Risk Factors of Peripheral Vascular Disease in Diabetic Patients at Assiut University Hospitals

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Abstract

Background: Peripheral arterial disease (PAD) in diabetics is often asymptomatic as pain perception may be blunted by the presence of peripheral neuropathy. Those patients are more likely to present with an ischemic ulcer or gangrene and its screening modalities have not been uniformly agreed upon.

Objectives: To detect the baseline demographic, clinical and laboratory characteristics associated with peripheral arterial disease among diabetic patients to predict those at risk of PAD.

Patients and Methods: 200 type 2 diabetes mellitus patients attending the diabetic out-patient Clinic at Assiut University Hospital, subdivided according to their Ankle Brachial Index measurement (ABI) into 71 patients with abnormal ABI (Group I) and 129 patients with normal ABI (Group II). For all, full medical history, clinical examination, ABI by Doppler ultrasound, in addition to ECG, RBS, HbA1C and lipid profile were done. This Study was Approved by the Ethical Committee of Assiut University.

Results: Old age, smoking, long duration of hypertension, diabetes, and ischaemic heart disease, high systolic blood pressure, high random blood sugar, elevated haemoglobin A1c and high LDL-Cholesterol were significantly higher in (Group I) than (Group II) and positively correlated with PAD. Neuropathic pain, foot ulcer, bullae or intermittent claudication pain were significantly associated with peripheral arterial disease in diabetic patients.

Conclusions: Peripheral arterial disease is a common associate with diabetes mellitus. However, the presentation could be uncommon.

Key Words: Peripheral arterial disease – Diabetes – ABI.

Introduction

PERIPHERAL vascular disease (PVD) is commonly referred to as peripheral arterial disease (PAD). It refers to the vasculature obstruction of large arteries not within the coronary, aortic arch, or brain. PVD can result from atherosclerosis, inflammatory processes leading to stenosis, an embolism, or thrombus formation. It causes either acute or chronic ischemia. Often PAD is a term used to refer to atherosclerotic blockages found in the lower extremity [1].

The true prevalence of PAD in people with diabetes has been difficult to determine, as most patients are asymptomatic, many do not report their symptoms, screening modalities have not been uniformly agreed upon, and pain perception may be blunted by the presence of peripheral neuropathy. For these reasons, a patient with diabetes and PAD may be more likely to present with an ischemic ulcer or gangrene than a patient without diabetes [2].

Diagnosis of PAD is of clinical importance for two reasons. The first is to identify a patient who has a high risk of subsequent MI or stroke regardless of symptoms of PAD. The second is to elicit and treat symptoms of PAD, which may be associated with functional disability and limb loss [3].

In 2013, according to International Diabetes Federation, an estimated 381 million people had diabetes [4]. Its incidence is increasing rapidly, and by 2030, this number is estimated to almost double [5]. Diabetes mellitus is characterized by recurrent or persistent hyperglycemia, and is diagnosed by demonstrating any one of the following according to American Diabetes Association (ADA) 2010:

• Fasting plasma glucose level ≥ 7.0mmol/l (126 mg/dl).
• Plasma glucose ≥ 11.1mmol/l (200mg/dL) two hours after a 75gm oral glucose load as in a glucose tolerance test.
• Symptoms of hyperglycemia and casual plasma glucose ≥ 11.1mmol/l (200mg/dL).
• Glycated hemoglobin (Hb A1C) ≥ 6.5% [6].
The central pathological mechanism in macrovascular disease is the process of atherosclerosis, which leads to narrowing of arterial walls throughout the body. Atherosclerosis is thought to result from chronic inflammation and injury to the arterial wall in the peripheral or coronary vascular system. In response to endothelial injury and inflammation, oxidized lipids from LDL particles accumulate in the endothelial wall of arteries. The net result of the process is the formation of a lipid-rich atherosclerotic lesion with a fibrous cap. Rupture of this lesion leads to acute vascular infarction [7].

There is strong evidence of increased platelet adhesion and hypercoagulability in type 2 diabetes. Impaired nitric oxide generation and increased free radical formation in platelets, as well as altered calcium regulation, may promote platelet aggregation [8].

Peripheral arterial disease affects approximately 12 million people in the U.S.; approximately 20% to 30% of these patients have diabetes [3]. In studies using the ankle-brachial index (ABI), which is the preferred screening technique, the prevalence of PAD (defined as an ABI < 0.90) in diabetic individuals ranges from 20% to 30% [9-11].

The duration and severity of diabetes correlate with the incidence and extent of PAD [12]. In a prospective cohort study, Al-Delaimy et al., found a strong positive association between the duration of diabetes and the risk of developing PAD [13]. The association was particularly strong among men with hypertension or who were current smokers. Adler et al., estimated the prevalence of PAD up to 18 years after the diagnosis of diabetes in 4,987 subjects and the data showed a higher prevalence of PAD in those with longer duration of diabetes [14].

The degree of diabetic control is an independent risk factor for PAD; with every 1% increase in glycosylated hemoglobin, the risk of PAD has been shown to increase by 28% [15]. The risk of PAD is associated with advancing age and the presence of peripheral neuropathy [3].

Aim of the work:

To study the baseline demographic, clinical and laboratory characteristics associated with peripheral arterial disease among diabetic patients.

Patients and Methods

This study included 200 patients diagnosed as type 2 diabetes mellitus, according to WHO 1998 criteria, attending the diabetes out-patient clinic at Assiut University Hospital during the period 1st January 2013 till 31st December 2013. The patients were screened for PAD by performing Ankle Brachial Index (ABI) and according to the results, they were subdivided into two groups; Group I included those who have abnormal ABI and Group II included patients who have normal ABI.

Patients with type 1 diabetes mellitus and those with other causes of claudication pains which interfere with ABI measurement as: Hip arthritis, nerve root compression, spinal canal stenosis, venous claudication and patient with previous history of amputation were excluded.

All the studied groups were subjected to the followings:

1- Detailed history including age, sex, smoking, duration of diabetes, presence of hypertension and its duration, symptoms of coronary artery disease or cerebrovascular stroke. In addition, symptoms of diabetic neuropathy (numbness, tingling, burning sensation), and symptoms of peripheral arterial disease (claudication, rest pain, cold sensation) were reported.

2- Thorough clinical examination including blood pressure measurement and foot examination.

3- Ankle brachial index measurement (ABI): The ABI was measured using a blood pressure cuff and a Doppler ultrasound sensor. The Doppler probe was used to determine systolic blood pressure in both upper and lower limbs. The ABI for each leg was calculated as the ratio of the higher of the two systolic pressures (posterior tibial or dorsalis pedis) in the leg and the higher systolic pressure of the corresponding arm. An ABI < 0.9 in either leg was considered abnormal, suggesting peripheral arterial disease; progressively lower ABI values indicate more severe obstruction [31].

4- In addition, all the studied patients had ECG, random blood sugar, HbA1C, and lipid profile.

Ethical consideration: Verbal or written consent form before starting the study. Confidentiality was assured for all patients and this study was approved by the ethical committee of Assiut University.

Statistical analysis: Analysis of the data was performed and statistical analysis using the SPSS software (version 16). Descriptive statistics: Mean, standard deviation and percentages were calculated. Test of significances: Student t-test was used to compare the mean difference between the two groups and Chi-square test and was used to compare the difference in proportion between the two groups. A significant p-value was considered when it is <0.05.
**Results**

The study population included 200 diabetic patients, 48% males, with mean age 61.1 ±6.5 years. The following table showed the demographic, clinical and laboratory criteria of the studied patients.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Demographic data:</strong></td>
<td></td>
</tr>
<tr>
<td>Age (mean±SD) in years</td>
<td>61.5±6.5</td>
</tr>
<tr>
<td>Sex, Male (%)</td>
<td>96 (48)</td>
</tr>
<tr>
<td>Smoking (%)</td>
<td>58 (29)</td>
</tr>
<tr>
<td><strong>Clinical data:</strong></td>
<td></td>
</tr>
<tr>
<td>Hypertension (%)</td>
<td>110 (55)</td>
</tr>
<tr>
<td>Duration of hypertension (mean±SD) in years</td>
<td>7.2±4.5</td>
</tr>
<tr>
<td>Duration of diabetes (mean±SD) in years</td>
<td>8.8±6.2</td>
</tr>
<tr>
<td>Ischemic heart disease (%)</td>
<td>87 (43.5)</td>
</tr>
<tr>
<td>Systolic blood pressure (mean±SD) in mmHg</td>
<td>129.6±20.7</td>
</tr>
<tr>
<td>Diastolic blood pressure (mean±SD) in mmHg</td>
<td>84.8±12.2</td>
</tr>
<tr>
<td><strong>Laboratory data:</strong></td>
<td></td>
</tr>
<tr>
<td>Random blood sugar (mean±SD) in mg/dL</td>
<td>289.1±98.3</td>
</tr>
<tr>
<td>Haemoglobin A1c (mean±SD) in %</td>
<td>9.5±2.1</td>
</tr>
<tr>
<td>Serum Cholesterol (mean±SD) in mg/dL</td>
<td>210.4±52.3</td>
</tr>
<tr>
<td>Triglycerides (mean±SD) in mg/dL</td>
<td>171.4±90.8</td>
</tr>
<tr>
<td>HDL-Cholesterol (mean±SD) in mg/dL</td>
<td>39.1±11.4</td>
</tr>
<tr>
<td>LDL-Cholesterol (mean±SD) in mg/dL</td>
<td>125.9±44.5</td>
</tr>
</tbody>
</table>

About two thirds (130 patients, 65%) of the studied patients were complaining of neuropathic pain in the form of numbers, tingling or burning sensation, while one quarter (51 patients, 25.5%) remained asymptomatic, Fig. (1).

![Fig. (1): Presentation of the studied patients.](image)

**According to the ABI, the studied patients were divided into two groups:**
- Group I: Included 71 patients (35.5%) with abnormal ABI (<0.9).
- Group II: Included 129 patients (64.5%) with normal ABI (>0.9).

The following table shows the demographic and clinical characteristics of both groups.

**Table (2): Demographic, clinical and laboratory characteristics of the diabetic patients according to the presence or absence of PAD.**

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Group I Abnormal ABI (71, 35.5%)</th>
<th>Group II Normal ABI (129, 64.5%)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (mean±SD)</td>
<td>63.0±7.2</td>
<td>60.1±5.8</td>
<td>0.002</td>
</tr>
<tr>
<td>Sex (Male, %)</td>
<td>34 (47.9)</td>
<td>62 (48.1)</td>
<td>0.9</td>
</tr>
<tr>
<td>Smoking (%)</td>
<td>37 (52.1)</td>
<td>21 (16.3)</td>
<td>0.001</td>
</tr>
<tr>
<td>Hypertension (%)</td>
<td>43 (60.6)</td>
<td>67 (51.9)</td>
<td>0.2</td>
</tr>
<tr>
<td>Duration of hypertension (mean±SD) in years</td>
<td>4.8±3.7</td>
<td>2.4±1.2</td>
<td>0.001</td>
</tr>
<tr>
<td>Duration of diabetes (mean±SD) in years</td>
<td>5.1±2.7</td>
<td>3.7±1.4</td>
<td>0.001</td>
</tr>
<tr>
<td>Ischaemic heart disease (%)</td>
<td>46 (64.8)</td>
<td>41 (31.8)</td>
<td>0.001</td>
</tr>
<tr>
<td>Systolic blood pressure (mean±SD) in mmHg</td>
<td>133.2±21.1</td>
<td>127.2±20.3</td>
<td>0.05</td>
</tr>
<tr>
<td>Diastolic blood pressure (mean±SD) in mmHg</td>
<td>86.3±11.2</td>
<td>84.0±12.6</td>
<td>0.19</td>
</tr>
<tr>
<td>Random blood sugar (mean±SD) in mg/dL</td>
<td>308.0±83.3</td>
<td>278.6±104.5</td>
<td>0.02</td>
</tr>
<tr>
<td>Haemoglobin A1c (mean±SD) in %</td>
<td>9.8±1.8</td>
<td>9.3±2.2</td>
<td>0.04</td>
</tr>
<tr>
<td>Serum Cholesterol (mean±SD) in mg/dL</td>
<td>217.9±53.0</td>
<td>206.3±51.7</td>
<td>0.2</td>
</tr>
<tr>
<td>Triglycerides (mean±SD) in mg/dL</td>
<td>157.1±66.7</td>
<td>179.2±101.1</td>
<td>0.3</td>
</tr>
<tr>
<td>HDL-Cholesterol (mean±SD) in mg/dL</td>
<td>37.6±10.2</td>
<td>40.0±11.9</td>
<td>0.09</td>
</tr>
<tr>
<td>LDL-Cholesterol (mean±SD) in mg/dL</td>
<td>136.0±40.1</td>
<td>120.3±45.9</td>
<td>0.01</td>
</tr>
</tbody>
</table>

Furthermore, the presence of neuropathic pain, foot ulcer, bullae or intermittent claudication pain were significantly associated with peripheral arterial disease in diabetic patients.

**Table (3): Association of peripheral neuropathy with PAD.**

<table>
<thead>
<tr>
<th>Complaint</th>
<th>Group I Abnormal ABI (71, 35.5%)</th>
<th>Group II Normal ABI (129, 64.5%)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neuropathic pain (%)</td>
<td>60 (84.5)</td>
<td>70 (55.0)</td>
<td>0.001</td>
</tr>
<tr>
<td>Ulcer (%)</td>
<td>6 (8.5)</td>
<td>8 (6.2)</td>
<td>0.04</td>
</tr>
<tr>
<td>Bullae (%)</td>
<td>2 (2.8)</td>
<td>1 (0.7)</td>
<td>0.001</td>
</tr>
<tr>
<td>Intermittent claudication pain (%)</td>
<td>2 (2.8)</td>
<td>0 (0.0)</td>
<td></td>
</tr>
<tr>
<td>Asymptomatic (%)</td>
<td>1 (1.4)</td>
<td>50 (38.8)</td>
<td>0.001</td>
</tr>
</tbody>
</table>

It was found that PAD in the studied group were significantly demonstrated in patients with smoking, prolonged duration of diabetes, HTN, poorly controlled metabolic profile in the form of high blood glucose level, high HBA1c, in addition to high LDL and low HDL.
Finally, the above Forest-box plot showed that advanced age (p<0.001), smoking (p<0.001), prolonged duration of diabetes mellitus (p<0.007), prolonged duration of hypertension (p<0.001), presence of ischemic heart disease (p<0.001), high systolic blood pressure (p<0.05), high blood sugar level (p<0.02), high glycated haemoglobin level (p<0.04) and high LDL level (p<0.01) were associated with PAD among our diabetic patients.

Discussion

Peripheral arterial disease (PAD) is characterized by atherosclerotic occlusive disease of the lower extremities and is a marker for atherothrombotic disease in other vascular beds [16]. It is a major macrovascular complication of diabetes mellitus [17]. Because of the unique involvement of distal pattern of vessels and variable association with neuropathy, peripheral arterial disease in diabetics presents late, having already developed limb threatening ischaemia [16].

It has been reported that diabetes is associated with a two-to four-fold increase in the incidence of PAD compared with that in non-diabetic subjects [18]. Among the U.S. adult population >40 years of age, the prevalence of PAD is 9.5% in diabetic subjects [19]. Moreover, it is well known that people with neuropathy more frequently present with silent PVD [20]. Neuropathy has been associated with poor peripheral arterial reconstruction outcome [21].

In the UKPDS (United Kingdom Prospective Diabetes Study), symptoms of claudication were reported in only 23% of the patients with ABI <0.8, indicating that for each patient with claudication there are 3 patients with silent PVD [22]. In our studied patient groups, PAD as detected by abnormal ABI was evident in 71 patients (35.5%). However, only two patients (2.8%) presented with claudication pain. Both symptomatic and asymptomatic PAD are associated with a significantly increased risk for cardiovascular mortality [23]. It has been reported that patients with PAD, even in the absence of a history of myocardial infarction or ischemic stroke, have approximately the same relative risk of death from cardiovascular causes as do patients with a history of coronary or cerebrovascular disease [24]. Accordingly, the American Diabetes Association (ADA) consensus statement recommends that ABI should be performed as a screening measure in all diabetic individuals >50 years of age [25].

Ankle-brachial pressure index is a noninvasive testing method which greatly increases the accuracy of clinical diagnosis for the presence of arterial disease and serves as an objective index to follow the natural history of the disease. It is a simple tool that can be done in the office setting [26]. Ankle-brachial pressure index is the most efficient, objective, and practical means of documenting presence and severity of peripheral arterial disease particularly in the absence of symptoms suggestive of PAD [27].

The ankle-brachial index (ABI), defined as the ratio between the systolic arterial pressure at the ankle arteries and that in the left or right brachial artery [28]. This test (also occasionally called the arm-ankle index) requires a blood pressure cuff and a handheld continuous-wave 5- to 10-MHz Doppler probe. The ABI is calculated for each leg by dividing the highest ankle systolic pressure by the highest brachial systolic pressure. In general, the ankle pressure will exceed the brachial pressure by 10 to 15 mmHg in healthy individuals as a result of higher peripheral resistance at the ankles. PAD is defined as an ABI < 0.9 [29]. This measurement is valuable for early detection of PAD and is also an indicator of generalized atherosclerosis [30].

According to the published practice guidelines for PAD management from the American College of Cardiology and the American Heart Association (ACC/AHA), ABI ratios of 1.00 to 1.29 were considered normal. An ABI of 0.90 or less has a sensitivity of 95% and a specificity of 100%, relative to contrast angiography, for detecting a stenotic lesion of at least 50% in the limb [31].

The American Diabetes Association suggests that a screening ABI be performed for old age diabetic patients or those who are younger than 50 years and have additional risk factors for PAD, such as smoking, hypertension, hyperlipidemia, or diabetes of long duration (>10 years) [3].
In our study, we tried to build up a profile for diabetic patients who were at risk for developing PAD. We identified his demographic, clinical and some laboratory features. This would help in early detection of PAD among diabetic patients, thus minimizing or avoiding its deleterious complications such as limb amputation.

We reported a prevalence of PAD to be 35.5% among our study population. This means that among every three diabetic patients, there is one with PAD. This result was nearly in agreement with what reported by Ashok et al., [32] and Marinelli et al., [33] who found that 33% of diabetic patients had PAD while a low prevalence (14.4%) was observed by Agarwal et al., [34] in their study.

This study revealed that females had slightly higher prevalence of PAD than males but without a statistical significant difference. This result is consistent with that of Agarwal et al., [34] and Tavintharan et al., [35] who report that the women having a slightly higher prevalence, as compared to men, this finding may be explained on the basis of some females are on contraceptive bills which may attributed to these results. In contrary to our results, Ji Hee et al., [36] found that the prevalence of PAD in women is usually lower than that in men. This may be explained as their studied female patients were less than 60 years old while in ours most of studied female were more than 60 years old. It has been suggested that onset of PAD in women usually starts 10 to 20 years later than that in men [37].

This study revealed that with increasing age the prevalence of PAD increased. This was in concordance with Lekshmi et al., [38] who found that the prevalence of peripheral arterial disease was positively associated with increasing age in diabetic patients and also with Ashok et al., [32] study who reported that 13.6% of patients with abnormal ABIs were in the age group of 40-49 years, 34.8% belonged to the age group of 50-59 years and 51.6% of them were older patients in the age group 60 years and above.

The link between smoking and PAD has been validated long time ago. The first major longitudinal association between smoking and PAD was established in the United States Framingham study [39]. Since that time, research has consistently revealed that smoking is the leading modifiable risk factor for PAD. For example, the National Health and Nutrition Examination Survey (1999-2000) reported that smoking accounted for the majority of PAD diagnoses [40]. In 2013, a group researchers from Glasgow published data from over 50 studies on the association between PAD and smoking, reporting that smoking more than doubled an individual’s risk of developing PAD [41].

This study demonstrated that there was a statistically significant relationship between smoking and PAD. This has been reported in many previous studies, such as Agarwal et al., [34] and Norman et al., [42] who found a higher prevalence of smoking in patients with PAD than those without.

The result of this study showed that mean systolic blood pressure was significantly higher in patient with abnormal ABI as compared with those with normal ABI. This has been reported in many other studies as Agarwal et al., [34], Kannel et al., [43], Mac Gregor et al., [44] and Uusitupa et al., [45]. These findings suggested that smoking and high systolic blood pressure may be particularly important in the development of PAD in diabetic populations.

As regard the association of coronary artery disease and low ABI, this study demonstrated that there was positive relationship between ischemic change in ECG (inverted T wave and pathological Q wave) with PAD. This result had been previously confirmed by Agarwal et al., [34] who found a 52% prevalence of coronary artery disease in PAD patients compared to 24% in non-PAD patients. Krishaswamy et al., [46] also found that PAD was common in elderly South Indian patients with coronary artery disease. But this isn’t the situation with Premalatha et al., [47] who reported that coronary artery disease was not found to be significantly higher in those with PAD in their study.

In our study neuropathic symptoms were the hallmark presentation of our PAD patients. 84.5% of our PAD patients had numbness, tingling and burning sensation without frank symptoms of ischemia (intermittent claudication, walking pain and rest pain). The classical symptoms of PAD were only present in less than 3% of patients. Hirsch et al., [48] conducted a large-scale study across 350 primary care centers in the United States, only 8.7% patients in the PAD-only group had classical symptoms of PAD. On the other hand, Ashok et al., [32] found that more than 60% of his PAD populations were symptomatic with symptoms of claudication, rest pain, or Leriche syndrome. We could explain the conflict in these results that most of our population had neuropathic symptoms that may mask or overwhelmed the classical symptoms of PAD.

Our results showed that mean HbA1c was significantly increased in patients with PAD. This is
in agreement with Agarwal et al., [34] who found that mean HbA 1c was higher in patients with PAD when compared to those without PAD. This has been confirmed by several authors. Janka et al., [49] and Walter et al., [50] found inferior glycemic control to be a predictor of PAD.

This study showed that there was no statistically significant difference in mean of total cholesterol, triglycerides and HDL of patients with abnormal ABI when compared with patient with normal ABI. The same was reported by Agarwal et al., [34] and Ji Hee et al., [36]. On the other side, this study found that there was a statistically significant increase in mean LDL of patients with abnormal ABI when compared to patients with normal ABI. While Agarwal et al., [34] and Ji Hee et al., [36] found no significant difference in LDL cholesterol between the two groups. The conflict between various studies may be a pure statistical bias as in most of these studies including ours, the history of cholesterol-lowering drugs intake is deficient.

Finally, we could draw a profile picture for that diabetic patient who is liable for PAD. It demonstrates an old age patient, smoker with long duration of diabetes, hypertension and ischaemic heart disease. The patient mostly complains of neuropathic pains such as numbness or tingling sensation. On examination, the patient has high systolic blood pressure. The laboratory investigations show raised random blood sugar, HbA1c level and LDL.

This is nearly similar to the result observed by Norman et al., [42] who found that old age, long duration of diabetes and higher systolic blood pressure were significant predictors of PAD among diabetic patients.

Conclusions:

Peripheral arterial disease is a common associate with diabetes mellitus. The presentation may be from the classical arterial insufficiency complaints mostly due to the presence of diabetic neuropathy. Ankle brachial index is a simple bedside non-invasive tool that helps to early diagnose PAD among diabetic patients hence avoiding its disastrous complications.

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Risk Factors of Peripheral Vascular Disease in Diabetic Patients


الاختصار العربي

أماراض الشرايين الطرفية في مرضى السكري غالبا ما يصعب تحديده حيث أن معظم المرضى لا يبلغون من أعراضهم. كما أن ضعف الإحساس بالألم من جراء وجود العضلات الصغيرة من أم العوامل. وكذلك تظريف القلب لم يتم التحقق عليها بشكل محدد. يؤدى قصور الدورة الدموية الطرفية إلى عرق متوسط (أول) في المشي بقلء التوقف عن الحركة) والشعور بآلام وآلام التأخر في التناسها ولد. والغثيان في نهاية المطاف إلى البدن.

وقد استهدفت هذه الدراسة تقييم مرضى السكري من النوع الثاني الذين يحتاجوا العوامل المؤدية إلى مرض قصور الشرايين الطرفية خاصة في غياب المرض.

المريض وطريقة البحث: أُشتملت هذه الدراسة على 200 مريض فينون من داء السكري من النوع الثاني حضروا العيادات الخارجية ليستقبلوا أسبابًا بالأسام التربويين عموديا وجنسيا مع المرضى كمجموعة ضابة. تم تقسيم المرضى بعد ذلك إلى مجموعتين مركز (100 مريض) لديهم قصور في الشرايين الطرفية والأخرى (129 مريض) ليس لديهم قصور في الشرايين الطرفية للمقارنة بين العوامل المؤدية إلى حدوث المرض. وقد خضع جميع المرضى والجنس الضابط في هذه الدراسة إلى اثنين: التاريخ الطبي الكامل، الفحص السريري قياس مؤشر الساعد والضغط بواسطة دوبلر بالموجات فوق الصوتية، بالإضافة إلى رسم قلب نسبة سكر عشاوي، والم sailor المعلومات السجلية ومستوى القهوة، ثم تم تشخيص وجود قصور في الشرايين الطرفية بناءً على قياس مؤشر الساعد والضغط بنسبة أقل من أو تساوي 0.09.

النتائج: نجد أن الشريحة، والتحدي، والملاءة الطويلة من ارتفاع ضغط الدم وارتفاع الهموغلوبين السكري أعلى بكثير في المرضى الذين لديهم قصور في LDL وارتفاع الكولسترول الشريان الطرفية وكذلك أم الاعتقال العمودي، ودرجة القدم، الفجوات أو أم العجز المقطعية ارتباط بشكل كبير مع مرضى الشريان الطرفية لدى مرضى السكري وخاصة الذين لديهم عوامل خطر أخرى.

الخلاصة: أمراض الشرايين الطرفية لها ارتباط وثيق مع مرض السكري ويمكن للمرضى أن يكونون من غير المكلف ونظرا لانتشار مرض قصور الشرايين الطرفية في المرضى الذين يعانون من مرض السكري إذا ينبغي إجراء فحص مؤشر الكاحل والضغط في المرضى بصورة دورية وخاصة الذين لديهم عوامل خطر أخرى.