

Study of Peripheral Arterial Disease in an Indian Tertiary Care Cardiology Outpatient Department

D. Sunil Reddy¹, Vishwa Deepak Tripathi², Avijit Singh³

¹Department of Cardiology, Krishna Institute of Medical Sciences, Hyderabad, Telangana, India. ²Department of Cardiology, Shyam Shah Medical College and Associated Superspeciality Hospital, Rewa, Madhya Pradesh, India. ³Department of CVTS, Shyam Shah Medical College and Associated Superspeciality Hospital, Rewa, Madhya Pradesh, India.

ABSTRACT

BACKGROUND

Peripheral Arterial Disease (PAD) is an obstructive disease of peripheral vasculature. The evidence that both symptomatic and asymptomatic PAD represent an independent risk for cardiovascular morbidity and mortality has triggered resurgence in epidemiological and clinical interest in PAD. We intended to determine the prevalence of asymptomatic and symptomatic PAD in patients attending Cardiology Department of our hospital, and evaluate the associated risk factors and coronary arterial disease among those with PAD.

METHODS

This is a descriptive cross-sectional study of PAD conducted among 450 eligible consecutive patients visiting Cardiology OPD who after giving informed consent underwent ABI measurement (auscultatory and Doppler) and relevant investigations. After taking history and physical examination, patients underwent ABI measurement. Appropriate investigations were done. All data was collected and analysed using SPSS software.

RESULTS

We had included 450 patients attending Cardiology OPD of Krishna Institute of Medical Sciences, Hyderabad. 92 out of 450 (20.44 %) were found to be suffering from PAD. 6.22 % (28) of patients described symptoms of intermittent claudication. Diabetes and smoking were found to be significantly associated with PAD but alcoholism and hypertension were not.

CONCLUSIONS

Peripheral arterial diseases are significantly associated with presence of CAD and its presence should be looked for particularly in smokers and diabetics who are visiting outpatient department.

KEYWORDS

PAD, CAD, ABI

Corresponding Author:

*Dr. Vishwa Deepak Tripathi,
Department of Cardiology,
Shyam Shah Medical College and
Associated Superspeciality Hospital,
Rewa, Madhya Pradesh, India.
E-mail: drvdtripathi@hotmail.com*

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BACKGROUND

Peripheral Arterial Disease (PAD) is an obstructive disease of peripheral vasculature. The evidence that both symptomatic and asymptomatic PAD represent an independent risk for cardiovascular morbidity and mortality which has triggered resurgence in epidemiological and clinical interest in PAD.¹ It's well established that a big proportion of patients plagued by CAD even have underlying PAD. Approximately 30 % of patients with CAD may have PAD. Patients of PAD suffer high morbidity and mortality and significant impairment of quality of life, yet it remains under diagnosed and under treated. Traditional risk factors for Atherosclerotic PAD shares similarity with atherosclerosis risk factors of atherosclerotic carotid, coronary and other vasculature.² Despite having high prevalence of a number of these CAD risk factors, the prevalence of PAD is disproportionately low in South Asian population. However some studies have shown similar prevalence. The finding of low incidence of PAD in South Asian people is unclear and genetic factors could also be involved.^{3, 4} for epidemiological purposes noninvasive test to screen PAD is ankle - brachial index (ABI) measured by a hand - held Doppler probe. It is ratio between systolic BP at the ankle and systolic BP of arm. The conventional value of the ABI ranges from 0.9 to 1.3. PAD is defined as an ABI of <0.9.⁵ In a population based study from India, the prevalence of PAD (as diagnosed by Ankle Brachial Pressure Index or ABPI of <0.9) was 3 %, in some studies PAD the prevalence of CAD was similar in people with and without PAD.⁶ Only some studies are stratified for asymptomatic and symptomatic PAD cases, but they didn't provide consistent outcomes. Leng et al demonstrated that asymptomatic PAD patients had higher event rates than symptomatic patients.⁷ Additionally, McDermott et al more recently reported that patients with asymptomatic PAD had poorer functional performance and quality of life.⁸ Overall, current data from the first care setting on the prevalence and risk of premature mortality and of cardiovascular events related to PAD are limited. Against this background, we intended to determine the prevalence of asymptomatic and symptomatic PAD in patients attending Cardiology Department of our Hospital, and also the associated risk factors and Coronary arterial disease among those with PAD.

We wanted to determine the prevalence of, PAD among patients, asymptomatic PAD, and CAD among patients of PAD attending the Department of Cardiology.

METHODS

This is a descriptive cross-sectional study conducted among 450 consecutive patients visiting Cardiology OPD of Krishna Institute of Medical Sciences, Telangana. All patients aged > 18 years attending the Department of Cardiology were included in the study.

Exclusion Criteria

1. All the conditions which hinder the measurement of ABI
 - Severe aortic regurgitation.
 - Overt congestive heart failure.
 - Gross pedal oedema.
2. Diagnosed cases of arteritis and fibromuscular dysplasia.
3. Patients unwilling to participate in the study.

After obtaining informed consent, patients underwent ABI measurement (auscultatory and Doppler) and relevant investigations. After taking history and physical examination, patients underwent ABI measurement. Blood pressure was measured by conventional cuff method (auscultation) and by arterial Doppler. Ankle brachial index (ABI) was taken as the ratio of systolic blood pressure in the lower limb at the level of ankle to the systolic blood pressure in the upper limb at the brachial level. The ABI was calculated separately for both right and left sides and an ABI of less than 0.9 was taken as the cut off for diagnosing peripheral artery disease. Arterial Doppler was done using Versa lab Dx Vascular Doppler recorder with 8 MHz vascular probe. The onset of auditory component of Doppler during deflation of cuff was taken as systolic blood pressure at that level.

The data was categorized into four groups based on ABI and distribution of different variables studied. Distribution was expressed as a percentage of total number in population and in actual numbers. All the statistical analysis was done with the help of a statistician using statistical package for social sciences (SPSS) VERSION 17.0 IBM Computers New York. Relation between variables was analysed using Pearson's correlation, where correlation (r) value greater than 0.300 and p value of <0.05 were considered significant correlation.

RESULTS

We had included 450 patients attending Cardiology OPD of Krishna Institute of Medical Sciences, Hyderabad. 92 out of 450 (20.44 %) were found to be suffering from PAD. Majority of cases were observed in the age range of 61 - 70 years (34.78 %). Mean age of overall population was 53.55 years (\pm 13.12) and that in PAD group was 53.35 years (\pm 13.60). There were a total of 342 (76 %) men and 108 (24 %) women. In this study, 6.22 % (28) of patients described symptoms of intermittent claudication. Of these 1.1 % (5) did not have PAD. The occurrence of intermittent claudication in the PAD group was 22.5 % (23 of 92 patients) (Table 1).

Out of the 450 patients, 210 (46.7 %) were diabetic. In the PAD group 52 of 92 (56.52 %) patients were diabetic and 24.7 % of patients with DM had PAD. ($p < 0.05$) Out of the 450 patients, 220 (48.9 %) were hypertensive. In the PAD group 43 (19.5 %) patients were hypertensive. ($p = 0.643$) Out of the 450 patients, 109 (24.2 %) patients had

history of CAD. In the PAD group 38 of 92 (41.3 %) patients had history of CAD ($p < 0.01$).

Out of the 450 patients, 184 (40.8 %) patients had never smoked or quit smoking 10 years back, 118 patients (26.4 %) smoked more than one cigarette a day and 148 patients (32.8 %) quit smoking less than 10 years back. In the PAD group these numbers were 28, 42 and 22 patients respectively. Among the PAD group 45 % of patients were smokers (< 0.01) (Table 2).

Variables / ABI	Less Than 0.9	0.91 – 0.99	1.0 - 1.4	> 1.4
Age Group (In years)				
20 - 30	1	5	12	0
31 - 40	6	28	34	2
41 - 50	11	25	43	3
51 - 60	27	34	56	5
61 - 70	32	24	42	14
71 - 80	15	2	28	1
Total	92	118	215	25
Gender				
Men	73	94	162	13
Women	19	24	53	12
Total	92	118	215	25
Intermittent claudication				
Present	23	2	2	1
Absent	69	116	213	24
Total	92	118	215	25

Table 1. Demographic Profile and Symptomatic Status of Patients

Out of the 450 patients, 185 (41.1 %) patients do not consume alcohol, 117 patients (26 %) drink socially and 148 patients (32.8 %) drink alcohol on regular basis. In the PAD group these numbers were 87, 60 and 11 patients (55 %, 38 % and 7 %) respectively ($p = 0.13$) (Table 2).

Out of the 144 patients who had family history of risk factors, 77 patients had family history of diabetes, 45 gave family history of hypertension and 22 gave family history of CAD (Table 2).

ABI	Less Than 0.9	0.91 – 0.99	1.0 - 1.4	> 1.4
Diabetes				
Diabetic	52	50	98	10
Non-Diabetic	40	68	117	15
Total	92	118	215	25
Hypertension				
Yes	43	66	100	11
No	49	52	115	14
Total	92	118	215	25
Coronary Artery Disease				
ABI	Less Than 0.9	0.91 – 0.99	1.0 - 1.4	> 1.4
Present	38	24	44	3
Absent	54	94	171	22
Total	92	118	215	25
Smoking				
Never Quit> 10 Yrs.	28	47	102	7
>1 / Day	42	28	40	8
Quit< 10 Yrs.	22	43	73	10
Total	92	118	215	25
Alcohol				
None	30	42	103	10
Social	28	27	54	8
Regular	34	49	58	7
Total	92	118	215	25
Family history				
DM	28	9	36	4
HTN	12	6	25	2
CAD	9	2	11	0
TOTAL	49	17	72	6

Table 2. Risk Factor Profile of Patients

The number of patients having echocardiographic evidence of LV diastolic dysfunction were 95, 94, 32 and 16 (grade I, II, III, IV) respectively. In the PAD group, these

numbers were 35, 38, 16 and 9 respectively. 244 patients had good LV systolic function (80 in PAD group).

The number of patients having echocardiographic evidence of LV systolic dysfunction were 99, 73 and 34 patients (mild, moderate and severe LV dysfunction) respectively. In the PAD group, these numbers were 19, 10 and 04 respectively (Table 3).

ABI	Less Than 0.9	0.91 – 0.99	1.0 - 1.4	> 1.4
Left ventricle Systolic Function				
Good LV function EF (50% and above)	59	83	162	17
Mild LV Systolic Dysfunction EF (40 - 49 %)	19	17	27	04
Moderate LV Systolic Dysfunction EF (30 - 39 %)	10	12	15	03
Severe LV Systolic Dysfunction EF (< 30 %)	04	09	11	01
Diastolic Dysfunction				
Grade I	35	22	36	2
Grade II	38	12	42	2
Grade III	18	8	6	0
Grade IV	9	4	3	0

Table 3. Echocardiographic Profile

Out of the 109 (24.2 %) patients who had angiographically documented CAD, 38 (34.8 %) patients had single vessel disease (SVD), 34 (32.2 %) patients had two vessel disease (DVD) and 37 (34.2%) patients had triple vessel disease (TVD). In the PAD group these numbers were 9, 11 and 18 (SVD, DVD, TVD) respectively. ($p = 0.035$) (Table 4).

ABI	Less Than 0.9	0.91 – 0.99	1.0 - 1.4	> 1.4
SVD	09	08	19	2
DVD	11	09	10	4
TVD	18	11	08	0
TOTAL	38	28	37	06

Table 4. Relationship with Coronary Artery Disease

DISCUSSION

In this study, 20.44 % (92 out of 450) of the patients had PAD. In various studies it has been reported in between 9 to 29 %.⁹ Study population when analysed age wise, PAD prevalence in age group of 30 – 40 years was only 8.6 %. It increased to 22.13 % in 50 – 60 yrs. age group and was 28.6 % in the 60 - 70 age group. Most studies have shown a linear relation between age and PAD.¹⁰ In our study population, the male subjects comprised 76 % and female subjects comprised 24 %. The occurrence of PAD among males was 21.35 % and among females was 17.6 %. The impact of sex on PAD, however, did not reach statistical significance ($p = 0.399$). Similar observation had been reported in another study.¹¹

An important aspect of this study was assessing the occurrence of symptomatic and asymptomatic PAD based on the presence of intermittent claudication (IC). In this study, 6.22 % of patients described symptoms of IC (Edinburgh questionnaire). Of these 1.1 % did not have PAD. The occurrence of IC in the PAD group was 22.5 %. This is comparable to most of the other studies.¹² In this study, among the patients diagnosed to having PAD, 25 % were

symptomatic. Hence, screening with ABI detected 75 % asymptomatic PAD subjects. Taking into consideration the whole study population, 69 subjects (15.3 %) out of 450 had asymptomatic PAD. Stoffers et al. have reported a prevalence of 6.9 % of asymptomatic PAD.¹³

In this study 24.7 % of patients with DM had PAD and the p value for diabetes as a risk factor was statistically significant ($p < 0.05$). It's a well-established risk factor For PAD.¹⁴⁻¹⁵

In our study, 26.22 % were smokers and all of them were males. Occurrence of PAD among smokers was 35.6 % which was significantly higher than among non - smokers (15 %) and it was statistically significant p value (< 0.01). Another study has shown that PAD is 2.5 times more common in smokers.¹⁶ The present study had 48.9 % of subjects were hypertensive; 19.5 % of hypertensive had PAD whereas a similar proportion of 21.3 % among non - hypertensive had PAD. The p value was not statistically significant ($p = 0.643$). However Reunanen et al showed that hypertension was not significantly related to PAD.¹² In the present study population of 450 patients, 109 patients (24.2 %) had CAD. Among PAD - positive cases, CAD was present in 41.3 %. Only 19.8 % of PAD - negative cases had CAD. A strong correlation was found to occur between PAD and CAD ($p < 0.01$). In our study 8.4% had PAD and CAD, 12 % had only PAD, and 15.8 % had only CAD. In our study, of the angiographically documented CAD, 48.65 % of patients with triple vessel disease had PAD. Study showed that among those who consume alcohol on a regular basis 22.9 % of them had PAD. Among those who never consumed alcohol, 19.2 % had PAD. This was not statistically significant. In our study, diastolic dysfunction (assessed by 2D Echo) was more prevalent in the PAD group (33.7 %) compared to the non - PAD group (24 %). This was not statistically significant ($p = 0.06$). The overall prevalence of diastolic dysfunction (all grades) was 26 %. In our study 28.7 % had LV systolic dysfunction and in PAD patients 35.8 % had LV systolic dysfunction. This was not statistically significant ($p = 0.08$). The values are comparable to those obtained by Ward et al study in which the prevalence of diastolic dysfunction and LV systolic dysfunction in PAD patients was 28 % and 35.3 % respectively.¹⁷

CONCLUSIONS

Ankle Brachial Index (ABI) is a well-established test for the diagnosis of PAD. The most significant advantage is that it is non-invasive, reproducible and can be carried out at any place. PAD can be picked up quite early in asymptomatic stage by doing ABI test thereby changing the natural history of PAD by earlier intervention. In patients with PAD, it not only has diagnostic implications, but also has prognostic significance, because lower ABI is associated with poorer outcomes.

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