

# The Relationship between Physical Exercise and HIV AIDS, A Systematic Review and Meta-Analysis

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## Abstract

*There are different factors which escalates HIV related deaths. Most of them could be expressed by hypokinetic conditions. It is difficult to get a single research which does not support physical exercise for HIV patients. There are lots of researches published on the relationship between Physical exercise and HIV AIDS. However there is a gap in indicating the specific benefits of exercise as well as the specific training to be used to better manage HIV related complications. Studies which are under the PubMed search engine and organizational reports, published from the year 1998 to 2014 were used. 37 papers which are more related with the issue reviewed. The effect of physical exercise in the management of hypokinetic disease, immunity, body weight, fatigue and Psychological status is thoroughly discussed. The Exercise tolerance of People living with HIV AIDS is determined. The role and intensity of Resistance, Aerobic and Resistive aerobic exercise for HIV management is decidedly addressed. Data based comparison focused on the association between aerobic exercise and HIV AIDS is made. The constellation of studies on the area approved that physical exercise plays a vital role for the management of HIV related complications. Nevertheless, the specific mode and dose of physical exercise is yet to be determined.*

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## Abstract

### Introduction

Following the clinical identification of HIV AIDS in 1981 (Dolin, 2010), our world had been giving due attention to save human beings from the virus. Prevention and treatment of the disease were a great concern especially in the first stage of the disease detection. HIV-infected children

and adults are now expected to live longer, but at the same time, they are at risk for developing health complications (Gabriel *et al.*, 2010). Increasing the quality of life of HIV infected patients is becoming a prior issue in the beginning of the new millennia. Physical exercise and nutrition are the two areas which had been given

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substantial attention. Greater physical activity was associated with greater Quality of Life, independent of HIV-related mortality risk (Erlandson et al., 2014). Physical activity can have important, and even life-saving, effects as secondary prevention of disease (Karmisholt and Gøtzsche, 2005). More specifically, Moderate physical activity may slow HIV disease progression (Mustafa et al., 1999). So far many researches had been conducted about one or more physical exercise and HIV related complications. However, regular physical exercise should be further studied as a potential anti-inflammatory, non-pharmacological approach to be used to treat HIV residual disease and non-AIDS-defining illnesses in ART-treated HIV-infected individuals (D'Ettorre et al., 2014). Targeted exercise programs to increase physical activity and improve speed and power should be evaluated as interventions to improve Quality of Life during ART (Erlandson et al., 2014). This study is aimed to investigate the relationship between physical exercise and HIV AIDS. It is done by examining the integration between HIV related complications and Physical exercise as well as by scrutinizing the role of aerobic exercise on the prevention and management of HIV related complications. Additionally, the state of immunity with physically active HIV patients will be evaluated.

### **Research Questions**

- This systematic review and meta-analysis answers the following queries.

- What is the role of physical exercise for HIV management?
- What is the relationship between physical exercise and HIV related complications?
- What can aerobic exercise do for HIV associated problems?

What would be the state of immunity after HIV patients engaged in physical exercise?

### **The State of Lipid and Physical Exercise in HIV patients**

Lifestyle modifications such as diet and exercise and switching antiretroviral therapies appear to be of limited value in reducing visceral adipose tissue (VAT). Metformin has shown some benefit in reducing VAT but at the expense of accelerating peripheral fat loss, and the thiazolidinediones have no effect on VAT. Similarly, testosterone does not appear to reduce VAT (Cofrancesco et al., 2009). After Describing that antiretroviral therapy could have a direct impact in increasing visceral adiposities, Moyle and his friends put their own nearly-doping solutions, which includes testosterone injection as a means of fat reduction. Surprisingly, they raised an important issue in their summary. According to them, the prevention and management of visceral adiposity remains a substantial challenge in clinical practice (Moyle et al., 2010).

In their guideline, the European AIDS Clinical Society suggests exercise and diet in addition to quitting smoking as lifestyle intervention. They further recommend A healthy diet, exercise and maintaining normal body weight to reduce dyslipidaemia. Intra-abdominal fat accumulation

is best managed by exercise and diet (Lundgren et al., 2008). Treatment of HIV dyslipidemia should include lifestyle modifications such as a low-fat diet, increased exercise, reduced alcohol consumption and smoking cessation (Sax, 2006). After Assessing Leisure Time Physical Activity participant HIV victims, Florindo and His colleagues verified that Physical activity contributed towards preventing fat accumulation in HIV/AIDS subjects (Florindo et al., 2007).

Exercise training in combination with metformin significantly improves cardiovascular and biochemical parameters more than metformin alone in HIV-infected patients with fat redistribution and hyperinsulinemia. Combined treatment was safe, well tolerated and may be a useful strategy to decrease cardiovascular risk in this population (Driscoll et al., 2004). In contrary to this, Birk and his colleagues concluded that long-term exercise training cannot correct lipid profile abnormality, particularly hypertriglyceridemia, common to individuals with advanced HIV-1 infection (Birk et al., 2002).

In general, Physical activity is a protective factor for the development of fat redistribution syndromes (Domingo et al., 2003). Exercise training may reduce trunk fat mass in HIV-positive men with fat redistribution (Roubenoff et al., 1999). Body weight, BMI and subcutaneous fat decreased by using Physical exercise (Smith et al., 2001).

### **Aerobic Exercise and HIV related complications**

After completing 12 weeks of training with two children subjects, Miller concluded that progressive resistance exercise training in a medically supervised environment is safe and feasible for children with HIV infection. His training mainly relies on aerobic type (Miller, 2007). Progressive resistive exercise or a combination of progressive resistive exercise and aerobic exercise appear to be safe and may be beneficial for adults living with HIV/AIDS (O'Brien et al., 2004). Both Progressive resistive and aerobic exercises increased body weight, arm and thigh circumference. They are shown to improve sub maximal heart rate and exercise time (O'Brien et al., 2008).

Moderate intensity aerobic exercise is an effective complementary therapy in lowering blood pressure and increasing CD4 cell count in PLWHA. (Ezema et al., 2014). Tai Chi and Aerobic Exercise improve physiologic parameters, functional outcomes, and Quality Of Life. Group intervention provides a socialization context for management of chronic HIV disease (Galantino et al., 2005). Performing constant or interval aerobic exercise, or a combination of constant aerobic exercise and progressive resistive exercise for at least 20 min, at least three times per week for 4 wk may be beneficial and appears to be safe for adults living with HIV/AIDS (O'Brien et al., 2004). Overall training can improve the muscle and aerobic fitness of HIV-infected patients with no negative effect on their immunological function. (Farinatti et al., 2010)

According to O'Brien and his colleagues, Aerobic exercise appears to be safe and may be beneficial for adults living with HIV. In their well-structured review type research which encompasses studies of three recent decades, they put their findings as follows. performing constant or interval aerobic exercise, or a combination of constant aerobic exercise and progressive resistive exercise for at least 20 minutes at least three times per week for at least five weeks appears to be safe and may lead to significant improvements in selected outcomes of cardiopulmonary fitness (maximum oxygen consumption), body composition (leg muscle area, percent body fat), and psychological status (depression-dejection symptoms) (O'Brein et al., 2010). Moderate-intensity aerobic and resistance training can improve Functional aerobic capacity and most importantly, it eliminate Functional aerobic impairment (Hand et al., 2008)

### **Exercise Tolerance and Fatigue in PLWHA**

In a study which was conducted on male victims, HIV patients showed resting cardiac dysfunction, altered cardiac responses to exercise and depressed exercise tolerance. Exercise stroke volume kinetics and muscle oxygenation were impaired in HIV patients, especially in those with resting diastolic dysfunction (Thoni et al., 2008). Highly Active Antiretroviral Therapy (HAART) users perform less vigorous exercise than Both HIV negative and HIV positive non-drug users. Nonetheless, Injection drug use and viral load are not associated with vigorous activity (Smit et al., 2006). Recombinant human growth hormone rhGH treatment may enable patients with wasting

to perform activities of daily living that would be exhausting without rhGH treatment (Evans et al., 2005).

Six weeks of combined moderate-intensity aerobic and resistance training can improve Functional aerobic capacity and eliminate Functional aerobic impairment in those with HIV. Results suggest that the functional limitations common in HIV-infected individuals are due in part to detraining that is reversible through moderate exercise adherence (Hand et al., 2008).

HIV-positive older adults were apt to view fatigue as an indirect indicator of their overall health status and immune functioning. This may explain why many of the coping strategies they used could be considered approaches to improving their overall health status as a means to increasing their energy levels (Siegel et al., 2004). HIV-related fatigue has a high prevalence and is strongly associated with psychological factors such as depression and anxiety. A validated instrument should be used to measure intensity and consequences of fatigue in HIV-infected individuals. In the case of fatigue, clinicians should not only search for physical mechanisms, but should question depression and anxiety in detail. According to Jong and his friends, Treatment of HIV-related fatigue is important in the care for HIV-infected patients and requires a multidisciplinary approach. (Jong et al., 2010). Supervised aerobic training is the proved mode of exercise to safely decreases fatigue for PLWHA (Smith et al., 2001).

## **Maintain ace of Bone Mineral Density and Muscle Mass in PLWHA**

Osteopenia/Osteoporosis could be a complication for HIV patients. A study conducted in Slovenia comes up with solid evidence concerning the prevalence of osteoporosis in HIV infected male population. What makes the study credible is it represents 72% of the national HIV infected males. The prevalence of reduced bone mineral density (BMD) was notably higher than the national prevalence among men of comparable age. There was no association between reduced BMD and any specific ART. But, absence of ART was confirmed as an independent predictor of osteopenia/osteoporosis. As a recommendation, Targeted screening and early treatment present a reasonable strategy for preventing reduced BMD in HIV-infected patients, but correcting vitamin D (3) levels could also be an important component (Tomazic et al., 2007).

Resistance exercise training, which is more easily accessible than Supplementation and Hormone therapy, holds promise in counteracting the process of HIV-related muscle wasting, as it has been successfully used to increase lean tissue mass in healthy and clinical populations (Dudgeon et al., 2006). Progressive Resistance Training increases functional status in patients with HIV wasting, both by increasing strength and by increasing Lean Body Mass (Roubenoff and [Wilson, 2001](#))

## **Physical Exercise and Immunity**

Studies on this area come up with three conflicting conclusions. A change, no change and

no magnified change are the three destinations of studies conducted in the past 17 years. According to a study which is conducted earlier, Programs of moderate training can be sustained without any large change in CD4+ count or CD4+/CD8+ ratio (Shephard, 1998). Similarly, physical exercise has no effect on immunological function (Farinatti et al., 2010).

Ezema and his colleagues come up with different conclusion. In their finding they assured that moderate intensity physical exercise increases CD4 levels of people living with HIV AIDS (Ezema et al., 2014). Their result is consistent with the findings of Yenehun and his colleagues. In their study which was conducted in Dire Dawa (Ethiopia), Yenehun and his partners measured CD4 and CD8 levels before and after treatment. They concluded that increasing duration, frequency, modality and intensity of floor aerobics exercise might have beneficial effects on immunity induction in people with HIV/AIDS. (Yenehun et al., 2012). Similarly, it is advised to escalate physical activity level as it has beneficial effects on viral load in HIV-infected individuals. A significant inverse relationship was found between physical activity and viral load (Bopp et al., 2004).

## **Psychological Status, after Physical Exercise**

After performing aerobic exercise (interval or constant) for five weeks (three days per week), the psychological status of subjects could be improved. They showed decreased depression-dejection symptoms (O'Brein et al., 2010). In another study which has control group (non-

exercise group), exercise participants showed reductions in depressive symptoms on all indices, and total depressive symptoms scores were highly correlated. (Neidig et al., 2003). Physically active participants had higher life satisfaction scores and healthier body composition as compared to those physically inactive. Health professionals must encourage the promotion of a physically active lifestyle among HIV-positive individuals (Ramírez et al., 2004).

### **Reviewer's Conclusion**

Following a thorough evaluation of studies published from 1998 to 2014, the following points are stated as a conclusion.

- Physical exercise helps to control HIV related fat accumulation. The type and intensity of exercise to be performed for fat reduction is similar with the non-infected partners.
- Aerobic exercise, a safe exercise for HIV patients, helps to lower blood pressure, increases immunity and quality of life. It improves functional aerobic capacity and eliminates functional aerobic impairment. However, further research is needed to better understand if unique intensity is needed for HIV patients from HIV free individuals.
- HIV patients have lesser exercise tolerance and greater fatigue due to physiological and psychological factors respectively. Aerobic exercise and psychotherapy are suggested to reverse those conditions.
- Bone mineral density is shown to be decreased in HIV patients. It results in osteoporosis and osteopenia. Physical exercise, particularly resistance exercise is helpful to maintain bone mass. Such exercise assists to prevent HIV related muscle wastage too.
- According to some studies, CD4 and CD8 level of HIV patients showed no change after physical exercise. Some more studies concluded that CD4 and CD8 in particular and immunity in general could be improved through physical exercise. As no study concluded with negative consequence of physical exercise for immunity, it is advisable to perform regular physical activity.
- Beside the aforementioned importance of physical exercise for the management of HIV related complications, the actual dose and mode of physical exercise for PLWHA is yet to be determined.

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