Assessment of Informativity of Dopplerographic Determination of the Ankle-Brachial Index

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Abstract

The modern concept of the diagnosis of peripheral artery disease is one of the urgent problems of modern medicine. Peripheral Artery Disease (PAD) is a pathology characterized by the formation of plaques in the peripheral arteries. As reported at the Scientific Session soft the American Heart Association in 2007, the prevalence of asymptomatic PAD in adults in the United States was constantly increasing, and now it is found in almost 5% of adults aged 40 years and older. In addition, PAD is an indicator of the condition of the arteries and its presence is associated with an increased risk of heart attack and stroke.

Keywords: *Vascular ultrasonography, dopplerography, peripheral artery disease, ultrasound duplex studies, ABI.*

Introduction

Prevention issues as a strategic direction of healthcare development in Uzbekistan are contained in all state legislative acts of recent years[1]. However, many of the necessary projects have not been properly implemented in everyday practice, including a strategy aimed at preventing chronic lower limb ischemia[2]. One of the reasons for the high mortality rate is the lack of effective primary prevention measures that ensure the timely identification and correction of risk factors for the development of pathology[4].

Unfortunately, today there is very little accurate data on the epidemiology of obliterating diseases of the arteries of the lower extremities. Information on the results of published studies on this issue 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 dynamics and outcomes of these diseases. According to published data, the prevalence of obliterating diseases of the arteries of the lower extremities in the countries of Europe and America is 2.1-20.7%, and this pathology is extremely rare in the indigenous peoples of Asia. Great importance is attached to the study of the prevalence, risk factors, and clinical features of these diseases among various ethnic groups. There are only a few short reports on the prevalence of obliterating diseases of the lower limb arteries among indigenous peoples[3].

The aim of the study. The study of the prevalence of peripheral arterial disease among residents of the Khorezm region aged 45-90 years and the development of an optimal model for its ultrasound diagnosis for general practitioners.

The degree of influence of unmodifiable and modifiable risk factors, as well as their combinations, in the occurrence of arterial pathology of the lower

extremities in this contingent is studied, taking into account the identified regional characteristics.

An objective picture of the prevalence of stenosing atherosclerosis of the arteries and hemodynamic disorders of the lower extremities in this population is obtained.

For the first time, an analysis of the information content of non-invasive diagnostic method in patients with PAD was carried out. The criteria for stenotic lesions of the arteries according to the values of the ankle-brachial index

Materials and Method

Among the examined 487 (87.0%) patients, no PAD was detected, and 73 (13.0%) patients were diagnosed with PAD. Arterial events were noted in the lower extremities in 38 (6.8%) patients. The proportion of patients with average SBP at the ankle level of 300 mm in different areas was generally the same (22 (30.1%) patients in the city of Urgench, 6 (8.2%) of them in the Urgench district, 3 (4.1%) patients in Hankha, 4 (5, 5%) patients in Bagat, 4 (5.5%) patients in Khazarasp, 7 (9.6%) patients in Yangarik, 6 (8.2%) patients in Khiva, 10 (13.7%) patients in Kushkupir, 2 (2.8%) patients in Shavat, 3 (4.1%) patients in Yangibazar, 6 (8.2%) patients in Gurlen).

The average ABI was 0.92+ 0.23 and was less than 0.9 in 13.0% of patients. The average ABI decreased with age; in elderly patients, the ABI was 0.96 + 0.18 versus 0.86 + 0.25 in senile patients. In addition, approximately twice as many elderly and senile patients of 63 (14.7%) patients had an ABI of less than 0.9 compared with middle-aged patients 10 (7.6%). When analyzing the ABI taking into account the type of patients, the ABI was less than 0.9 in 16 (22.0%) patients with coronary heart disease (mean value of the ABI 0.91+ 0.24), in 15 (21.0%) patients with cerebrovascular disease (the average value of the ABI is 0.91+ 0.23), in 6 (8.0%) patients with multiple vascular pathology (the average value of the ABI is 0.87+ 0.25) and in 36 (49.0%) patients with only cardiovascular risk factors (average LPI 0.94+ 0.22). When taking into account the living area of the Khorezm region, the ABI is less than 0.9 in: 22 (30.1%) patients in the city of Urgench, 6 (8.2%) of them in the Urgench district, 3 (4.1%) in Hankha, 4 (5.5%) in Bagat, 4 (5.5%) in Khazarasp, 7 (9.6%) in Yangarik, 6 (8.2%) in Khiva, 10 (13.7%) in Kushkupir, 2 (2.8%) in Shavat, 3 (4.1%) in Yangibazar, 6 (8.2%) in Gurlen.

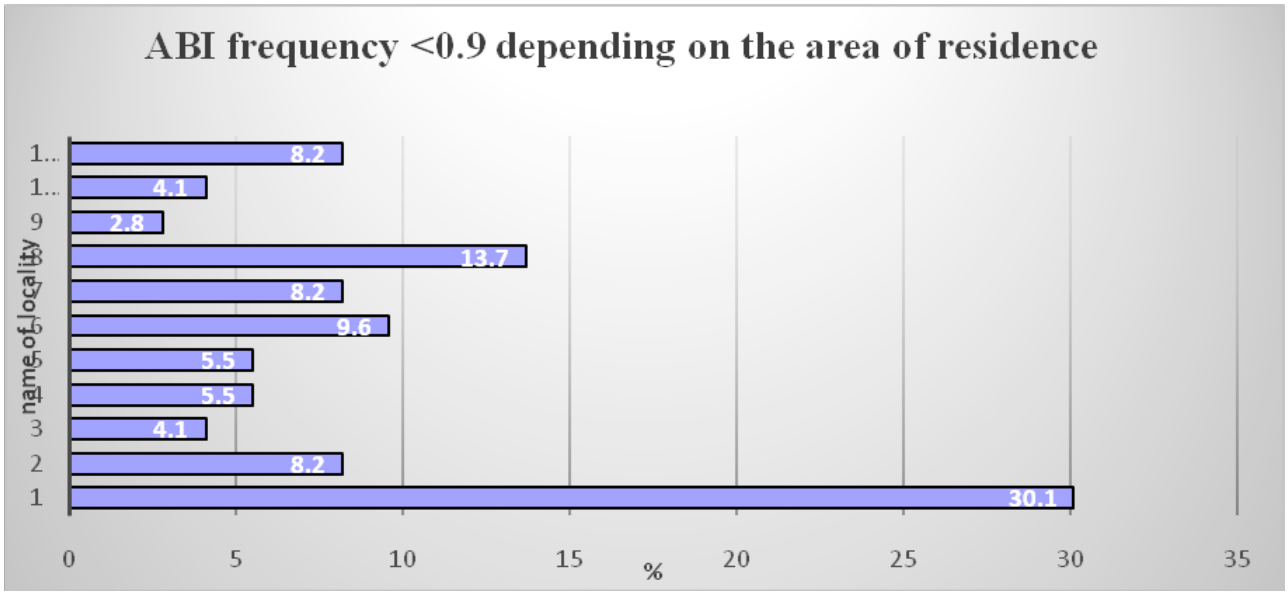

Figure 1. ABI frequency <0.9 depending on the area of residence

The prevalence of ABI values of 1.3 among patients with and without diabetes did not differ significantly and amounted to 3.0 versus 2.2% between the two groups.

Table 1: The indicators of the ankle-brachial index in groups

ABI values	Total (n-560)	Coronary (n-149)	Cerebrovascular (n-111)	Multivascular (n-39)	Only RF(n-261)
Average (M±SD)	0,92 ±0,23	0,91±0,24	0,91±0,23	0,87±0,25	0,94± 0,22
0,5	6 (1,1%)	1 (0,7%)	1 (0,9%)	1 (2,6%)	3(1,2%)
0,5-0,7	26 (4,6%)	5 (3,4%)	6 (5,4%)	3 (7,7%)	12 (4,6%)
0,7-0,9	41(7,3%)	10(6,7%)	8(7,2%)	2 (5,1%)	21 (8,0%)
0,9-1,1	300(53,6%)	78(52,3%)	57(51,4%)	20(51,3%)	145(55,6%)
1,1-1,3	128(22,9%)	35(23,5%)	25(22,5%)	9 (23,0%)	59 (22,6%)
More 1,3	59 (10,5%)	20(13,4%)	14(12,6%)	4 (10,3%)	21 (8,0%)

The determination of the ankle-brachial index led to a noticeable change in the distribution of patient types.

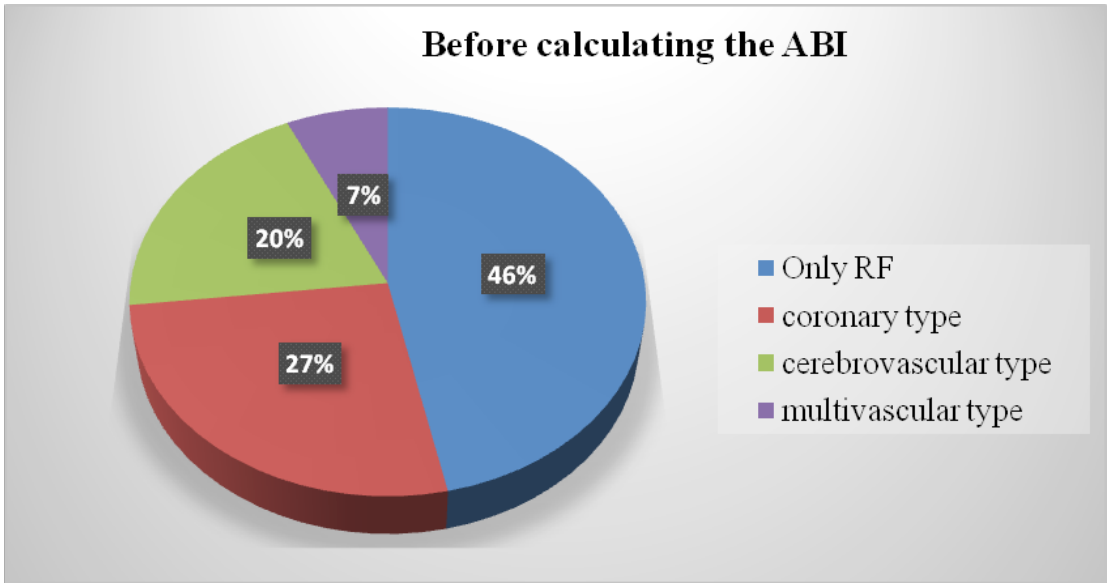

Figure 2. Patient distribution before calculating the ankle-brachial index in peripheral artery disease

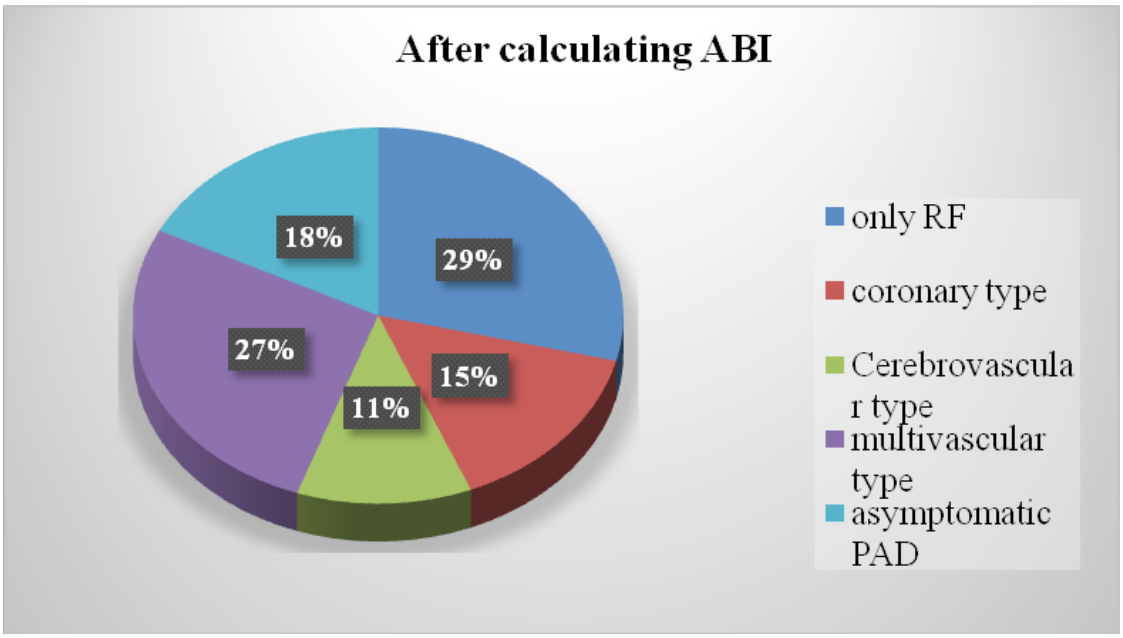

Figure 3. Patient distribution after calculating the ankle-brachial index for peripheral artery disease

Results

When enrolled in the study, patients with high risk and asymptomatic PAD were divided into four groups: patients with [1] documented coronary artery disease, [2] documented cerebrovascular disease, [3] documented multivascular disease (both coronary and cerebrovascular disease) and [4] the presence of at least one cardiovascular risk factor without ischemic or cerebrovascular disease. After evaluating the ankle-brachial index, coronary patients with PAD and cerebrovascular patients with PAD were counted as patients with multiple vascular lesions. Almost (38%) of the examined individuals, initially rated as having only RF, had PAD (36 (49.3%) of the total). The percentage of patients with multiple vascular lesions, which initially was 19 (3.4%), increased to 39 (7%) after measuring the ABI.

Widespread RF PADs include obesity, dyslipidemia, arterial hypertension, diabetes mellitus, smoking, and increased age.

BMI of patients ranged from 17.1 to 48.6 with an average of 26.9 kg / m² + 4.5% kg / m². 1.4% of the subjects were overweight, 1.5%[8] were of normal weight, 40.7% were obese, 19.6% were obese 1 st, 5.1% were obese 2 st, and 0.8% had obesity 3 tbsp. Only 32.6% of participants had normal BMI. and 66.2% were at least overweight. 33.5% of patients with PAD suffered from obesity, which is less than the proportion of people with obesity in patients with irreplaceable LPI (44.4%). Patients with a BMI of at least 30 (class I obesity) accounted for 40% of patients with PAD and 21.0% in patients without PAD (which roughly corresponds to the proportion in the average population). A significant relationship between BMI and PAD was revealed.

Discussion

Overall, 25.4% of participants suffered from diabetes (25.0% of women and 25.6% of men). The average disease duration was 12.1 + 10.1 years. 45% of all diabetics had PAD, compared with 26.4% of non-diabetic patients, and significantly more diabetics than non-diabetics with PAD. Overall, 33.5% of patients with PAD had diabetes mellitus. Of all diabetics, 44.4% had a history of myocardial infarction and 86.4% had arterial hypertension.

In addition to history, dyslipidemia was determined by laboratory determination of LDL (low density lipids), HDL (high density lipids), triglycerides and total cholesterol (HDL <1 mmol / L, LDL> 4.2 mmol / dL), triglycerides> 2 3 mmol / L (150 mg / dl) and total cholesterol> 6.2 mmol / L (240 mg / dl). 21 (37.8%) patients with high cholesterol had PAD, 20.3% of those without high cholesterol suffered from PAD. 5.3% of patients had high LDL levels. Of all patients with hyperlipidemia, 35.4% had PAD, 46.0% had myocardial infarction, and 88.0% had arterial hypertension.

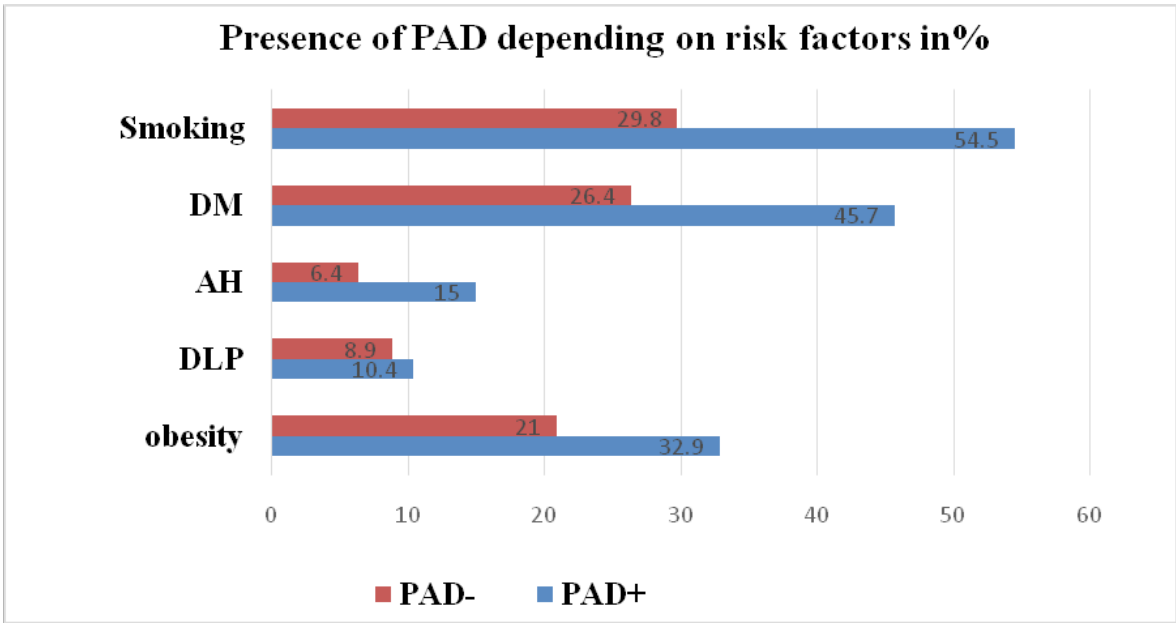

Figure 4. The presence of PAD for various cardiovascular risk factors: obesity, dyslipidemia, arterial hypertension, diabetes mellitus, smoking

Overall, 83.9% of all patients had hypertension. 34.0% of patients with arterial hypertension also had pathological ABI. 82.9% of patients with pathological ABI had arterial hypertension. 4.3% of the subjects were smokers (2.6% of women and 5.3% of men). Significant relationships have been identified between PAD and smoking. 29.8% of patients who never smoked had PAD, compared with 37.7% of former smokers and 54.5% of smokers (43.1%) ($p < 0.05$).

10 (7.6%) of patients under the age of 60 suffered from PAD. 44 (13.7%) patients out of 320 elderly patients had PAD. Over 75 years old, 19 (17.6%) of 108 patients suffered from PAD. Thus, there is a correlation of age with the presence of PAD.

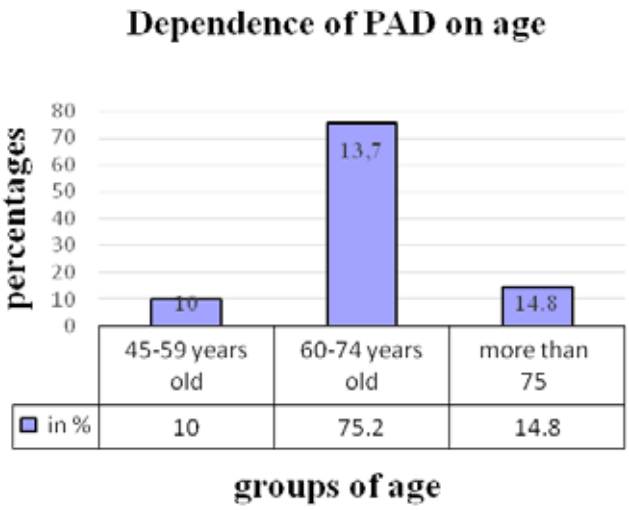

Figure 5. Frequency of PAD depending on age

Table 2: Distribution of the number of risk factors

The number of risk factors	Absolute number	%
0+1	128 (29 + 99)	25,20
2	299	58,86
3	132	25,98
4	18	3,54

Traditional risk factors were analyzed: hyperlipidemia, elderly and senile age, arterial hypertension, smoking and diabetes mellitus. The number of RFs for each patient was calculated. The distribution is shown in table.

Since only 26 patients had one risk factor. 117 patients had 2 RFs, 85 patients had 3 RFs, and 6 patients had 4 RFs. A correlation was found between the number of RFs and the presence of PAD. 11.1% of patients with 1 risk factor or without it had PAD. 50% of patients with two risk factors suffered from PAD. Patients with 3 risk factors had a PAD probability of 36.3%. 2.6% of patients with four risk factors had PAD.

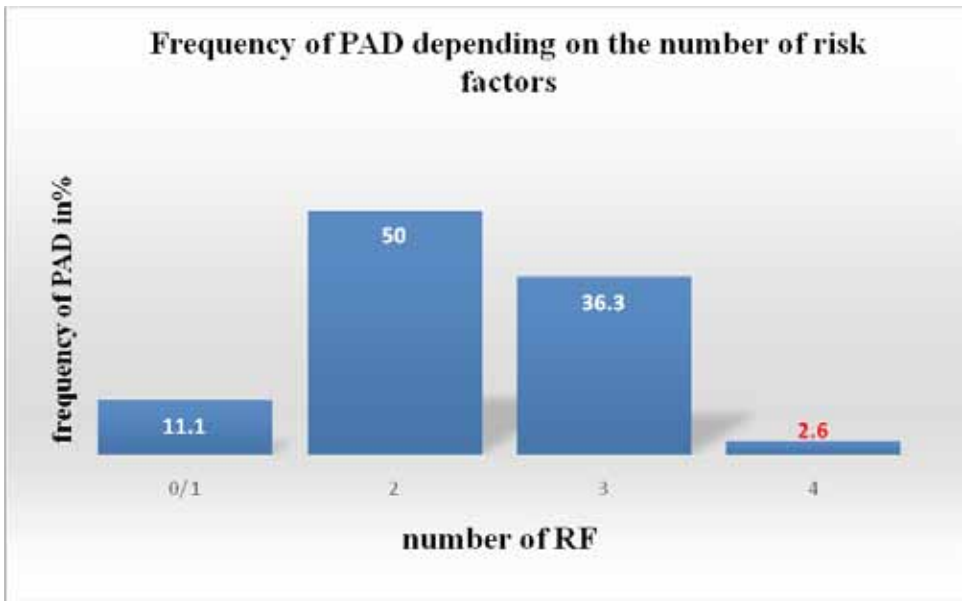

Figure 6. The frequency of PAD depending on the number of RF

Other possible RFs included the presence of first-line relatives with PAD. 13.4% of patients had a hereditary burden.

Among the concomitant diseases of PAD, other diseases of the cardiovascular and cerebral system (MI, IS, TIA) were analyzed. Among patients who had myocardial infarction, 39% had PAD or asymptomatic elevated ABI, compared with 31% of patients who did not have myocardial infarction. 45.1% of patients with PAD had a history of myocardial infarction. 36.4% had MI, in the absence of PAD. In 42.9% of patients with the condition after IS / TIA, PAD was diagnosed, compared with 32.6% of patients without cerebrovascular disease. In patients who complained of angina pectoris, 36.8% of cases had PAD. Significant correlation of selected concomitant diseases with PAD was not observed.

Conclusion

The results can be used in the work of medical expert commissions. The baseline examination should include a medical history, examination, palpation and auscultation, as well as a measurement of the ankle-brachial index.

The necessity of compulsory use of the ankle-brachial index (ABI) for the diagnosis of asymptomatic lesions of the arteries of the lower extremities in a screening examination of the elderly and senile, as well as people with high cardiovascular risk, has been proved.

The developed criteria for the values of the ankle-brachial index make it possible to diagnose lesions in the arteries of the lower extremities and to predict violations in the main arteries of the head and heart

Given the high diagnostic accuracy in assessing arterial disease of the lower extremities, color Doppler mapping of arteries is sufficient for decision-making in the treatment of these patients and may reduce the number of diagnostic angiographies. The method allows to assess the degree of damage, to clarify the topical diagnosis of PAD and to give an objective assessment of the functional state of the limbs, which can be effectively used in planning and monitoring treatment.

Ethical Clearance: No ethical approval is needed.

Source of Funding: Self

Conflict of Interest: Nil

References

1. Khan S FMMRDNFGBAea. Characteristics and treatments of patients with peripheral arterial disease referred to UK vascular clinics: results of a prospective registry. Eur J Vasc Endovasc Surg. 2007; 33: p. 442-50..
2. Baxritdinov F.SH. SAS. Ultrasound Indicators peripheral hemodynamic of patients with chronic ischemia lower limbs //Patology of circulation and cardiac surgery. 2009;: p. 54-58.
3. Konin C ENAAACINRBNJKJYHAIAM. eripheral arterial disease of the lower limbs in African diabetic patients:ultrasonography and determining factors. P J Mal Vasc. 2014; 39: p. 373-381.
4. Criqui MH LRFAFHKMMTea. Mortality over a period of 10 years in patients with peripheral arterial disease. N Engl J Med. 1992; 326: p. 381-6.
5. al. DAe. Chronic critical limb ischemia. Deutsches Ärzteblatt International. 2012; 109(№. 6. – C): p. 95.
6. al. HKe. ow-intensity pulsed ultrasound induces angiogenesis and ameliorates left ventricular dysfunction in a porcine model of chronic myocardial ischemia. PLoS One. 2014; 9(№.): p. 8.