

# Lower functional capacity is associated with higher cardiovascular risk in Brazilian patients with intermittent claudication

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*The purpose of this study was to examine the association between cardiovascular risk estimated by the Framingham Risk Score and functional capacity in patients with peripheral artery disease using a 6-minute walk test. Fifty-six participants with intermittent claudication were recruited. The Framingham Risk Score was calculated and used to split the participants into two groups: Group A (mild and moderate risk) and group B (severe risk). The ankle-brachial index (ABI) was calculated for each leg using a handheld Doppler probe. Walking ability was verified by a 6-minute walk test. Descriptive statistics were used to describe the sample's demographic and clinical characteristics. To compare clinical data between the two groups, a t test or Mann-Whitney test was used as appropriate according to the type of variable being analyzed. The Pearson coefficient was used to verify the association between cardiovascular risk and functional capacity. Group A had 19 participants (60.5 ± 6.3 years; 36.8% male) and group B had 37 participants (63.4 ± 8.7 years; 73% male). No differences were observed when comparing the ABI between both groups. The total distances covered by the men in group A were shorter compared with those of group B (331.4 + 51.5 vs 257.9 + 84.0; P = .02). The cardiovascular risk score was negative and was significantly correlated with total distances for men (r = -0.53; P = .001) and with pain-free distances for women (r = -0.46; P = .03). Functional capacity, evaluated through a 6-minute walk test, seems to be associated with 10-year total mortality risk. (J Vasc Nurs 2015;33:21-25)*

Lower extremity peripheral artery disease (PAD) affects men and women worldwide and is expected to increase owing to unhealthy lifestyle habits, aging, and an increased survival of people with chronic diseases. Recent statistical analyses of cardiovascular diseases estimated that PAD affects 8.5 million Americans ≥40 years of age and that cardiovascular disease is more prevalent among elderly people, non-Hispanic blacks, and women.<sup>1</sup>

“The Hearts of Brazil,” an epidemiologic study of the prevalence of cardiovascular risk factors in a random population sample from 72 Brazilian urban centers, showed that the prevalence of PAD in the Brazilian population is 10.5%.<sup>2</sup> A population-based prospective study on ageing, The Bambuí Health and Ageing Study, enrolled 1,485 elderly participants (>60 years) living in the town of Bambuí (Minas Gerais, Brazil). In this study,

2.5% of the participants met the criteria for probable intermittent claudication; that is, the interviewee reported pain in the calf during walking that was not present when standing or sitting, lasted ≤10 minutes, and disappeared with pace reduction or interruption of gait.<sup>3</sup> More recent data from DATASUS, the Brazilian Health Ministry database, showed that atherosclerosis and other peripheral vascular diseases accounted for 20,565 hospitalizations in public hospitals in Brazil with an approximate cost of \$24 million in 2012.<sup>4</sup>

Risk factors for PAD are similar to those that have been described for coronary heart disease (CHD).<sup>1,5</sup> However, both diabetes and smoking are stronger risk factors for PAD than for CHD.<sup>3</sup> Patients with PAD are at an increased risk of cardiovascular events. The results of the Atherosclerosis Risk In Communities (ARIC) study<sup>6</sup> showed that 964 fatal or nonfatal CHD events occurred over a median follow-up period of 13.1 years. Moreover, CHD risk increased exponentially with decreasing ankle-brachial index (ABI).

The ABI is the ratio of systolic pressure at the ankle to that in the arm. It is used for screening for and diagnosing PAD and to determine the severity of the disease. An ABI value of <0.90 is indicative of significant flow-limiting atherosclerotic disease in the lower extremity.<sup>5</sup> It has been associated with an increased risk of coronary and cerebrovascular disease and with the presence of cardiovascular risk factors. In a meta-analysis, researchers observed that an ABI of ≤0.90 was associated with approximately two times greater 10-year total mortality, cardiovascular mortality, and major coronary event rates compared with the overall rate in each Framingham category. Furthermore, the risk of cardiovascular events was higher in patients with PAD

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compared with those without PAD, and the hazard ratio remained high for men and women, even after adjusting for the Framingham Risk Score.<sup>7</sup>

Patients with low ABI experience mobility loss and are less engaged in physical activities, including leisure activities.<sup>8</sup> Studies have shown that the ABI is inversely related to physical activity and that people with low ABI are often less physically active.<sup>9,10</sup> Recently, authors have investigated the relationship between the intensity of physical activity and cardiovascular disease risk with ABI status. They observed that individuals with a low ABI spent less time engaging in moderate-to-vigorous physical activity compared with those with a normal ABI and that total accelerometer counts were inversely related to Framingham Risk Score.<sup>11</sup>

Patients with PAD are at high risk of coronary events, and those with low ABI are less able to engage in physical activities. The purpose of this study was to examine the association between cardiovascular risk estimated by the Framingham Risk Score and functional capacity in patients with PAD using a 6-minute walk test.

## METHODS

### *Patient recruitment and estimation of cardiovascular risk*

Patients were recruited from the intermittent claudication clinic at the Hospital of the University of São Paulo. The inclusion criteria were 18 to 80 years of age, both genders, and ABI of <0.90. All participants provided informed consent. Patients were excluded if they needed to use assistive devices for ambulation.

Clinical information was obtained by reviewing medical records or interviewing and examining patients. Participants were considered current smokers if they reported that they were currently using tobacco. Clinical information regarding comorbidities, results of laboratory tests, and medications were obtained from medical records. Blood pressure measurements were taken according to the VI Diretrizes Brasileiras de Hipertensão<sup>12</sup> (Brazilian Guidelines on Hypertension) with an oscillometric device (Omron HEM 741C, Omron Healthcare Inc., China) immediately before measuring the ABI.

These data were used to estimate global cardiovascular risk. The Framingham Risk Score estimates global cardiovascular risk, which reflects 10-year total mortality risk. It is accurate and has a good discriminatory capacity. This score takes into account the clinical data of patients (risk factor). For each risk, a score is assigned, and then a total score is calculated. Absolute cardiovascular risk corresponds with a specific total score, which represents the percentage of risk that the patient has a cardiovascular event within 10 years. The global cardiovascular risk is classified as low, moderate, or severe according to absolute risk: <10%, 10% to 20%, and >20%, respectively.<sup>13,14</sup> Absolute risk was used to classify participants into two groups: Group A, mild and moderate cardiovascular risk (n = 19; 60.5 ± 6.3 years; 36.8% male), and group B, severe cardiovascular risk (n = 37; 63.4 ± 8.7 years; 73.0% male). [Table 1](#) provides the general characteristics of the participants.

This study was approved by the Ethics Committee of the Clinical Hospital, Medical School, University of Sao Paulo. All subjects completed a consent form that was approved by that committee.

### *ABI measurements*

Participants rested in the supine position for 5 minutes before measuring ABI. An appropriately sized blood pressure cuff was placed over both the left and right brachial arteries and above each malleolus. The cuff was rapidly inflated to 20 mmHg above the audible systolic pressure. Using a handheld Doppler probe (Medmega, SP, Brazil), we measured the systolic blood pressure in each artery following a standardized sequence: The left brachial artery, the left dorsalis pedis artery, the left posterior tibial artery, the right dorsalis pedis artery, the right posterior tibial artery, and the right brachial artery. The cuff was deflated at an approximate rate of 2 mm/s. The ABI was calculated for each leg and was the ratio of the highest systolic blood pressure in the leg to the highest systolic blood pressure in the arm. The lower ABI between the two legs was used.

### *Walking ability*

Walking ability was used as a measure of functional capacity. The 6-minute walk test was used for this purpose. Participants were instructed to walk up and down a 20-m corridor for 6 minutes after being instructed to cover as much distance as possible, according to their tolerance, and to describe all symptoms during the walk. Total and pain-free distances were recorded.

### *Data analysis*

Descriptive statistics were used to describe the sample's demographic and clinical characteristics. The statistical program SPSS 12.0 was used to analyze the data regarding cardiovascular risk and functional capacity. To compare clinical data between the two groups the *t* test or Mann-Whitney test were used as appropriate according to the type of variable being analyzed. The Pearson coefficient was used to verify the association between cardiovascular risk and functional capacity. That association was classified as weak (0-0.39), moderate (0.40-0.69), or strong (>0.70).

## RESULTS

We studied 19 patients with mild to moderate cardiovascular risk (group A) and 37 patients with severe cardiovascular risk (group B) for a total of 56 patients.

### *Framingham Risk Score*

As shown in [Table 1](#), the frequency of male participants was higher in group B compared with group A, although both groups were similar regarding the mean age of the subjects. The frequency of current smokers was significantly higher in group A (*P* = .018). The prevalence of participants with diabetes was higher in group B. Total cholesterol serum levels were similar between the two groups; however, group A had higher levels of high-density lipoprotein cholesterol. The mean systolic blood pressure values were >140 mmHg in both groups, but were higher in group B, even though 78.4% of the participants in group B were taking antihypertensive medication. In group A, 63.1% of participants were treated for hypertension.

[Table 2](#) shows the estimated absolute risk of infarction and death within 10 years. The mean average risk for all participants in group A and B were 13.2 ± 2.6% and 13.3 ± 5.2, respectively.

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