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Research Article

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Ankle-brachial index in the study of the prevalence of peripheral artery disease in the Uzbek population

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Abstract

The available information on the epidemiology of peripheral artery disease (PAD) is fragmentary and contradictory and does not give a complete picture of the prevalence of this process in different regions, among different age and ethnic groups. There is no data on the epidemiology of PAD of the lower extremities among the indigenous people from 45 to 90 years of the Khorezm region (Uzbekistan). The use of ABI for screening of PAD is especially justified in elderly patients with atherosclerosis or who have a high cardiovascular risk, which is important for secondary prevention.

Keywords: Ankle-brachial index; Khorezm region; Peripheral artery disease; Prevalence

Introduction

Peripheral arterial disease (PAD) is a manifestation of systemic atherosclerosis and associated [1-4] with an increased risk of cardiovascular disease and death [5-16]. PAD is strongly associated with future cardiovascular events, even among people with PAD with no clinically evident cardiovascular disease [1-6]. Low ABI (≤ 0.90) was associated with an increased risk of adult mortality ≥ 65 [13,10]. Only 1/3 of patients with PAD have a typical intermittent claudication, 2/3 of the patients are asymptomatic. Data suggest that the prevalence among men aged > 65 to 74 years is 10.3% to 12.1% in the general population in high-income countries [7] and that prevalence increases significantly with age [3,5,6,10,12]. Despite this, the disease remains undiagnosed for a long time, and only one third of these patients are identified [8, 9]. The available information on the prevalence of PAD is fragmentary and contradictory, which does not give a complete picture of the prevalence of this process in different regions, among different age

and ethnic groups. The prevalence of PAD in the general population of the Khorezm region is not exactly known, primarily due to the lack of data on the prevalence of asymptomatic PAD.

This study is aimed at assessing the diagnostic value of ABI among adult residents of the Khorezm region aged 45-90 years.

Materials and Methods

502 indigenous subjects of the Khorezm region of Uzbekistan from 45 to 90 years old were included in the cross-sectional population survey (Table 1). Clinical-anamnestic, demographic and instrumental data were collected at the beginning of the study. In addition to examination, palpation and auscultation, the basic vascular examination includes Doppler ultrasound measurement of pressure in the supine position and calculation of the ankle-brachial index. The systolic pressure of A. dorsalis pedis, A. tibialis posterior was measured on an ultrasound machine using a linear transducer (5-10 MHz). An ABI was calculated for each leg as the ratio of systolic blood pressure on the ankle (the highest SBP obtained on A. dorsalis pedis or A. tibialis posterior) and the A. brachialis. PAD was defined as ABI <0.9 [14]. If PAD

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was diagnosed, an additional questionnaire including history of earlier cardiovascular events (stroke, angina pectoris, and myocardial infarction) was administered, and cardiovascular preventive actions were taken.

№	area of residence	Age/sex n/%	45-59 лет		60-74 лет		75-90 лет	
			male n	female n	male n	female n	male n	female n
1.	Urgench city	52 (10,4%)	6	5	19	13	5	4
2.	Urgench district	51 (10,0%)	5	6	17	14	5	4
3.	Honka District	45 (9,0%)	5	4	16	12	4	4
4.	Bogot district	47 (9,4%)	5	4	17	13	5	3
5.	Khazorasp district	44 (8,8%)	5	3	16	12	4	4
6.	Yangiariq district	46 (9,0%)	5	4	16	14	4	3
7.	Khiva district	42 (8,4%)	4	3	16	12	4	3
8.	Kushkupir district	44 (8,8%)	5	4	17	11	4	3
9.	Shavat district	45 (9,0%)	5	4	16	13	4	3
10.	Yangibozor district	42 (8,4%)	5	4	15	12	3	3
11.	Gurlan district	44 (8,8%)	5	4	16	13	3	3
Total			55	45	181	139	45	37
-			502 (male/female= 281/221)					

Table 1: Distribution of all studied subjects, depending on the sex, age and area of residence.

Results

Among the 502 subjects examined, 149 (29.7%) had PAD (**Table 2**). The mean age was 69.7±6.4 years. The 149 participants with PAD differed markedly in their baseline parameters compared with participants with no PAD. Those with PAD were older and more often current smokers (6.7% vs 2.3%). A higher proportion of participants with PAD was diagnosed with hypertension and diabetes. The only variable that was not significantly different for the two groups was BMI. The mean BMI was 27.6 kg / m²±9.7 kg / m². 32 patients with ABI< 0.9 (21.5%) and 69 patients with normal values of ABI (19.5%) ($p < 0.005$) had diagnosed hypertension. 29 patients with PAD (19.5%) and 24 no PAD (6.8%) had diabetes mellitus ($p > 0.05$). At the time of screening, 10 patients with PAD (6.7%) and 8 patients no PAD (2.3%) were current smokers ($p < 0.05$).

Parameters		With Pad(n 149)	No PAD (n 353)
By Age			
Mean age, years	Mean (SD)	70,9 (10,3)	67,8 (11,7)
45-59	n (%)	15(10,0%)	85(24,1%)
60-74	n (%)	112 (75,2%)	208 (58,9%)
≥ 75	n (%)	22 (14,8%)	60 (17,0%)
Gender, male	n (%)	281 (70,1%)	83 (69,1%)
By area of residence			
Urgench city	n (%)	15(10,1%)	37(10,5%)
Urgench district	n (%)	16 (10,7%)	35 (9,9%)
Honka District	n (%)	13 (8,7%)	32(9,1%)
Bogot district	n (%)	16(10,7%)	31(8,8%)
Khazorasp district	n (%)	11(7,4%)	33(9,3%)
Yangiariq district	n (%)	15(10,1%)	31(8,8%)

Khiva district	n (%)	13 (8,7%)	29 (8,2%)
Kushkupir district	n (%)	14(9,4%)	30(8,5%)
Shavat district	n (%)	12 (8,1%)	33 (9,3%)
Yangibozor district	n (%)	11(7,4%)	31(8,8%)
Gurlan district	n (%)	13(8,7%)	31(8,8%)

Table 2: Contribution of patients with PAD and no PAD by age and sex.

The average value of ABI in the examined cohort of patients was 0.92 ± 0.23 , and was <0.9 in 29.7% of patients. The average ABI decreased with age. In elderly patients (60-74 years) and senile age (75 and >), the ABI values were 0.96 ± 0.18 and 0.86 ± 0.13 , respectively ($p < 0.05$). Many more elderly and senile patients (45%) had pathological ABI compared with middle-aged patients (45-59 years) (10%). Patients in older age groups were more likely to suffer from asymptomatic PAD and, therefore, benefited more from screening. The frequency of detected cases in the studied regions is shown in the **Table 3**.

ABI	Total (n-502)
0,5	6 (1,2%)
0,5-0,7	39 (7,8%)
0,7-0,9	104 (20,7%)
0,9-1,1	248 (49,4%)
1,1-1,3	79 (15,7%)
>1,3	26 (5,2%)

Table 3: Ankle-brachial index (ABI).

Discussion

The prevalence and severity of atherosclerosis in different geographical regions differ significantly, due to the influence of environmental factors, climate, diet, lifestyle [10,17,18,20]. In this regard, regional studies of atherosclerosis are of great interest.

PAD is a common problem in older people, especially with diabetes. An effective and at the same time insufficiently used method today is the dopplerographic determination of ankle-brachial index (ABI), calculated as the ratio of systolic blood pressure (SBP) on A. dorsalis pedis or A. tibialis posterior) and the A. brachialis [13,15,17,20]. The experience of using ABI as a method for screening PAD has also allowed us to identify the causes of possible measurement errors. Errors were often associated with the presence of media sclerosis in patients with diabetes mellitus, the presence of leg edema, incorrect blood pressure measurements, problems with cuff application, and sensor movement during measurement. When taking into account the regional characteristics of the areas of residence, the proportion of patients with PAD was somewhat in individuals with increased salt intake (more than 15g/day), a history of smoking, senile age (75 years and older), burdened by heredity for cardiovascular diseases, arterial hypertension, hypodynamie ($\chi^2 9,7$, $p < 0,01$).

Conclusion

The use of ABI for screening of PAD is especially justified in elderly patients with atherosclerosis or who have a high cardiovascular risk, which is important for secondary prevention. The use of targeted ultrasound screening of the PAD showed an important information content of the ankle - brachial index and a direct relationship between the frequency of PAD and cardiovascular risk factors. With an increase in the number of risk factors, the likelihood of developing PAD increases.

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