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Original Research Article

Study prevalence of peripheral arterial disease in diabetics with coronary artery disease at a large tertiary care teaching hospital in North India

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ABSTRACT

Background: Peripheral arterial disease and coronary artery disease have similar factors. The extent and severity of PAD is significantly associated with presence and severity of CAD.
Methods: Patients were interviewed and clinical profile of patients including risk factors of coronary artery disease like diabetes, hypertension, smoking, dyslipidemia, obesity and family history of coronary artery disease were assessed and recorded in the proforma. Information regarding demographics, co morbidity, past history and family history was collected. Physical examination of each patient was carried and basic anthropometric data: height, weight, BMI and blood pressure, peripheral pulses calculated. Investigations both non- invasive and invasive including peripheral angiography were recorded.
Results: In this prospective study fifty (50) type 2 diabetes patients admitted with CAD were studied whose mean age was 55.6+8.2 and mean duration of diabetes was 6.8+8.4. In this study none of the patients with PAD had single atherosclerosis risk factors including diabetes. 30% patients were having two risk factors. PAD in in patients with CAD is particularly enhanced by the concomitant occurrence of two or more of these risk factors (p=0.016). Hypertension as a predictor of PAD was statistically significant (p=0.0037). In this study the duration of diabetes was <5 years in 10%, 5-10 years in 40% and >10 years in 40% of patients with angiographically proven PAD.
Conclusions: It was observed that presence and severity CAD was significantly associated with PAD.

Keywords: Ankle brachial index, Body mass index, Coronary artery bypass graft, Coronary artery disease, Percutaneous intervention, Peripheral arterial disease

INTRODUCTION

Atherosclerosis is a generalized disease, several manifestations of which may coexist in the same patient. Peripheral Arterial Disease (PAD) is characterized by a gradual reduction in the blood flow to one or more limbs secondary to atherosclerosis.[1] Atherosclerotic Cardiovascular (CV) disease is increased in individuals with type 1 and 2 diabetes millets. In fact atherosclerotic vascular disease among diabetic patients accounts today for most deaths.[2] The Framingham heart study revealed a marked increase in CAD, PAD, CHF, MI, sudden cardiac deaths in diabetes millets. The same pathological process in atherosclerosis can have a similar impact on all vessels in the body, leading to Coronary Artery Disease (CAD), Cerebrovascular Disease (CVD) Peripheral Arterial Disease (PAD).[3]

Peripheral Arterial Disease (PAD) is a condition characterized by atherosclerotic occlusive disease of the

lower extremities.[4] Inflammation has been established as both a risk marker and perhaps a risk factor for atherothrombotic disease states including PAD.[5] Compared with a prevalence ranging from 4% to 20% in general population patients with diabetes have an increased prevalence.[6-10] The prevalence of PAD among patients with diabetes in the western population ranges from 16% to 22%.[11,12] PAD often coexists with CAD and CVD particularly in older people. Atherosclerosis being a generalized disease, the relative accessibility of the peripheral vessel for diagnostic studies can allow the early identification of persons with asymptomatic atherosclerotic disease.[13]

PAD and CAD have similar risk factors. The extent and severity of PAD is significantly associated with the presence and severity of CAD.

METHODS

The present study was a hospital based cross sectional study conducted in the postgraduate department of cardiology at Sher I Kashmir institute of medical sciences Soura. The present study was carried for a period of one year from 1st October 2014 to 30th September 2015.

Study population

All diabetic patients admitted with coronary artery disease who undergo coronary angiography irrespective of their presentation (stable angina, unstable angina, NSTEMI, STEMI) were included in the study.

Exclusion criteria

- Patients with coronary artery disease without diabetes
- Diabetic patients without coronary artery disease
- Patients on vasodilators
- Chronic kidney disease patients

After taking informed consent to participate in the study, patients were interviewed and clinical profile of patients including risk factors of coronary artery disease like diabetes, hypertension, smoking, dyslipidemia, obesity and family history of coronary artery disease were assessed and recorded in the proforma. Information regarding demographics, co morbidity, past history and family history was collected. Physical examination of each patient was carried and basic anthropometric data: height, weight, BMI and blood pressure, peripheral pulses calculated. Investigations both non- invasive and invasive including peripheral angiography were recorded. Systolic blood pressures of both arms at the brachial arteries and both lower limbs at the dorsalis pedis arteries were taken with the help of sphygmomanometer and a handheld doppler probe and recorded in the proforma. The higher of the two systolic pressures recorded at the ankle was divided by the highest of the systolic pressures recorded in the arms to get the ankle brachial index.

The responses obtained on the questionnaires were converted into data over a Microsoft excel sheet. The variables of interest have been shown in term of frequency and percentages. The standard statistical test, Pearson's chi square test has been used to analyze the data. All the results so obtained were discussed at 5% level of significance (p-value<0.05). Also, the appropriate statistical charts have been used to represent the results. SPSS V 20 has been used to analyze the data.

RESULTS

During the study period of two years after carefully considering inclusion and exclusion criteria, fifty (50) patients were enrolled in the study. Of the patient's males were 37(64%) and 13(26%) were females with a male female ratio of 2.85:1. The mean age of the patients was with a range of 55.6±8.2 and mean duration of diabetes was 6.8±8.4 years. Out of fifty patients in the study, 32% (n=16) were <50 yrs of age, 36% (n=18) were between 50-60 yrs of age, 32% (n=16) were above 60 yrs of age (Table 1).

Table 1: Age distribution.

Age	Frequency	Percentage
< 50 yrs	16	32.0
50-60 yrs	18	36.0
>60 yrs	16	32.0
Total	50	100.0

Out of fifty (50) patients in study group 74% (n=37) were males and 26% (n=13) were females (Table 2).

Table 2: Sex distribution.

Gender	Frequency	Percent
Male	37	74
Female	13	26
Total	50	100.0

In the present study 44% of patients had a normal BMI, 26% were overweight and 30% were obese (Table 3).

Table 3: Body Mass Index.

	Frequency	Percent
Normal	22	44.0
Overweight	13	26.0
Obese	15	30.0
Total	50	100.0

Among the total of fifty (50) patients in the study group 80% (n=40) had a normal peripheral angiography while 20% (n=10) had an abnormal angiography. Out of the affected patients 4% (n=2) had plaquing and 16% (n=8) had stenosis of the peripheral arteries 9 (Table 4).

Table 4: Number of patients with PAD on peripheral angiography.

PAD	Frequency	Percent
Normal	40	80
Plaqueing	2	4
Stenosis	8	16
Total	50	100.0

Out of 10 patients having PAD 2% (n=1) were <50 yrs of age, 4% (n=2) were between 50-60 yrs of age and 14% (n=7) of the patients were above 60 yrs of age. The results were statistically significant in relation to age of patients (p=0.014) (Table 5).

Table 5: Age wise distribution of PAD.

Age	Peripheral angiography		Total	p value
	Positive	Negative		
<50	1	15	16	0.014
50-60	2	18	18	
>60	7	9	16	
Total	10	40	50	
	100%	100%	100%	

Out of ten (10) affected patients, 70% (n=7) were males and 30% (n=3) were females. The relation between sex and PAD was not statistically significant (p=0.707) (Table 6).

Table 6: Gender wise frequency of PAD.

		Peripheral angiography		Total	p Value
		Positive	Negative		
Sex	Male	7	30		0.707
		70%	30%		
	Female	3	10		
		30%	25%		
Total		10	40		
		100%	100%		

Among the patients affected by PAD 20% (n=2) had normal BMI, 30% (n=3) were overweight and 50% (n=3) were overweight and 50% (n=5) were obese (Table 7).

Among all the patients with PAD none had only one of the atherosclerosis risks factors, 30% (n=3) patients were having two risk factors while 70% (n=7) had more than two risk factors (Table 8).

Table 7: Frequency of PAD in relation BMI.

		Peripheral angiography		Total	p Value
		Positive	Negative		
BMI	Normal	2	20	22	0.184
		20%	50%	44%	
	Overweight	3	10	13	
		30%	25%	26%	
	Obese	5	10	15	
		50%	25%	30%	
Total		10	40	50	
		100%	100%	100%	

Table 8: Relationship between number of risk factors and presence of PAD.

		Peripheral angiography		Total	p value
		Positive	Negative		
Risk factors	1	0	17	17	0.184
		0%	42.5%	34%	
	2	3	12	15	
		30%	30%	30%	
	>2	7	11	18	
		70%	27.5%	36%	
Total		10	40	50	
		100%	100%	100%	

Seventy percent of the patients with documented PAD were smokers and 30% were nonsmokers. In the non-PAD class 30% were smokers while 70% were nonsmokers. Smoking was significantly associated with PAD (p=0.03) (Table 9).

Table 9: Frequency of smokers in PAD and non-PAD group.

Smokers	PAD		Total	Total
	Present	Absent		
Yes	7	12	19	0.03
No	3	28	31	
Total	10	40	50	

In the study group among patients with PAD 80% were hypertensive and 20% were normotensive while in non-PAD class 27.5% were hypertensive and 72.5% were

without hypertension. Hypertension as a predictor of PAD was statistically significant (p=0.0037) in this study (Table 10).

Table 10: Frequency of hypertension in PAD and non-PAD group.

Hypertension	PAD		Total	Total
	Present	Absent		
Yes	8	11	19	
No	2	29	31	0.0037
Total	10	40	50	

Out of the all cases with dyslipidemia in the study 38.8% patients had PAD while in patients without dyslipidemia only 9% had dyslipidemia (p=0.23) (Table 11).

Table 11: Frequency of dyslipidemia in PAD and non-PAD group.

Dyslipidemia	PAD		Total	Total
	Present	Absent		
Yes	7	11	18	
No	3	29	32	0.023
Total	10	40	50	

The duration of diabetes was <5 yrs in 10% (n=2), 5-10 yrs in 40% (n=40) and >10 yrs in 50% (n=4) of patients with angiographically proven PAD. Among patients with PAD 20% (n=2) were on OHA's alone, 50% (n=5) on insulin alone and 30% (n=3) on both OHA's and insulin (Table 12, 13).

Table 12: Relationship between number of risk factors and presence of PAD.

		Peripheral angiography		Total	p Value
		Positive	Negative		
Diabetes millets duration	<5 yrs	1	22	22	0.031
		10%	55%	46%	
	25-10 yrs	4	10	14	
		40%	25%	28%	
	>10 yrs	5	8	13	
		50%	20%	26%	
Total		10	40	50	
		100%	100%	100%	

Table 13: Depicting the frequency of PAD in relation to treatment of diabetes.

		Peripheral angiography		Total	p Value
		Positive	Negative		
Treatment	OHA	2	16	18	0.031
		20%	40%	36%	
	Insulin	5	19	24	
		50%	47.5%	48%	
	Both	3	5	8	
		30%	12.5%	16%	
Total		10	40	50	
		100%	100%	100%	

Table 14: Depicting the frequency of PAD in relation to level of HbA1c.

		Peripheral angiography		Total	p Value
		Positive	Negative		
HbA1c	<7%	7	19	26	0.031
		70%	49.5%	36%	
	7- 9%	2	16	24	
		20%	40%	48%	
	>9%	1	5	8	
		10%	12.5%	16%	
Total		10	40	50	
		100%	100%	100%	

Out of ten patients with PAD HbA1c was ><7 in 70% (n=70) of patients, between 7 and 9 in 20% (n=2) and >9 in 10% (n=1) of patients (Table 14).

DISCUSSION

The present study was a hospital-based study conducted in the postgraduate department of cardiology, Sher I kashmir institute of medical sciences Soura Srinagar. In this prospective study fifty (50) type 2 diabetes patients admitted with CAD were studied whose mean age was 55.6±8.2 and mean duration of diabetes was 6.8±8.4. Not much of the research is currently available on the assessment of PAD in diabetic patients with concomitant CAD. Most of the studies in diabetic patients focus on assessment of CAD with or without other neurovascular complications. The study group included diabetic patients with CAD irrespective of their presentation as stable angina, unstable angina, NSTEMI, and STEMI. In the present study the prevalence of angiographically detected PAD was found to be 20%. Excluding four (4) patients with normal coronary angiography the actual prevalence of PAD in patients with concomitant CAD was equal to 21.73%. The results are consistent with various studies which include Rehan et al, who found that prevalence of PAD in diabetics presenting with ACS was 24.16%.[14] A K Agarwal et al, found the prevalence of PAD to be 26% in their study of 146 patients with CAD.[15]

In the current study out of the total 10 patients having PAD 2% were <50 yrs of age, 4% were between 50-60 yrs of age and 14% of the patients were above 60 yrs of age. The association between age and occurrence of PAD was statically significant (p=0.014). In a study conducted by Ajay et al, on 73 patients the mean age in PAD group was greater than those in non- PAD group and was statistically significant.[16]

This study included 74% male and 26% female population. Out of total PAD patients 70% were males and 30% were females. No association was noted between gender and risk of PAD. (p=0.7070). In their study of 146 diabetic patients by A K Agarwal et al, the prevalence of PAD was 14.4% with women having slightly higher prevalence (14.9%) as compared to men (13.9%) (p=0.864).

In this study among patients affected by PAD 20% had normal BMI 30% were overweight and 50% were obese and the association was not statistically significant (p=0.184). Robert et al, in their study involving patients with CAD found that BMI similarly elevated in both PAD (27.1%) and non-PAD (27.8%) groups (p=0.46).

Classical major risk factors of CAD like smoking, hypertension and hyperlipidemia were assessed to determine, their role as risk factors PAD. In this study none of the patients with PAD had single atherosclerosis risk factors including diabetes. 30% patients were having two risk factors. PAD in in patients with CAD is particularly enhanced by the concomitant occurrence of two or more of these risk factors(p=0.016). Rigatelli in their study of CAD patients showed that presence of multiple risk factors is an independent predictor of PAD.[17] This observation is comparable with this finding.

Seventy percent (70%) of the patients with documented PAD were smokers and 30% were nonsmokers. In the non-PAD class 30% were smokers while 70% were nonsmokers. This finding corroborated with many researchers including Luo et al, and Robert et al.[18]

In this study group among the patients with PAD 80% were hypertensive and 20% were normotensive while in non-PAD class 27.5% hypertensive and 72.5% were normotensive. Hypertension as a predictor of PAD was statistically significant (p=0.0037). There were 202 hypertensive and 148 normotensive patients in one of the trials by Rehan et al. PAD was present in 44(12.6%) patients with hypertension while 18(5.1%) patients with normal blood pressures also had PAD. There was a statistically significant increase in the frequency of PAD (p=0.020) among the hypertensive cohort with ACS.

In this study the duration of diabetes was <5 yrs in 10%, 5-10 yrs in 40% and >10 yrs in 40% of patients with angiographically proven PAD. The association was statistically significant (p=0.031) and in line with many studies. Janka et al, in their study of 623 diabetic outpatients found a significant relationship between duration of diabetes and frequency of PAD.[19]

Out of ten affected patients with PAD HbA1c was <7% in 10% of patients, between 7% and 9% in 40% of patients and >9% in 60% of patients. It was significantly related to the proportion of patients having PAD (p=0.046). Jameel et al, in their study noted in the clinical profile of 331 patients at diabetic clinic , that about 75% had uncontrolled HbA1c. using cut off of >7% for poor control, 44% had poor glycemic control in non-PAD group compared to 71.43% in the PAD group (p=0.001). Walter et al, and Janka et al, also found inferior glycemic control to be a predictor of PAD.

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