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A Study of Prevalence of Peripheral Arterial Disease among Type 2 Diabetes Mellitus patients attending a tertiary care hospital of Assam

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ABSTRACT:eripheral arterial disease(PAD) is a condition characterized by atherosclerotic occlusive disease of the peripheral arteries most commonly affecting the lower extremities. . While PAD is a major risk factor for lower extremity amputation, it is also associated with higher incidence of coronary and cerebrovascular complications. Diabetes mellitus is a major risk factor for PAD. In studies using the ankle-brachial index (ABI) as screening technique, the prevalence of PAD in diabetic individuals ranges from 20% to 30%.

This cross-sectional observational study was conducted from 1st July 2020 to 31st December 2020 at F. A. A. Medical College, Barpeta . 127 diabetic patients were included in this study. Diagnosis of PAD was made with ABI criteria of <0.9.

Out of the 127 patients included in the present study, 21 patients were found to have PAD (ABI<0.9) which was 16.53% of the study group. To assess the risk factors between the PAD and the non-PAD groups, a binary logistic regression model was applied. Mean duration of diabetes in PAD negative patients was 5.58±3.915 years and mean duration of diabetes in PAD positive cases was 8.81±3.995 years and the difference was found statistically significant (p<0.5) in this model.

I. INTRODUCTION:

Peripheral arterial disease is a condition characterized by atherosclerotic occlusive disease of the peripheral arteries most commonly affecting the lower extremities. Symptoms of PDA include intermittent claudication, rest pain, tissue loss or gangrene in extreme cases. While PAD is a major risk factor for lower extremity amputation, it is also associated with a higher incidence of coronary and cerebrovascular complications. [(1)]

Diabetes is a major risk factor for PAD. As observed in United Kingdom Prospective Diabetes Study, 1% increase in glycosylated hemoglobin correlated with a 28% in increase in incidence of PAD and higher rates of death, microvascular complications and major amputation[(18,19)] . In 2003, the American Diabetes Association (ADA) issued a consensus statement that recommended performing a screening ABI in all diabetic patients older than 50 years of age and, if normal, the screen should be repeated every 5 years.[(8)]

Ankle-Brachial Index (ABI) measurement is a simple, non invasive, reproducible and economical tool to diagnose PAD. An ABI < 0.9 is diagnostic of PAD even in asymptomatic patients and can be used to predict its morbidity and mortality. Using Doppler ultrasound as a reference method, numerous studies have reported that an ABI <0.9, when compared to angiography, has a sensitivity of more than 90% and a specificity of more than 95% in diagnosing more than 50% stenosis of the lower extremity arteries [2,3,4,5].

In view of the growing burden of type 2 diabetes mellitus globally and associated complications, the study was done to assess the prevalence and risk factors of PAD among Type 2 diabetes patients attending a tertiary care hospital in Assam.

This cross-sectional observational study was conducted from 1st July 2020 to 31st December 2020 at Fakhruddin Ali Ahmed Medical College, Barpeta

Inclusion criteria:

Type 2 diabetes mellitus patients(as per WHO criteria) of age more than 18 years attending in FAA Medical College, department of medicine.

Exclusion criteria:

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Leg ulcers, gangrene (conditions that may interfere taking ABI measurement)

In studies using the ankle-brachial index (ABI) as screening technique, the prevalence of PAD in diabetic individuals ranges from 20% to 30%[6,7] . Taking frequency of PAD amongst type II diabetics to be 30% using Open Epi calculator with the statistical assumptions of 8% alpha error and 95 % confidence interval sample size came out to be 127 patients for this study.

II. MATERIAL AND METHOD:

Measurements of ABI:

Measurement of ABI was made in the supine position after 5 min of rest. A pneumatic cuff was placed around the ankle and the pressure was measured at both the dorsalis pedis and posterior tibial arteries using a hand-held continuous-wave Doppler probe (5-10 MHz). The same technique was also used in both arms for measuring brachial artery pressure. The higher of the two ankle pressures (dorsalis pedis vs. posterior tibial) was divided by the highest brachial artery pressure (right versus left).

PAD severity in each leg is assessed according to the levels of ABI:

0.91-1.30: normal;
0.70-0.90: mild occlusion;
0.40-0.69: moderate occlusion;
<0.40 : severe occlusion; and
>1.30 : poorly compressible vessels due to calcification

A written consent was taken from all subjects who fulfilled the inclusion criteria of the study. Detail history and physical examination was performed and recorded on predesigned proforma from each patient. Patient's personal history, physical examination findings like the blood pressure , age, gender, BMI (kg/m2), presence and quality of the lower limb pulses on palpation, presence of ulcers/gangrene on inspection, , patients clinical history (duration of DM, family history of diabetics, current medical therapy, history of hypertension and symptoms of PAD), associated symptoms, , occupation, smoking history, alcoholic habit, blood sugar level, and laboratory measurement (HbA1c) were recorded. A resting ABI of each lower limb was then determined.

Statistical analysis

Data was analyzed using Statistical Package for Social Sciences,(SPSS) version 20. Results for continuous variables are presented as mean±standard deviation, whereas results for categorical variables are presented as number (percentage). Statistic Sensitivity, Specificity (Positive and Negative Predictive) was calculated on 95% CI. The level P <0.05 was considered as the cutoff value or significance

III. RESULTS

A total of 127 patients (74 men and 53 women) with type 2 diabetes were included in the study. Demographic and clinical features of these patients are shown in Table1. The mean age of the patients was 52.58±11.96 years. The mean duration of diabetes was 6.29±4.27 years. 32.28% of patients had history of hypertension and 16.53% were smokers. Mean HbA1c in the patients was 7.72±1.16%. 28 (22.04%) patients had obesity(BMI **≥30kg/m^2**). **Demographic and clinical profile of patients in the study group are shown in the Table 1. below.**

Table 1.

VARIABLES	MALE	FEMALE	TOTAL
Age (years) (Mean± SD)	54.92±12.836	49.32±9.843	52.58±11.963
Duration of diabetes (years) (Mean± SD)	6.88±4.512	5.47±3.801	6.29±4.271
HbA1c level(%) (Mean± SD)	7.86±.956	7.53±1.395	7.72±1.166
History of hypertension (N)	25(33.78%)	16(30.18%)	41(32.28%)
History of Obesity(N)	15(20.27%)	13(24.52%)	28(22.04%)
History of Smoking(N)	21(28.37%)	0(0%)	21(16.53%)

Out of the 127 patients included in the present study, total number of patients with PAD (ABI<.9) was 21 which is 16.53% of the study group . PAD positive cases consisted of 13 male and 8 female patients. . The remaining 106 patients did not have peripheral arterial disease. None of the patient was symptomatic at the time of diagnosis of PAD. No statistically significant association was found in both gender and risk of PAD.

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Table 2:

CATEGORY	PAD	NO PAD	CHI SQUARE	P VALUE
MALE	13	61	0.0302	0.862117
FEMALE	8	46		
TOTAL	21	107		

To assess the risk factors between the PAD and the non-PAD groups, a binary logistic regression model is applied in which PAD is proposed to be a dependent variable on independent variables – age, duration, HbA1c level, hypertension, obesity(BMI≥30), and smoking respectively. Mean duration of diabetes in PAD negative patients was 5.58±3.915 years and mean duration of diabetes in PAD positive cases was 8.81±3.995 years. The association between the duration of diabetes and occurrence of PAD was statistically significant (p>0.5) in this model. No other variables were statistically significant .

Table 3

Category	PAD	NO PAD	SIGNIFICANCE
AGE (mean±SD)	58.67±7.889	51.38±12.289	0.142
DURATION (mean±SD)	8.81±3.995	5.58±3.915	<0.001
HBA1C(mean±SD)	7.95±1.203	7.58 ±1.159	0.173
HTN	47.61% (n=10)	29.24% (n=31)	0.096
OBESITY	23.80% (n=5)	21.69% (n=23)	0.211
SMOKING	23.80% (n=5)	15.09% (n=16)	0.090

IV. DISCUSSION :

The prevalence of PAD among diabetic patients as observed in different studies varies substantially. Among different studies carried out in Indian subcontinent the prevalence of PAD in diabetes ranged from 4.47% to 39.28%[15,16,17] depending upon patient characteristic, geographical differences and other study specific correlates. In this present study the prevelance of PAD among diabetic patients was found to be 16.53 % which was comparable to study conducted by Agrawal RP,et al, in 2000(11), Janka HU et al [9], ,Sharma RK et al.[10] and Madhu SV et al, in 2006[12], , in which PAD was found to be 18.1%, 15.9% 15% and 13.73% respectively. In studies from South India by Mohan V et al,[13] and CUPS[14] , prevalence of PAD in diabetics was found to be 3.9% and 6.3%, respectively which is much lower than the present study. However prevalence found in the present study was lower than that obtained by some previous studies like Solanki et al.(35%)[21], ,Mwebaze ans Kibirige (39%)[22] and Ali et al (39.28%)[23] .

In the Fremantle diabetes study, age, duration of diabetes, higher systolic blood pressure and higher BMI were found to be significant predictors of PAD[18] .The present study finds a significant association of PAD with duration of diabetes , which correlates with several previous studies [11, 19,20] . However our study did not find significant association of PAD with other factors like age, glycemic control, BMI, hypertension and smoking.

The possible limitation of this study is that we did not include confirmatory tests like invasive arteriography which is considered to be the gold standard of diagnosis. Also the validity of the ABI may be decreased in diabetes, as ankle pressures may be elevated by medial arterial calcification and arterial stiffening, which occur more frequently in diabetes. The small sample size is another limitation of the study.

V. CONCLUSION

PAD is an important complication of Type 2 diabetic subjects which confers poorer prognosis in diabetics as compared to non diabetics. Prevalence of peripheral vascular disease (ABI < 0.9) was about 16.53% in our study which revealed that a significant proportion of type 2 diabetic subjects are affected by PAD. ABI measurement is a simple, inexpensive, noninvasive method for detection of PAD and also predictor of cardiovascular risk . Hence due importance to be given for routine use of ABI for active screening and early detection of PAD and in prevention of it's complications.

Conflict of interest:
None

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