

INPLASY

Effect of physical exercise on the oxidative capacity, cardiovascular and pulmonary function of People Living with HIV/AIDS: a protocol for a systematic review with meta-analysis

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ADMINISTRATIVE INFORMATION

Support - None.

Review Stage at time of this submission - Completed but not published.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 04 July 2023 and was last updated on 04 July 2023.

INTRODUCTION

Review question / Objective This current systematic review will seek to address the following review question: what is the effect of physical exercise on the oxidative capacity, VO₂max and cardiopulmonary function of People Living with HIV/AIDS?he effect of physical exercise on the oxidative capacity, VO₂max and cardiopulmonary function of People Living with HIV/AIDS: a protocol for a systematic review with meta-analysis.

Rationale This review will explore the documented results of trials in the literature for evidence of the impact of physical exercise on some cardiovascular and cardiopulmonary health outcomes highlighted above in in people living with HIV/AIDS. This study will reveal effective non-pharmacological approaches in the management of the cardiovascular and cardiopulmonary complications of HIV infection or its treatment with HAART, while achieving a balance between the antioxidants and reactive oxygen species so as to

mitigate the prevalent deleterious impact of oxidative stress which is generally considered as the fore bearer for the onset of several diseases and plays a major role in the development of aging and chronic and degenerative disorders such as arthritis, autoimmune disorders, cardiovascular and neuro-degenerative diseases, inflammation and cancer.

Condition being studied The acquired immunodeficiency syndrome (AIDS), is linked to the human immunodeficiency virus (HIV) infection, and has remained one of the major global public health problems in the last four decades (Dos Santos et al., 2017). Despite the advent of the Highly Active Antiretroviral therapy (HAART), people living with HIV/AIDS (PLWH) still suffer from lactic acidosis, lipid abnormalities & lipodystrophy, (Reust, 2011), cardiopulmonary dysfunction (Gingo et al, 2018) and increase in creatinine kinase level (Lee & Carr, 2011). These conditions exist due to increased inflammatory response (Stacey et al., 2009) associated with HIV and HAART (Christine et al., 2020). There have also been reports of

increased levels of Interleukin-18 (IL-18) in the sputum/plasma of PLWH likewise plasma-related Interferon gamma (IFN- γ), which is associated with high pressures from the pulmonary artery, (Shirai, et al., 2010). Consequently, timely management of inflammation is required in ameliorating HIV/ART-associated morbidity (O'Connor & Irwin, 2010), and can be achieved through physical exercises.

METHODS

Search strategy "HIV" OR "AIDS" OR "human immunodeficiency virus" OR "acquired immune deficiency syndrome" AND "Physical exercise" OR "exercise therapy" OR "exercise" OR "resistance training" OR "aerobic exercise" OR "motor activity" OR "exercise training" OR "physical activity" OR "progressive resistance training" AND "oxidative capacity" OR "oxygen consumption" OR "oxygen saturation" OR "serum lactate concentration" OR "vo2max" OR "cardiopulmonary function" OR "cardio-respiratory fitness".

Participant or population People living with HIV/AIDS (PLWHA) who are adults (aged 18 years and older), regardless of their sex and stage of infection will be included in this review.

Intervention This review will include RCTs that studied the effects of exercise defined as either aerobic exercises or resistance exercises or progressive resistance training or a combination of aerobic and resistance exercises on the variables of interest in PLWHA.

Comparator This review will include RCTs comparing exercise training with non-exercise training or with another therapeutic modality or treatment options.

Study designs to be included Only Randomized Control trials (RCTs).

Eligibility criteria Inclusion criteria: Study Characteristics - This review will include studies published only in English Language, and RCTs comparing exercise training with non-exercise training or with another therapeutic modality(ies). Only exercise intervention programmes performed for at least two times per week for a minimum duration of 4 weeks will be included. Participants - Only RCTs conducted among adults aged 18 years and older, regardless of sex and at all stages of infection will be included in this review. Intervention - This review will include RCTs that studied the effects of exercise defined as either aerobic exercises or resistance exercises or progressive resistance training or a combination of aerobic and

resistance exercises on the variables of interest in PLWHA. Control - This review will include RCTs comparing exercise training with non-exercise training or with another therapeutic modality or treatment options. Outcomes - This systematic review will be limited to some health outcomes in PLWHA including: Primary outcomes: i. Circulating reactive oxygen species -ROS, VO₂max ii. Oxidative capacity measures (Oxygen saturation and); and iii. Cardiopulmonary parameters (BP, HR, FVC, FEV₁, and PEFR), This review will include studies that reported the aforementioned variables based on standardized and validated scales or questionnaires.

Information sources Literature searches will include a combination of terms from medical subject headings (MeSH) and keywords in the title, abstract and text for the population, intervention, control and outcomes. This procedure will be implemented by following the recommended guidelines of the Cochrane Handbook for Systematic Reviews and Centre for Reviews and Dissemination (Akers et al. 2009; Higgins and Green 2011). A PubMed search strategy presented above will be adapted to the syntax and subject headings of the remaining databases. Studies will also be searched in the following databases: CINAHL, the Cochrane Library, OVID, ProQuest, AMED, MEDLINE, PsycINFO and Web of Science Core Collection. Trial registers and directory of open-access repository websites including <http://www.clinicaltrial.gov>, <http://www.opendor.org> and the Web of science conference proceedings will be searched. Additionally, searches will be performed from the reference lists of identified studies. In addition to searching the electronic databases, the published systematic reviews of physical activity interventions will be searched to identify relevant RCTs; reference lists of relevant articles and books; the Database of Abstracts of Reviews of Effects (DARE); the Cochrane systematic review database; the National Institute of Health Research (NIHR) portfolio for recently completed or ongoing studies; and the current controlled trials register. Hand search of the bibliographies of all included studies will be done. The search strategy will be implemented in two stages as prescribed in the PRISMA protocol. The first stage involved; (i) searching the bibliographic databases and grey literature, and (ii) choosing which studies to include in the review based on eligibility criteria. The search strategy will be used differently for the selected study outcomes.

Main outcome(s) i. Metabolic indices (Serum lactate concentration, ii. Circulating reactive oxygen species -ROS, VO₂max, iii. Oxidative

capacity measures (Oxygen saturation and); and, iv. Cardiopulmonary parameters (BP, HR, FVC, FEV1, and PEFR).

Quality assessment / Risk of bias analysis The risk of bias in the included studies will be assessed using the Cochrane Collaboration Tool for Risk of Bias Assessment in six key domains:

- (i) Selection bias (random sequence generation, allocation concealment);
- (ii) Performance bias (blinding of personnel and participants);
- (iii) Detection bias (blinding of outcome assessments);
- (iv) Bias due to attrition (incomplete outcome data, including dropouts and withdrawals);
- (v) Reporting bias (selective reporting) and
- (vi) Other bias (other sources of bias not elsewhere addressed) (Higgins and Green 2011).

Assessment will be made in each of the included studies, and they will be graded as 'high risk' or 'low risk' following a well-described procedure (Higgins and Green 2011). Then, summary assessment for each important outcome (across domains) within and across studies will be conducted. When there will be inadequate detail in a study to make a judgment, the risk of bias in that study will be reported as unclear. In such cases, the study authors will be contacted to provide the required information. Two reviewers will make judgments regarding the risk of bias independent of each other. All areas of differences will be resolved by discussion and reflection, or in consultation with the third reviewer. Appraisal of the quality of the included studies will only be carried out after study selection had been completed, and during data extraction and synthesis. After this, the strength of evidence for this review will be reported.

Strategy of data synthesis First, the question of the effects of exercise intervention on cardiopulmonary parameters and oxidative capacity in PLWHA will be answered. In doing this, all quantitative study results which examined the effect of this intervention will be presented, compared and pooled in an evidence table. Appropriate statistical techniques will be used for each type of continuous (weighted mean differences if outcomes are consistent or standardized mean difference if different outcomes are used, with 95% CI) and dichotomous variables (risk ratios, with 95% CI).

This review will also include a meta-analysis (if there is sufficient homogeneity of outcomes) to calculate pooled effect sizes across studies, using a random-effect or fixed-effect model depending on the level of heterogeneity of intervention effects.

Heterogeneity will be investigated using χ^2 (significance level will be set at 0.01) and Higgins I² statistics, with high levels (as specified by guidance in the Cochrane Handbook for Systematic Reviews of Interventions) being considered suitable for sub-group analysis to determine the source of the heterogeneity.

Characteristics of the retained studies will be sorted by year of publication and will be presented in a tabular form. Both tables will have information relating to authors' references, sample size, age, setting, data collection format, outcomes, components of the intervention, component of the control, format and provider of the intervention, setting of the intervention (home/community vs hospital), intervention and follow-up periods, and results.

Subgroup analysis Subgroup analysis will not be done.

Sensitivity analysis Sensitivity analysis will be carried out to determine the effects of studies with a high risk of bias on the overall results with and without these studies.

Language restriction Only studies published in English language will be included in this review.

Country(ies) involved Nigeria.

Other relevant information None.

Keywords People living with HIV/AIDS; exercise therapy; cardiopulmonary parameters; oxidative capacity.

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