAD in Coronary artery disease patients. This high prevalence of significant asymptomatic subclinical lower extremity peripheral arterial disease in our local population is about the same as in other Asian and European population as Switzerland, Germany, Japan, France, and Turkey.[20-23] Similarly in another manuscript by Ramzy et al. in Australian PCI registry documented that 1251 of 18,380 patients had PAD. In their study, Peripheral arterial disease was independently associated with adverse cardiac outcomes, and there was a protective effect of drug-eluting stents.

An Arabian Middle eastern study reported a prevalence of subclinical isolated PAD without involvement of coronary bed and coexistent with CAD as in patients with and without CAD as 4.5% and 14.7%, respectively.[22] However, in nearly 90% of these patients transfemoral approach was used, In contrary to that we have used trans-radial route in more than 50% of control and 47.8% of Peripheral arterial disease cohort because radial approach should be the preferred approach as per recent guidelines.[23-24] These findings add more information as PAD seems to be an independent risk factor for adverse cardiac outcomes in contemporary practice. our study could not demonstrate relation of severity of CAD with prevalence of PAD and these results were insignificant. Therefore, in a patient with CAD making a diagnosis of PAD should alert physician to be more concern with aggressive risk factor management and possible intervention. Furthermore, these CAD patients' needs to be considered as an exceptionally high-risk patients group.

Limitations:

There are several limitations in this study.

1. The diagnosis of PAD was made via noninvasive test i.e., ABI index rather than conventional angiogram; so, it does not truly reflect the actual extent and true burden of underlying systemic atherosclerosis.
2. Primary and secondary outcomes of coronary and peripheral arterial diseases were not studied.
3. Only limited risk factors of PAD and CAD such as age, smoking, diabetes, and hypertension were studied

CONCLUSION

In patients with Coronary artery disease Asymptomatic Peripheral arterial disease is more frequent in multivessel coronary artery disease.

Recommendation:

Because of high prevalence of PAD as evident from this study promotes the idea of active screening for PAD in patients with CAD.

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AUTHOR'S CONTRIBUTION
The following authors full fill authorship criteria as per ICMJE guidelines;

Ayaz S, Zeb S:	Idea conception, data acquisition, final approval, agreed to be accountable for all the work.
Hidayatullah, Akbar F:	Design of the work, drafting the work, critical rivision, final approval, agreed to be accountable for all the work.
Imran M, Kareemullah:	Data analysis, drafting of the work, final approval, agreed to be accountable for all the work.
Kamal S, Hassan MU:	Data interpretation, critical revision, final approval, agreed to be accountable for all the work.