Exercise and HIV

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INTRODUCTION

Human immunodeficiency virus (HIV) is a retrovirus that progressively lowers the body’s CD4+ cell counts and impairs the immune system [2]. Acquired immunodeficiency syndrome (AIDS), a chronic, life-threatening condition that is caused by HIV, is the final stage of the HIV infection (see Table 1). At the end of 2003, an estimated 1,039,000 to 1,185,000 persons in the United States were living with HIV/AIDS, with 24%-27% undiagnosed and unaware of their HIV infection [3]. Many unfavorable metabolic and morphological abnormalities are associated with HIV, particularly body composition and muscle wasting [6]. The standard treatment for HIV is a combination of medicines called highly active antiretroviral therapy (HAART). Antiretroviral medicines slow the rate at which the virus multiplies and promotes favorable virological control, which significantly decreases the morbidity and mortality associated with HIV [6]. Although the introduction of HAART has improved longevity among HIV patients, HIV and its therapy have been associated with the development of several metabolic complications and may put patients at an increased risk of metabolic and cardiovascular diseases [6]. Examples of metabolic complications related to HIV and HAART include dyslipidemia, lipodystrophy (swollen abdominal region with loss of fat tissue in the face and extremities), insulin resistance, and diabetes mellitus [6]. In regards to cardiovascular disease (CVD) and HIV-infected patients, one study reported a 32% increase in the relative risk of CVD over five years following the initiation of HAART [7]. Metabolic syndrome, the clustering of specific cardiovascular risk factors1, is another metabolic complication of HIV and HAART. The prevalence of metabolic syndrome in HIV-infected patients ranges from 17% - 45.5%4 and is associated with greater insulin resistance [7]. In patients who develop metabolic syndrome while on HAART, the risk of developing diabetes increased four to five-fold while CVD risk increased three-fold [7]. Lipodystrophy is another notable complication associated with HAART and is the most difficult to reverse [7]. It is characterized by loss of fat in the face, arms, and legs and the accumulation of fat in the abdomen.

Table 1. Stages of Human Immunodeficiency Virus
Stage 1 – Primary HIV infection and seroconversion (HIV negative to HIV positive).
Stage 2 – Stabilization of the viral load (early disease stage). CD4+ count >500 cells·mm-3.
Stage 3 – CD+4 cell count falls to 200 – 400 cells·mm-3. Skin disorders become evident. Increased risk of advancing to stage 4 if disease left untreated.
Stage 4 – CD4+ cell count drops below 200 cells·mm-3. This stage meets the Centers for Disease Control and Prevention definition for AIDS. Risk increases of
developing opportunistic infections.

Stage 5 – HIV infection is uncontrolled and CD4+ cell counts drop below 50 cells·mm⁻³. Risk of death from opportunistic infection is highly probable.

Smith et al [7]

The cost of improved immune function and life expectancy for HIV-infected patients on HAART is severe metabolic complications. These individuals are now living longer, but with more chronic diseases. Participation in an exercise program may be an important no pharmacological alternative to improve the metabolic and morphological features of HIV/AIDS.

**BENEFITS OF EXERCISE/PHYSICAL ACTIVITY ON HIV/AIDS**

Physical activity has long been established as a supplemental therapy for treating chronic illnesses. Aerobic, resistance, and combined resistance and aerobic training programs may help alleviate the unfavorable metabolic complications associated with HIV and HAART by altering body composition and body fat distribution, as well as normalizing lipid profiles [6].

Aerobic training is important in HIV-infected patients on HAART because of its potential to increase cardiovascular fitness and reduce body fat. One study examining the effects of aerobic training on body weight, body composition, and fatigue noted a decrease in body weight, sum of skinfolds, waist circumference, and fatigue, while reporting improvements in aerobic fitness [9]. In another study examining aerobic training in adults with lipodystrophy and dyslipidemia, a mean reduction of 12 cm in visceral fat was noted, as well as a reduction in total cholesterol and fasting triglycerides and in increase in HDL cholesterol [10]. Both of these studies suggest that aerobic training may reduce central body fat, which is an important factor in reducing cardiovascular risk factors.

Metabolic complications arising from HIV and HAART and AIDS related wasting have been found to be associated with a decline in physical functioning and quality of life. Resistance training (RT) has the ability to increase lean body mass and reduce fat mass in individuals who have HIV. However, many studies are inconsistent in their findings [6]. One notable study showed that participants in an eight week RT program significantly increased their fat free mass while decreasing their fat mass. Another study examining the effects of RT on body composition showed a whole-body lean mass increase of 2.5% and a 2.6% increase in trunk adipose mass [11]. This same study also noted a decrease in fasting triglycerides. These studies suggest that a progressive RT program may be effective intervention for patients suffering from AIDS-related wasting.

Combined aerobic and RT may be a more effective adjunct therapy for patients with lipodystrophy than either type of training alone. Jones et al [5] reported that aerobic and RT combined has the potential to reduce central body fat redistribution and results in positive changes in body composition. Combined aerobic and progressive RT also has been found to significantly improve muscle size and quality [2]. These changes
in muscle included decreases in muscle fat, which may contribute to improved metabolic profiles in HIV-infected individuals. Furthermore, improvement in strength and muscle mass may help ameliorate the metabolic complications of HIV/AIDS and the negative metabolic side effects of HAART.

**EXERCISE TESTING AND PRESCRIPTION**

Individuals with HIV can undergo exercise testing similar to that of someone without the infection. However, their exercise tolerance may be limited due to a number of factors. Often, depending on the stage of the disease, individuals taking antiretroviral medications (i.e., HAART) suffer from nausea, vomiting, and become easily fatigued. Thus, the type of exercise test (or the decision not to test) that is to be conducted will be based on the clinical judgment of the exercise professional (e.g., RCEP, CES). If the individual has led a relatively active lifestyle and maintained a higher level of fitness, they may tolerate a treadmill test, conversely, if the individual to be tested leads a sedentary lifestyle, or they are in a later stage of the HIV (i.e., stage 3 or 4) (see Table 1) they may not be candidates for exercise testing.

Regular physical activity and/or exercise can favorably impact the devitalized state of many individuals suffering from HIV. Varying, but measurable improvements of the five components of fitness (cardiovascular fitness, muscular strength and endurance, body composition, and flexibility) can be seen following exercise training in individuals with HIV. These individuals do not need any special supervision beyond that of teaching the appropriate exercise techniques, progression, and safety. The primary concerns of the exercise professional when designing physical activity/exercise programs in this population is to be aware of the current fitness/activity level of the individual, stage of the disease, medication regimen and side-effects, and fatigability (see Table 2). The exercise professionals understanding of HIV, the medications prescribed and their numerous side-effects and their compassion to want to help those with this infection improve their quality of life are essential.

**Table 2. Primary Concerns of the Exercise Professional Working with HIV+ Clients**

- *Stage of Disease (See Table 1)*
- *Current fitness and/or physical activity level of their client*
- *Medication regimen and side-effects*
- *Fatigability*

**SUMMARY**

Today, due to medical advances and an increased focus by the individual on their own well being, many individuals who are HIV+ are living relatively normal lives. Beginning an exercise program or maintaining a physically active lifestyle is one way to help improve the quality of life of not only the apparently healthy population, but also those diagnosed with chronic conditions like HIV. The exercise professional has a role
in helping these individuals meet their fitness goals, while understanding the limitations involved with working with this special population.

REFERENCES


