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Prevalence of Asymptomatic Peripheral Vascular Disease Among Type 2 Diabetes Mellitus Patients

Surendra Kumar¹, Akhil Gupta², Vinod Aswal³, Prabhu Dayal Barala⁴

¹Professor, Department of Medicine, Sardar Patel Medical College, Bikaner, Rajasthan, India; ²Post Graduate Student, Department of Medicine, Sardar Patel Medical College, Bikaner, Rajasthan, India; ³Assistant, Professor, Department of Medicine, Sardar Patel Medical College, Bikaner, Rajasthan, India; ⁴Medical Officer, Government of Rajasthan, India.

ABSTRACT

Background: Peripheral vascular disease (PVD) is one of the significant Macrovascular complications of type 2 diabetes mellitus presenting commonly with symptoms of intermittent claudication, it is the leading cause for limb gangrene and hence amputation in diabetic patients, it is also accompanied by a high likelihood for symptomatic cardiovascular and cerebrovascular disease, The routine PVD assessment in type 2 DM patients showing importance in the light of a long duration of asymptomatic period in the natural course of the disease

Aim: This study was done with the aim to determine the prevalence of asymptomatic PVD among Type 2 diabetes patients, so that by early recognition of PVD, related complications can be limited

Material and Method: Our study was conducted in the Department of Medicine, S.P. Medical College and Associated group of hospitals, Bikaner. A total of 108 type-2 DM cases who visited medical outdoor and those admitted in PBM hospital were selected for study after obtaining proper informed consent

Result and Conclusion: Prevalence of asymptomatic PVD ($ABI \leq 0.9$) is about 12% in our study. Thus a significant proportion of type 2 diabetic subjects are affected by PVD, and hence due importance to be given for active screening annually specially by ABI and prevention and management of complication among type 2 diabetes patients.

Key Words: Peripheral Vascular Disease, Ankle Brachial Index, Type 2 Diabetes Mellitus

INTRODUCTION

Peripheral vascular disease (PVD) is one of the significant Macrovascular complications of type 2 diabetes mellitus. The most common symptom of PVD is intermittent claudication, defined as pain, cramping, or aching in the calves, thighs, or buttocks that appears reproducibly with walking exercise and is relieved by rest. More extreme presentations of PVD include rest pain, tissue loss, or gangrene; these limb-threatening manifestations of PVD are collectively termed critical limb ischemia (CLI). and while it is a major risk factor for lower-extremity amputation, it is also accompanied by a high likelihood for symptomatic cardiovascular and cerebrovascular disease¹⁵. The routine PVD assessment in type 2 DM patients showing importance in the light of a long duration of asymptomatic period in the natural course

of the disease and hence the importance of active screening for PVD with special emphasis on ankle – Brachial index gains importance for saving the limbs of Diabetic patients¹. Although Diabetic Peripheral Neuropathy and Peripheral Vascular Disease (PVD) both contribute to the development of diabetic foot, the risk of amputation raises steeply only if there is associated PVD². Diabetes predominately leads to PVD in the infrageniculate arteries of calf and the risk factors associated with development of PVD in diabetes are found to be advancing age, uncontrolled hyperglycemia, hypertension, dyslipidaemia and smoking^{3,9}.

Several population studies have shown that diabetes is a strong risk factor for PVD⁴ and PVD was found in approximately 20% of the diabetic patients⁵ but this probably greatly underestimates the prevalence, given that many more people with

Corresponding Author:

Dr. Surendra Kumar, Professor, Department of Medicine, Sardar Patel Medical College, Bikaner, Rajasthan, India;
Email: drsurendrakumar@rediffmail.com

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PVD are asymptomatic rather than symptomatic. In the United Kingdom prospective diabetes study (UKPDS) PVD was found in 11% of patients after a follow up period of 6 years from the time of diagnosis of type 2 diabetes⁶. It can be safely concluded based on these population studies that PVD is a highly prevalent disorder, in particular in the elderly diabetic patient. Unfortunately, the awareness of the physicians that these patients have PVD is low, resulting in inadequate preventive measures for reducing lower extremity amputation and to reduce the grossly elevated general cardiovascular risk^{7,8}.

AIMS AND OBJECTIVES

To determine the prevalence of asymptomatic PVD among Type 2 diabetes patients, so that early recognition of PVD by active screening in diabetic subjects can be done, before devastating complications of peripheral limb ischemia develops and timely management can be done.

MATERIAL AND METHODS

Our study was conducted in the Department of Medicine, S.P. Medical College and Associated group of hospitals, Bikaner. A total of 108 type-2 DM cases who visited medical outdoor and those admitted in PBM hospital were selected for study after obtaining proper informed consent.

The exclusion criteria used were

1. Clinical evidence of thromboangitisobliterans.
2. Suspected arteritis subjects.
3. Patients suffering from hypercoagulable states including hemotologic diseases.
4. Hypothyroidism
5. Collagen vascular disorders
6. Valvular heart disease
7. A patient without clinical evidence of coronary, cerebrovascular, and peripheral artery disease (PAD).

Present study was conducted on patients of type 2 diabetes mellitus and was interviewed with special attention on elicitation of history regarding symptoms of PVD, in the form of intermittent claudication, Ischemic rest pain, history of foot ulcers in the past and present. Smoking was recorded in pack-years of cigarettes smoked. Duration of diabetes since diagnosis was recorded and they were grouped accordingly.

The anthropometric measurements were recorded and the body-mass index was calculated. Waist-hip ratio was also recorded. The blood pressure was recorded in both the upper limbs and both the lower legs using the standard B.P cuff. An comprehensive physical examination was done and findings

recorded. Special importance was given to foot examination. Peripheral neuropathy assessment was done using simmelweiss monofilament testing and timed vibration sense perception recordings. Symptoms of peripheral neuropathy were also noted.

For detection of peripheral vascular disease recordings of ankle-brachial index (ABI) was recorded using the hand held Doppler probe (5-8 MHz) is positioned over the posterior tibial artery after applying the sphygmomanometer cuff over lower calf just above the ankle. The two consecutive readings were taken. Patients with ABI of <0.9 were taken as cases of PVD. In this study patients who had an ABI of ≥ 1.15 were screened with duplex color Doppler-imaging for screening for PVD.

RESULTS

Out of total 108 patients studied 63 were males and 45 were females. Total 13 (12%) patients had PVD(peripheral vascular disease) positive, stating 12% prevalence, which is quite significant (**Table I**), with women having a slightly higher prevalence (6 out of 45; 13.33%), as compared to men (7 out of 63; 11.11%).(**Table II**). None of the patient was symptomatic at the time of diagnosis of PVD. Mean age in PVD positive cases were 61.85 ± 12.22 while mean age in PVD negative cases was 52.33 ± 10.70 and the difference was found statistically significant ($p < 0.01$)(**Table III**).

Table I: Prevalence of PVD (ABI <0.90)

Prevalence of PVD	Number of Cases	%
Total Number of Cases	108	100
PVD Cases	13	12.0

Table II: Distribution of cases according to sex in relation to PVD

Sex	PVD				Total	
	Absent		Present		No.	%PVD
No.*	%*	No.	%			
Female	39	41.1	6	46.2	45	13.33
Male	56	58.9	7	53.8	63	11.11
Total			13		108	
χ^2		0.122				
P		0.726				

*:number

%percentage

Table III: Distribution of cases according to age group in relation PVD

Age Group (years)	PVD				Total	
	Absent		Present		No.	%
	No.	%	No.	%		
<40	12	12.6	0	-	12	11.1
41-50	30	31.6	3	23.1	33	30.6
51-60	31	32.6	2	15.4	33	30.6
61-70	18	18.9	5	38.5	23	21.3
>70	4	4.2	3	23.1	7	6.5
Total	95	100	13	100	108	100
Mean	52.33		61.85			
SD	10.70		12.22			
T			2.959			
P			0.004			

DISCUSSION

The importance of PVD assessment assumes importance in the light of a long duration, asymptomatic period in the natural course of the disease so the importance of active screening methods with special emphasis on ankle – Brachial index gains importance for saving the limbs of Diabetic patients¹⁰. Once there is presence of PVD in an individual, the time duration taken up for development of gross limb and life threatening sepsis after an injury is very rapid and interventions to augment peripheral blood flow during such an acute active sepsis is not possible always. Hence the importance lies in identifying the risk factors responsible for the development of PVD in type 2 diabetes, and in active screening for PVD in all diabetic subjects. Effective implementation of preventive measures in the targeted high risk group will pave the way for Limb protection.

Our study showed that prevalence and risk of development of PVD increases with age. Mean age of PVD positive cases were 61.85±12.22. Seki et al¹¹ described that the prevalence of peripheral vascular disease (PVD) was determined in 296 Japanese diabetics (mean age 55.2 years). The prevalence of PVD was 11.11% among males and 13.33% among females in our study group. Similar trend in epidemiological studies in the year 2012 Agarwal et al¹² and in the year 1995, Mohan et al¹³ seen.

Mean duration of diabetes in PVD negative patients was 7.19. Mean duration of diabetes in PVD positive cases was 10.428.43 years while and the difference was found statistically insignificant (p>0.5).

In our study prevalence of asymptomatic peripheral vascular disease (ABI <0.90) by hand held Doppler technique was found to be 12% (13 out of 108 patients) . This high

asymptomatic PVD prevalence was may be due to sedentary life, old ages unable to walk long distance and associate peripheral neuropathy, which was comparable to a study done by Meijer et al¹⁴ which showed prevalence of PVD ranging from 5.5% to 26.7%¹⁴.

CONCLUSION

Prevalence of asymptomatic (subclinical) peripheral vascular disease (ABI ≤ 0.9) is about 12% in our study. This has to be viewed seriously considering the huge type 2 diabetic population. Thus a significant proportion of type 2 diabetic subjects are affected by PVD, and hence due importance to be given for active screening annually specially by ABI and prevention and management of complication among type 2 diabetes patients.

Central obesity, uncontrolled hyperglycemia, hypertension, high LDL cholesterol, high triglycerides, low-HDL cholesterol and smoking are the modifiable risk factors associated with development of PVD. Advancing age was found to be the non modifiable risk factors for development of PVD.

Conflict of Interest

Authors declare that there is no conflict of interest

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