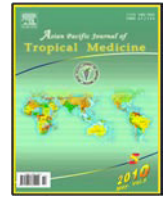
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Document heading

Risk factors for peripheral arterial disease in the tropics and its comparison with the western population

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ABSTRACT

Objective: To identify and compare the existence of similar and other risk factors in the perspective of an Indian population. **Methods:** It was designed as a case control study and was conducted in the Department of General and Vascular Surgery Unit 2 of Christian Medical College, Vellore, India between the periods July 2003 to June 2005. 100 patients with an ABPI < 0.9 and 100 controls were studied. **Results:** Peripheral arterial disease (PAD) was found to be commoner among males (87%). While atherosclerosis was the commonest aetiology (54%), the incidence of Thromboangiitis Obliterans was also not uncommon (38%). Smoking was the main risk factor in the Indian context (83%) as compared to hypercholesterolemia (60%) in the West. The patients with atherosclerotic PAD were middle-aged and had concomitant diabetes (50%) and hypertension (30%). **Conclusions:** Peripheral arterial disease occurs in a relatively younger age group in India as compared to their Western counterparts. Thromboangiitis Obliterans was found to be a significant aetiology for arterial occlusive disease, with smoking as the primary risk factor followed by diabetes, hypertension and hypercholesterolemia.

1. Introduction

The use of plants as a source of remedies for the treatment of many diseases dated back to prehistory and people of all peripheral arterial disease (PAD) refers to occlusive disease of the lower limb arteries. It could be asymptomatic or cause intermittent claudication, rest pain, gangrene or ulceration. It includes disease aetiologies like atherosclerosis, aneurysms, vasculitis, arteritis and embolism. In recent years, it has become evident that PAD is an important predictor of substantial coronary and cerebral vascular risk^[1–4]. Increased awareness of the prognostic importance of PAD has led to a search for sensitive diagnostic markers^[5,6]. The ankle–brachial pressure index (ABPI) has emerged as a valid and reliable marker of PAD and its attendant vascular risk, particularly in asymptomatic patients^[7,8]. The validity of the ABPI as a diagnostic marker of subclinical arterial vascular disease is confirmed by its adverse prognostic significance for coronary and cerebrovascular events^[1,2,7,8].

The incidence of symptomatic PAD increases with age, from about 0.3% per year for men aged 40–55 years to about 1% per year for men aged over 75 years. Using the definition of an ABPI less than 0.9, most epidemiological studies report the prevalence of PAD to be about 10%–25% in men and women over 55 years of age^[9]. The prevalence of PAD rises with age. On average, the prevalence of symptomatic disease at around 60 years of age is about 5%^[10].

The classic cardiovascular risk factors of smoking, hypercholesterolemia and hypertension are implicated in PAD. Likewise, more recently investigated risk factors for coronary heart disease such as lack of physical exercise, alcohol consumption, diabetes mellitus, low high density lipoprotein (HDL) cholesterol, hyperhomocystenaemia^[1,2], thrombophilia and hypercoagulable states, are also associated with an increased risk of PAD.

Abundant studies exist in literature regarding the aetiology and risk factors of PAD in the Western population. However, not data is available from India on the same subject. This study was therefore undertaken to identify and compare the existence of similar and other risk factors for PAD in an Indian population.

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2. Materials and methods

The study was designed as a case control study, conducted in the Department of General and Vascular Surgery unit 2, Christian Medical College, Vellore, India between the period January 2004 to December 2004.

100 consecutive patients with PAD attending the outpatient of our Unit during the study period were chosen as subjects. The controls were selected among patients without PAD attending the same OPD during the same period.

An ABPI of less than 0.9 was taken as diagnostic of PAD³.

Exclusion criteria were patients with ABPI>0.9 and recent history of trauma or surgery.

A proforma containing demographic details like age, sex, place of residence; symptoms of PAD such as intermittent claudication, rest pain, ulceration, gangrene; history suggestive of vasculitis, coronary heart diseases and cerebrovascular accidents was filled up for each subject. Their blood pressure was checked using a mercury sphygmomanometer and blood samples were collected for estimation of random blood sugar, lipid profile, C-reactive protein (CRP) and serum homocysteine levels. Blood sugar was estimated by the Orthotoluidine method, serum cholesterol was assayed by Zac method using a Hitachi analyzer and serum CRP was measured with a Behring Nephelometer analyzer.

Analyses were performed with SPSS 11.5 software. Chi-square test for comparing the categorical variables and student's *t*-test for continuous data was done.

3. Results

PAD was found to occur more commonly among men. There were 13% female and 87% male in the group. And the age distribution and the sex ratio were similar in the two groups (Figure 1).

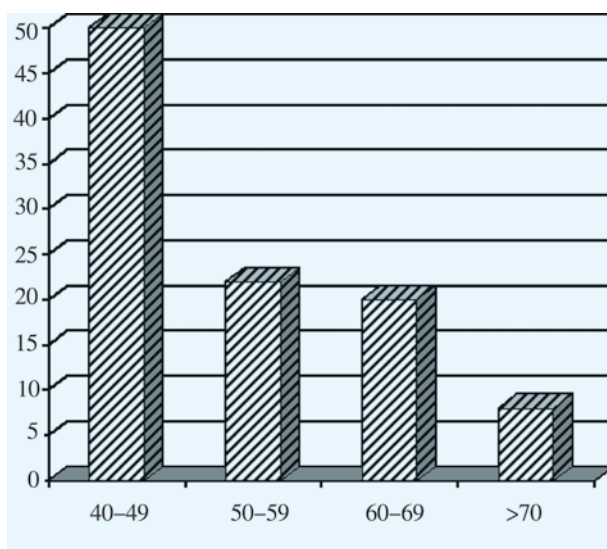


Figure 1. Age distribution in our study group.

PAD was found to occur more commonly in the younger age group as compared to Western figures. This may be due to the relatively higher prevalence of Thrombo Angitis

Obliterans (TAO) in Indian population. PAD was found to occur more commonly among men.

The most commonly found aetiology of PAD in the study was atherosclerosis (54%). TAO came a close second (38%) and a smaller group was found to be due to vasculitis (8%). Diabetes, hypertension and hypercholesterolemia were described as the common risk factors for atherosclerosis. All the TAO patients had a significant history of smoking.

The most commonly encountered presentation of PAD was claudication which was present in three-fourths of the cases, while one-third had features of critical limb ischaemia. In 85% of the cases, symptoms had been present for a short duration (6 months) (Figure 2).

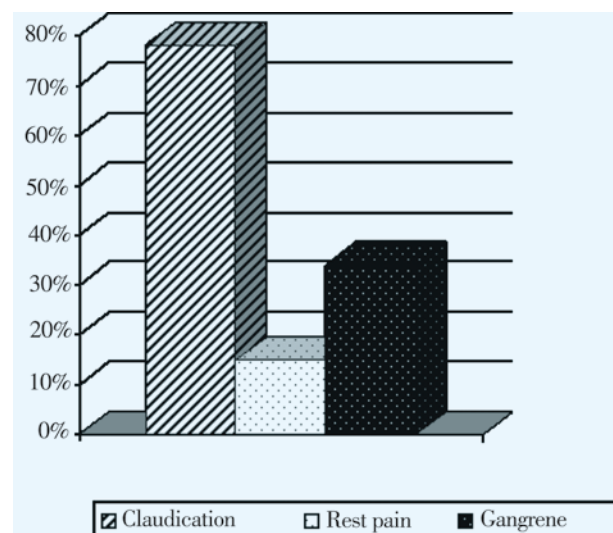


Figure 2. Presentation of PAD in our study group.

Taking a "P" value of less than 0.05, the association of smoking, diabetes, hypertension, hypercholesterolemia as risk factors for PAD was found to be statistically significant (Table 1). Table 2 showed that in the Indian context, smoking and diabetes occurred more commonly as compared to their American counterparts among whom the prevalence of hypertension and hyperlipidemia was more.

4. Discussion

While there is an abundance of literature studying the association of various risk factors with PAD in a Western population, there has been a paucity of similar data from an Indian background.

Christian Medical College, Vellore is a leading tertiary care center which receives clientele from across the country and therefore, a study population here can be taken as representative of a national population.

As age advances, the prevalence of patients with PAD is likely to increase, requiring increasing demands on the nation's medical resources.

In our study, we found that the mean age of presentation for patients with PAD was 51.2; and that males were more commonly affected. Though male gender cannot be

Table 1

Risk factors among patients with PAD.

Risk factor	PAD	No PAD	Odds ratio	95% CI
Mean age*	51.2	44.2	–	–
Male	87%	84%	1.28	0.59–2.27
Smoking*	83%	25%	14.67	7.30–29.1
Diabetes*	50%	15%	5.67	2.90–11.05
Hypertension*	30%	11%	3.47	1.60–7.30
Vasculitis*	10%	1%	11.00	1.70–6.70
CAD*	20%	8%	2.87	1.22–6.70
CVA*	10%	0%	–	–
Hypercholesterolemia*	27%	6%	5.79	2.30–14.00

*: $P < 0.05$; CAD: Coronary heart disease; CVA: Cerebrovascular accident;

Table 2

Risk factors among persons with PAD comparing Indian and western study.

Risk factor	Indian	American
Mean age	51.2	68.7
Male	87.0%	46.2%
Smoking	83.0%	35.0%
Diabetes	50.0%	26.4%
Hypertension	30.0%	73.6%
CAD	20.0%	24.0%
CVA	10.0%	11.2%
Hypercholesterolemia	27.0%	60.0%
C reactive protein	70.0%	8.0%
Homocystein raise	8.0%	–

CAD: Coronary heart disease; CVA: Cerebrovascular accident.

considered a risk factor for developing PAD, the more frequent occurrence of comorbid factors in males makes PAD more common among the male. In addition, few Indian women smoke and they present late to hospitals, probably as the rural community continues to be male-dominated.

The most commonly encountered aetiology for PAD in Western studies is atherosclerosis. However, our study shows that TAO has a relatively higher incidence in this geographical region.

85% of our PAD presented as intermittent claudication. We also found that smoking was the main risk factor involved. The occurrence of traditional cardiovascular risk factors such as diabetes, hypertension and hypercholesterolemia was also high among the cases with PAD, with 90% of the patients having at least one of them. These patients also had associated coronary heart disease and were more prone to develop cardiovascular accidents^[11–13].

Atherosclerotic PAD was discovered to be more common in middle aged people, mostly men with concomitant hypertension, diabetes, and a significant history of smoking. Hyperlipidemia as a risk factor came relatively lower in the list.

Patients with TAO causing PAD belonged to a relatively younger age group, mid-40s and all of them were chronic smokers. The patients with vasculitis also had concomitant diabetes and hypertension. Our study therefore shows that the prevalence of PAD occurs in a relatively younger Indian

population than that reported from studies done on their Western counterparts and this may be due to a higher prevalence of TAO in this region.

Conflict of interest statement

We declare that we have no conflict of interest.

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