Short Communication

Prevalence of intermittent claudication in rural and urban Vellore, Tamil Nadu, India: a population-based study

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ABSTRACT

Background: Population based estimates from India on the prevalence of Peripheral Artery Disease (PAD) are scarce. This study aimed to assess the population-based prevalence of PAD in rural and urban Vellore, Tamil Nadu, South India.

Methods: A cross sectional survey was conducted using the WHO STEPS methodology and the WHO/Rose questionnaire for intermittent claudication for identifying symptomatic PAD among adults aged 30-64 years. The study was done in nine villages of one rural block and in 48 urban wards of Vellore, between 2011-12. Risk factors for PAD such as sociodemographic factors, tobacco use, anthropometry, known medical conditions, Fasting Plasma Glucose and lipid profile were also assessed and association with PAD estimated using odds ratios, chi-square tests and logistic regression.

Results: Among 5429 adults aged 30-64 years, the prevalence of PAD (intermittent claudication) was 4.9/1000 (95% Confidence Interval CI: 3.0/1000 - 6.8/1000). The prevalence in urban Vellore was higher than in the rural area (6.9/1000 vs. 3.8/1000). After adjusting for sociodemographic factors and other confounding factors, current tobacco use was found to be significantly associated with the presence of PAD (adjusted Odds Ratio: 2.89, 95% CI: 1.10-7.54).

Conclusions: This study provides estimates of the burden of PAD in rural and urban adults in Vellore, Tamil Nadu. The trend of this condition needs to be monitored in various locations to assess the public health significance and the need for population level measures for diagnosis, treatment and screening. Education regarding harmful effects of tobacco use should also involve education regarding risk of PAD.

Keywords: Intermittent claudication, Peripheral artery disease, Prevalence

INTRODUCTION

Peripheral arterial disease (PAD) is a sign of systemic atherosclerosis and is associated with cardiovascular disease. The disease can either cause symptoms of exertional calf pain or may even be asymptomatic.[1] A systematic review reported that there has been a 28.7% increase in prevalence of PAD in Low and Middle-Income countries.[2] Smoking and diabetes mellitus have been found to be significant risk factors for PAD.[1] Those with PAD have a higher risk of dying of cardiovascular diseases. There is paucity of data on the burden of this disease in the general population, in India, which has a rapidly increasing burden of diabetes and cardiovascular disease.[3]

METHODS

A cross sectional survey was conducted in Vellore district among adults aged 30 to 64 years, between 2011-12. The

study was carried out in Vellore town (48 out of 60 wards: 12 wards selected consecutively from each of four zones) and in one rural block (9 villages selected randomly). In the urban wards, one street was selected randomly from each ward and all adults aged 30-64 years in the first 40 households were invited for the study. In the rural area, all adults 30-64 years were invited. Data collection was done using the WHO STEPS methodology as well as the Rose questionnaires for Coronary Heart Disease (CHD) and Intermittent Claudication (IC).[4,5] Fasting Plasma Glucose (FPG) and lipids were also assessed in addition to anthropometry and Electrocardiography (ECG). Further details on methodology and the results on prevalence of CHD and its risk factors have been published previously.[6] This analysis reports the prevalence of PAD defined as symptoms of IC using the WHO/Rose questionnaire.

IC was defined as pain in the calf/calves while walking/hurrying, that causes a person to stop or slow down and is relieved within 10 minutes of rest, and that does not begin while standing still or disappear while walking.[5] CHD was defined as previous medical diagnosis of CHD, positive symptoms (Rose angina questionnaire) or signs of ischaemia on the ECG (assessed by a cardiologist).[6] Diabetes mellitus was defined as on medication or FPG ≥ 126 mg/dl and hypertension as on medication or abnormal blood pressure (BP) measurement (Systolic ≥ 140 mm Hg or Diastolic ≥ 90 mm Hg, average of two seated readings).[4] Tobacco use was defined as current use of tobacco.

Statistical analysis

Analysis was done using SPSS 24.0 for Windows (SPSS Inc., Chicago, Illinois, USA). Chi square tests and Odds Ratios (OR) were used to determine association, and factors with a p <0.20 were considered for logistic regression.

RESULTS

Information on symptoms of PAD was obtained from 5429 adults aged 30-64 years (urban:2013, rural:3416), out of the total sample of 6196 (87.6%). The prevalence of PAD as defined by symptoms of Intermittent Claudication was 4.9/1000 (95% Confidence Interval CI: 3.0/1000 - 6.8/1000).

Table 1: Factors associated with the presence of peripheral arterial disease (PAD).

Associated factors		PAD (n = 27) No. (%)	No PAD (n = 5402) No. (%)	p value	Odds ratio (OR)	Adjusted OR
Place	Urban	14 (0.7)	1999 (99.3)	0.111	1.32 (0.57-3.04)	1.32 (0.57-3.04)
	Rural	13 (0.4)	3403 (99.6)			
Gender	Male	10 (0.4)	2329 (99.6)	0.525	0.78 (0.36-1.69)	-
	Female	17 (0.6)	3073 (99.4)			
Age in years	≥ 50	11 (0.6)	1900 (99.4)	0.546	1.27 (0.59-2.74)	-
	<50	16 (0.5)	3502 (99.5)			
Education in years	>8	9 (0.4)	2121 (99.6)	0.618	0.81 (0.36-1.83)	-
	≤ 8	17 (0.5)	3262 (99.5)			
Employed	No	15 (0.8)	1885 (99.2)	0.019	2.46 (1.13-5.37)	2.92 (0.98-8.72)
	Yes	11 (0.3)	3404 (99.7)			
Current tobacco use	Yes	8 (0.7)	1060 (99.3)	0.154	1.82 (0.79-4.20)	2.89 (1.10-7.54)[3]
	No	18 (0.4)	4341 (99.6)			
BMI ≥ 25 kg/m^2	Yes	15 (0.7)	2051 (99.3)	0.090	0.52 (0.24-1.12)	1.43 (0.61-3.38)
	No	12 (0.4)	3136 (99.6)			
Diabetes	Yes	8 (1.0)	775 (99.0)	0.061	2.25 (0.98-5.17)	1.36 (0.53-3.49)
	No	19 (0.5)	4147 (99.5)			
Hypertension	Yes	7 (0.6)	1114 (99.4)	0.564	1.29 (0.54-3.05)	-
	No	20 (0.5)	4811 (99.5)			
Total cholesterol ≥ 240 mg/dl^2	Yes	7 (1.6)	443 (98.4)	0.009	0.29 (0.12-0.68)	2.13 (0.79- 5.73)
	No	20 (0.5)	4416 (99.5)			
LDL ≥ 100 mg/dl^2	Yes	20 (0.6)	3228 (99.4)	0.402	1.44 (0.61-3.42)	-
	No	7 (0.4)	1630 (99.6)			
Triglycerides ≥ 180 mg/dl	Yes	9 (1.0)	855 (99.0)	0.042	0.43 (0.19-0.95)	1.57 (0.64-3.88)
	No	18 (0.4)	4013 (99.6)			
Coronary Heart Disease	Yes	4 (1.0)	390 (99.0)	0.145	2.12 (0.73-6.17)	1.61 (0.53-4.89)
	No	23 (0.5)	4764 (99.5)			

The prevalence of PAD in urban Vellore was slightly higher compared to the rural area (6.9/1000 vs 3.8/1000), Table 1. The prevalence was higher in those with diabetes, high total cholesterol and high triglycerides, as well as those who were unemployed, Table 1.

However, after adjusting for additional factors such as Body Mass Index, tobacco, place of residence, employment status, diabetes, total cholesterol, triglycerides and CHD, only current tobacco use was found to be significantly associated with PAD (OR: 2.89, 95% CI: 1.10-7.54), Table 1.

DISCUSSION

Peripheral arterial disease is a condition that causes significant morbidity and disability among those affected. Although this study is from a single district in south India, the prevalence of symptomatic PAD reported here is a population-based estimate which is important as such estimates of this condition in India are scarce. Other population-based estimates of PAD in India are from Chennai (urban) and Kerala (rural and urban, elderly subjects). The prevalence of PAD (symptoms of IC) in urban Vellore among those aged 30-64 years was 0.7%, whereas a study done in urban Chennai using Ankle Brachial Index (ABI) reported a higher prevalence of 3.2% among those aged ≥20 years.[7] The ABI is a more objective tool and the sensitivity when used in the general population has been estimated to be 80%, with a specificity of 97%, while symptoms of IC when used as the sole diagnostic criterion for PAD in epidemiological surveys has a much lower sensitivity (60-68%) with specificity of 90%-100%.[8] Lack of information on ABI values was a limitation in our study, and another study has now been initiated to document this.

The lower prevalence of PAD in India compared to western countries as seen in these studies from Tamil Nadu, is as reported in a systematic review which had shown that prevalence is higher in higher income countries.[2] However, the study from Kerala among rural and urban subjects aged 60 to 79 years, which used both ABI and the Rose questionnaire for IC, showed an overall prevalence of PAD (symptomatic and asymptomatic) to be higher than developed countries.[8] The possible explanation for this was the extremely high prevalence of cardiovascular risk factors in this region.[8] A recent national report on burden of diseases in India, has also classified both these south Indian states (Tamil Nadu and Kerala) as High Epidemiological Transition states, with a high burden of Non-Communicable Diseases.[3] There was a slightly higher prevalence of symptomatic PAD/IC in urban Vellore compare to the rural area, which was also seen in the study from Kerala.[8] Tobacco use was confirmed as one of the most important risk factors for PAD, as has been shown previously,[1,2] providing another compelling reason to address this risk factor through primary prevention. As the prevalence of cardiovascular

risk factors is rising rapidly in India, the incidence of PAD, may also increase in the near future. Further population-based studies using sensitive diagnostic tools such as ABI are needed to document the burden of this condition in India, to understand the volume of services required to plan diagnostic and treatment related services needed for this condition.

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