Prevalence and Pattern of Peripheral Arterial Disease among Diabetic Individual in Al-jouf Region

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Abstract:
Introduction: Peripheral arterial disease (PAD) is a common vascular disorder in Saudi Arabia where diabetes mellitus, hypertension and smoking are common risks. As this disease carries significant morbidity and mortality. **Objective:** This study aimed to screen for PAD in the community among diabetics, determining its prevalence, severity and associated risk factors. **Patients and Methods:** This study was done at 3 primary health care centers (PHCCs) at Domat Aljandal and two centers at Quraiat, Aljouf region. The included patients were 149, all were diabetic, 114 males and 35 females. The sociodemographic data, special habits, symptoms of peripheral ischemia and biochemical profiles [including blood lipids and fasting sugar] were extracted from the medical files and asked during interview. After clinical assessment, the ankle brachial index (ABI) was bilaterally determined on supine position using 8 MHz vascular Doppler. PAD was diagnosed if an ABI was <0.9. **Results:** The means of age, duration of diabetes and body mass index were 59.2, 9.13 years and 30.07 kg/m^2 respectively. Of all, 47% were smokers and 56.7% had hypertension. Out of the 149 studied patients, 21 (14.1%) were previously diagnosed to have PAD and had undergone angioplasty. Symptoms of PAD were found only in 10 of these 21 and none of the remaining 128. By the ABI measurement, PAD was diagnosed in 48 patients (32.2%), being unilateral in 27 and bilateral in 21 patients. Most of PADs (79.2%) were mild to moderate severity while it was severe 20.8%. The frequency of PAD was non-significantly more among females, patients with co-morbid hypertension, patients on oral hypoglycemic drugs and smokers (P>0.05 for each). The frequency of low ABI was significantly more frequent among patients with history of vascular surgery (P=0.001). Patients with PAD had significantly higher mean ages (P=0.048) and non- significantly higher mean of duration of DM. If patients known to have PAD are excluded, new diagnosis of PAD was made in 30 of 128 naïve patients (23.4%). **Conclusion:** The prevalence of PAD in diabetic individuals in the community is high, probably due to the high frequency of other risks such as smoking and hypertension. These finding warrants activation of the nationwide screening program for prevention of cardiovascular diseases to decrease the morbidity and mortality of this diabetic complication.
Keywords: Peripheral Arterial Disease, Diabetic Individual, Al-jouf.

Introduction

The peripheral arterial disease (PAD) is a pathological entity related toatherosclerotic and thromboembolic processes affecting the aorta, visceral branches and the arteries of the lower limbs [1-4]. It is caused in most of cases by atherosclerosis, which leads to the development of narrowing and/ or occlusions in the major arteries of the lower limbs movement [4,5]. Significant narrowing leads to ischemia of tissues supplied by the affected artery, hence the signs and symptoms of the disease. The most common symptom of PAD is intermittent claudication (IC), whose prevalence is about 3% in patients with 40 years old that increases with age [3,4].

Identification of risk factors is extremely important for the early diagnosis and treatment of PAD to slow reduced functional capacity and improve quality of life. Moreover, PAD has been related to an increase in cardiovascular morbidity and mortality, especially after acute myocardial infarction and/or stroke [4,6,7]. Basic clinical examination is usually based on symptoms such as IC, pain at rest and abnormal signs such as decreased peripheral pulses, ischemic ulceration and gangrene. PAD can be diagnosed in most cases by measuring the ankle-brachial index [3,6]. Risk factors are cigarette smoking, diabetes mellitus, high blood pressure. About 3% of people under age 60 have PAD, and so do as many as 20% of those over age 70. The disease is more common among males. However, later in life, higher proportions of women are affected [8]. Management of PAD is a two-step-process. First, reduction of the cardiovascular risk reduction through vascular risk factor modification and anti-platelet therapy and

second, symptom-guided therapy including supervised exercise, pharmacological interventions and revascularization procedures, when needed [9]. Diabetes mellitus which is a common disease in KSA is a major risk factor for peripheral arterial disease through acceleration of the macrovascular changes [10]. Meanwhile due to change in the life style of Saudi citizens, hypertension is a common disease.

Objective:

This study aimed to determine the prevalence of PAD in the community among diabetic patients so as to detect early disease before it manifest clinically. The detailed objectives were to determine the prevalence of PAD among individuals with type 2 diabetes mellitus, to assess its severity and determine associated risk factors.

Patients and Methods

This community-based cross-sectional study was done in 5 primary health care centers, three at Domat Aljandal and two at Quraiat, Aljouf region. The study was approved by the committee of research and ethics of the college of medicine. Patients studied were 149, 35 females and 114 males, their age ranged 37 to 84 years and all had diabetes mellitus. **Study procedures:** After explaining the objectives and benefits of the study to eligible patients, the approved ones were interviewed regarding their sociodemographic data, special habits including smoking and symptoms suggestive of PAD. Their blood pressure was measured, and the ankle brachial index was measured during supine position using 8 MHz vascular Doppler. The ankle-brachial index (ABI) is an efficient tool for objectively documenting the presence of lower-extremity peripheral arterial disease (PAD) [11,12]. It is a simple, reproducible, and cost-effective assessment that can be used to detect lower-extremity arterial stenosis in the primary care setting. An ABI less than 0.9 has been shown to have a sensitivity of 90% and a specificity of 98% for detecting a lower-extremity stenosis of greater than 50% [13,14].

Statistics and Analysis:

Statistics was done by using SPSS version 18. Numeric variables were represented as mean (± standard deviation), while non-numeric data was presented as frequency and percentage. Comparison between subgroups was done accordingly. A P value <0.05 was considered statistically significant. Results were presented as tables and graphs.

Results:

In this study, 149 patients were included 114 males and 35 females. Their age ranged 37-84 years with a mean of 59.2 years. All were diabetic and the duration of diabetes ranged between 1 to 31 years (mean = 9.13 years). Of all patients, insulin was used to control blood sugar in 117 (78.5%). Hypertension was present in 85 patients (56.7%). Their body mass index ranged between 20.5 and 45.8 kg/m^2, with a mean of 30.07. Current smoking was present in 70 (47%). Peripheral arterial disease was present in 48 patients (32.2%), being bilateral in 21 (14.1%) and unilateral in 27 (18.1%). The arterial obstruction was mild to moderate in 39 of 48 (81.2%) and severe in 9 (18.8%). History of vascular surgery (angioplasty was found in 21 (14.1%).

Peripheral arterial disease was more frequent among females 14/35 (40%) than males 34/114 (29.8%) with no statistically significant difference (P=0.303). Also, PAD was more frequent among diabetic patients with co-morbid hypertension 37.6% (32/85) compared to 25 (16/64) diabetics without hypertension (P>0.05), and more frequent patients on oral anti-diabetic drugs compared to insulin (38.7% v.30.8%, P>0.05). PAD was more frequent among non-insulin users compared to others (38.7 vs. 30.8%, P=0.389). PAD was significantly more frequent among patients with history of angioplasty compared to those without (85.7% vs. 23.4%, P=0.001). Meanwhile, the prevalence of insulin users was significantly higher among females than males (94.3% vs. 74.3%, P=0.009). The prevalence of PAD was more frequent in smokers than non-smokers (37.1 vs. 27.8%), with no statistically significant difference. In this study, the mean ages of patients with PAD was significantly higher compared to without PAD (61.67±9.34 vs. 58.05±10.78, P=0.048). Meanwhile, the mean duration of diabetes mellitus was higher among PAD group compared to patients with no PAD (9.54 vs. 8.94), however, the difference showed no statistical significance. The mean values of ABI were significantly higher in patients with PAD compared to patients with no PAD. The mean values of lipid profile and FBS showed no statistically significant difference between patients with and without PAD (Table 3).

Table 1: Sociodemographic and clinical data of the studied population (n=149)

Age range and mean (years)	37-84 (59/1±10.44)
M:F	114:35
Duration of DM range and mean (years)	1-31(9.13±6.36)
Insulin: oral therapy (N)	117:32
Co-morbid hypertension (n & %)	85 (56.7%)
BMI range and mean (Kg/m^2)	20.5-45.8 (30.26±6.62)
Current smokers (n & %)	70 (47%)
Past history of lower limb angioplasty(n & %)	21 (14.1%)
PAD (n & %)	48 (32.2%)
Unilateral: bilateral PAD (n)	27:21
PAD mild to moderate: severe (n)	38:10

Table 2: Relation of PAD with some variables among the studied population (n=149)

	PAD (n & %)	P value
Males (n=114)	34 (29.8)	>0.05
Females (n=35)	14 (40)	
Diabetes (n=64)	16 (25)	>0.05
Diabetes and Hypertension (n=84)	32(37.6)	
Insulin (n=117)	36 (30.8)	>0.05
oral hypoglycemic(n=31)	31 (38.7)	
History of vascular surgery (n=21)	18 (85.7)	0.0.001
No history of vascular surgery (n=128)	30 (23.4)	
Smokers (n=70)	26 (37.1)	>0.05
Nonsmokers(n=79)	22 (27.8)	

Table 3: Mean differences in patients with PAD regarding age, BMI, duration of DM and Biochemical Profiles among the studied population (n=149)

		Mean	Std. Deviation	P value
Age	PAD	61.67	9.354	0.048
	No PAD	58.05	10.781	
Duration of DM	PAD	9.54	6.943	0.592
	No PAD	8.94	6.094	
SBP	PAD	150.27	24.181	0.137
	No PAD	144.23	22.53	
DBP	PAD	79.06	13.68	0.682
	No PAD	79.92	11.02	
BMI	PAD	29.29	5.63	0.218
	No PAD	30.72	7.02	
ABI Lt	PAD	0.76	0.34	0.001
	No PAD	1.08	0.21	
ABI Rt	PAD	0.76	0.36	0.001
	No PAD	1.08	0.22	
Cholesterol	PAD	4.77	1.12	0.108
	No PAD	4.443	1.17	
FBS	PAD	186.73	68.05	0.576
	No PAD	180.17	66.25	
HDL	PAD	0.9	0.17	0.185
	No PAD	0.957	0.24	

Discussion:

This study aimed to determine the prevalence and pattern of PAD among diabetic patients regularly attending the PHCCs at Aljouf region. The prevalence of PAD was high (32.2%), being bilateral in 21 of 48 patients and severe in 10. PAD was significantly more frequent in patients with established diagnosis who previously had angioplasty. Other non-significant risks included female gender, co-morbid hypertension, oral hypoglycemic drugs

and smoking. The study also emphasized the importance of old age as an important risk factor. The results revealed by this work are an important warning message to health care providers and decision makers to the magnitude of PAD among diabetic patients at the level of PHCCs and community. Among asymptomatic 128 diabetic attendants, PAD was newly diagnosed in 23.4%. The high prevalence of PAD could be explained by the inclusion of patients with type 2 diabetes mellitus who had high frequency of co-morbid hypertension and smoking. The prevalence of PAD in this study is higher than 11.7% of 471 attendants of PHCC as reported by Al-Sheikh and colleagues in 2007 [15]. In their study, DM was present in 50.1% and most of their patients were asymptomatic. In our study, only 10 of 21 previously diagnosed to have PAD and undergone angioplasty had symptoms while the remaining 128 patients showed no symptoms as revealed from their medical records or interview in the PHCCs. Among the 21 patients previously diagnosed as having PAD, low ABI was found in 18 (85.7%). If such patients are excluded, the prevalence of PAD among undiagnosed cohort would be 23.4%, all were asymptomatic. This prevalence is close to 23.1% among 598 Saudi diabetic patients as reported by Alzahrani and colleagues in 2014 [16]. However, the later study was hospital-based. From many studies done in Saudi Arabia, the prevalence of PAD is increasing. If patients with PAD disease are not identified and managed, this cardiovascular complication of diabetes will represent a significant pressure on the health system in the near future. The absence of symptoms in our cohort of patients with PAD, could be either due to incomplete clinical assessment of diabetic patients or lack of recording data in their files. Patients with PAD whether manifest or non-manifest are at significant risk for increased morbidity and mortality due to complications of atherosclerosis as stroke and myocardial infarction, lower limb gangrene, ulceration and amputation [17,19].

Owing to the dramatic changes in lifestyle and diet in past decades, it is estimated that Saudi Arabia has 3.4 million cases of diabetes in 2015 [10]. The Ministry of Health has implemented many national programs to for prevention of cardiovascular diseases and "The Crown's Health Prevention Program" for early detection and control of non-communicable diseases in the Kingdom. In view of our results, there is an urgent need to activate these efforts, increase awareness of health care providers to identify individuals with high PAD risk thus preventing onset of PAD particularly among patients with diabetes.

Study limitations:
Inclusion of 21 patients previously diagnosed with PAD, however, the prevalence of PAD was still high after their exclusion from the total sample.
The frequency of females was low due to social limitation and absence of female colleague in the research team.

In conclusion:
The prevalence of PAD is high in PHCCs at Aljouf region. This could be explained by the high frequency of co-morbid hypertension and smoking. The fact that most of our patients had no symptoms of PAD emphasized the importance of frequent screening for arterial patency particularly in diabetic.

Recommendation:
Improve recording of patients in their file. Physicians at the PHCCs should follow guidelines during their management of diabetics and high-risk patients and provide patients with health education to modify risk factors of PAD.
Provision of vascular Doppler to physicians in the PHCC as a sensitive, cheap, non-invasive tool for diagnosis of PAD.

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