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RESEARCH ARTICLE
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FREQUENCY OF PERIPHERAL ARTERIAL DISEASE AMONG PATIENTS WITH TYPE-II DIABETES MELLITUS PRESENTING TO A TERTIARY CARE HOSPITAL

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ABSTRACT

Objective: To determine the frequency of peripheral artery disease in patients with type-II diabetes mellitus presenting to tertiary care hospitals.

Methodology: This cross-sectional study conducted from the May to August 2024 at the Department of Medical Unit-III, Peoples University of Medical & Health Sciences for Women (PUMHSW), Nawabshah assessed the prevalence of peripheral artery disease (PAD) in 250 type-II diabetes patients aged 25-60. Exclusion criteria included known PAD, amputations, hypertension, and certain medications. After informed consent, we recorded demographics, height, weight, and blood pressure. The Ankle-Brachial Index (ABI) was calculated, with an ABI ratio below 0.9 indicating PAD. Data were analyzed using SPSS 26.0, with significance set at $p \leq 0.05$.

Results : The study included 250 participants, with an average age of 52.59 years (SD = 9.91). The average duration of diabetes was 10.68 years (SD = 6.05), with 60.4% having the condition for 1 to 10 years. Dyslipidemia averaged 4.66 years (SD = 4.38). Peripheral artery disease (PAD) was present in 95 cases (38.0%).

Conclusion: Peripheral artery disease (PAD) is a common occurrence among type-II diabetes patients in tertiary care, particularly those with an extended history of diabetes. It is essential to conduct routine monitoring to guarantee the early detection and management of this prevalent complication.

Keywords: Ankle-Brachial Index (ABI), Cardiovascular Risk, Prevalence, Peripheral Artery Disease (PAD), Type-II Diabetes Mellitus

INTRODUCTION

Diabetes mellitus (DM) is an urgent global health crisis, affecting over 170 million currently with projections of nearly 370 million by 2030[1]. As a major risk factor for cardiovascular disease, the leading cause of death in adults with DM, the impact of diabetes is profound[2]. A significant complication is peripheral artery disease (PAD), characterized by atherosclerosis in the lower extremity arteries[3]. PAD increases risks of severe cardiac and limb events while impairing quality of life significantly[4]. It contributes substantially to long-term disability among diabetic patients.

In the United States alone, over 8.5 million suffer from PAD, with approximately one-third concurrently having diabetes mellitus[5]. The prevalence of PAD in diabetic populations may be underestimated due to often asymptomatic early-stage PAD and diabetic neuropathy masking symptoms[6]. Notably, 20% of individuals with dysglycemia exhibit abnormal ankle-brachial index readings versus only 7% with normal glucose levels, even before diabetes diagnosis[7].

The risk of PAD increases with age for both diabetics and non-diabetics. For example, over 70% of diabetic patients older than 70 attending medical or vascular clinics in Spain were found to have PAD when screened with an ankle-brachial index <0.90 [8]. Furthermore, DM exacerbates limb ischemia severity, with nearly 50% of diabetic patients with chronic limb-threatening ischemia developing similar issues in the opposite limb within five years[9]. Diabetic patients also tend to experience more distal arterial disease compared to non-diabetics[10].

Current management strategies for PAD in diabetic patients largely mirror those for non-diabetics, focusing on symptom relief and cardiovascular risk reduction[11]. Studies have shown varying PAD prevalence rates among diabetic patients, with figures ranging from 15% to as high as 38.5%[12,13]. These discrepancies highlight the need for more precise data.

This study aims to address the gap in local literature regarding PAD prevalence among diabetic patients. Despite growing recognition of PAD as a serious comorbidity, local data remains limited. Inconsistent findings from previous studies, likely due to population demographic and disease characteristic differences, further emphasize the necessity for comprehensive assessment. By evaluating PAD prevalence among patients with type-II diabetes mellitus, this study seeks to provide essential insights informing evidence-based screening and management strategies. Improved understanding of PAD's burden in this population will facilitate timely diagnosis and intervention, ultimately enhancing patient outcomes and contributing to targeted screening guideline development.

METHODOLOGY

This cross-sectional study was conducted from the May to August 2024 at the Department of Medical Unit-III, Peoples University of Medical & Health Sciences for Women (PUMHSW), Nawabshah, involving 250 patients selected through non-probability, consecutive sampling. The sample size was determined based on a (15%)[11] expected prevalence of peripheral artery disease (PAD), with a 95% confidence level and a 5% margin of error. Participants included individuals aged 25 to 60 years of either gender, diagnosed with type-II diabetes mellitus for at least one year and presenting to a tertiary care hospital.

Patients who were unwilling to participate, had a prior diagnosis of PAD, had undergone amputation of both lower limbs, and had familial dyslipidemia were excluded from the study. Informed consent was obtained from all participants, after which demographic details such as age, gender, residential status, family history of diabetes, height, and weight were recorded.

Peripheral artery disease was defined as an ankle-brachial index (ABI) of less than 0.9. The ABI was calculated by dividing the systolic pressure from the ankle (measured at either the dorsal pedis or posterior tibial arteries) by the systolic pressure from the brachial artery. Two readings of systolic blood pressure were taken using a standard protocol, with the higher of the two readings recorded as final. ABI ratios were calculated bilaterally, one leg at a time, by determining the highest brachial

pressure and the highest ankle pressure for each leg, then dividing the highest ankle pressure on each side by the highest overall brachial pressure.

Blood pressure measurements were performed with the patient in a supine position. A blood pressure cuff was placed on the arm, with the limb at the level of the heart. The brachial pulse was identified using a handheld Doppler and ultrasound gel, and the cuff was inflated to about 20 mmHg above the expected systolic pressure. The cuff was then slowly deflated until the Doppler signal reappeared, indicating the brachial systolic pressure, which was recorded.

Ankle systolic pressures were measured at the dorsal pedis and posterior tibial arteries by placing the cuff immediately proximal to the malleoli. The Doppler probe and ultrasound gel were used to locate the signal from the dorsal pedis artery, with the cuff inflated until the signal disappeared and then deflated slowly until it reappeared, at which point the systolic pressure was recorded. The same procedure was followed for the posterior tibial artery, and both measurements were taken for each leg. All measurements were conducted under the supervision of an experienced consultant to ensure accuracy.

Data were analyzed using SPSS version 26.0. Descriptive statistics were employed to summarize both qualitative and quantitative data. Chi-square tests were applied to assess statistical significance, with a p-value of ≤ 0.05 considered indicative of statistical significance.

RESULTS

The study included 250 participants with an average age of 52.59 years (SD = 9.91). The majority of participants (70.8%) were older than 50 years, while 29.2% were between 20 and 50 years old. The average duration of diabetes mellitus among participants was 10.68 years (SD = 6.05), with 60.4% having had the condition for 1 to 10 years, and 39.6% for more than 10 years. Dyslipidemia had an average duration of 4.66 years (SD = 4.38), with 69.2% having had it for 0.2 to 4 years, and 30.8% for more than 4 years. Hypertension was present for an average of 7.71 years (SD = 4.42), with 65.2% of participants experiencing it for 1 to 8 years, and 34.8% for more than 8 years. The average Body Mass Index (BMI) was 27.23 kg/m² (SD = 5.05), with 68.0% of participants having a BMI between 20 and 28 kg/m², and 32.0% having a BMI greater than 28 kg/m². Regarding gender, 64.4% of the participants were male, and 35.6% were female. Additionally, 58.8% of the participants had hypertension, while 41.2% did not. Peripheral artery disease was present in 38.0% of the participants, while 62.0% did not have the condition as shown in Table I.

Table II presents the characteristics of patients with and without PAD. Gender distribution was similar, with no significant association (p=0.823). Age and BMI were also not significantly different between those with and without PAD (p=0.245 and p=0.219, respectively). The duration of diabetes and the presence of hypertension showed no significant associations with PAD, with p-values of 0.666 and 0.970, respectively. Overall, no significant differences were found between the groups in terms of gender, age, BMI, diabetes duration, or hypertension status.

DISCUSSION

Peripheral artery disease (PAD) is a common and serious complication in patients with type 2 diabetes mellitus (T2DM), significantly impacting morbidity and mortality[14]. The interaction between the two highlights important issues in CVD risk management. Peripheral arterial disease (PAD) is secondary to an atherosclerotic process involving peripheral arteries that results in diminished blood supply especially the lower limb. Patients with T2DM carry a significantly high risk of developing PAD for several linked reasons[15].

A high level of glucose in the blood leads to an accelerated atherosclerotic process via various mechanisms like endothelial dysfunction, increased oxidative stress and advanced glycation end-products[16]. Furthermore, patients with T2DM often have additional cardiovascular risk factors such as hypertension, dyslipidemia and obesity which would predispose to PAD.

Many epidemiological studies showed that PAD is common in large numbers among T2DM individuals. It is estimated that as many as 20 to 30% of diabetics maintain PAD, a rate considerably

superior to that seen in non-diabetic patients[17]. The high rate of occurrence highlights the importance of screening and intervention if we are to get a grip on this condition.

The common presence of atypical symptoms or asymptomatic nature in patients with PAD and T2DM creates a diagnostic dilemma. Often the disease remains asymptomatic, while symptoms may present as intermittent claudication (pain or cramping in legs during activity) at one end and critical limb ischemia deep rest-pain with non-healing ulcers on the other[18]. The presence of PAD has a profound effect on overall life quality, increasing the risk for functional deterioration and even amputation in more severe cases.

In addition, in T2DM patients the presence of PAD is also related with an increased risk for adverse cardiovascular events[19]. PAD develops in the context of atherosclerosis and is thus predictive beyond PAD itself; an increased risk for MI, stroke, and other cardiovascular diseases accompanies even established lower limb disease. This increased risk argues for a somewhat aggressive strategy to cardiovascular prevention in patients with diabetes.

The management of PAD in the context of T2DM has many facets and challenges. Optimal glycemic control is essential to retard the progression of PAD and reducing its related complications. Aggressive glucose control, in conjunction with other modifiable risk factors such as hypertension and dyslipidemia constitute the backbone of treatment which can achieve dramatically improved outcomes[20].

In our study, PAD was detected in 95 (38.0%) of the total study subjects. In another study, 38.5% had PAD[10]. Ali Z, et al reported PAD in 152 (39.28%) of the patients[21] whereas in the study of Akram J, et al, 31.6% had evidence of PAD[22].

Importantly, lifestyle modulations like quitting smoking, performing routine physical activities and effecting dietary modifications play a significant role in controlling PAD along with enhancing patient outcomes. Pharmaceutical Keep the antiplatelet agent, statin and medicine for claudication symptom as well

However, conservative measures may need to be taken in some cases and if they fail, more invasive treatments (eg. angioplasty or surgical revascularization) might be required. The choice to go for these interventions ought to be guided by careful analysis of the patient's all-encompassing health, PAD severity and functional level.

PAD is a major complication associated with management of T2DM, and it has important implications in patient morbidity and mortality. Early detection, management of risk factors, comprehensive treatment critical for optimizing outcomes and quality-of-life among diabetic patients with PAD Future studies that can lead to improved treatment strategies and elucidate pathophysiological links between T2DM, and PAD are necessary in this multifaceted clinical problem

CONCLUSION

Peripheral artery disease (PAD) is a common occurrence among type-II diabetes patients in tertiary care, particularly those with an extended history of diabetes. It is essential to conduct routine monitoring to guarantee the early detection and management of this prevalent complication.

Conflict of Interest: Authors declare that there is no conflict of interest.

Authors' Contributions:

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Table I: Demographic Characteristics of Study Participants (n=250)	
Variable	**n (%)**
Age (Mean ± SD) = 52.59 ± 9.91	
20 - 50 years	73 (29.2)
>50 years	177 (70.8)
Duration of Diabetes Mellitus (Mean ± SD) = 10.68 ± 6.05	
1 - 10 years	151 (60.4)
>10 years	99 (39.6)
Duration of Dyslipidemia (Mean ± SD) = 4.66 ± 4.38	
0.2 - 4 years	173 (69.2)
>4 years	77 (30.8)
Duration of Hypertension (Mean ± SD) = 7.71 ± 4.42	
1 - 8 years	163 (65.2)
>8 years	87 (34.8)
Body mass Index (Mean ± SD) = 27.23 ± 5.05	
20 - 28 kg/m^2	170 (68.0)
>28 kg/m^2	80 (32.0)
Gender	
Female	89 (35.6)
Male	161 (64.4)
Hypertension	
Yes	147 (58.8)
No	103 (41.2)
Peripheral Artery Disease	
Yes	95 (38.0)
No	155 (62.0)

Table II: Characteristics of Patients with and without PAD (n=250)					
Variables		**PAD (n=95)**	**No PAD (n=155)**	**ODD RATIO (95% C. I)**	**P-Value**
Gender	Male, *n* (%)	33 (34.7)	56 (36.1)	0.941 (0.551----1.606)	0.823
	Female, *n* (%)	62 (65.3)	99 (63.9)		
Age Group	20 - 50 years, *n* (%)	31 (32.6)	40 (25.8)	1.393 (0.796----2.437)	0.245
	>50 years, *n* (%)	64 (67.4)	115 (74.2)		
BMI Group	20 - 28 kg/m^2, *n* (%)	69 (72.6)	101 (65.2)	1.419 (0.811----2.482)	0.219
	>28 kg/m^2, *n* (%)	26 (27.4)	54 (34.8)		
Duration of DM	1 - 10 years, *n* (%)	59 (62.1)	92 (59.4)	1.122 (0.665----1.895)	0.666
	>10 years, *n* (%)	36 (37.9)	63 (40.6)		
Hypertension	Yes, *n* (%)	56 (58.9)	91 (58.7)	1.010 (0.601----1.697)	0.970
	No, *n* (%)	39 (41.1)	64 (41.3)		