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A STUDY ON SYNTHESIS OFPERIPHERAL ARTERIAL DISEASE ACTIVITY

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ABSTRACT

Ischemia (lack of blood flow) in the lower extremities causes peripheral arterial disease. Atherosclerosis is the most frequent cause of peripheral artery disease, but it may also affect the heart, lungs, and other organs in the body as a whole, including the lower limbs. Patients with signs of peripheral arterial disease should be evaluated for their atherosclerosis risk in this manner. To summarise, compared to research conducted in high-risk nations, the prevalence of peripheral artery disease is lower in our population of low-medium risk. Physical activity and being overweight have a protective effect, but our findings are in line with those of most other research looking at the risk factors for peripheral artery disease. A longitudinal research is needed to establish the prognostic value of peripheral artery diseases and to identify the population for whom ankle arm index usage should be a priority in order to properly stratify our community's cardiovascular risk beyond using the tables for cardiovascular risk.

Keywords: PAD, peripheral arterial disease activity, cardiovascular, risk factors, LRM

1. INTRODUCTION

Parotid artery disease (PAD) is a frequent symptom of advanced atherosclerosis. Most people will feel intermittent claudication, which is an agonising discomfort, cramping, or numbness in their calf buttocks, hips, thighs, or the arch of their foot as a consequence of inadequate oxygenation of their lower extremity muscles. Stimulation of symptoms by walking or other forms of exercise relieves them. Other specialist procedures such as colour Doppler studies, contrast angiography, and magnetic resonance angiography are recommended in questionable situations in addition to history, clinical examination, and regular investigation. PAD may be detected using the ankle-brachial index (ABI), which can help identify individuals who previously went undiagnosed. Ankle systolic blood pressure to brachial systolic blood pressure ratio. An abnormal ABI is less than 0.9. [1]

Lower extremity atherosclerosis, also known as peripheral arterial disease (PAD), may range in severity from asymptomatic to critical limb ischemia (CLI) (CLI). PAD and coronary artery disease have the same atherosclerosis process and risk factors: male gender, age, diabetes, smoking, high blood pressure, high cholesterol, and renal insufficiency. PAD has a similar atherosclerotic process. [2]

For individuals with diabetes, it raises the risk of foot or leg amputation significantly. PAD is also a sign of systemic vascular disease affecting the heart, brain, and kidneys in the asymptomatic patient and increases the risk of events including myocardial infarction

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(MI), stroke, and death. The most significant risk factors for PAD are having diabetes and smoking. Excessive alcohol use is a well-known risk factor as is being overweight or obese, as well as having high blood pressure or high cholesterol. [3]

Two factors make a PAD diagnosis clinically significant. The first step is to determine whether or not a patient has signs of PAD and a high risk of having another MI or stroke in the future. In the second, signs of PAD, including as functional impairment and limb loss, will be sought out and treated. Patients with diabetes may appear with a more mild manifestation of PAD. Diabetic individuals are more likely to have diffuse and distal atherosclerotic lesions than other high-risk patients who have more localised and proximal PAD lesions. Peripheral neuropathy and decreased sensory feedback are common in people with diabetes with PAD. [4]

According to many research, tobacco use raises one's risk of developing peripheral artery disease (PAD). Intermittent claudication is almost twice as common among smokers as angina pectoris. It's important to quit smoking if you want to decrease your chance of developing vascular problems, which may lead to amputation and death. When it comes to the treatment of peripheral arterial disease, it's important to focus on reducing the risk factors that contribute to atherosclerosis in the first place.[5]

2. LITERATURE REVIEW

Tamar S. Polonsky, MD, MSCI, Mary M. McDermott, MD (2021) People with PAD gradually reduce their walking activity or slow down their walking pace in order to minimise the occurrence of leg symptoms. Individuals with PAD have substantially larger yearly decreases in 6-minute walk performance than those without it, despite the fact that about 75% of people with PAD report no change in leg symptoms over time. People with the most severe type of PAD, persistent limb-threatening ischemia, account for around 11% of those with PAD overall. When individuals with PAD are tracked for 10 years, their death rates for all causes, cardiovascular mortality, and major coronary events are about double those of people without the condition. Patients with PAD who were taking high doses of statins or antiplatelet treatment, either alone or in combination with antithrombotic therapy, had lower risks of coronary events and stroke.. Walking on a supervised treadmill increased 6-minute walk distance by 30 to 35 metres, which is clinically significant, while walking on a home treadmill increased 6-minute walk distance by 42 to 53 metres. Behavioral techniques, such as coach monitoring, are required for effective home workout regimens.[6]

Michael R. Zemaitis, Julia M. Boll, Mark A. Dreyer (2020) Reduced arterial perfusion in the lower extremities is a symptom of peripheral artery disease (PAD), which is sometimes referred to as "poor circulation." Atherosclerotic plaques constrict the artery's flow lumen, causing reduced blood flow to the extremities in most PAD patients. Reduced blood flow through the arteries is one of the symptoms of peripheral arterial disease (PAD). Walking or exercise may cause thigh or calf discomfort if blood supply is reduced to the extremities. To better care for patients with peripheral artery disease, the interprofessional team plays a key role. [7]

Graham H. Bevan, Khendi T. White Solaru (2020) An atherosclerotic condition of the lower limbs, peripheral artery disease has a significant death rate due to cardiovascular causes. For this disease, treatment options include changing one's way of life and/or using medical treatment such as endovascular repair or surgery. A comprehensive medical

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strategy is used to treat peripheral artery disease, including cholesterol lowering, antiplatelet treatment, anticoagulation, peripheral vasodilators, blood pressure control, exercise therapy, and quitting smoking. If you follow this plan, you'll be less likely to have limb-related problems like critical-limb ischemia and amputation, as well as systemic complications from atherosclerosis like a stroke or a heart attack.. Peripheral artery disease is undertreated in comparison to coronary artery disease. Peripheral artery disease treatment options are discussed in this article, which examines the evidence. [8]

Dr. Marc Ferrini (2018) Heart disease risk is markedly increased in those with LEAD (lower extremity artery disease). The high incidence of worldwide cardiovascular consequences in this group underscores the need of decreasing cardiovascular morbidity and mortality in addition to treating intermittent claudication and limb risk. We will address the therapeutic usefulness of medicines that improve claudication symptoms as well as the most current data on antithrombotic agents here, despite the fact that therapy for these individuals is very diverse and complicated. [9]

Mark F McCarty, James H O'Keefe, James J DiNicolantonio (2016) A review of existing literature suggests that pentoxifylline has the potential to slow the progression of atherosclerosis, stabilise plaque, reduce the risk of vascular events, improve the outcome of vascular events, and dampen the systemic inflammatory response following cardiopulmonary bypass, while clinical trials with pentoxifylline have not always been large enough to reach statistically significant findings regarding the effects on hard end points. [10]

3. RESEARCH METHODS

Data collection

The research included urban and semi-rural primary healthcare facilities from the Barcelona metropolitan region and the county of Barcelonès Nord-Maresme. Finally, the research comprised 3786 individuals over the age of 49 from September 2020 to June 2021.Two healthcare experts trained in the method examined the patients' ankle-arm indices in the participating clinics under standardised circumstances. Standardized Ultrasonic Doppler Device was utilised (Mini-Dopplex D 900-P, Huntleigh Healthcare, 8 MHz). On both lower limbs, an ankle-arm index was conducted on the two paramaleolar arteries. There was a ratio between the systolic pressures of the highest leg (tibial posterior and anterior) and the highest leg's corresponding ankle-arm index, which was the systolic pressure of each leg. This was used to calculate the ankle-arm index. Otherwise, another expert was entrusted with the job of doing it. The first professional repeated the test if the ankle arm index was less than or equal to 0.9; the second professional's result was deemed the final result.

Statistical analysis

In the whole sample, the prevalence of peripheral artery disease was calculated. Further studies addressing possible risk factors for peripheral artery disease in individuals with Mönckeberg sclerosis excluded those having an ankle-arm index >1.4 (arterial calcification). chi squared tests were utilised to compare categorical and continuous data, and the t-test was used for both. The individual impact of the possible risk variables was examined in age- and sex-adjusted LRM, using odds ratios [OR, (95 percent confidence interval)].

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4. RESULTS AND DISCUSSION

Study participants made up 63 percent, and there were a total of 3786 people over the age of 49 who were included, with a mean age of 64.9 years plus or minus 8.9 years. There were 286 patients with an ankle-arm index less than or equal to 0.9 out of the total. Peripheral vascular disease affected 7.6% of the population (95 percent confidence range 6.7-8.4) (men 10% (9.2-11.2), women 5.3 percent (4.6-6.0); p 0.001). PE doubled in incidence for every additional ten years of age rise. As shown in Figure 1. An estimated 6.2% (5.5-7.0 percent) of the 235 patients with peripheral artery disease (men: 8.5% (7.6-9.4%), women: 4.2 percent (3.6-4.8 percent; p = 0.001) were found to have arterial calcification.

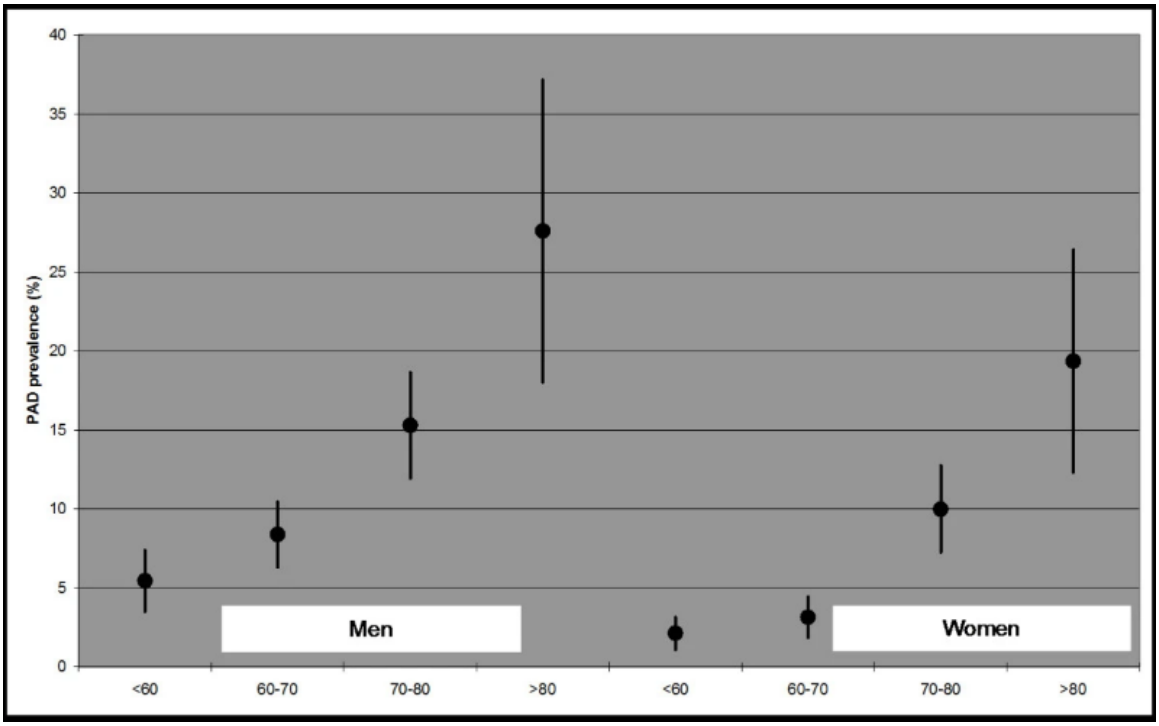

Figure 1: Prevalence of peripheral arterial disease and 95% confidence interval by age and sex.

According to whether or not peripheral arterial disease was present, individuals with arterial calcification were excluded from the sample (see Table 1). One in ten of the participants suffered from intermittent claudication. Peripheral artery disease was discovered in just 19.0 percent of participants before the study began. IC symptoms were present in 29.3% of those who had never been diagnosed before. The study found that more than 368 percent of the participants were overweight or obese. According to the data, the majority of patients had low or moderate cardiovascular risk, with 10.8% having cardiovascular disease already.

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Table 1: Sample characteristics by peripheral arterial disease

Catagory	PADn = 286	Control[a] n = 3265	*p*-value[b]
Gender			< 0.001
Men	11.1 (178)	88.9 (1419)	
Women	5.5 (108)	94.5 (1846)	
Age (years) (mean ± SD)	70.70 ± 9.26	64.22 ± 8.60	< 0.001
Education			< 0.001
Illiterate	14.2 (30)	85.8 (182)	
Primary school	8.1 (196)	91.9 (2229)	
Secondary school	5.4 (27)	94.6 (477)	
High school	5.7 (7)	94.3 (116)	
University	3.4 (4)	96.6 (112)	
Occupation status			< 0.001
Currently working	3.6 (30)	96.4 (813)	
Housewife	4.7 (34)	95.3 (689)	
Retired	12.2 (192)	87.8 (1380)	
Unemployed	3.9 (6)	96.1 (148)	
Disabled	11.1 (15)	88.9 (120)	
Other	6.3 (3)	93.8 (45)	
Ability to perform physical activity			< 0.001
No limitation	3.8 (51)	96.2 (1291)	
Mild limitation	8.5 (150)	91.5 (1618)	
Only able to do light activity	19.9 (72)	80.1 (289)	
Breathless with any activity	29.3 (12)	70.7 (29)	
Walking (hours/week)			0.376
0-3	7.2 (65)	92.8 (844)	
>3-7	8.0 (61)	92.0 (697)	
>7	6.4 (86)	93.6 (1252)	
Tobacco smoking			< 0.001
Never smoker	5.3 (104)	94.7 (1871)	
Former smoker	11.3 (108)	88.7 (844)	
Current smoker	11.9 (74)	88.1 (550)	
Claudication (people with leg pain when walking and no pain when stop)			< 0.001
No	5.9 (184)	94.1 (2952)	
Yes	26.9 (94)	73.1 (255)	
Obesity			0.164
Underweight/Average (BMI<25)	9.7 (61)	90.3 (566)	
Overweight (25≤BMI<30)	7.3 (118)	92.7 (1496)	
Obese (BMI ≥ 30)	8.2 (107)	91.8 (1198)	
Waist circumference			0.035
1st tertile[c]	6.9 (78)	93.1 (1060)	
2nd tertile	7.6 (89)	92.4 (1076)	
3rd tertile	9.7 (118)	90.3 (1104)	
Hypertension (medical record)			< 0.001
No	4.7 (88)	95.3 (1791)	
Yes	11.9 (193)	88.1 (1431)	

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Hypercholesterolemia (medical record)			< 0.001
No	6.0 (108)	94.0 (1691)	
Yes	10.2 (170)	89.8 (1501)	
Blood analysis (mean ± SD)			
Total cholesterol (mg/dL)	210.03 ± 42.10	216.53 ± 38.48	0.007
HDL (mg/dL)	52.30 ± 14.09	56.03 ± 14.48	< 0.001
Triglycerides (blood analysis)			< 0.001
Normal	6.9 (181)	93.1 (2447)	
High (≥ 150 mg/dL)	11.8 (105)	88.2 (786)	
Diabetes (medical record)			< 0.001
No	6.4 (191)	93.6 (2802)	
Yes	17.0 (95)	83.0 (463)	
Stroke (medical record)			< 0.001
No		7.6 (260) 92.4 (3176)	
Yes		24.4 (22) 75.6 (68)	
Transient ischaemic attack (medical record)			0.001
No	7.7 (266)	92.3 (3167)	
Yes	17.5 (14)	82.5 (66)	
Angor (medical record)			< 0.001
No	7.5 (253)	92.5 (3105)	
Yes	19.0 (31)	81.0 (132)	
Myocardial infarction (medical record)			< 0.001
No	7.2 (245)	92.8 (3148)	
Yes	29.0 (38)	71.0 (93)	
Framingham index (aged≤74)			< 0.001
<10	2.9 (32)	97.1 (1081)	
10-20	5.5 (65)	94.5 (1120)	
>20	13.0 (81)	87.0 (542)	
REGICOR index (aged≤74))			< 0.001
<5	3.1 (41)	96.9 (1295)	
5-10	7.0 (89)	93.0 (1177)	
>10	15.0 (48)	85.0 (271)	
SCORE index (aged<65)			< 0.001
<2.5	2.4 (27)	97.6 (1105)	
2.5-5	4.0 (18)	96.0 (427)	
>5	10.9 (37)	89.1 (302)	
Metabolic syndrome (NCEP)			< 0.001
No	7.2 (198)	92.8 (2559)	
Yes	11.4 (88)	88.6 (685)	

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All values are presented as prevalence of healthy and peripheral arterial disease as percent (n) unless otherwise specified. SD: standard deviation. BMI: Bodymass index expressed in Kg/m^2.

Patients with calcification excluded.

P value forachi- squared test (categorical variable) and t-test (continuous variable). Fisher exact test and rank sum test shave also been performed for categorical and continuous variables respectively leading to similar p values.

Sex-specific tertiles. Cut points are 97 cm and 105 cm for men and 90 cm and 101 cm for women.

According to the LRM adjusted for age, sex, and location in Table 2, the risk variables for peripheral arterial disease were combined into a single variable for cardiovascular disease in the multivariate model for improved AIC scores. Most of the components of cardiovascular disease risk tables and metabolic syndrome were previously incorporated in the multivariate model. The metabolic syndrome was shown to be associated with an increased risk of peripheral artery disease (OR 1.79, 95% CI 1.32-2.36). and in the age and sex adjusted models, these factors revealed a positive and substantial connection with peripheral arterial disease.

Table 2: Association between peripheral arterial disease and potential risk factors. Logistic regression models adjusted by age andsex

	OR (95%CI)	***p*-value for trend**
Men	2.13 (1.65-2.75)	
Age (per 10 years)	2.25 (1.96-2.60)	
Education (reference = Illiterate)		0.011
Primary school	0.65 (0.42-1.00)	
Secondary school	0.55 (0.31-0.99)	
High school	0.48 (0.20-1.16)	
University	0.29 (0.10-0.87)	
Occupation status (reference = Currently working)		
Housewife	1.02 (0.57-1.83)	
Retired	1.14 (0.70-1.86)	
Unemployed	1.10 (0.45-2.71)	
Disabled	2.50 (1.29-4.88)	
Other	1.76 (0.51-6.05)	
Ability to perform physical activity (reference = No limitation)		< 0.001
Mild limitation	2.07 (1.47-2.92)	
Only able to do light activity	4.84 (3.19-7.36)	
Breathless with any activity	6.70 (3.10-14.45)	
Walking (hours/week) (reference = 0-3)		0.002

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>3-7	0.88 (0.60-1.29)	
>7	0.58 (0.40-0.82)	
Tobacco smoking (reference = Never smoker)		< 0.001
Former smoker	2.14 (1.45-3.17)	
Current smoker	3.91 (2.58-5.93)	
Claudication	5.00 (3.73-6.71)	
Obesity (reference = BMI<25)		0.685
Overweight (25≤BMI<30)	0.67 (0.48-0.94)	
Obese (BMI ≥30)	0.85 (0.60-1.20)	
Waist circumference2nd tertile[a]	1.02 (0.73-1.41)	0.174
3rd tertile	1.23 (0.90-1.67)	
Hypertension	1.99 (1.51-2.62)	
Hypercholesterolemia	1.86 (1.43-2.41)	
Triglycerides ≥ 150 mg/dL	2.05 (1.58-2.66)	
Diabetes	2.39 (1.82-3.15)	
Stroke	2.92 (1.74-4.90)	
Transient ischaemic attack	1.73 (0.93-3.20)	
Angor	1.90 (1.23-2.93)	
Myocardial infarction	3.81 (2.50-5.82)	
Framingham index (aged≤74)		< 0.001
10-20	1.42 (0.88-2.29)	
>20	2.57 (1.49-4.43)	
REGICOR index (aged≤74)		< 0.001
5-10	1.60 (1.05-2.43)	
>10	2.61 (1.55-4.38)	
SCORE index (aged<65)		< 0.001
2.5-5	1.43 (0.71-2.89)	
>5	3.99 (2.00-7.95)	
Metabolic syndrome (NCEP)	1.79 (1.36-2.36)	

Patients with calcification excluded.

All models adjusted for age, sex and centre. BMI: Body mass index.

Sex-specific tertiles. Cut points are 97 cm and 105 cm for men and 90 cm and 101 cm for women.

Peri-arterial disease (PAD) as measured by the ankle-arm index is less common in countries with low cardiovascular risk like Spain than in countries with greater cardiovascular risk like the United States (7.6%). Accordingly, we found that the prevalence of cardiovascular diseases such ischemic heart disease was lower in our study than in other research. Another Spanish research found a reduced incidence of peripheral artery disease (4.5 percent). Despite this, the individuals examined ranged in age from 35 to 79, which may account for the discrepancy between their findings and ours, given that cardiovascular disease is more common as people become older.

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In low-risk nations, the incidence of peripheral arterial disease is unknown to the general public. Studies in high-risk or well-selected groups have been conducted in Spain, including those with a history of cardiovascular disease or those who smoke. According to the demographic examined, prevalence varied from 3.9% to 26.2% in these studies, with notable highs among hospitalised (26.2%) and diabetic patients (21.4%). France's paradoxical low incidence of peripheral artery disease may be explained by dietary and other preventive factors common in Mediterranean nations with low cardiovascular risk but high cardiovascular risk factors. Compared to research performed in Northern Europe, investigations in Spain have verified the low incidence of peripheral artery disease, coronary heart disease, and stroke.

According to some researchers, the underdiagnosis rate of 81.0 percent in our study may be ascribed to the high number of patients (80-90 percent) who stay asymptomatic and to the fact that primary care offices do not regularly assess the ankle-arm index, according to our study results. It's worth noting that 33.8% of individuals with a pathologic ankle-arm index had clinical signs of IC, as described by the Edinburgh questionnaire. Other illnesses or degenerative processes may be blamed by patients for these symptoms. Except for the study by Coni et al., where the prevalence of IC was very high (37.5 percent) and similar to our study, the IC values in patients with peripheral arterial disease were between 5 and 29.6 percent in most published studies. However, in contrast to the previous study, we used the Edinburgh questionnaire in our study.

Physical Examination

A thorough cardiovascular physical examination may reveal a lot about a patient. Because concomitant subclavian artery disease is often present in individuals with PAD, blood pressure should be taken from each arm in these patients. A change in blood pressure of more than 20 mm Hg suggests innominate, subclavian, or axillary illness. The carotid and subclavian arteries should also be checked for bruits; if any are heard, they may be classified as systolic, diastolic, or both. Patients with carotid bruits had MI and cardiovascular mortality rates two times higher than those without, according to a meta-analysis of 3000 patients with a combined patient-years of 3786. This suggests that bruits may be a sign of a more serious stenosis. All patients should have their abdominal aorta palpated, and if it seems larger, they should have abdominal ultrasonography. You should feel for and characterise the presence or absence of the femoral, popliteal, dorsalis, and posterior tibial arteries as normal [2+] or reduced [1+]. During the physical examination, look for any femoral or popliteal artery aneurysms. Up to 12% of individuals will not have a dorsalis pedis pulse, which is not regarded abnormal. To be clear, a missing posterior tibial pulse is almost never normal. Toes should be thoroughly inspected for signs of infection, such as ulcers, calluses, and tinea. Preventing infections and amputations starts with proper nail and foot care.

5. CONCLUSION

To summarise, compared to research conducted in high-risk nations, the prevalence of peripheral artery disease is lower in our population of low-medium risk. Physical activity and being overweight have a protective effect, but our findings are in line with those of most other research looking at the risk factors for peripheral artery disease. A longitudinal research is needed to establish the prognostic value of peripheral artery diseases and to identify the population for whom ankle arm index usage should be a

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