EPIDEMIOLOGICAL CHARACTERISTICS OF PERIPHERAL ARTERY DISEASE: RETROSPECTIVE STUDY

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EPIDEMIOLOGICAL CHARACTERISTICS OF PERIPHERAL ARTERY DISEASE: A RETROSPECTIVE STUDY (Abstract): Peripheral artery disease (PAD) is a common condition. Over the past 20 years the risk factors for PAD have changed. Aims: To identify the regional characteristics of the patients with PAD and the sex- and urban/rural-related differences. Material and methods: Retrospective study on patients admitted to the Iasi “St. Spiridon” University Hospital in the interval 2007-2012. The dataset was prepared for student analysis in view of determining statistical significance. Results: Of the 361,248 patients admitted to the 20 units of the hospital, 2,623 patients were diagnosed with advanced stages of PAD (Leriche - Fontain III a and IV). Significant statistical differences were found between men and women, and between rural and urban men (p=0.001). 20.5% of the patients underwent amputations. Conclusions: This is one of the first studies that has identified urban/rural differences. The characteristics specific to PAD patients from North-Eastern Romania are presented. Keywords: PERIPHERAL ARTERY DISEASE, EPIDEMIOLOGY, RISK FACTORS.

Peripheral artery disease (PAD) is a major cause of disability, morbidity and mortality with a negative effect on the quality of life (1, 2). PAD is chronic, ischemic, with slowly-progressive. The patient adapts to the compromised arterial system by reducing oxygen demand and indirectly physical activity.

Standard therapy for PAD includes the administration of antiplatelet drugs (3,4) and a good control of the risk factors (smoking, dyslipidemia, diabetes, hypertension, etc.) (5) Antiplatelet therapy is usually combined with physical exercise that may help prevent or delay the onset of atherosclerosis. In advanced cases a wide variety of interventional surgical procedures are used to address specific findings in each individual case (5).

The prevalence of PAD increases with age, several epidemiological studies finding it in the range of 3% to 10 % (6), and 15% to 20% in persons over 70 years (7).

Many risk factors are involved in the development of PAD, their prevalence being higher in the male population. The most frequently involved risks are: sex, smoking, diabetes, hypertension and hyper-
lipidemia (8).

**MATERIAL AND METHODS**

We conducted a retrospective study including a total of 2623 subjects diagnosed with various forms and stages of PAD. The data were extracted from the database of "St. Spiridon" University Hospital (Iasi, Romania), covering the interval January 1, 2007 – January 1, 2012.

The data were statistically analyzed using Microsoft Excel and IBM® SPSS® Statistics version 17.0, and Graph Pad Prism for graphics.

The obtained data were organized into groups according to age, sex and urban/rural area to facilitate the analysis of treatment and laboratory data, by writing a Visual Basic macro in MS Excel. A descriptive statistical analysis was performed for the various subgroups. Student t test was used to compare the groups. This type of analysis is the best choice for analysis of small data sets specific to medical studies, for comparison with 95% confidence interval and α value of 0.05.

**RESULTS**

During the study interval a total of 361,248 patients were admitted to the 20 units of the hospital, Vascular Surgery, Cardiology, Internal Medicine included. Of these, 2,623 patients were diagnosed with PAD, totalizing 4869 readmissions during the study interval.

![Image](image.png)

**Fig. 1.** Distribution of the PAD patients according to a) hospital unit b) sex, and c) urban/rural area

Of all PAD patients, 685 were women and 1938 men (fig. 1b.). All patients were caucasians and presented the classical urban/rural characteristics (fig. 1c).

The mean age of the study group was 64.5 years, and median age 66 years. Age distribution was bimodal (about 57 years and about 69 years) (fig. 2a). This trend suggests the presence of two different groups that need further analysis and separation (fig. 2b, c, and d).

**Fig. 2b** shows the age distribution by sex. Bimodal age distribution with a first peak at 57 years seen in the male population is almost absent in women (fig. 2b). Further, urban/rural distribution of women showed bimodal distribution in rural women while in the urban women the distribution is lognormal (fig. 2c).

In the male patients there was a clear rural/urban difference (fig. 2c). Urban patients had an obvious bimodal distribution
of the age at onset (57 and 70 years) while in the rural male patients the first peak was almost absent, as in urban women. Furthermore, in the urban patients the onset was at slightly older age.

The prevalence of PAD in men from rural areas was higher than in urban men, fact also confirmed by Student T test (Paired Samples T Test), statistical significance $p = 0.001$, the same being true for women ($p < 0.05$).

Smoking is one of the most important risk factors for peripheral arterial disease. We evaluated only the patients admitted to internal medicine units, a total of 1028 patients, of which 857 (83.4%) self-declared smoking or former smoking status. There is a clear male prevalence of smoking ($p=0.001$), while no rural/urban difference in smoking status was noticed ($p = 0.753$).

Laboratory tests showed an average fibrinogen level of 413 mg/dl, above the normal upper limit (200-400 mg/dl). Also average total cholesterol was 200 mg/dl, the normal upper limit. HDL-cholesterol was lower (average 38 mg/dl) than normal level (normal > 40 mg/dl).

Of the 2623 study patients 537 (20.5%) underwent amputation (fig. 4).

Surgical revascularization techniques were used in 782 (53.7%) patients, 424 (54.2%) requiring multiple revascularization techniques. A total of 1457 surgical procedures were performed in patients with PAD.

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**Fig. 2.** Distributions of patients according to: a) age, b) sex vs. age, c) women age vs. urban/rural, and d) men age vs. urban/rural.

The graphs are presented as age vs. patient frequency.
In 602 surgical revascularizations (41.3%) synthetic or composite grafts were used, that required the association of anticoagulant therapy. In 338 (56.1%) amputations of the lower limb segments, and in 100 (16.6%) major amputations (thigh or calf) were performed.

**DISCUSSION**

Peripheral artery disease is known to be a disease affecting small and medium-sized arteries of the body, with a prevalence varying according to age and sex. In our study the prevalence PAD in the patients admitted to the Iasi "St. Spiridon" University Hospital Iasi was 1.35%; mean age of our patients was 64.5 years, very close to that reported by other studies (7).

The incidence of the disease in our study is lower than in other studies (9).
Epidemiological characteristics of peripheral artery disease: retrospective study

This difference may be explained by the late-stage presentation of most of our patients. All our patients were stage III or IV according to Leriche-Fontain classification.

The prevalence of PAD is higher in men than in women, fact not reported by previous studies. This can be explained by the socioeconomic status of our patients as demonstrated by the subgroups comparison. There are no statistically significant differences between women and men from urban areas. The high statistically significant difference between rural women and men areas (p<0.001) can be explained mostly by the fact that rural communities are traditional and religious, and smoking among women is rare.

A statistically significant difference (p=0.001) was found between rural and urban men. Thus, the onset of PAD is at a younger age in rural than urban males. This is mainly related to the rural life style and also very likely to socioeconomic status (10). It is confirmed by an obvious bimodal distribution (fig. 2d) with a first peak at a younger age (about 57 years) and an almost similar frequency at about 70 years. In the urban male population the onset at a younger age is much less obvious, while the second onset peak is at a slightly older age (about 72 years). Student T test showed that these data are statistically significant (p = 0.001), thus being a second characteristic never described by other studies.

Laboratory tests showed no differences between study groups except for hemaleukogram that detected higher red blood counts and hemoglobin concentrations in the smokers.

Several studies have demonstrated that amputation rate is 1-7% in patients with 5 to 10 years of persistent claudication. And only one patient out of four will complain of worsening symptoms (11).

There is no evidence that shows that patients with symptomatic PAD have a more rapid progression as compared with asymptomatic patients, and it was found that variations in disease symptoms are related to patient activity level.

CONCLUSIONS

Chronic ischemia of lower limbs has a high prevalence, and it is often under diagnosed. Its prevalence increases with age, and in the Moldavian rural population the onset is at a younger age. In this study we found that of the total number of patients admitted for vascular conditions, 1.4% had chronic ischemia. In these patients the disease is in advanced stages, and 60% of them require revascularization surgery or amputation.

In Iasi County, an estimated 5% of the total population (723,553 according to the 2011 census) has peripheral artery disease (over 36000 persons).

Another observation based on our study is the increased prevalence of PAD in men as compared to women, finding reported by few studies. This may be accounted for by the fact that women have later onset of PAD and a different lifestyle than men.

Under these circumstances, primary prevention of PAD is ineffective. It is a consequence of the fact that asymptomatic patients with critical ischemia do not present to a physician, and thus do not benefit from an early treatment and avoidance of complications in later stages.

The question why PAD has a younger age onset in urban men and rural women needs to be answered. This may require collaboration with the National Institute of Statistics for identifying: (i) the possible relationship between age of onset and under-
development (ii) relationship between geographical areas and regional infrastructure, (iii) relationship with unemployment, etc.

In further studies we plan to map geographically PAD prevalence in order to identify the regions where maximum attention should be given to prevention and screening.

REFERENCES