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Original research article

CORONARY ARTERY DISEASE IN PATIENTS OF PERIPHERAL ARTERIAL DISEASE: AN OBSERVATIONAL STUDY

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Abstract: *Peripheral arterial disease (PAD) and coronary artery disease (CAD) share common risk factors and pathophysiological mechanisms. However, the frequency and co-occurrence of CAD in patients diagnosed with PAD remain underexplored in clinical practice. Understanding this relationship is vital for improving diagnostic strategies and patient outcomes.* ***Objectives:*** *T.o determine the frequency of coronary artery disease (CAD) in patients diagnosed with peripheral arterial disease (PAD).* ***Methods:*** *This study was conducted in the department of cardiology after approval from the hospital's ethical committee, between January and June 2024. A detailed history and physical examination were performed on 160 individuals who met the inclusion criteria. Clinical data, including demographics, risk factors (hypertension, diabetes, smoking, dyslipidemia, family history of CAD), symptoms of PAD, and Ankle-Brachial Index (ABI) measurements, were collected. CAD screening was done using ECG, echocardiography, and coronary angiography or CTA for high-risk patients. Significant CAD was defined as ≥70% narrowing in major epicardial arteries or ≥50% in the left main coronary artery. PAD was confirmed through imaging studies and was severe enough to require referral for vascular surgery. A predesigned questionnaire was used for data collection, and SPSS Version 26 was utilized for statistical analysis.* ***Results:*** *The mean age of the enrolled patients was 45.97±8.78 years. The study included 160 individuals, with 51.3% (n=82) males and 48.8% (n=78) females. Age distribution showed that 0.5% (n=8) were 18-30 years old, 10.6% (n=17) were 31-40 years old, 55.0% (n=88) were 41-50 years old, and 29.4% (n=47) were over 50 years old. Regarding coronary artery disease (CAD), 44.4% (n=71) of participants were diagnosed with CAD. Among males, 52.4% (n=43) had CAD compared to 35.9% (n=28) of females, showing a statistically significant difference (p=0.03). In terms of age groups, 45.2% (n=14) of individuals aged 18-30 years, 32.0% (n=8) of those aged 31-40 years, 45.8% (n=27) of those aged 41-50 years, and 48.9% (n=22) of those over 50 years had CAD, but the association between CAD and age was not statistically significant (p=0.57).* ***Conclusion:*** *The study concluded that there is a high frequency of coronary artery disease (CAD) in patients with peripheral arterial disease (PAD), emphasizing the importance of early detection, thorough cardiovascular evaluation, and a multidisciplinary approach to enhance patient outcomes.*

Keywords: Coronary Artery Disease, Peripheral Arterial Disease, Atherosclerosis.

Introduction

Coronary artery disease (CAD) and peripheral arterial disease (PAD) are both manifestations of systemic atherosclerosis, a condition characterized by the progressive narrowing and hardening of arteries due to the accumulation of lipid plaques.(1, 2) The coexistence of coronary artery disease (CAD) and peripheral arterial disease (PAD) was first recognized nearly 50 years ago.(3) Complications arising from CAD remain the primary contributors to postoperative morbidity and mortality in patients undergoing surgery for PAD.(4) Consequently, preoperative coronary angiography has become a standard practice for assessing patients considered to be at elevated risk. CAD primarily affects the coronary arteries, leading to reduced blood flow to the heart, while PAD involves the peripheral arteries, typically those supplying the lower extremities, resulting in impaired circulation.(5) The coexistence of CAD in patients with PAD is common due to shared risk factors such as hypertension, diabetes mellitus, dyslipidemia, smoking, and advanced age.(6, 7) Patients with PAD often experience intermittent claudication, rest pain, or critical limb ischemia, and they are at a significantly higher risk of developing cardiovascular events, including myocardial infarction and stroke.(8) Studies have shown that the prevalence of CAD in individuals with PAD is substantially higher than in the general population, underscoring the systemic nature of atherosclerosis.(9, 10) Despite the established relationship, CAD may remain asymptomatic in PAD patients, complicating timely diagnosis and management.(11) Early identification of CAD in PAD patients is crucial for implementing comprehensive management, including lifestyle modifications, pharmacological interventions, and revascularization procedures, to mitigate cardiovascular risk and improve quality of life. Understanding the prevalence and characteristics of CAD in PAD patients can aid in designing targeted screening protocols and optimizing treatment approaches. Thus the aim of the study is to determine the frequency of coronary artery disease (CAD) in patients diagnosed with peripheral arterial disease (PAD).

Methodology

This observational cross-sectional study was conducted in the Department of Cardiology at the Armed Forces Institute of Cardiology and NIHD over a six-month period from

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January 2024 to June 2024. The study included patients aged 18 to 70 years who were diagnosed with peripheral arterial disease (PAD) and represented both genders. However, certain patients were excluded from the study to ensure the validity and reliability of the findings. Exclusion criteria encompassed individuals with previously diagnosed coronary artery disease (CAD), a history of myocardial infarction, coronary revascularization procedures such as angioplasty or bypass surgery, or diagnosed stable or unstable angina. Additionally, patients who experienced a recent myocardial infarction, stroke, or acute limb ischemia within the past three months were not included. Pregnant or breastfeeding women were also excluded to avoid potential confounding factors that could influence the outcomes.

After the approval of hospital ethical committee, this study was conducted in the department of cardiology, between Jan 2024 and June 2024. A detailed history was obtained, and a thorough physical examination was conducted. A total of 160 individuals who met the selection criteria were enrolled in the study. Data collection involved gathering clinical data, including demographics (age, gender), risk factors (hypertension, diabetes, smoking, dyslipidemia, family history of CAD, and obesity), symptoms of PAD (e.g., intermittent claudication, rest pain), and Ankle-Brachial Index (ABI) measurements. Screening for CAD was performed using electrocardiograms (ECG), echocardiography, and, in high-risk patients, coronary angiography or computed tomography angiography (CTA). Significant CAD was defined as a ≥70% narrowing in the luminal diameter of a major epicardial artery or a ≥50% narrowing in the left main coronary artery. PAD was defined as a condition confirmed through vascular imaging studies, such as computed tomography, ultrasound, peripheral angiography, or magnetic resonance imaging, and deemed severe enough to warrant referral for elective vascular surgery. A predesign questionnaire was used to collect data. For statistical analysis SPSS Version 26 were used.

Results

The mean age of all enrolled patients were 45.97±8.78 years. The study population comprised 160 individuals, with 51.3% (n=82) being male and 48.8% (n=78) female. Age distribution revealed that 0.5% (n=8) were aged 18-30 years, 10.6% (n=17) were 31-40 years, 55.0% (n=88) were 41-50 years, and 29.4% (n=47) were above 50 years. Regarding coronary artery disease (CAD), 44.4% (n=71) of participants were diagnosed with CAD, while 55.6% (n=89) did not have the condition. Among males, 52.4% (n=43) had CAD compared to 35.9% (n=28) of females, with a statistically significant difference (p=0.03). Regarding age groups, 45.2% (n=14) of individuals aged 18-30 years, 32.0% (n=8) of those aged 31-40 years, 45.8% (n=27) of those aged 41-50 years, and 48.9% (n=22) of those over 50 years had CAD. However, the association between CAD and age was not statistically significant (p=0.57).

Table 1: Mean age of all enrolled patients (n=160)

Variables	Mean±SD
Age (Years)	45.97±8.78

Table 2: Demographic Characteristics of all enrolled Patients (n=160)

	Frequency	Percentage
Gender		
Male	82	51.3
Female	78	48.8
Age groups		
18-30 years	8	0.5
31-40 years	17	10.6
41-50 years	88	55.0
>50 years	47	29.4
CAD		
YES	71	44.4
NO	89	55.6

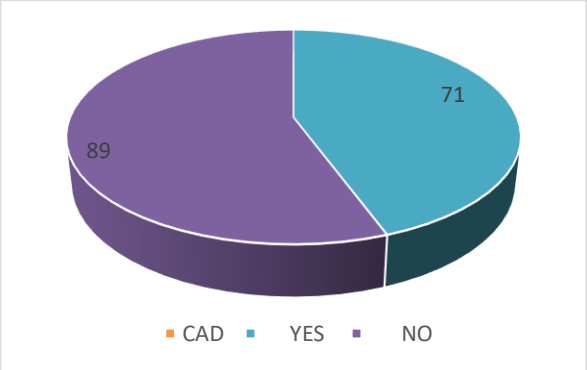

Fig 1: Frequency of CAD Patients (n=160)

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Table 3: stratification of patients on the basis of CAD with respect to age and gender

	CAD		
	YES	**NO**	**p-value**
Gender			
Male	43(52.4%)	39(47.6%)	0.03
Female	28(35.9%)	50(64.1%)	
Age Groups			
18-30 years	14(45.2%)	17(54.8%)	0.57
31-40 years	8(32.0%)	17(68.0%)	
41-50 years	27(45.8%)	32(54.2%)	
>50 years	22(48.9%)	23(51.1%)	

Discussion

The coexistence of coronary artery disease (CAD) and peripheral arterial disease (PAD) highlights the systemic nature of atherosclerosis, where multiple vascular beds are affected by similar pathological processes. This relationship has significant clinical implications, as patients with PAD are at a higher risk of cardiovascular morbidity and mortality due to the increased prevalence of CAD. Understanding the overlap between these conditions is essential for optimizing patient care, particularly in the perioperative setting. In the present study, the high prevalence of CAD among patients with PAD underscores the need for comprehensive cardiovascular evaluation in this population. Previous research supports these findings, showing that nearly 40–60% of PAD patients have concurrent CAD, often asymptomatic or subclinical. This silent nature of CAD poses a challenge, as undiagnosed coronary disease can lead to adverse outcomes during or after vascular interventions for PAD, such as myocardial infarction, arrhythmias, or sudden cardiac death. In the present study we have found that 44.4% of patients had CAD. In the Western world, the prevalence of peripheral arterial disease (PAD) among patients with coronary artery disease (CAD) ranges from 10% to 30%.(9) According to the literature, the incidence of coronary artery disease (CAD) among patients with peripheral arterial disease (PAD) shows considerable variation, ranging from 28% to 94%.(10) Although it is commonly assumed that patients with severe peripheral arterial disease (PAD) also have severe concomitant coronary artery disease (CAD), published reports indicate that the prevalence of significant CAD in patients with severe PAD varies widely, ranging from 28% to 94%.(3) Another study reported that peripheral arterial disease (PAD) was found in 12.9% of patients with coronary artery disease (CAD).(12) In our cohort, males showed a higher prevalence of CAD compared to females, consistent with established gender differences in cardiovascular disease epidemiology. This observation highlights the importance of considering demographic factors when stratifying risk and designing preventive strategies.

Preoperative coronary angiography has become a cornerstone in managing PAD patients at risk of CAD. Identifying coronary lesions and determining the need for interventions such as percutaneous coronary intervention (PCI) or coronary artery bypass grafting (CABG) can significantly reduce perioperative complications and improve long-term outcomes.

Conclusion

It was concluded that this study underscores the high prevalence of coronary artery disease (CAD) in patients with peripheral arterial disease (PAD), highlighting the need for early detection, comprehensive cardiovascular evaluation, and a multidisciplinary approach to improve patient outcomes.

Declarations

Data Availability statement
All data generated or analyzed during the study are included in the manuscript.
Ethics approval and consent to participate.
Approved by the department Concerned. (IRBEC-AFCNE-0231/23)
Consent for publication
Approved
Funding
Not applicable

Conflict of interest

The authors declared an absence of conflict of interest.

Authors Contribution

MALIK MUHAMMAD KHURAM SHAHZAD (Resident cardiology)
Final Approval of version
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Revisiting Critically & Data Analysis
MUHAMMAD WALEED GHOUS (Resident cardiology)
Drafting, Concept & Design of Study

References

1. Shao C, Wang J, Tian J, Tang Y-d. Coronary artery disease: from mechanism to clinical practice. Coronary Artery Disease: Therapeutics and Drug Discovery. 2020:1-36.
2. Agnelli G, Belch JJ, Baumgartner I, Giovas P, Hoffmann U. Morbidity and mortality associated with atherosclerotic peripheral artery disease: A systematic review. Atherosclerosis. 2020;293:94-100.
3. Hur DJ, Kizilgul M, Aung WW, Roussillon KC, Keeley EC. Frequency of coronary artery disease in patients

undergoing peripheral artery disease surgery. The American journal of cardiology. 2012;110(5):736-40.
4. Welten GM, Schouten O, Hoeks SE, Chonchol M, Vidakovic R, van Domburg RT, et al. Long-term prognosis of patients with peripheral arterial disease: a comparison in patients with coronary artery disease. Journal of the American College of Cardiology. 2008;51(16):1588-96.
5. Muir RL. Peripheral arterial disease: Pathophysiology, risk factors, diagnosis, treatment, and prevention. Journal of Vascular Nursing. 2009;27(2):26-30.
6. CH KT. To Study the Correlation Between Peripheral Artery Disease and Coronary Artery Disease Using Ankle Brachial Index in Type 2 Diabetes Mellitus Patients: Rajiv Gandhi University of Health Sciences (India); 2016.
7. Takahara M, Iida O, Kohsaka S, Soga Y, Fujihara M, Shinke T, et al. Diabetes mellitus and other cardiovascular risk factors in lower-extremity peripheral artery disease versus coronary artery disease: an analysis of 1,121,359 cases from the nationwide databases. Cardiovascular Diabetology. 2019;18:1-9.
8. Golledge J. Update on the pathophysiology and medical treatment of peripheral artery disease. Nature reviews cardiology. 2022;19(7):456-74.
9. Saran R, Bhagat R, Narain V, Dwivedi S, Puri A, Sharad C, et al. Prevalence of peripheral arterial diseases in patient with coronary artery diseases of Indian origin. Heart. 2012;98(Suppl 2):E266-E.
10. Rai A, Baridkazemi S, Sobhiyeh M, Amiri M, Ghorbani M, Shafiei S, et al. Prevalence and risk factors associated with coronary artery disease in Iranian patients with peripheral artery disease. Journal of Vascular Nursing. 2024.
11. Gerhard-Herman MD, Gornik HL, Barrett C, Barshes NR, Corriere MA, Drachman DE, et al. 2016 AHA/ACC guideline on the management of patients with lower extremity peripheral artery disease: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. Journal of the American College of Cardiology. 2017;69(11):e71-e126.
12. Ayaz S, Zeb S, Akbar F, Imran M, Kamal S, Hassan MU. How Common Peripheral Arterial Disease is in Patients Undergoing Coronary Angiography? Journal of Saidu Medical College, Swat. 2023;13(1):13-8.

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