

Incidence of Asymptomatic Peripheral Artery Disease in Type 2 Diabetes in A Tertiary Care Hospital

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Abstract: Diabetes mellitus refers to a group of disorders presenting with hyperglycemia, having several distinct causes, resulting from complex interactions of genetic and environmental factors. Hyperglycemia results from decreased insulin secretion decreased glucose utilization or increased glucose production. Peripheral artery disease is common in type II diabetics both men and women, though most are not detected in spite of severe blood flow limitation. Ankle brachial index (ABI) was measured using sphygmomanometer and hand held doppler in both the cases (diabetic) and control (non diabetic) and compared. Prevalence of low ABI was significantly higher in diabetics compared to non diabetics (16% v/s 4%) . The aim of the study was to establish the high prevalence of undetected, asymptomatic peripheral arterial disease in type 2 diabetes in patients attending Coimbatore Medical College and Hospital.

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I. Introduction

Asymptomatic peripheral artery disease is defined as ankle brachial index less than 0.9 in patients with no clinical evidence of peripheral arterial disease or foot ulcer. Ankle brachial index less than 0.9 has got 90% sensitivity and specificity. Low brachial index is a predictor of future myocardial events stroke and amputation. Though prevalence of peripheral arterial disease is high in diabetes, studies looking into the presence of asymptomatic peripheral arterial disease in diabetic patients are very few. Epidemiological studies have demonstrated that patients with peripheral arterial diseases have poor survival when compared to the general population. Diabetic patients with peripheral arterial diseases have even more poor prognosis compared to non-diabetic peripheral arterial diseases

Prolonged duration of diabetes, associated diseases like hypertension, kidney diseases, lipid abnormalities etc also seem to increase the atherosclerotic risk and hence peripheral arterial diseases. Smoking is an important risk factor for all vascular events. In peripheral arterial disease also, smoking forms an important risk factor for its development. Presence of other vascular diseases in any patient is indicative of atherosclerotic disease in the patient and hence possibility of peripheral artery disease in such patients is high. This study is aimed at finding out the presence of asymptomatic peripheral arterial disease in diabetic individuals and comparing it with non diabetic population.

II. Material And Methods

Study Design: This was a cross sectional, case- control study of patients attending Coimbatore Medical College with (cases) or without (controls) Diabetes

Study Location: This was a tertiary care teaching hospital based study done in Department of General surgery ,Coimbatore medical college Hospital, Coimbatore,Tamilnadu.

Study Duration: August 2014 to July 2015

Sample size: 200 patients.

Inclusion criteria:

100 diabetic patients without clinical evidence of peripheral vascular disease or other vascular diseases and an equal number of non diabetics attending hospital for other ailments were included as cases and controls respectively.

Exclusion criteria:

1. Established atherosclerotic diseases like coronary artery disease, stroke or peripheral vascular diseases.
2. Smokers.
3. Patients with leg claudication or chronic leg pain syndrome.
4. Patients with absent lower limb pulses
5. Bed-ridden patients.
6. Diabetic foot ulcer patients.

Data collection methods :

Informed consent was taken from all the participants prior to examination.

- Detailed history including duration of diabetes, vascular diseases, dyslipidaemia, smoking, alcohol use and drugs were noted.
- A thorough physical examination including all peripheral pulses and carotid pulses were examined.
- Blood pressure measured using aneroid/ digital sphygmomanometer using a stethoscope.
- Brachial and ankle systolic blood pressures were measured using a hand held Doppler.
- Routine investigations including blood sugars, lipids, RFT, and ECG were done.
- Data recorded in a proforma, tabulated and statistically analyzed using online statistical tools.

III. Result

A total of 100 diabetic patients (cases) and 100 non-diabetic controls participated in the study. All the 100 cases had more than one year type2 diabetes history. Ankle Brachial Index was measured for all 200 participants (both cases and controls). 20 persons (10%) had ABI value <0.9. prevalence off low ABI was significantly higher in diabetics in comparison with non-diabetic controls. (16% vs 4%)

Table-1 Age distribution

	DM N=100	No DM N=100	p-value
Age	51.9 (+/-11.18)	61.37 (+/-9.56)	<0.001

Chart-1: Age distribution

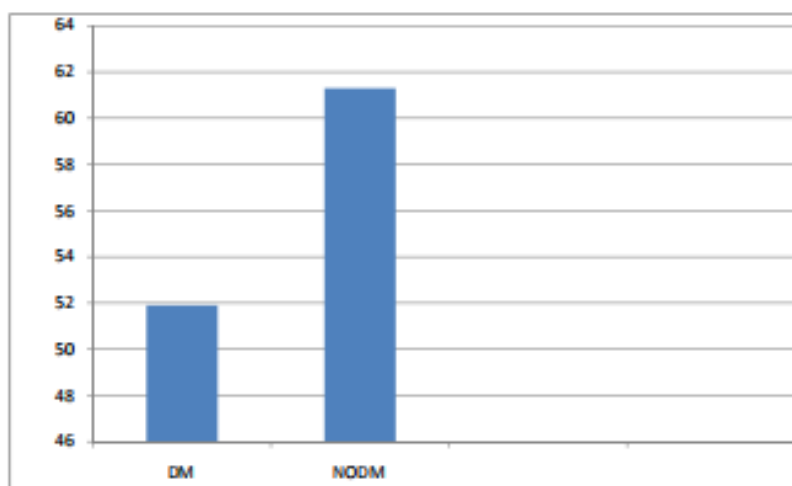


Table 2: Asymptomatic PAD as evident by ABI<0.9

Case/contl	Total N=200	DM N=100	Non DM N=100	p-value
ABI<0.9	20(10%)	16(16%)	4 (4%)	0.0095

Chart 2: Asymptomatic PAD as evident by ABI<0.9

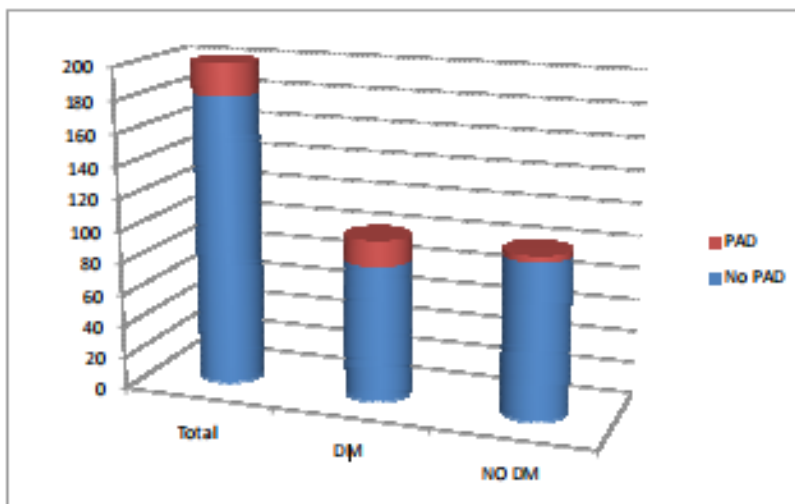
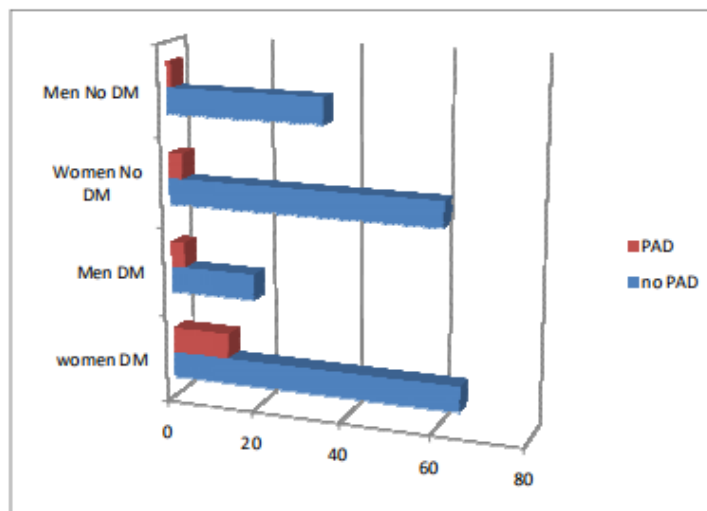


Table 3: Sex distribution of PAD in diabetic and non diabetic

	Diabetic N=100 (ABI<0.9)	Non DM N=100 (ABI<0.9)	Total N=200 (ABI<0.9)	P
Women	78(13)	64(3)	142 (16)	0.0478 (S)
Men	22(3)	36 (1)	58(4)	0.2939 (NS)

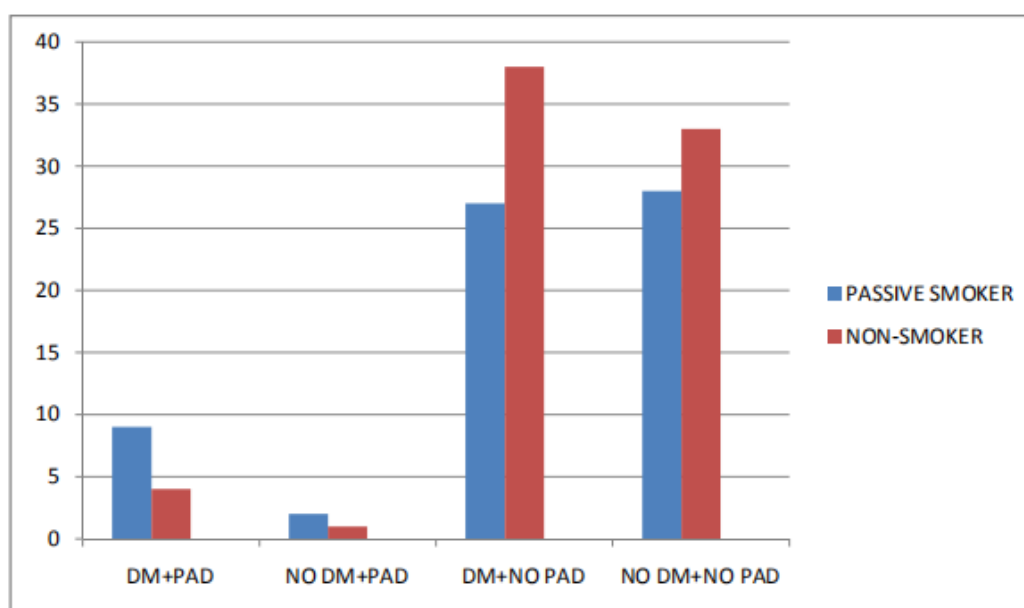
Chart 3: Sex distribution of PAD in diabetic and non diabetic



In univariate analysis, age, hypertension, obesity and metabolic syndrome were all associated with low ABI. Our cohort contained more females than males, probably as a result of the exclusion criteria of tobacco use. The difference between diabetic and non-diabetic women in the prevalence of PAD was statistically significant ($p=0.0478$), where as the same in men was not statistically significant ($p=0.2939$). Also, PAD was more common in women both diabetic and non diabetic. This is an important observation when the fact was that a number of these women were passive smokers as their spouses were smoking.

Table 4: Relationship of passive smoking with PAD in women

Woman	PAD No DM	PAD DM	No PAD DM	No PAD No DM	Total
Passive Smoking	2	9	27	28	66
No smoking	1	4	38	33	76
Total	3	13	65	61	142



IV. Discussion

According to data collected, there are only a few studies looking into the association of asymptomatic peripheral artery disease to diabetes; though there are a number of studies looking into the association of symptomatic disease with diabetes.

A study by Carlos Lohos et al demonstrated the association between metabolic syndrome asymptomatic peripheral artery diseases, without cardiovascular disease. In this study all patients with evidence of any significant vascular disease were excluded. Another study looked into the association of metabolic syndrome and peripheral artery disease in patients already having cardiovascular disease, Peripheral artery disease diagnosis being done by measurement of ankle brachial index <0.9 . 14% had low ABI in metabolic syndrome group whereas 10% of those without metabolic syndrome had low ABI. Yet another study³⁴ of peripheral artery disease in diabetes reported 12.6% incidence of asymptomatic PAD. A study in South Indian women with type 2 diabetes, asymptomatic PAD was reported in 19% of diabetic women when compared non-diabetic women of similar age group.

In this study also there were more women included and the incidence of peripheral arterial disease was significantly more in females. REGICOR investigators demonstrated a 4.5% prevalence of peripheral arterial disease in general population adults³⁵. Classical risk factors like age, dyslipidaemia, hypertension are often associated with low ABI^{36,37,38}. Many conditions associated with diabetes like low HDL, high Triglycerides, high LDL, metabolic syndrome etc are associated with high incidence of low ankle brachial index and peripheral arterial disease³⁹. As per a study by Elizabeth Selvin and Thomas P Erlinger⁴⁰, peripheral arterial disease prevalence in adults more than 40 years in the USA was 4.3% (95% CI 3.1% to 5.5%), which translates to ≈ 5 million persons (95% CI 4 to 7 million). The prevalence was 14.5% (95% CI 10.8% to 18.2%) in elderly,

ie those more than 70 years. Black race/ethnicity (OR 2.83, 95% CI 1.48 to 5.42) active smoking (OR 4.46, 95% CI 2.25 to 8.84), diabetes (OR 2.71, 95% CI 1.03 to 7.12), hypertension (OR 1.75, 95% CI 0.97 to 3.13), hypercholesterolemia (OR 1.68, 95% CI 1.09 to 2.57), and low kidney function (OR 2.00, 95% CI 1.08 to 3.70) were positively associated with prevalent PAD in age and sex adjusted multivariate analysis. Gender difference was variable in published literature. In a review by Higgins and Higgins,⁴¹ in women 45 to 93 years of age had a 3% to 29% (over this span of 5 decades) prevalence of peripheral arterial disease. But, it was evident that peripheral arterial disease was common in diabetic women. Most of these studies were done with cohort including smokers also. More men than women were smokers and hence, naturally men had higher incidence of peripheral arterial disease. We excluded all smokers, both men and women and found that women had higher incidence of peripheral arterial disease in both diabetic and nondiabetic populations, which was probably related to passive smoking as shown by the analysis. Allison et al⁴², showed that the prevalence of peripheral arterial disease increased with age for both men and women. More than just definitions, any atherosclerotic disease had higher occurrence, i.e., increase in the population “burden” of these diseases (defined as the total number of individuals who have the disease). Age, the most traditional risk factor for peripheral arterial disease was seen to increase incidence⁴³. However in our study, diabetic population was younger than control population ($p < 0.001$). ABI is useful as a marker for atherosclerotic risk factors and also vascular diseases in other vascular beds. Low ankle-brachial index is associated with a number of other risk factors, like hypertension, type 2 diabetes, dyslipidemia, history of smoking, and several other cardiovascular risk factors (e.g., high sensitivity CRP, interleukin-6, homocysteine, and chronic kidney disease)⁴⁴. Death and the composite end points of stroke or myocardial infarction (MI) occurred in 8.4% and 11.6% of patients. Bad prognosis was noted in patients with prior history of CHD, extremes of age, people with diabetes and a low ankle brachial index as shown by a report from United Kingdom by Gerard Stansby, MChir et al⁴⁵. As a marker of future cardiovascular events, stroke events and amputations; asymptomatic peripheral arterial disease is an important, simple clinical tool, though terribly underutilized. More and more studies in the field will overemphasize the utility of ankle-brachial index as a regular screening procedure in diabetics with high sensitivity and specificity preventing future morbidity and mortality. ⁷³ Higher incidence of peripheral arterial disease in diabetes was demonstrated previously in a number of studies and is a well known factor. Higher incidence of asymptomatic peripheral artery disease demonstrated in our study is in concordance with available previous studies. ⁷⁴

V. Conclusion

1. Peripheral artery disease is common in diabetes, both men and women.
2. The condition may not be detected in many patients due to absence of signs and symptoms even when the blood flow limitation is significant.
3. Though asymptomatic, these patients with low ABI are potentially at risk of developing ischemic limb and associated complications.
4. Other vascular complications like coronary artery disease and cerebrovascular disease are also fairly common in these patients and hence detection of asymptomatic disease is important to prevent complications.
5. Females were more included in the study as a result of the exclusion criteria, smoking, which excluded most men. However, among those included, men had a lower incidence of peripheral arterial disease compared to females. Analysis of history revealed that most of these females had a smoking partner at home, making these ladies passive smokers.

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