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Frequency of Peripheral Vascular Disease in Diabetics with Hyperlipidemia

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ABSTRACT

Introduction: Diabetes mellitus is a prevalent risk factor for peripheral vascular disease, involving narrowed peripheral arteries due to atherosclerosis. Further research is necessary locally and internationally to address inconclusive findings and insufficient data. Conducting a thorough study can provide critical insights for identifying and managing asymptomatic peripheral vascular disease (PVD) cases, ultimately reducing associated morbidity. **Methodology:** This study at Allama Iqbal Memorial Teaching Hospital aimed to determine PVD frequency in type 2 diabetic patients with hyperlipidemia. Conducted from July 2024 to January 2025, 163 participants were enrolled. Initial blood samples were taken, followed by patient reports of fasting glucose and lipid profiles. PVD diagnosis used ABPI via Doppler. Data were analyzed using SPSS v25 with stratification for age, gender, diabetes duration, and BMI. Chi-square test post-stratification with $p \leq 0.05$ was used for statistical significance. **Results:** In this study, 163 diabetes mellitus patients with hyperlipidemia were enrolled. Age range in this study was from 30 to 65 years with mean age of 51.54±10.403 years. Frequency of peripheral vascular disease in diabetes mellitus patients with hyperlipidemia was observed in 45(27.6%). **Conclusion:** Study findings revealed a high occurrence of peripheral vascular disease in diabetic patients with hyperlipidemia, with the ankle-brachial index using Doppler proving reliable for detecting this condition in diabetics.

INTRODUCTION

Peripheral vascular disease (PVD) encompasses plaque build-up and aneurysms in blood vessels outside the heart, impacting about 200 million globally. With a high incidence among the elderly, PVD significantly affects morbidity and mortality rates.[1-2] The occurrence of PVD is significantly higher in individuals with diabetes than those without, even after adjusting for age and sex. This highlights the importance of enhanced monitoring and intervention for diabetic individuals to reduce the risk of PVD. The severity of PVD can be categorized into stages - compensation, rest pain, chronic ulcer, gangrene, and amputation - showing the advancing nature of the condition and its impact on patients' health.[2-3]

Specific symptoms indicating various stages of this process include decreased ankle blood pressure, new blood vessel formation (angiogenesis), endothelial cell dysfunction, and muscle fiber damage, particularly significant in Type-II Diabetes Mellitus as a risk factor for atherosclerotic peripheral vascular disease (PVD) development.[2] Peripheral vascular disease is more common in individuals with diabetes. However, there are other factors like hypertension, hyperlipidemia, smoking, and vascular disease history that also play a role. By addressing these risk factors, healthcare professionals can enhance patient care and outcomes.[4-5]

Kumar et al. found a 12% prevalence of asymptomatic peripheral vascular disease (PVD) and its complications in individuals with type 2 diabetes.[6] However, recent studies have reported a much higher incidence of PVD in type 2 diabetics, reaching 30%.[7] These conflicting results highlight the need for further investigation in our country, as limited studies have been conducted to address this issue, while the international data on this topic remains inconsistent. Thus, conducting a comprehensive study on this matter will not only provide valuable information for future reference but also aid in the identification and management of asymptomatic PVD cases, ultimately reducing the morbidity associated with this condition.

METHODOLOGY

This cross-sectional study was conducted at the Department of Medicine, Allama Iqbal Memorial Teaching Hospital, Sialkot, between July 3, 2024, and January 2, 2025. A total of 163 patients were enrolled using non-probability consecutive sampling. The sample size was

calculated based on a 95% confidence level, 5% margin of error, and an expected prevalence of peripheral vascular disease (PVD) in type 2 diabetic patients of 12%.[6]

Patients included were between 30 to 65 years of age, with a confirmed diagnosis of type 2 diabetes mellitus for more than five years, and hyperlipidemia as per defined biochemical criteria. Exclusion criteria included patients with a history of connective tissue disorders, hypercoagulable states, hematologic diseases, hypothyroidism, valvular heart disease, or limb amputation, based on medical history and available records.

Each participant provided informed consent prior to inclusion. Demographic data, including age and duration of diabetes, were recorded following clinical history and examination. In cases lacking prior laboratory documentation, venous blood samples were collected by trained paramedical staff for fasting blood glucose and fasting lipid profile analysis, which patients were instructed to submit during a follow-up visit. The ankle-brachial index (ABI) was measured to identify PVD. This was done using a hand-held Doppler probe (5–8 MHz) over the brachial and posterior tibial arteries. Systolic pressures were recorded after cuff inflation and deflation at the arm and ankle, and ABI was calculated by dividing the ankle systolic pressure by the upper arm systolic pressure. Two readings were taken to ensure accuracy.

The study data were recorded in a structured form. Data entry and statistical analysis used SPSS v25. Quantitative variables like age and diabetes duration were summarized with mean and standard deviation. Qualitative variables (e.g., gender, PVD presence) were shown as frequencies. Age, gender, diabetes duration, and BMI were stratified for controlling confounders. Chi-square test was post-stratified for statistical significance ($p \leq 0.05$).

RESULTS

A total of 163 patients with type 2 diabetes mellitus and hyperlipidemia were included in the study. Of these, 107 (65.6%) were male and 56 (34.4%) were female. The participants' ages ranged from 30 to 65 years, with a mean age of 51.54 ± 10.40 years. Most patients (100, or 61.3%) were older than 50, while 63 (38.7%) were aged 50 or below. The mean BMI was 27.5 ± 2.37 kg/m^2. Based on BMI classification, 106 patients (65.0%) had a normal BMI, 50 (30.7%) were overweight, and 7 (4.3%) were classified as obese. The average duration of diabetes was 9.2 ± 2.34 years. A total of 75 patients (46.0%) had diabetes for 7 years or less, while 88 (54.0%) had the condition for more than 7 years. Peripheral vascular disease (PVD) was detected in 45 patients (27.6%). Stratified analysis showed no statistically significant association between PVD and gender, age, or BMI ($p > 0.05$). However, a significant association was observed between PVD and the duration of diabetes mellitus ($p < 0.05$).

Table 1

Frequency distribution of different variables (n=163)

Variables		Frequency	Percent
Gender	Male	107	65.6
	Female	56	34.4
Age groups	≤50 years	63	38.7
	>50 years	100	61.3
	Mean age (years)	51.54±10.40	
Body mass index	Normal	106	65.0
	Overweight	50	30.7
	Obese	7	4.3
	Mean BMI (kg/m^2)	26.50±2.30	
Duration of DM	≤7 years	75	46.0
	>7 years	88	54.0
	Mean duration (years)	6.43±2.37	
Peripheral vascular disease (PVD)	Yes	45	27.6
	No	118	72.4

Table 2

Stratification of peripheral vascular disease with respect to different variables

Variables		Peripheral vascular disease (PVD)		p-value
		Yes	No	
Gender	Male	28(26.2%)	79(73.8%)	0.570
	Female	17(30.4%)	39(69.6%)	
Age groups	≤50 years	14(22.2%)	49(77.8%)	0.222
	>50 years	31(31.0%)	69(69.0%)	
Body mass index	Normal	27(25.5%)	79(74.5%)	0.097
	Overweight	18(36.0%)	32(64.0%)	
	Obese	0(0.0%)	7(100.0%)	
Duration of DM	≤7 years	13(17.3%)	62(82.7%)	0.007
	>7 years	32(36.4%)	56(63.6%)	

DISCUSSION

Research in medical literature definitively shows a strong link between diabetes and peripheral vascular disease (PVD), with those diagnosed with diabetes at higher risk. A study from 2018 in Pakistan found a worrying 16.97% prevalence of PVD in type 2 diabetic patients, highlighting a significant public health concern needing urgent attention. This emphasizes the critical need for increased awareness, timely diagnosis, and tailored treatment strategies to improve health outcomes for this vulnerable group.[8]

Numerous conflicting reports discuss the link between peripheral vascular disease (PVD) and diabetes mellitus (DM), leading to confusion. Some sources suggest no significant relationship between types of diabetes and PVD, while others indicate a higher prevalence of PVD in type 2 DM patients. This highlights the need for a thorough examination of underlying mechanisms and implications for clinical practice in managing diabetes-related complications.[9] This may be because there are more patients with type 2 DM than with type 1 DM.

Our research aligns with Wilcox et al.'s findings on diabetes and peripheral vascular disease (PVD). Although no significant correlation was found between diabetes duration and PVD prevalence, individuals with diabetes for over seven years showed notably higher PVD incidence. Wilcox's study emphasized the strong link between diabetes duration and peripheral artery disease (PAD) onset, contrasting with the minimal correlation found with obesity among other factors examined.[10]

The literature on Peripheral Vascular Disease (PVD) in Pakistan presents varying statistics, emphasizing the need for detailed epidemiological studies. In our recent research, PVD was found to affect 27.6% of the population, highlighting its significant impact. Despite this, a report

from Bahawal Victoria Hospital reported a much lower prevalence of 1.2%, sparking questions about study methods and factors causing these differences. These discrepancies call for further investigation into demographic, environmental, and healthcare factors influencing PVD recognition in different Pakistani settings.[11]

The current study's findings differed significantly from a previous investigation in Bahawalpur, highlighting the need for further examination. The study focused on 20 individuals with peripheral vascular disease, limiting the generalizability of its conclusions. It reported a PVD prevalence of 1.2% and identified smoking as the main risk factor in 90% of cases, emphasizing the link between tobacco use and vascular health. Demographically, most participants were over 40 years old and male, with potential implications for age-related risk, though the study did not explicitly classify these factors as risks for PVD development.

The omission highlights the need to consider various factors, such as age and gender, in understanding PVD fully. A detailed analysis incorporating demographics could improve our grasp of the disease's risk profile and guide future research in public health.[11]

Our study, unlike previous ones, looked at 113 patients, with 31 diagnosed with Peripheral Vascular Disease (PVD), reflecting a prevalence rate of 27.4%. Zia et al.'s 2007 research reported a 35% PVD prevalence, noting higher occurrence in males over 50. They did not explore links between PVD and other risk factors, unlike our study which aimed to investigate diverse factors influencing its development beyond age and gender.[12]

Zia et al.'s findings contrast with Akram et al.'s, who found no significant gender difference in PVD acquisition. Akram et al. also linked obesity and larger waist circumference with PVD but noted no associations with DM duration or smoking. This study partially aligns with Akram et al.'s results.[13] In a 2012 study by Ali et al., it was reported that the prevalence of peripheral vascular disease (PVD) was higher (39.28%) in diabetic patients compared to the general population. The study revealed a higher prevalence of PVD in diabetic females and those with hypertension. Additionally, a significant link between hypertension and PVD was noted, although the relationship between sex and PVD was not investigated.[14]

In their study, Kumar et al. found a 12% prevalence of asymptomatic peripheral vascular disease (PVD) and complications in type 2 diabetes patients,[6] a figure disputed by newer studies reporting rates as high as 30% for PVD in this group.[7]

CONCLUSION

The study found a high occurrence of peripheral vascular disease in diabetic patients with hyperlipidemia, with Doppler ankle-brachial index being a reliable tool for diagnosing this condition.

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