e-ISSN: 0976-822X, p-ISSN:2961-6042

Available online on http://www.ijcpr.com/

International Journal of Current Pharmaceutical Review and Research 2026; 18(8); 377-381

Original Research Article

A Study of Peripheral Vascular Disease in Myocardial Infarction Patients Admitted to the Cardiac Care Unit of a Tertiary Care Hospital

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Received: 01-05-2026 / Revised: 15-06-2026 / Accepted: 21-07-2026
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Conflict of interest: Nil

Abstract

Background: Peripheral vascular disease (PVD) is a common macrovascular complication of diabetes mellitus and hypertension and shows a strong correlation with coronary artery disease and cerebrovascular disease. This study aimed to detect PVD in patients with myocardial infarction (MI) using the ankle brachial index (ABI) and arterial Doppler of the lower limbs, and to correlate clinical and biochemical variables with PVD and coronary artery disease.

Methods: One hundred randomly selected patients with myocardial infarction admitted to Subbaiah medical college, were included. ABI and arterial Doppler study of the lower limbs were performed in all patients to detect PVD.

Results: PVD was detected by Doppler study in 33% of patients and by ABI (<0.9) in 32% of patients. The occurrence of PVD showed a direct relationship with increasing age, hypertension, diabetes mellitus and smoking. Most patients belonged to the 56–65 year age group (45%), with a male predominance (74%). Non-ST elevation MI (NSTEMI) was the commonest presentation (48%), followed by unstable angina (34%) and ST elevation MI (18%).

Conclusion: The occurrence of PVD in myocardial infarction by Doppler study was 33% in and around Shimoga. Patients with MI and concomitant PVD are likely to carry higher morbidity than those without PVD. Advanced age increases the risk of PVD, and PVD is significantly associated with hypertension, smoking and diabetes mellitus. ABI is a simple, inexpensive and reliable screening tool and should be considered for routine use in patients with myocardial infarction.

Keywords: Acute Coronary Syndrome; Ankle Brachial Index; Peripheral Vascular Disease; Doppler Study; Diabetes Mellitus; Hypertension.

DOI: 10.25258/ijcpr.18.8.58

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Introduction

Coronary artery disease (CAD) has a varied clinical presentation ranging from silent ischemia and stable angina to acute coronary syndrome (ACS), heart failure and sudden death. Acute coronary syndrome encompasses unstable angina (UA), non-ST elevation myocardial infarction (NSTEMI) and ST elevation myocardial infarction (STEMI). Coronary artery disease remains a major health problem in India, with an estimated 2.98 million patients and 1.27 million acute coronary events occurring annually; Indian patients tend to present six to ten years younger than their western counterparts.

There is a strong correlation between the presence of peripheral vascular disease (PVD), coronary artery disease, cerebrovascular disease, diabetes mellitus and hypertension. Among the macrovascular complications of common medical disorders such as diabetes and hypertension, cerebrovascular accidents (CVA) and CAD conventionally receive the greatest clinical attention because of their contribution to immediate mortality. However, with improved survival after CVA and CAD, early detection and management of concomitant PVD assumes increasing importance for preserving the functional quality of life of these survivors.

This study was undertaken to determine the occurrence of PVD in patients with myocardial infarction and to evaluate whether routine screening of MI patients for PVD using simple bedside tools is worthwhile.

Objectives

1. To find out the association of peripheral vascular disease and myocardial infarction.
2. To study the clinical and biochemical variables associated with peripheral vascular disease in these subjects.

Materials and Methods

This study was conducted at Subbaiah medical college, from December 2013 to June 2015. One hundred randomly selected patients with acute myocardial infarction admitted to Subbaiah medical college, satisfying the inclusion and exclusion criteria, were enrolled.

Each patient underwent a detailed clinical examination as per a pre-designed proforma, including assessment of risk factors and detailed evaluation of the peripheral vascular system.

Inclusion Criteria: Diagnosed cases of myocardial infarction.

Exclusion Criteria: Coarctation of aorta; known vasculitis syndromes.

Investigations: All patients underwent urine albumin, sugar and microscopy; haemoglobin, total and differential leukocyte count, ESR; random blood sugar and HbA1c; fasting lipid profile; serum creatinine; ECG; troponin-T; CK-MB; coronary angiogram; 2D echocardiography; arterial Doppler of the lower limbs; and ankle brachial index (ABI).

Ankle Brachial Index: ABI was calculated as the ratio of ankle systolic blood pressure to brachial systolic blood pressure, measured using Doppler ultrasound. An ABI value of less than 0.9 was taken as a marker of peripheral vascular disease in this study. ABI was interpreted as: >1.30 – non-compressible (medial wall calcification); 0.91–1.30 – normal; 0.51–0.90 – mild-to-moderate PAD; and <0.50 – severe PAD.

Statistical Analysis: The Chi-square test was used to assess the significance of the association between peripheral vascular disease in myocardial infarction and diabetes mellitus, lipid profile, hypertension and smoking. Statistical analysis was performed using SPSS 11.0 and Systat 8.0; Microsoft Word and Excel were used to generate tables and graphs.

Results

A total of 100 patients with myocardial infarction were analysed. The age of patients ranged from 36 to 85 years, with 74 males and 26 females (male: female ratio 3.5:1). Forty-five percent of patients were in the 56–65 year age group and 25% were in the 66–75 year age group.

Table 1: Age and sex distribution in the study group

Age group (years)	Male	Female	Total
36–45	9	1	10
46–55	19	1	20
56–65	28	17	45
66–75	18	7	25
Total	74	26	100

Most patients presented with NSTEMI (48%), followed by unstable angina (34%) and STEMI (18%). There was no statistically significant association between age group and type of MI (p=0.88), or between sex and type of MI (p=0.119).

Table 2: Occurrence of myocardial infarction type according to sex distribution

MI type	Male	Female	Total
STEMI	15	3	18
NSTEMI	31	17	48
Unstable Angina	28	6	34
Total	74	26	100

$\chi^2 = 4.26$, p = 0.119

Peripheral vascular disease, detected by arterial Doppler study, was present in 33 of the 100 patients (33%); PVD detected by ABI (<0.9) was present in 32 patients (32%), of whom 12 had severe PVD (ABI <0.5) and 20 had mild-to-moderate PVD (ABI 0.5–0.9).

Table 3: Association of PVD (Doppler) with sex distribution

Doppler	Male	Female	Total
Normal	48	19	67
Abnormal	26	7	33
Total	74	26	100

$\chi^2 = 0.587$, p = 0.444

Table 4: Association of PVD with age distribution (Doppler findings)

Age group (years)	Normal	Abnormal	Total
36–45	8	2	10
46–55	12	8	20
56–65	32	13	45
66–75	15	10	25
Total	67	33	100

$\chi^2 = 2.1$, $p = 0.551$

A significant association was found between PVD and hypertension, smoking status and MI type.

Table 5: Association of PVD (Doppler) with hypertension

Doppler	Hypertensive	Non-hypertensive	Total
Normal	13	54	67
Abnormal	19	14	33
Total	32	68	100

$\chi^2 = 14.8$, $p < 0.005$ (significant)

Table 6: Association of PVD (Doppler) with smoking status

Doppler	Smoker	Non-smoker	Total
Normal	24	43	67
Abnormal	19	14	33
Total	43	57	100

$\chi^2 = 4.27$, $p = 0.039$ (significant)

Table 7: Association of PVD (ABI) with diabetes mellitus

ABI	Diabetic	Non-diabetic	Total
<0.5	2	10	12
0.5–0.9	9	11	20
>0.9	8	60	68
Total	19	81	100

$\chi^2 = 11.14$, $p = 0.004$ (significant)

Table 8: Association of PVD (ABI) with hypertension

ABI	Hypertensive	Non-hypertensive	Total
<0.5	8	4	12
0.5–0.9	11	9	20
>0.9	13	55	68
Total	32	68	100

$\chi^2 = 16.7$, $p < 0.005$ (significant)

Table 9: Association of PVD (ABI) with MI type

ABI	STEMI	NSTEMI	Unstable Angina	Total
<0.5	6	4	2	12
0.5–0.9	3	14	3	20
>0.9	9	30	29	68
Total	18	48	34	100

$\chi^2 = 15.2$, $p = 0.004$ (significant)

PVD detected by ABI also showed a borderline association with smoking status ($\chi^2 = 5.6$, $p = 0.062$), and a non-significant trend with age group ($\chi^2 = 7.7$, $p = 0.263$), suggesting that age and smoking act as contributory but not independently decisive factors when analysed by this method in the present sample size.

Table 10: Occurrence of PVD in acute coronary syndrome – comparison with similar studies

Study	PVD (%)
Present study	33%
Serge Kownator et al.	21.3%
Bertomeu V et al.	39.8%
Jorge Loria et al.	20.5%
Jean Jacques et al.	36.8%
Nunes JLB et al.	34.3%

Discussion

In this study, PVD was detected in 33% of patients with myocardial infarction by Doppler study and 32% by ABI, which is comparable to the findings of Nunes JLB et al. (34.3%) and Jean Jacques Mourad et al. (36.8%), though somewhat higher than the figures reported by Serge Kownator et al. (21.3%) and Jorge Loria et al. (20.5%). Bertomeu V et al. reported a higher prevalence of 39.8% among ACS patients. This variation across studies likely reflects differences in patient selection, diagnostic thresholds and the screening method used (ABI alone versus Doppler).

The age distribution in this study, with a predominance of patients in the 56–65 year age group and an overall male predominance (74 males to 26 females), is consistent with previously reported Indian data, including the study by Yadav P et al., which showed similar male predominance and a comparable mean age.

The prevalence of hypertension (32%), diabetes mellitus (19%) and dyslipidemia (26%) observed in this cohort is comparable with the study by Yadav P et al., which reported prevalences of 33%, 21% and 23% respectively for these risk factors.

A significant association was observed between PVD and hypertension, diabetes mellitus and smoking status, findings that are consistent with previously described risk factors for peripheral arterial disease, including in the report by Hasan A. Al-Thani et al. Smoking emerged as the leading modifiable risk factor in this cohort (43%), with a male preponderance, in keeping with earlier studies such as that of Yusuf et al., in which 65% of subjects were smokers with a similar male predominance. No statistically significant association was found between PVD and dyslipidemia in this study; only 7 of the 33 patients with PVD had dyslipidemia. This finding differs from some other reports in the literature and may be attributable to the relatively small sample size of this study.

Conclusion

1. The occurrence of PVD in myocardial infarction in this study was 33%.
2. Males were more commonly affected than females.
3. The occurrence of PVD increased with increasing age of patients.
4. Poorly controlled diabetes mellitus, hypertension, and irregular treatment for the same increased the likelihood of developing PVD.
5. PVD was significantly associated with hypertension, diabetes mellitus and smoking.
6. The ankle brachial index is a cheap, reliable and non-invasive method for detecting PVD in myocardial infarction and can be used as an initial screening test.
7. Smoking increased the risk of atherosclerosis leading to vascular disease.
8. The high prevalence of PVD among myocardial infarction patients supports routine screening for peripheral arterial disease in this population, enabling early intervention and potentially reducing the associated morbidity.

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