

Predictors of health-related quality of life in patients with symptomatic peripheral artery disease

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ABSTRACT

Objective: The aim of this study was to identify predictors of baseline measures of health-related quality of life (HRQoL) in symptomatic patients with peripheral artery disease (PAD) from objective markers of severity of PAD, clinical and demographic characteristics, comorbid conditions, cardiovascular risk factors, objectively measured physical activity, and patient-based measures of physical function.

Methods: HRQoL measurements of 216 symptomatic men and women with PAD were assessed with the Medical Outcomes Study 36-Item Short Form Health Survey. Patients were further characterized on demographic variables, comorbid conditions, cardiovascular risk factors, ankle-brachial index, peak walking time during a maximal treadmill test, 6-minute walk distance, gait speed, ambulatory activity monitored during 1 week, activities of daily living (ADLs), Mini-Mental State Examination questionnaire, and Walking Impairment Questionnaire (WIQ).

Results: For the physical function HRQoL subscale, the significant predictors included WIQ speed score ($P < .001$), history of stumbling ($P < .001$), WIQ stair climbing score ($P < .001$), ADL associated with bathing ($P = .001$), 6-minute walk distance ($P = .004$), and daily walking cadence ($P = .043$). For the role emotional function HRQoL subscale, the significant predictors included a history of stumbling ($P < .001$), the ADL associated with transferring from a bed to a chair ($P < .001$), and the WIQ distance score ($P = .022$).

Conclusions: Physical and mental subscales of HRQoL in symptomatic patients with PAD are primarily predicted by patient-based physical function rather than by more specific markers of PAD severity and comorbid conditions. The clinical significance is that interventions designed to improve HRQoL should focus on improving the quality of executing functional tasks, such as walking more steadily without stumbling; completing ADLs that are not specific to walking, such as bathing and transferring; and improving patient-based ability to walk various distances and speeds and to climb stairs. (J Vasc Surg 2018;■:1-9.)

Keywords: Claudication; Exercise; Peripheral artery disease; Physical function; Quality of life

Peripheral artery disease (PAD) is not only highly prevalent,¹ costly,² and deadly,³ but it also results in high rates of disability that may not be fully appreciated. Between 50% and 85% of those with PAD experience exercise leg pain that is either typical or atypical of classic claudication,⁴ resulting in ambulatory dysfunction,⁵ impaired physical function that declines over time,^{6,7} and low daily physical activity.⁸ Consequently, it is not surprising that symptomatic patients with PAD have impaired health-related quality of life (HRQoL) compared with controls⁹⁻¹¹ and even worse scores than individuals with coronary artery disease and congestive heart failure.¹²

The primary goal in treating symptoms is to improve ambulatory function and HRQoL.¹³ Although much has been studied on exercise, pharmacologic, and peripheral revascularization interventions to treat ambulatory dysfunction,¹⁴⁻¹⁶ comparatively little attention has focused on HRQoL in symptomatic patients with PAD, which may be of equal or greater concern to patients. Objective measures of PAD severity are related to HRQoL,^{10,17-19} but the strength of the associations is not strong, suggesting that quality of life is only partially attributed to PAD-specific outcomes.¹⁸ This is further evident by observing that improvements in walking distances after an exercise program are greater than changes in HRQoL.²⁰ Consequently, other factors may be associated with HRQoL in symptomatic patients with PAD.

We have previously found that metabolic syndrome²¹ and lower cognitive status²² are both negatively associated with HRQoL in symptomatic patients with PAD, and another investigation found that hypertension is negatively associated with overall quality of life and general health.¹⁸ However, the identification of factors associated with baseline HRQoL in symptomatic patients with PAD has been primarily limited to PAD-specific markers and has rarely considered comorbid conditions,¹⁸ patient-based measures of overall physical function, and objective measurements of physical activity level.

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The first step in designing appropriate interventions to improve HRQoL in symptomatic patients with PAD is to identify key baseline factors. The aim of this study was to identify predictors of baseline measures of HRQoL in symptomatic patients with PAD from objective markers of severity of PAD, clinical and demographic characteristics, comorbid conditions, cardiovascular risk factors, objectively measured physical activity, and patient-based measures of physical function.

METHODS

Patients

Approval and informed consent. The procedures of this study were approved by the Institutional Review Board at the University of Oklahoma Health Sciences Center (HSC). Written informed consent was obtained from each patient at the beginning of investigation.

Recruitment. Patients who were not currently exercising were recruited from vascular laboratories and vascular clinics from the University of Oklahoma HSC for possible enrollment into exercise rehabilitation programs to treat leg pain secondary to PAD.^{14,23}

Baseline clinical assessments

Protocol. Patients were evaluated in the Clinical Research Center at the University of Oklahoma HSC. Patients arrived in the morning fasted but were allowed to take their usual medications. To begin the study visit, patients completed the consent form, and their vital signs, demographic information, height, weight, body mass index, anthropometric measurements, and waist circumference²⁴ were recorded by research personnel. Subsequently, patients had blood samples drawn by study nurses, which were then sent to the central laboratory at the University of Oklahoma HSC for fasting blood chemistry analysis. Patients then underwent a medical history and physical examination by study physicians, in which claudication history, comorbid conditions, cardiovascular risk factors, and current medications were recorded. After this assessment, patients rested supine for 10 minutes under standardized laboratory conditions. Ankle and brachial systolic blood pressures were then obtained according to standard guidelines²⁵ by exercise physiologists for the calculation of the ankle-brachial index (ABI). Patients then performed a screening graded treadmill test in which the ABI was measured from the more affected leg immediately after exercise⁵ for the purpose of confirming that leg pain was of vascular origin, which was one of the criteria for study inclusion. Based on this battery of baseline assessments, patients were coded on cardiovascular risk factors and comorbid conditions according to standard definitions,²⁶ and patients were characterized on the presence, severity, and symptoms of PAD.

Inclusion and exclusion criteria. Patients with symptomatic PAD were included in this study if they met

ARTICLE HIGHLIGHTS

- **Type of Research:** Prospective cross-sectional study
- **Take Home Message:** Quality of life related to claudication in 216 patients with peripheral artery disease better correlated with measures of physical function, such as walking speed, stair climbing, and stumbling, than with traditional physiologic measures, such as ankle-brachial index and walking distance.
- **Recommendation:** The authors suggest that physicians caring for patients with peripheral artery disease ask about measures of physical function as well as measuring limb blood flow when making decisions about treatment of claudication.

the following criteria: history of ambulatory leg pain, ambulatory leg pain confirmed by treadmill exercise,⁵ and ABI ≤ 0.90 at rest⁴ or ≤ 0.73 after exercise.²⁷ Patients were excluded for the following conditions: absence of PAD (ABI > 0.90 at rest and ABI > 0.73 after exercise), noncompressible vessels (ABI > 1.40), asymptomatic PAD (Fontaine stage I; Rutherford grade 0),⁴ rest pain due to PAD (Fontaine stage III; Rutherford grade 2), tissue loss due to PAD (Fontaine stage IV; Rutherford grades 3 and 4), use of medications indicated for the treatment of claudication (cilostazol or pentoxifylline) initiated within 3 months before investigation, exercise limited by other diseases or conditions, active cancer, stage 5 chronic kidney disease (end stage) as defined by an estimated glomerular filtration rate < 15 mL/min per 1.73 m,²⁸ and abnormal liver function. A total of 216 patients were eligible and included in the study.

Measurements

HRQoL. HRQoL was assessed with the Medical Outcomes Study 36-Item Short Form Health Survey,²⁹ a reliable and valid generic instrument that includes multi-item questions assessing eight health subscales. Four of the subscales are related to physical health, which includes physical function, role limitations due to physical problems, general health, and bodily pain. The remaining four subscales are related to mental health, which includes social function, role limitations due to emotional problems, mental health, and vitality. For each subscale, multiple item scores are standardized into a scale of 0 to 100, with higher scores reflecting better health states. We previously found that of the four subscales related to physical health, the physical function subscale was the most impaired in patients with symptomatic PAD compared with national norms.¹⁷ Furthermore, of the four subscales related to mental health, the role limitations due to emotional problems subscale was the only one in which patients with symptomatic PAD scored lower

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