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Aerobic capacity and health-related quality of life in adults HIV-infected patients with and without lipodystrophy

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ABSTRACT

Introduction: HIV infection and its therapy which can affect their aerobic capacity and health-related quality of life of patients.
Objective: We conducted a cross-sectional study to determine if aerobic capacity and health related quality of life was decreased in HIV-infected patients receiving highly active antiretroviral therapy and comparing patients with and without lipodystrophy.
Research design and methods: HIV-infected patients older than 18 years, and in current use of highly active antiretroviral therapy drugs, were evaluated for blood count, fasting total cholesterol, high density lipoprotein, triglycerides, glucose, HIV viral load and CD4/CD8 counts, body composition, peak oxygen consumption (peak VO_2) and metabolic equivalent. Health related quality of life was assessed by using Short Form-36 (SF-36). Statistical analysis was carried out using SPSS version 20.0.
Results: A total of 63 patients with mean age of 43.1 ± 6.4 years were evaluated, of these 34 (54%) had lipodystrophy. The average peak VO_2 ($31.4 \pm 7.6\,mL\,kg^{-1}\,min^{-1}$) was significantly lower ($p < 0.01$) than expected values ($37.9 \pm 5.6\,mL\,kg^{-1}\,min^{-1}$) according to the characteristics of the patients. The lipodystrophy group presented with a significant difference in muscle mass, body fat, peak VO_2 and metabolic equivalent and in functional capacity domains of SF-36.
Conclusion: Aerobic capacity values were reduced in HIV-infected patients under highly active antiretroviral therapy when compared to predicted values. Lipodystrophy was associated with reduced aerobic capacity and higher frequency of metabolic syndrome. Lifestyle modification should be a priority in the management of chronic HIV disease.

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Introduction

HIV-infected individuals are living longer in the era of highly active antiretroviral therapy (HAART). However, recent reports suggest increased rates of cardiovascular risk,[1,2] body fat changes (lipodystrophy),[3] and long-term adverse effects such as changes in physical functioning, disabilities and health-related quality of life (HRQOL) are common findings in this population.[4]

Functional impairment is common among HIV-infected persons. HIV-related disability has been associated with decrease in exercise capacity and patient's daily activities.[5,6] Reduced aerobic capacity or cardiovascular fitness may contribute to further physical impairment and activity limitations, placing HIV-infected patients at risk for poor health outcomes.[7–9] Some studies have shown an association between cardiovascular fitness and cardiovascular mortality, as well as all-cause mortality in men and women of all ages.[10,11]

Dependence on assistance with activities of daily living and/or reduced recreational activities participation may be associated with a lower HRQOL and higher risk of mortality.[12] However, conflicting results have been reported in regard to aerobic capacity. Some authors have reported reduced aerobic capacity in HIV patients in HAART use,[5,6,12,13] whereas others have detected no adverse long-term effect.[14,15]

The measure of peak oxygen consumption (peak VO_2) has been utilized to assess aerobic capacity as well as for the prescription of exercise programs in this population.[16] HRQOL is one of the most utilized subjective aspects in evaluating the impact of chronic diseases and both its definition and assessment are contentious.[17,18] The combination of negative effects on physical and mental function in HIV-infected patients with lipodystrophy may have a further adverse impact on HRQOL, but its impact on aerobic capacity and quality of life has not been properly studied. The objective of this study was to determine if aerobic capacity and quality of life was diminished in HIV-infected patients receiving HAART and if lipodystrophy was related to these outcomes.

Methods

Patients and settings. The study was conducted at the AIDS Clinics of Federal University of Bahia Hospital (HUPES), a public HIV referral service in Salvador, Brazil. The project was approved by the Institutional Ethics Research Committee.

Study design: We conducted an observational cross-sectional study. Patients were consecutively invited to enter the protocol following the signature of an informed consent. The inclusion criteria were: current use of ARV drugs, age equal or higher than 18 years, and availability to attend the study activities. Exclusion criteria included pregnancy, active opportunistic infections and history of regular exercising before entering the study.

Measures

Laboratory measurements consisted of total cholesterol, HDL, triglycerides, glucose, HIV viral load and CD4/CD8 counts. Metabolic syndrome was defined following National Cholesterol Education Program Adult Treatment Panel III definition.[19] Based on that definition, three or more of the following criteria need to be met for defining metabolic syndrome: (1) fasting serum triglycerides $\geq$150 mg/dL; (2) abnormal waist circumference: waist perimeter $\geq$102 cm in man, or $\geq$88 cm in women; (3) fasting blood glucose $\geq$100 mg/dL; (4) hypertension: systolic blood pressure $\geq$130 mmHg and/or diastolic blood pressure $\geq$85 mmHg, and/or use of an antihypertensive drug; (5) low HDL-cholesterol: $\leq$40 mg/dL for men, or $\leq$50 mg/dL for women.

We measured weight, height, body mass index (BMI) and skin fold. Body weight was measured using a balance accurate to 100 g. Height was measured by a stadiometer with subjects barefoot. BMI was calculated by dividing body weight (kg) by height squared (m^2). We used the digital caliper to evaluate the percentage of lean body mass, fat mass, and muscle mass. The calculation was based on Faulkner's skinfold protocol.[20] In addition, we measured the circumference of chest, waist, waist-hip ratio, abdomen, hips, forearms, arms, thighs and calves (0 and 6 months). The measurement was performed with the patient standing upright, using a flexible tape measure and extendable to one decimal place.[21,22]

Lipodystrophy was defined clinically by physical examination and by patient report of fat wasting in the face, arms or legs with or without central obesity. Patients were initially asked a general question about any changes in body appearance, followed by questions with specific reference to the regions mentioned above, time of onset of changes in each region, and whether the changes had resolved. Patients with weight change but without peripheral fat loss were not defined as having lipodystrophy.[23]

The exercise testing was performed to evaluate the clinical response, the hemodynamic, electrocardiographic and metabolic stress, and to customized exercise prescription and subsequent evaluation of therapeutic intervention, under the supervision of a cardiologist. We used the ergometer treadmill. We chose ramp protocol for the study. Subjects were exercised on a motor-driven treadmill with an initial speed of 3 km h^{-1} and a 2% incline. We used continuous increments in speed and incline, following a ramp protocol adjusted to the subjects' predicted functional capacity, to reach volitional fatigue in approximately 8–12 min. Blood pressure was measured every 3 min using a standard arm sphygmomanometer, while 12-lead ECG was continuously monitored.[24,16] The values of the test performed were compared with the predicted values in accordance with Jones equation for the treadmill test (VO_2 predicted for male subjects = $[60.0 - (0.55 \times \text{age})] \times 1.11$; and VO_2 predicted for female subjects = $[48.0 - (0.37\ \text{age})] \times 1.11$).[16]

Assessment of quality of life was performed by applying the SF-36 (Medical Outcomes Study 36-Item Short-Form Health Survey). The SF-36 questionnaire contains 36 questions that are grouped into eight domains: functional capacity, limitations related to emotions, and perceptions of mental health, whose scores range from 0 to 100, where zero corresponds to the worst general state of health and 100 to the best state, meaning that the higher the total score, the better the perception of quality of life. This tool was already validated for use in Brazilian patients.[25]