ORIGINAL RESEARCH

Ankle brachial index in peripheral vascular disease in patients with type II diabetes mellitus

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ABSTRACT
Background: Peripheral artery disease (PAD) has classically been defined as the obstruction of the lower extremity arteries by atherosclerotic plaques. **Materials & Methods:** 72 type II diabetes patients with peripheral vascular disease of both genders were subjected to assessment of CBC, fasting and post-prandial blood glucose, glycosylated haemoglobin, lipid profile, blood urea, urine examination, liver function tests and serum creatinine level. Ankle brachial index (ABI) was calculated for each leg. **Results:** Out of 72 patients, males were 40 and females were 32. The mean ABI <0.5 was seen in 12, 0.5- 0.9 in 22 and 0.9- 1.3 in 38 patients. The difference was significant (P< 0.05). **Conclusion:** Most of the patients had ankle-brachial index between 0.9-1.3 in type II diabetes patients with peripheral vascular disease. Thus, it can be suggested that higher ankle brachial index (ABI) may be indicator of peripheral vascular disease (PVD) in patients with type 2 diabetes mellitus.
Key words: Ankle brachial index, Peripheral vascular disease, type II diabetes

INTRODUCTION

Peripheral artery disease (PAD) has classically been defined as the obstruction of the lower extremity arteries by atherosclerotic plaques. Although this concept is widely accepted, peripheral arteries can also be affected by arterial calcification (AC). Thus, the term lower extremity artery disease (LEAD) will be used to include both, PAD and AC, for the purpose of this investigation.[1] LEAD has been associated with cardiovascular events in patients with type 2 diabetes mellitus (DM). These events have included coronary heart disease, stroke and other atherosclerotic related causes of death. For PAD, risk factors include the presence of diabetes mellitus, hypertension, previous history of cardiovascular disease, smoking, and hypercholesterolemia.[2]

Diabetes and its complications are on the rise and have emerged as a serious and difficult health issue. Out of the 300 million people with diabetes worldwide, 57 million will live in India by 2025. Peripheral vascular disease (PVD) is one of the side effects of uncontrolled diabetes mellitus. Additionally, it is one of the main reasons for lower limb amputations, which affect diabetics 12 times more frequently than non-diabetics. A risk factor for foot infections is PVD.[3] If a diabetic foot ulcer is present, PVD and infections are among the main causes of leg amputations. Although risk factors for PAD in individuals with DM are still not completely understood, it is well known that the ankle-brachial index (ABI) is the preferred method for diagnosing this condition since it is non-invasive, inexpensive, simple to use, and detects PAD symptoms before they appear.[4] The American College of Cardiology/American Heart Association (AHA) has advised screening for PAD in asymptomatic diabetic individuals older than 50 or younger than 50 who have additional cardiovascular disease risk factors.[5] Interestingly, the American Diabetes Association (ADA) advised against using the ABI test in T2DM patients without PAD symptoms or indications in 2018.ABI is a non-invasive, reproducible, and generally accurate measurement.[6,7] The present study assessed ankle brachial index (ABI) in peripheral vascular disease (PVD) in patients with type 2 diabetes mellitus.

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MATERIALS & METHODS

The present study consisted of 72 type II diabetes patients with peripheral vascular disease of both genders, attending the dept. of medicine of GRMC Gwalior (mp). All patients gave their written consent for participating in the study.

Data such as name, age, gender etc. was recorded. A thorough physical examination was done. Height (cm), weight (kg) and BMI were recorded. All were subjected to assessment of CBC, fasting and post-prandial blood glucose, glycosylated haemoglobin, lipid profile, blood urea, urine examination, liver function tests and serum creatinine level. Colour doppler ultrasound, ophthalmic examination, ECG, CT scan for cerebrovascular profile and coronary angiography, sphygmomanometer measurement of ankle and brachial artery pressure, doppler examination to auscultate and record blood flow from dorsalis pedis and posterior tibial and brachial arteries and treadmill testing to assess functional limitations objectively (decline of ABI immediately after exercise provides further support of diagnosis of PVD) was done. Ankle brachial index (ABI) was calculated for each leg. Results thus obtained were subjected to statistical analysis P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of patients

| Total- 72		
Gender	Males	Females
Number	40	32

Table I shows that out of 72 patients, males were 40 and females were 32.

Table II Assessment of ankle brachial index (ABI) in patients with peripheral artery disease

Ankle brachial index (ABI)	Number	P value
<0.5	12	0.03
0.5-0.9	22	
0.9-1.3	38	

Table II, graph I shows that mean ABI <0.5 was seen in 12, 0.5- 0.9 in 22 and 0.9- 1.3 in 38 patients. The difference was significant (P< 0.05).

Graph I Assessment of ankle brachial index (ABI) in patients with peripheral artery disease
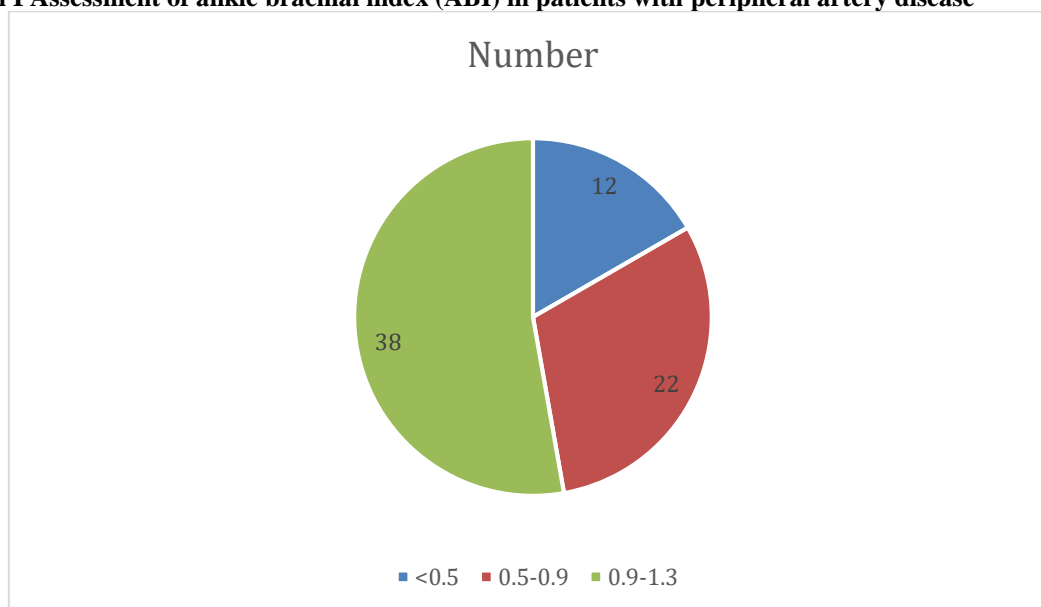
DISCUSSION

Peripheral arterial disease (PAD) is a common manifestation of atherosclerosis. Its prevalence increases with age and the presence of cardiovascular (CV) risk factors.[8] Circumstances of discovery include intermittent claudication or distal trophic lesions, but some subjects are asymptomatic, and the condition is detected during routine physical examination.[9,10] The majority of the expenditures associated with this disease for the public health system are attributable to atherosclerotic cardiovascular diseases, which are the primary cause of mortality in people with diabetes mellitus (DM).[11] Peripheral arterial disease (PAD), which is linked to other vascular events like stroke and myocardial infarction and raises the likelihood of cardiovascular diseases by up to one-third in patients with diabetes at a more advanced stage, is also a significant risk factor

for lower limb amputation in people with diabetes.[12]The present study assessed ankle brachial index (ABI) in peripheral vascular disease (PVD) in patients with type 2 diabetes mellitus.

We found that out of 72 patients, males were 40 and females were 32. Joosten et al[13] evaluated the association between smoking, hypertension, hypercholesterolaemia and T2DM as PAD predictors in men. They concluded that patients who did not present one or more of these risk factors had 77% lower risk of developing this disease.

We found that mean ABI <0.5 was seen in 12, 0.5-0.9 in 22 and 0.9- 1.3 in 38 patients. Ankle brachial index (ABI) and peripheral vascular disease (PVD) in type 2 diabetes mellitus in 100 patients between the ages of 30 and 80 was studied by Singh et al.[14] The average age was 60.04 years, the average BMI was 27.10 2.67 kg/m2, and the average length of time with diabetes was 7.75 1.50 years. ABI detected PVD in 68 of the instances that were diagnosed with it on CDU (a true positive), however ABI alone failed to diagnose 20 cases (a false negative), leaving the remaining 29.4% of cases undiagnosed. On the other hand, 5.9% of the 51 diagnosed PVD cases by the ABI approach were false positives because the CDU results were normal. The specificity of the ABI approach was determined to be 88.5%.

Felicio et al[15] in 711 subjects (group 1, 600 type 2 diabetes mellitus patients, symptomatic or not for peripheral arterial disease); (group 2, 61 type 2 diabetes mellitus patients newly diagnosed and drug naïve); and (group 3, 50 subjects without diabetes) recorded ankle-brachial index. In group 1 asymptomatic patient to peripheral arterial disease, they found abnormal ankle-brachial index in 49% (77/156) >50 years and 42% (16/38) <50 years. Considering drug-naïve patients, a peripheral arterial disease prevalence of 39% (24/61) was found; among these, 48% (13/27) were <50 years and 32% (11/34) were >50 years.

The shortcoming of the study is small sample size.

CONCLUSION

Authors found that most of the patients had ankle-brachial index between 0.9-1.3 in type II diabetes patients with peripheral vascular disease. Thus, it can be suggested that higher ankle brachial index (ABI) may be indicator of peripheral vascular disease (PVD) in patients with type 2 diabetes mellitus.

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