



Review article

# Exercise therapy for human immunodeficiency virus/AIDS patients: Guidelines for clinical exercise therapists

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## Abstract

Human immunodeficiency virus (HIV) has infected > 60 million people since its discovery and 30 million people have died since the pandemic began. Antiretroviral therapy has transformed HIV infection from an acute to a chronic disease, increasing life expectancy but also adding to the potential side effects associated with drug therapy and the comorbidity accompanying longevity. Exercise can play a valuable role in the management of HIV/AIDS patients by addressing various symptoms and improving their quality of life, but the optimum mode, intensity, frequency, and duration of exercise that take the different clinical stages of the disease into consideration are inadequately known. Searches of Medline, Embase, Science Citation Index, CINAHL database, HealthSTAR, PsycINFO, Cochrane Central Register of Controlled Trials (CENTRAL), Cochrane Database of Systematic Reviews, Physiotherapy Evidence Database (PEDro), and SPORTDiscus were conducted between 2000 and January 2014. Searches of published and unpublished abstracts were conducted, as well as a hand search of reference lists and tables of contents of relevant journals and books. Identified studies were reviewed for methodological quality. A total of 33 studies met the inclusion criteria. Most studies failed to indicate the optimum type (mode), intensity, frequency, and duration of aerobic and progressive resistive exercise prescribed to HIV-infected individuals in relation to the different clinical stages of the disease. The purpose of this review is to provide evidence-based recommendations after revision of exercise guidelines for HIV patients, by highlighting practical guidelines that clinical exercise therapists should consider when prescribing exercise for patients in different stages of the disease.

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**Keywords:** Aerobic exercise; CD4 count; Highly active antiretroviral therapy; Immunodeficiency progressive resistive exercise

## Introduction

Health professionals are concerned to know more about the use of exercise as a complementary therapeutic modality for individuals infected with human immunodeficiency virus (HIV) because there are gaps in our knowledge regarding the optimal mode, duration, frequency, and intensity of exercises prescribed to HIV/AIDS patients. Exercise has the potential to ameliorate a range of side effects associated with HIV

infection, as well as the cardiometabolic and morphological complications (i.e., mitochondrial dysfunction, inflammation, and oxidative stress) that may accompany highly active antiretroviral therapy (HAART).<sup>1,2</sup> Exercise can delay the progression of the disease and improve quality of life (QOL) in adults living with HIV infection.<sup>3</sup> In addition, exercise is generally regarded as safe because it does not compromise the immune function, and is beneficial in boosting functional capacity, strength, physical fitness, mood, and sense of well-being, and in ameliorating wasting and lipodystrophy.<sup>1,2,4</sup> Studies investigating the effects of exercise on cardiometabolic and morphological outcomes in people living with HIV indicate that this activity can have beneficial effects on insulin resistance and diabetes,<sup>5,6</sup> improve oxidative

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stress,<sup>7,8</sup> improve lipid profile,<sup>7–9</sup> and reduce risk of cardiovascular disease.<sup>10</sup>

Exercise studies in HIV patients have assessed the impact of aerobic exercise (AE) and progressive resistive exercise (PRE), individually or in combination, on immune function, psychological factors, cardiorespiratory fitness, strength, body composition, and QOL,<sup>1,10</sup> as well as HAART-induced metabolic complications<sup>11</sup> in HIV/AIDS patients. Results from these studies indicate that moderate- to high-intensity AE, PRE, and a combination thereof is safe and elicit favorable and beneficial changes in an HIV-infected population. These benefits include changes in body composition, functional capacity, total and high-density lipoprotein cholesterol (HDL-C), cognitive function, depression and anxiety, overall health, and QOL.<sup>1,10</sup> Exercise training, however, apparently confers no beneficial effect on HIV status, viral load, or immune function.<sup>1,11</sup> All the current clinical guidelines do not necessarily address the different disease stages when prescribing exercises to HIV/AIDS patients because it is not always possible to have a homogeneous group in HIV/AIDS exercise studies. For this reason, after carefully reviewing HIV/AIDS exercise guidelines regarding the type (mode), intensity, frequency, and duration of exercise, we describe for the first time, exercises that we believe can be applied to the different clinical stages of HIV-infected individuals.

## Methods

### Study design

Reviews of the published literature were conducted on the mode, intensity, frequency, and duration of exercises prescribed to HIV/AIDS patients. Only randomized trials in which a prescribed AE, PRE, or a combined AE and PRE intervention was compared with no exercise or with another exercise intervention at least twice weekly, over at least 4 weeks, were included. Trials combining exercise with non-exercise intervention (e.g., anabolic steroids), English language publications, unpublished studies, and conference proceedings were excluded.

### Types of participants

We included studies of adults ( $\geq 18$  years) living with HIV. Studies of men only, women only, or both at all stages of infection were included.

### Types of intervention

Exercise training including AE, PRE, or a combination of both, either supervised or unsupervised, was included. AE was defined as an intervention containing AE (e.g., walking, jogging, running, rowing, or cycling). PRE was defined as resistive exercise intervention (e.g., weight training, isotonic, or isometric exercises). Comparisons examined were exercise training versus no exercise training (control) and exercise training versus another form of exercise training. Our

parameters for AE and PRE inclusion were based on the American College of Sports Medicine Guidelines.<sup>12</sup>

### Outcome measures

Morphological outcomes considered were body weight (kg), body mass index (BMI; kg/m<sup>2</sup>), lean body mass (kg), girth circumference (thigh, calf, arm, chest, waist, and hip; cm), percent body fat, skin fold thickness of subcutaneous fat and cross-sectional muscle area (mm<sup>2</sup>), waist circumference (cm), waist to hip ratio (WHR), and bone mineral density (BMD). Cardiorespiratory measures considered in this review included but were not limited to maximal oxygen consumption (VO<sub>2max</sub>; mL/kg/min), oxygen pulse, maximum heart rate (beats/min), maximum tidal volume, forced expiratory volume, minute ventilation, lactic acid threshold, maximum work rate, fatigue (time on treadmill), and dyspnea (rate of perceived exertion). Metabolic outcomes considered – all measured in mmol/L were blood lipids [total cholesterol, HDL-C, low-density lipoprotein cholesterol (LDL-C), triglycerides] and blood glucose. Immunological and virological indicators considered in this review included but were not limited to CD4/CD8 count (cells/mm<sup>3</sup>) and viral load (log<sub>10</sub> copies/mL). Strength measures considered for this review included but were not limited to strength (maximum amount of weight able to resist in kilograms). Psychological measures considered in this review included general measures of psychological status and health-related QOL used in studies with people living with HIV. These included but were not limited to the General Health Self-Assessment, Functional Assessment of HIV Infection, HIV/AIDS-Targeted Quality of Life Instrument, Living With HIV Scale, Medical Outcomes Study HIV Health Survey, Multidimensional QOL for Persons Living with HIV/AIDS, QOL, Medical Outcomes Study-HIV, Short Form (SF)-36, SF-12, SF-21, Quality of Life Index, Sickness Impact Profile, and Profile of Mood State Scale.

### Search methods for identification of studies

The present work followed the recommendations of the PRISMA Statement which is a guideline for reporting systematic reviews.<sup>13</sup> Searches of Medline, Embase, Science Citation Index, CINAHL, HealthSTAR, PsycINFO, SPORT-Discus, Cochrane Central Register of Controlled Trials (CENTRAL), Cochrane Database of Systematic Review, and Physiotherapy Evidence Database (PEDro) were conducted between 2000 and January 2014. Searches of published and unpublished abstracts were conducted, as well as a hand search of reference lists and tables of contents of relevant journals and books. Three arms of the search strategy were developed and intersected using the Boolean term “AND”: (1) HIV subject headings: HIV, HIV infections, HIV long-term survivors, AIDS, human immunodeficiency virus, or acquired immunodeficiency syndrome, highly active antiretroviral therapy; (2) exercise subject headings: exercise, exertion, physical fitness, sports, physical education and training, aerobic, anaerobic, progressive resistive/resistance, exercise

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