Section: General Surgery

Original Research Article

A STUDY ON THE PREVALENCE OF PERIPHERAL VASCULAR DISEASE IN DIABETIC FOOT ULCER PATIENTS

Received : 31/12/2023
Received in revised form : 27/02/2024
Accepted : 13/03/2024

Keywords:
Diabetic foot ulcer, Ankle Brachial Index, Handheld Doppler, Peripheral Vascular Disease.

Corresponding Author:
Dr. S.Nataraja Sethupathy,
Email: nutty5550@gmail.com.

DOI: 10.47009/jamp.2024.6.2.50

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2024; 6 (2); 238-240

M. Satheesh Kumar[1], S. Nataraja Sethupathy[2]

[1]Assistant Professor, Department of General Surgery, Government Thiruvarur Medical College, Thiruvarur, Tamilnadu, India.
[2]Assistant Professor, Department of General Surgery, Government Thiruvarur Medical College, Thiruvarur, Tamilnadu, India.

Abstract

Background: Peripheral Vascular Disease is a chronic limb ischemia caused by atherosclerosis of the peripheral arteries. In diabetic patients, atherosclerosis occurs prematurely and progresses at an accelerated pace commonly involving crural arteries namely tibials and peroneals with baring of the arteries of the foot. **Aim:** The study aimed to evaluate the occurrence of Peripheral Vascular Disease in diabetic foot ulcer patients. **Material and Methods:** This cross-sectional study was conducted on 100 diabetic patients with foot ulcers who attended the Surgical Outpatient Department at Government Kilpauk Medical College from December 2016 to September 2017. **Results:** In this study of 100 diabetic foot ulcer patients, 67 were male and 33 were female. Most patients were on oral hypoglycemic agents (60) or insulin (23), with 17 untreated. 31 had hypertension, 2 had bronchial asthma, and 2 had hypertension and coronary artery disease. Twelve patients (12%) had peripheral vascular disease (ABI < 0.9), mostly with a diabetes duration ≥ 6 years and poorly controlled glycemic status. **Conclusion:** The increased duration of diabetes with uncontrolled glycaemic status has a significant role in the development of Peripheral Vascular Disease and its complications in the diabetic population.

INTRODUCTION

Peripheral Vascular Disease is a chronic limb ischemia caused by atherosclerosis of the peripheral arteries. In diabetic patients, atherosclerosis occurs prematurely and progresses at an accelerated pace commonly involving crural arteries namely tibials and peroneals with baring of the arteries of the foot. The perception of muscle pain in the lower limbs on exercise which is the most common symptom of Peripheral Vascular Disease may be blunted in diabetic patients by the presence of peripheral neuropathy. Therefore, a patient with diabetes and Peripheral Vascular Disease is more likely to present with an ischemic ulcer or gangrene than a patient without diabetes.

The characteristic vascular involvement in diabetes had made it possible to carry out vascular reconstruction where proximal vessel like popliteal is anastomosed to foot vessels like dorsalis pedis thus bypassing the obstructed tibial and peroneal vessels. These pedal artery bypass techniques have led to a significant decline in the incidence of all levels of limb amputations.

Aim

The study aimed to evaluate the occurrence of peripheral vascular disease in diabetic foot ulcer patients by measuring Ankle Brachial Index using portable Hand-held Doppler.

MATERIALS AND METHODS

This cross-sectional study was conducted on 100 diabetic patients with foot ulcers who attended the Surgical Outpatient Department at Government Kilpauk Medical College for ten months, from December 2016 to September 2017. The study received institutional ethics committee approval before its initiation, and informed consent was obtained from all patients.

Inclusion Criteria: Diabetic patients with foot ulcers who attended the Surgical Outpatient Department were included.

The patients were duly informed about the nature of the study and after getting consent from the patients in the language (Tamil) in which they can read/understand the demographic, clinical and laboratory details were collected.

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Ankle-Brachial Index (ABI) was measured for each patient using the portable handheld Doppler. ABI < 0.9 was taken as the cut-off to identify the patient as having peripheral vascular disease (PVD).

Statistical Analysis

Data is entered in Microsoft Excel and analysed by using SPSS version 20.0. Descriptive Statistics such as Frequency, proportion, mean, and standard error are used to describe the data. Inferential statistics such as the Chi-square test and Pearson correlation were used to analyse the data.

RESULTS

In sex distribution 67 were male and 33 were female. About 23 patients were on treatment with insulin and 60 patients were on treatment with oral hypoglycaemic agents 17 patients were found to have no treatment for diabetes. The right foot was involved in about 54 patients while the left foot was involved in 46 patients and trauma was present in 67 patients 13 patients presented with cellulitis and 52 patients had active discharge from the foot ulcers. [Table 1]

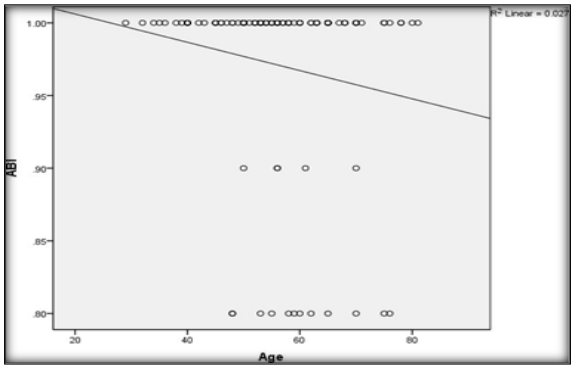

Figure 1: Age in the study

The youngest in the study population was 29 years and the eldest was 81 years. [Figure 1]

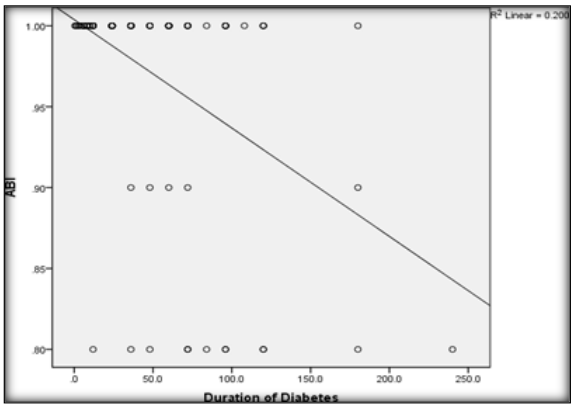

Figure 2: Duration of diabetes

The duration of diabetes ranges from 2 weeks to 20 years. ABI was found to be 1 in most patients (83), 0.9 in 5 patients and 0.8 in 12 patients. ABI was found to be 1 in most patients (83), 0.9 in 5 patients and 0.8 in 12 patients. Taking into consideration of ABI <0.9 as the cut-off value, 12 patients were found to have peripheral vascular disease (PVD). [Figure 2]

Among the patients identified to have peripheral vascular disease (12) majority of patients (9) had a duration of diabetes ≥ 6 years and about half of the patients (6) were on treatment with Insulin for uncontrolled diabetes; the rest of the patients (6) were on treatment with oral hypoglycaemic Agents and glycaemic status during the study was found to be under control in 8 patients (5 on insulin therapy and 3 on OHAs respectively).

Table 1: Comparison of various findings between ABI

		ABI		P value
		<0.9	≥ 9	
Sex	Female	4	29	1
	Male	8	59	
Insulin	No	6	71	0.028
	Yes	6	17	
Oral hypoglycaemic	No	6	34	0.535
	Yes	6	54	
Foot involved	Left	5	41	0.748
	Right	7	47	
Trauma	No	1	32	0.097
	Yes	11	56	
Cellulitis	No	10	77	0.653
	Yes	2	11	
Discharge	No	4	44	0.278
	Yes	8	44	

Table 2: Correlation of age and duration of diabetes between ABI

	Pearson correlation	P-value
Age	-0.165	0.101
Duration of diabetes	-0.447	0.0001

ISSN (O): 2687-5365; ISSN (P): 2753-6556

DISCUSSION

The prevalence of Peripheral Vascular Disease (PVD) in diabetic foot ulcer (DFU) patients in India is reported to be around 30%. This prevalence is higher than in previous studies and indicates an increasing trend in the region. The study conducted in North India found that neuropathic ulcers (NPU) were more common than neuro-ischemic ulcers (NIU), with NIU being present in 30% and NPU in 70% of the patients studied.[1] The prevalence of peripheral artery disease in patients with diabetic foot is significantly high i.e. 38 % in a study conducted at Kilpauk Medical College.[2]

Major risk factors for peripheral arterial disease (PAD) such as diabetes mellitus (DM), hypertension, smoking, and hyperlipidemia also play a role in coronary heart disease (CHD) and cerebrovascular disease (CVD). However, their impact on vascular diseases varies. In recent research examining community-based studies on PAD's global prevalence and risk factors, DM ranked closely after smoking as a major risk, followed by hypertension and hypercholesterolemia. Similarly, in the National Health and Nutrition Examination Survey, smoking and DM emerged as the most significant risk factors for PAD, with odds ratios of 4.5 and 2.7, respectively.[3]

Other community-based studies have also highlighted diabetes as a significant risk factor for PAD occurrence and progression, alongside traditional risks like age, smoking, hypertension, hypercholesterolemia, and low kidney function. Diabetes is associated with increased rates of lower extremity amputation, longer hospital stays, and higher mortality rates.[4,5]

While traditional risk factors are important, they do not fully account for atherosclerosis development in peripheral or other vascular beds. Inflammation, abnormalities in hemostasis, and blood viscosity also contribute to atherosclerosis evolution. Markers like high-sensitivity C-reactive protein, hyperuricemia, and hyperhomocysteinemia are non-traditional risk factors associated with PAD in both the general population and individuals with diabetes mellitus.[6-8]

CONCLUSION

The increased duration of diabetes with uncontrolled glycaemic status was found to have a significant role in the development of Peripheral Vascular Disease and its complications in the diabetic population.

REFERENCES

1. Bajaj S, Mahajan A, Grover S, Mahajan V, Goyal P, Gupta VK. Peripheral vascular disease in patients with diabetic foot ulcers - an emerging trend: A prospective study from north India. J Assoc Physicians India. 2017; 65(5):14–7.
2. Muthiah A, Kandasamy R, Nagulan, Madasamy A. A study on diabetic foot and its association with peripheral artery disease. Int Surg J [Internet]. 2017; 4(4):1217. Available from: http://dx.doi.org/10.18203/2349-2902.isj20170937
3. Selvin E, Erlinger TP. Prevalence of and risk factors for peripheral arterial disease in the United States: Results from the National Health and Nutrition Examination Survey, 1999–2000. J Vasc Surg [Internet]. 2005; 41(2):369. Available from: http://dx.doi.org/10.1016/j.jvs.2004.11.004
4. Weragoda J, Seneviratne R, Weerasinghe MC, Wijeyaratne SM. Risk factors of peripheral arterial disease: a case control study in Sri Lanka. BMC Res Notes [Internet]. 2016; 9(1):508. Available from: http://dx.doi.org/10.1186/s13104-016-2314-x
5. Shukla V, Fatima J, Ali M, Garg A. A study of prevalence of peripheral arterial disease in type 2 diabetes mellitus patients in a teaching hospital. J Assoc Physicians India. 2018; 66(5):57–60.
6. Shou Z, Zhao Y, Zhang Y, Li S. Risk factors for peripheral arterial disease in elderly patients with Type-2 diabetes mellitus: A clinical study. Pak J Med Sci Q [Internet]. 2020; 36(6). Available from: http://dx.doi.org/10.12669/pjms.36.6.2906
7. Aronow WS, Ahn C. Association between plasma homocysteine and peripheral arterial disease in older persons. Coron Artery Dis [Internet]. 1998; 9(1):49–50. Available from: http://dx.doi.org/10.1097/00019501-199809010-00008
8. Bembi V, Singh S, Singh P, Aneja GK, Arya TVS, Arora R. Prevalence of peripheral arterial disease in a cohort of diabetic patients. South Med J [Internet]. 2006; 99(6):564–9. Available from: http://dx.doi.org/10.1097/01.smj.0000221624.68378.5d.

ISSN (O): 2687-5365; ISSN (P): 2753-6556