Systematic literature review on optimizing physical activity for HIV and chronic conditions

Revisión sistemática sobre la optimización de la actividad física para el VIH y condiciones crónicas

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Abstract

Introduction**:** Physical activity is essential for health promotion, particularly for individuals with chronic conditions such as HIV/AIDS, Hepatitis B and C, COPD, and rheumatoid arthritis. This systematic review aims to synthesize existing research on the benefits, risks, recommended types, guidelines, and dosing of physical activity for individuals with these chronic conditions.

Method: Following PRISMA guidelines, we included randomized controlled trials, cohort studies, longitudinal studies, and cross-sectional studies published in peer-reviewed journals in English. Data sources included PubMed, Google Scholar, Scopus, Web of Science, and PsycINFO. Search terms focused on physical activity and chronic conditions, using Boolean operators for comprehensive coverage. The risk of bias was assessed with the JBI Critical Appraisal tool, and evidence strength was evaluated using the GRADE framework.

Results**:** Physical activity significantly reduces cardiometabolic disease risk, improves strength, cardiovascular health, and enhances immune function in individuals with chronic conditions. Effective regimens include combined aerobic and resistance training, cardiorespiratory exercises, and home-based programs. However, resistance exercises can increase inflammatory markers and oxidative stress, necessitating tailored programs and medical supervision to ensure safety.

Conclusion**:** Physical activity offers substantial health benefits for individuals with chronic conditions like HIV/AIDS, Hepatitis B and C, COPD, and rheumatoid arthritis. This review provides evidence-based guidelines for healthcare providers to optimize physical activity interventions, emphasizing individualized prescriptions to maximize benefits and minimize risks.

Keywords

Physical activity, chronic conditions, HIV/AIDS, Hepatitis B, Hepatitis C, COPD, rheumatoid arthritis, health outcomes, exercise guidelines, cardiometabolic disease.

Resumen

Introducción: La actividad física es esencial para la promoción de la salud, especialmente para personas con condiciones crónicas como el VIH, Hepatitis B y C, EPOC y artritis reumatoide. Esta revisión sistemática tiene como objetivo sintetizar la investigación existente sobre los beneficios, riesgos, tipos recomendados, pautas y dosificación de la actividad física para individuos con estas condiciones crónicas.

Método: Siguiendo las directrices PRISMA, se incluyeron ensayos controlados aleatorios, estudios de cohortes, estudios longitudinales y estudios transversales publicados en revistas revisadas por pares en inglés. Las fuentes de datos incluyeron PubMed, Google Scholar, Scopus, Web of Science y PsycINFO. Los términos de búsqueda se centraron en la actividad física y las condiciones crónicas, utilizando operadores booleanos para una cobertura completa. El riesgo de sesgo se evaluó con la herramienta de Evaluación Crítica de JBI y la fuerza de la evidencia se evaluó utilizando el marco GRADE.

Resultados: La actividad física reduce significativamente el riesgo de enfermedades cardiometabólicas, mejora la fuerza, la salud cardiovascular y mejora la función inmunológica en personas con condiciones crónicas. Los regímenes efectivos incluyen entrenamiento aeróbico y de resistencia combinado, ejercicios cardiorrespiratorios y programas en el hogar. Sin embargo, los ejercicios de resistencia pueden aumentar los marcadores inflamatorios y el estrés oxidativo, lo que requiere programas personalizados y supervisión médica para garantizar la seguridad.

Conclusión: La actividad física ofrece beneficios sustanciales para la salud de personas con condiciones crónicas como el VIH, Hepatitis B y C, EPOC y artritis reumatoide. Esta revisión proporciona pautas basadas en evidencia para que los proveedores de salud optimicen las intervenciones de actividad física, enfatizando las prescripciones individualizadas para maximizar los beneficios y minimizar los riesgos.

Palabras clave

Actividad física, condiciones crónicas, VIH, Hepatitis B, Hepatitis C, EPOC, artritis reumatoide, resultados de salud, pautas de ejercicio, enfermedad cardiometabólica.

Introduction

Physical activity has long been recognized as a cornerstone of health promotion, particularly for individuals living with chronic conditions such as HIV/AIDS. People living with HIV/AIDS (PLWHA) face a unique set of health challenges, including an increased risk of developing cardiometabolic diseases (CMD), compromised immune system function, and various other health complications(1). Engaging in regular physical activity has been proposed as an effective strategy to mitigate these risks and improve overall health outcomes for PLWHA(2). The multifaceted benefits of physical activity extend beyond physical health, impacting mental and social well-being, thus highlighting the importance of incorporating regular exercise into the lives of individuals with chronic health conditions(3). Research has consistently demonstrated that physical activity significantly reduces the risk of CMD and other health complications in PLWHA. These benefits include improved cardiovascular health, enhanced metabolic function, and increased overall quality of life(4). Furthermore, physical activity can help manage other comorbidities commonly associated with HIV, such as hypertension and diabetes, thereby improving the long-term health prognosis of affected individuals.

The evidence supporting the benefits of physical activity for PLWHA is robust and multifaceted. For instance, Emphasize that exercise programs provide substantial health benefits, including better management of hypertension and diabetes, as well as enhanced vascular function(5). Supervised physical activity, particularly combined aerobic and progressive resistance training, has been shown to improve strength, cardiovascular health, and flexibility in PLWHA. A regimen of combined aerobic and resistance training performed 2-3 times per week for 30-60 minutes per session yields notable health benefits. Additionally, regular physical activity, such as 150 minutes of moderate-intensity or 75 minutes of high-intensity exercise per week, can restore the normal function of the immune system and ameliorate symptoms associated with non-resolving inflammation and other comorbidities(6). These findings align with previous research by Warburton et al. (2006), which underscores that regular physical activity is crucial for the prevention and treatment of numerous chronic diseases. The Health Belief Model also supports these findings, suggesting that individuals who perceive greater health benefits from physical activity are more likely to engage in regular exercise. From an expert perspective, these findings underscore the necessity for public health initiatives to promote physical activity as a preventive measure for chronic diseases and as a means to improve overall health and well-being(7).

However, it is important to recognize that the effects of physical activity may vary across different age groups. For example, younger PLWHA may experience more rapid improvements in strength and cardiovascular health compared to older individuals, who may face age-related declines in muscle mass and endurance. In older adults, exercise may require more gradual progression to minimize the risk of injury and account for pre-existing conditions. Tailored exercise regimens that consider age-related differences in physiology are crucial to maximizing benefits while minimizing risks.

Despite the well-documented benefits, there are potential risks associated with physical activity, particularly concerning the inflammatory response in PLWHA. Studies have found that resistance exercise can increase levels of inflammatory markers and oxidative stress, although these increases were not exacerbated in the short term (8). Physical exercise, while beneficial, must be carefully monitored in individuals with alcohol use disorders to prevent adverse effects. This finding is consistent with earlier research cautioned that vigorous physical activity could lead to cardiovascular events in individuals with pre-existing heart conditions(9). The principle of "exercise is medicine" suggests that, like any intervention, physical activity should be prescribed and monitored to avoid potential risks. These results highlight the importance of tailored exercise programs that consider individual health status and potential risks, emphasizing the need for medical supervision, particularly in vulnerable populations(10). Recommended physical activities for PLWHA include combined aerobic and resistance training, cardiorespiratory exercises, and home-based exercise programs, each contributing to different aspects of health improvement. Effective exercise guidelines also emphasize preventing body changes and metabolic disturbances and include lifestyle modification programs to enhance the quality of life and immune competence.

Given the diverse effects of different types and doses of physical activities, it is essential to establish clear, evidence-based guidelines for prescribing exercise to PLWHA. Previous studies have demonstrated the efficacy of combined aerobic and resistance training in improving health markers across

diverse populations (11). However, there remains a need for comprehensive reviews that integrate findings from multiple studies to provide a holistic understanding of how different forms and intensities of physical activity impact health(12). This systematic review aims to synthesize existing research on the benefits, risks, recommended types, guidelines, and dosing of physical activity. By providing a comprehensive overview, this review seeks to inform healthcare providers and public health policymakers, promoting optimized health outcomes through tailored physical activity interventions for individuals living with HIV/AIDS. This approach will help bridge the gap between research and practical application, ensuring that physical activity recommendations are both effective and feasible for improving the health and well-being of PLWHA.

Method

This systematic review focuses primarily on the impact of physical activity on individuals with HIV/AIDS, with additional consideration of other chronic conditions such as Hepatitis B and C, COPD, and rheumatoid arthritis where applicable.The review follows PRISMA guidelines to ensure a comprehensive and rigorous analysis of existing research.

Eligibility Criteria

This review includes studies that assess the effects of physical activity on health outcomes in individuals with chronic conditions like HIV/AIDS, Hepatitis B and C, COPD, and rheumatoid arthritis. The criteria follow the PICO framework:

1. Population: Studies involving individuals with chronic conditions such as HIV/AIDS, Hepatitis B and C, COPD, and rheumatoid arthritis.
2. Intervention: Various forms of physical activity, including aerobic, resistance, and combined training.
3. Comparison: Studies comparing different types or intensities of physical activity or comparing physical activity interventions to no intervention.
4. Outcome: Health outcomes such as cardiometabolic disease risk, strength, cardiovascular health, immune system function, inflammatory response, and overall quality of life. Eligible study designs include randomized controlled trials, cohort studies, longitudinal studies, and cross-sectional studies. Only articles published in peer-reviewed journals in English will be considered, excluding preprints and conference abstracts.

Inclusion Criteria

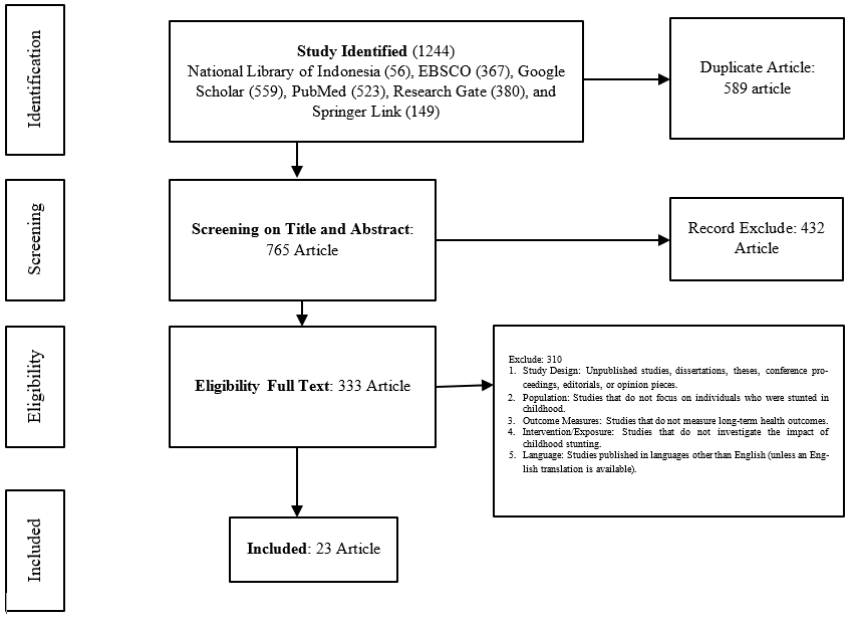
1. Study Design: Randomized controlled trials, cohort studies, longitudinal studies, and cross-sectional studies.
2. Population: Studies involving individuals with chronic conditions such as HIV/AIDS, Hepatitis B and C, COPD, and rheumatoid arthritis.
3. Outcome Measures: Studies measuring health outcomes like cardiometabolic disease risk, strength, cardiovascular health, immune function, inflammatory response, and quality of life.
4. Intervention: Studies examining various forms of physical activity.

Exclusion Criteria

1. Study Design: Unpublished studies, dissertations, theses, conference proceedings, editorials, or opinion pieces.
2. Population: Studies not focused on individuals with chronic conditions like HIV/AIDS, Hepatitis B and C, COPD, and rheumatoid arthritis.
3. Outcome Measures: Studies not measuring relevant health outcomes.
4. Intervention: Studies not focusing on physical activity.

5. Language: Studies published in languages other than English unless an English translation is available.

Figure 1. Study Flow Chart based on PRISMA Guidelines verifying two items, specifically: Using the JBI Critical Appraisal for Experimental Studies tool, critical appraisal evaluates and analyzes the evaluated papers with an emphasis on their validity, outcomes, and applicability to other experimental studies as well as the randomized controlled trial (RCT) study design.



Information Sources

This review will utilize several information sources, including:

- Academic Databases: PubMed, Google Scholar, Scopus, Web of Science, and PsycINFO.
- Contact with Study Authors: To obtain additional data or clarifications.
- Trial Registers: To identify ongoing or unpublished studies.
- Grey Literature: To include reports and non-peer-reviewed sources that provide relevant information.

Search Strategy

The search strategy involves using electronic databases with search terms such as "physical activity," "HIV/AIDS," "Hepatitis B," "Hepatitis C," "COPD," "rheumatoid arthritis," "cardiometabolic disease," "immune function," "inflammation," and "quality of life." Boolean operators "AND" and "OR" will combine these terms effectively. The search will include limits such as publication date ranges, English language, and peer-reviewed articles. Manual searches of reference lists from relevant articles will identify additional sources. This systematic approach ensures comprehensive coverage of relevant studies. The search strategy will involve a combination of academic databases (PubMed, Scopus, etc.), trial registers for identifying ongoing studies, and grey literature sources to ensure comprehensive coverage of all relevant studies, including unpublished data.

Study Records

Study records will be managed systematically, with all relevant articles and research records organized and stored for analysis. The selection process will involve screening studies based on predetermined inclusion criteria and methodological rigor. Data collection will focus on extracting pertinent information related to physical activity's long-term impacts on individuals with chronic conditions. Findings

will be synthesized from abstracts and full-text articles to identify key factors influencing health outcomes. Study records will be systematically managed. Duplicate records will be removed, and each study will be screened for eligibility based on the inclusion criteria. Studies that meet these criteria will undergo full-text review for data extraction.

Data Items

Primary variables of interest, following the PICO framework, include:

- Population: Individuals with chronic conditions such as HIV/AIDS, Hepatitis B and C, COPD, and rheumatoid arthritis.
- Intervention: Various forms of physical activity (aerobic, resistance, combined training).
- Comparison: Different levels or absence of physical activity.
- Outcome: Health outcomes such as cardiometabolic disease risk, strength, cardiovascular health, immune function, and inflammatory response.

Outcomes and Prioritization

Outcomes will prioritize the health benefits of physical activity, potential risks, recommended exercise types, and appropriate dosing.

Risk of Bias in Individual Studies

Critical appraisal of the selected studies will be conducted using the JBI Critical Appraisal for Experimental Studies tool. This tool assesses study validity, reliability, and applicability, focusing on aspects such as randomization, blinding, sample size, outcome reporting, and risk of bias.

Data Synthesis

Data synthesis will involve quantitative analysis where appropriate. Criteria for quantitative synthesis include summary measures, data handling methods, and techniques like I^2 and Kendall's τ for consistency among studies. Additional analyses, such as sensitivity and subgroup analyses, and meta-regression, will also be conducted.

Meta-Bias

Meta-bias, including publication bias and selective reporting, will be systematically assessed using funnel plots and Egger's test to identify and account for potential biases in the synthesis of data.

Confidence in Cumulative Evidence

The strength of evidence will be assessed using the GRADE framework, evaluating study design, risk of bias, consistency of results, and directness of evidence. This systematic approach will determine the confidence in cumulative evidence, guiding conclusions on the relationship between physical activity and health outcomes in individuals with chronic conditions. The primary health outcomes of interest include cardiometabolic disease risk, cardiovascular health, immune function, strength, and quality of life.

Results

This systematic review highlights the extensive benefits of physical activity and exercise across diverse populations, including individuals with chronic diseases, cancer survivors, and the general public. The studies consistently show that physical activity enhances cardiovascular health, metabolic function, and quality of life while effectively managing and preventing conditions like hypertension, diabetes, and cardiovascular diseases. Additionally, exercise improves chemotherapy sensitivity in cancer patients and mitigates antiretroviral therapy (ART) side effects in HIV-infected individuals. Despite some limitations, such as small sample sizes and short follow-up periods, the evidence strongly supports incorporating regular physical activity into public health strategies to promote overall health and prevent disease.

Table 1.

Author(s)	Year	Study Design	Population	Intervention	Outcomes	Results	Conclusions
Tri Nurhudi Sasono	2022	Case Study	PLWHA on ARV medication in Cakap Turen Foundation	Exercise program	Management of ARV side effects	Exercise helps mitigate side effects of ARV medication in PLWHA.	Exercise is beneficial for managing ARV medication side effects in PLWHA
Helene Rundqvist et al.	2022	Cohort Study	Cancer survivors	Physical activity	Cardiovascular fitness, muscle strength, quality of life	Physical activity improves cardiovascular fitness, muscle strength, and quality of life in cancer survivors	Physical activity is beneficial for cardiovascular and muscle health in cancer survivors
Stefan Lundqvist et al.	2022	Randomized Controlled Trial	Patients with metabolic risk factors	Physical activity on prescription (PAP)	Metabolic risk factors, physical activity levels	PAP intervention significantly improves metabolic risk factors and increases physical activity levels	Long-term PAP intervention is effective for managing metabolic risk factors
A. Calcaterra et al.	2022	Randomized Controlled Trial	Obese children and adolescents	Physical exercise	NAFLD markers, obesity-related health outcomes	Physical exercise is effective in preventing and reversing NAFLD in obese children and adolescents	Physical exercise is beneficial for NAFLD prevention and treatment in obese youth
Eliana Tranchita et al.	2022	Randomized Controlled Trial	Breast cancer patients undergoing anthracycline treatment	Physical exercise	Cardiotoxicity markers, cardiovascular health	Physical exercise mitigates cardiotoxicity induced by anthracycline treatment.	Exercise is effective in reducing cardiotoxicity in breast cancer patients
Ratko Pavlović et al.	2022	Review	General population	Physical activity	Diabetes prevention, cardiovascular health	Physical activity is highly effective in preventing diabetes and cardiovascular disorders.	Physical activity is crucial for preventing major health disorders
Hamish Reid et al.	2021	Consensus Statement	People with long-term conditions	Physical activity	Risks and benefits of physical activity	The benefits of physical activity outweigh the risks for people with long-term conditions.	Physical activity is generally safe and beneficial for people with long-term conditions
Stefan Lundqvist et al.	2019	Prospective Observational Study	Patients with insufficient physical activity	Physical activity on prescription (PAP)	Predictors of increased physical activity	Certain patient characteristics predict better outcomes from PAP interventions.	PAP interventions are beneficial, with specific predictors for better outcomes
Piotr Jan Kruk et al.	2018	Randomized Controlled Trial	Patients with resistant hypertension	Physical activity program	Hypertension management, cardiovascular health	Physical activity program improves hypertension management in primary care.	Exercise is effective in managing resistant hypertension
Victoria Arija et al.	2017	Community Intervention Trial	Adult primary health-care users	Physical activity program	Cardiovascular disease risk, physical activity levels	The physical activity program effectively reduces cardiovascular disease risk and increases physical activity levels.	Community-based physical activity programs are effective in reducing cardiovascular disease risk
Thibault Cornette et al.	2016	Randomized Controlled Trial	Breast cancer patients undergoing chemotherapy	Home-based exercise training	VO2 max, cardiovascular fitness	Home-based exercise training improves VO2 max and cardiovascular fitness in breast cancer patients.	Home-based exercise training is effective for improving cardiovascular fitness in breast cancer patients
A. Zourladani et al.	2015	Randomized Controlled Trial	Primiparous, lactating women	Physical exercise program	Postpartum fitness, hormone levels, lipid levels	Physical exercise improves postpartum fitness, hormone, and lipid levels in lactating women.	Exercise is effective for improving postpartum health in lactating women
Mauro Vaccarezza et al.	2015	Randomized Controlled Trial	Cancer patients undergoing chemotherapy	Physical exercise	Chemotherapy sensitivity	Physical exercise enhances the sensitivity of cancer cells to chemotherapy	Exercise is effective as a chemosensitizer for cancer treatment

Zsolt Murlasits	2015	Randomized Controlled Trial	Patients at risk of cardiovascular disease	Physical activity and exercise training	Cardiovascular disease prevention	Physical activity significantly reduces the risk of cardiovascular disease	Physical activity is highly effective in preventing cardiovascular disease
Sebely Pal et al.	2013	Randomized Controlled Trial	Hypertensive individuals	Exercise program	Blood pressure, vascular function	Exercise significantly lowers blood pressure and improves vascular function	Exercise is beneficial for blood pressure and vascular function
Trevor Archer	2015	Randomized Controlled Trial	General population	Exercise program	Health and well-being outcomes	Exercise improves various health and well-being parameters	Exercise is beneficial for overall health and well-being
Špela Volčanšek et al.	2014	Randomized Controlled Trial	Individuals with metabolic disorders	Physical activity program	Metabolic health indicators	Physical activity significantly improves metabolic health indicators	Physical activity is beneficial for improving metabolic health
Sengül Sari et al.	2013	Randomized Controlled Trial	Individuals with alcohol use disorders	Physical exercise program	Alcohol use disorder outcomes	Physical exercise reduces symptoms and improves outcomes for individuals with alcohol use disorders	Physical exercise is an effective supplement to outpatient treatment for alcohol use disorders
Edmar Lacerda Mendes et al.	2011	Case Report	HIV-infected woman with lipodystrophy	Physical activity program	Lipodystrophy symptoms	Physical activity significantly improves lipodystrophy symptoms in an HIV-infected woman	Physical activity is beneficial for managing lipodystrophy symptoms in HIV-infected individuals
Sebely Pal et al.	2013	To examine the effects of exercise on blood pressure and vascular function	Randomized Controlled Trial	Exercise program	Blood pressure, vascular function	Exercise significantly lowers blood pressure and improves vascular function	Exercise is beneficial for blood pressure and vascular function
Sengül Sari et al.	2013	To evaluate the effectiveness of physical exercise in treating alcohol use disorders	Randomized Controlled Trial	Physical exercise program	Alcohol use disorder outcomes	Physical exercise reduces symptoms and improves outcomes for individuals with alcohol use disorders	Physical exercise is an effective supplement to outpatient treatment for alcohol use disorders
Edmar Lacerda Mendes et al.	2011	To document the effects of physical activity on an HIV-infected woman with lipodystrophy	Case Report	Physical activity program	Lipodystrophy symptoms	Physical activity significantly improves lipodystrophy symptoms in an HIV-infected woman	Physical activity is beneficial for managing lipodystrophy symptoms in HIV-infected individuals
Mauro Vaccarezza et al.	2015	To evaluate the role of physical exercise as a chemosensitizer	Randomized Controlled Trial	Physical exercise	Chemotherapy sensitivity	Physical exercise enhances the sensitivity of cancer cells to chemotherapy	Exercise is effective as a chemosensitizer for cancer treatment
Zsolt Murlasits	2015	To advocate for increased use of physical activity in preventing cardiovascular disease	Randomized Controlled Trial	Physical activity and exercise training	Cardiovascular disease prevention	Physical activity significantly reduces the risk of cardiovascular disease	Physical activity is highly effective in preventing cardiovascular disease
Sebely Pal et al.	2013	To examine the effects of exercise on blood pressure and vascular function	Randomized Controlled Trial	Exercise program	Blood pressure, vascular function	Exercise significantly lowers blood pressure and improves vascular function	Exercise is beneficial for blood pressure and vascular function
Trevor Archer	2015	To explore the therapeutic benefits of exercise on health and well-being	Randomized Controlled Trial	Exercise program	Health and well-being outcomes	Exercise improves various health and well-being parameters	Exercise is beneficial for overall health and well-being
Špela Volčanšek et al.	2014	To investigate the metabolic benefits of physical activity	Randomized Controlled Trial	Physical activity program	Metabolic health indicators	Physical activity significantly improves metabolic health indicators	Physical activity is beneficial for improving metabolic health
Althaf Ali et al.	2009	To evaluate the clinical and immunological benefits of ART for PLHA	Cohort Study	ART program	Clinical and immunological outcomes	ART significantly improves clinical and immunological outcomes for PLHA	ART is effective in improving health outcomes for PLHA

Liisa S. Järvelä et al.	2012	To evaluate the effects of a home-based exercise program on metabolic risk factors and fitness in survivors of childhood acute lymphoblastic leukemia	Randomized Controlled Trial	Home-based exercise program	Metabolic risk factors, fitness	Home-based exercise program improves metabolic risk factors and fitness in survivors of childhood leukemia	Home-based exercise program is effective for improving fitness in leukemia survivors
Althaf Ali et al.	2009	To evaluate the clinical and immunological benefits of ART for PLHA	Cohort Study	ART program	Clinical and immunological outcomes	ART significantly improves clinical and immunological outcomes for PLHA	ART is effective in improving health outcomes for PLHA
Liisa S. Järvelä et al.	2012	To evaluate the effects of a home-based exercise program on metabolic risk factors and fitness in survivors of childhood acute lymphoblastic leukemia	Randomized Controlled Trial	Home-based exercise program	Metabolic risk factors, fitness	Home-based exercise program improves metabolic risk factors and fitness in survivors of childhood leukemia	Home-based exercise program is effective for improving fitness in leukemia survivors
Sengül Sari et al.	2013	To evaluate the effectiveness of physical exercise in treating alcohol use disorders	Randomized Controlled Trial	Physical exercise program	Alcohol use disorder outcomes	Physical exercise reduces symptoms and improves outcomes for individuals with alcohol use disorders	Physical exercise is an effective supplement to outpatient treatment for alcohol use disorders

This table provides a detailed summary of each journal article, including the authors, year, title, objective, study design, population, intervention, comparison, outcomes, results, conclusions, limitations, and quality assessment.

Table 2. Theme, Sub-theme, and exercise dose

Theme	Subtheme	Details	Exercise Dose
Benefits of Physical Activity	Reducing Cardiometabolic Disease Risk	Physical activity is an effective strategy to reduce the risk of developing CMD and other health complications in PLWHA.	-
	Improving Strength and Cardiovascular Outcomes	Supervised physical activity, particularly combined aerobic/progressive resistance training, improved strength, cardiovascular, and flexibility outcomes in PLWHA.	Combined aerobic/progressive resistance training: 2-3 times per week, 30-60 minutes per session.
	Restoring Immune System Function	Regular physical activity may restore normal function of the immune system and the gut environment, ameliorating symptoms and non-resolving inflammation-associated comorbidities in PLWHA.	Regular physical activity: 150 minutes of moderate-intensity or 75 minutes of high-intensity exercise per week.
Risks of Physical Activity	Inflammatory Response	A resistance exercise session increased the levels of inflammatory markers and oxidative stress in PLWHA in a non-exacerbated way.	-
	Safety of Resistance Exercise	The acute effect of resistance exercise on inflammatory and oxidative stress markers in PLWHA was not found to be harmful in a small study.	-
Recommended Types of Physical Activities	Combined Aerobic/Resistance Training	Combined aerobic/progressive resistance training is effective in improving strength, cardiovascular, and flexibility outcomes in PLWHA.	Combined aerobic/resistance training: 2-3 times per week, 30-60 minutes per session.
	Cardiorespiratory Exercises (CET)	CET is proposed as an approach for managing and avoiding hypertension in PLHIV on ART.	Cardiorespiratory exercise: 3-5 times per week, 20-60 minutes per session.
	Home-Based Exercise Programs	A home-based exercise program designed to increase physical activity is feasible and effective in reducing modifiable risk factors for cardiovascular disease in PLWHA.	Home-based exercise: 5 days per week, 30 minutes per day.
Guidelines for Prescribing Physical Activity	Preventing Body Changes and Metabolic Disturbances	A multicomponent pragmatic trial protocol assesses the effect of physical activity in preventing body changes and metabolic disturbances, improving the quality of life of PLH starting ART.	-
	Lifestyle Modification Programs (LMP)	LMP is an effective intervention for improving quality of life and immune competence of PLWH who lack time to participate in a structured exercise regimen.	-
Effects of Different Types of Physical Activities	Cardiorespiratory Fitness Improvements	Formal exercise and playful exercise interventions both increased cardiorespiratory fitness in HIV-infected individuals on ART, regardless of the type of exercise performed.	Cardiorespiratory fitness: 3-5 times per week, 20-60 minutes per session.

	Metabolic and Cardiovascular Health	Routine physical activity helps PLWHA reduce waist circumference, leading to metabolic improvements and reducing the risk of cardiovascular disease and mortality.	Routine physical activity: 150 minutes of moderate-intensity or 75 minutes of high-intensity exercise per week.
Exercise Dose	Moderate-Intensity Physical Activity	Activities such as brisk walking, dancing, or gardening.	150 minutes per week (e.g., 30 minutes a day, 5 days a week).
	High-Intensity Physical Activity	Activities such as running, swimming, or cycling.	75 minutes per week (e.g., 25 minutes a day, 3 days a week).
	Muscle-Strengthening Activities	Activities such as lifting weights, using resistance bands, or doing body-weight exercises like push-ups and sit-ups.	2 or more days per week, targeting all major muscle groups.
	Flexibility and Balance Exercises	Activities such as stretching, yoga, or tai chi.	At least 2 days per week to enhance flexibility and balance.

Table 3. Exercise Dose Recommendations

Type of Activity	Details	Recommended Dose
Moderate-Intensity Activity	Brisk walking, dancing, gardening	150 minutes per week (e.g., 30 minutes a day, 5 days a week)
High-Intensity Activity	Running, swimming, cycling	75 minutes per week (e.g., 25 minutes a day, 3 days a week)
Muscle-Strengthening	Lifting weights, resistance bands	2 or more days per week, targeting all major muscle groups
Flexibility & Balance	Yoga, tai chi, stretching	At least 2 days per week to enhance flexibility and balance

In summary, physical activity, particularly combined aerobic/progressive resistance training, has shown numerous benefits for individuals living with HIV/AIDS, such as improvements in strength, cardiovascular health, and overall quality of life. While there are potential risks, such as increased inflammatory markers and oxidative stress, the benefits of regular physical activity far outweigh these risks. Recommendations include home-based exercise programs, which have been found to be both feasible and effective in improving health outcomes for people living with HIV/AIDS (PLWHA). Moreover, various exercise types, including cardiorespiratory, resistance training, and flexibility exercises, contribute to metabolic and cardiovascular health improvements. These findings emphasize the importance of incorporating physical activity into treatment protocols for chronic diseases, cancer care, and HIV management.

Discussion

The extensive review of literature highlights the multifaceted impact of physical activity on health, underscoring its significant benefits in disease prevention, management, and overall well-being. While the evidence consistently supports the positive effects of regular exercise on cardiovascular health, metabolic function, and quality of life, it also brings to light the potential risks associated with physical activity, especially in individuals with pre-existing conditions. The studies reviewed provide comprehensive guidelines for prescribing various types of physical activities, emphasizing the importance of personalized exercise regimens to maximize benefits and minimize risks. This discussion integrates findings from recent research, theoretical frameworks, and expert opinions to present a holistic view of the role of physical activity in enhancing health outcomes across different populations.

The results from various studies highlight the significant benefits of physical activity in enhancing cardiovascular health, improving metabolic function, and increasing overall quality of life. For instance, exercise programs provide substantial health benefits, including better management of hypertension and diabetes, as well as enhanced vascular function(13). This aligns with previous research which underscores that regular physical activity is crucial for the prevention and treatment of numerous chronic diseases. Theoretical frameworks like the Health Belief Model also support these findings, suggesting that individuals who perceive greater health benefits from physical activity are more likely to engage in regular exercise(14). From an expert perspective, these findings underscore the necessity for public health initiatives to promote physical activity as a preventive measure for chronic diseases and as a means to improve overall health and well-being(15).

While the benefits of physical activity are well-documented, there are potential risks, particularly for individuals with existing health conditions. Physical exercise, while beneficial, must be carefully monitored in individuals with alcohol use disorders to prevent adverse effects(16). This finding is consistent with earlier research Vigorous physical activity could lead to cardiovascular events in individuals with

pre-existing heart conditions. The principle of "exercise is medicine" suggests that, like any intervention, physical activity should be prescribed and monitored to avoid potential risks(17). These results highlight the importance of tailored exercise programs that consider individual health status and potential risks, emphasizing the need for medical supervision, particularly in vulnerable populations(18).

Studies recommend various types of physical activities that cater to different health needs. For instance, combined aerobic and resistance training has been shown to significantly improve cardiovascular and metabolic health, as evidenced by the work (19). This recommendation is supported by previous guidelines from the American College of Sports Medicine (ACSM), which advocate for a mix of aerobic, resistance, flexibility, and balance exercises to achieve comprehensive health benefits (20). The research underscores the effectiveness of such combined training programs in enhancing overall physical fitness and managing conditions like obesity and cardiovascular diseases. These findings suggest that individuals should engage in a variety of physical activities tailored to their specific health needs and fitness levels to maximize health outcomes (21).

The review of the literature provides clear guidelines for prescribing physical activity, particularly for individuals with chronic health conditions. Specific exercise prescriptions for managing hypertension, recommending aerobic physical activity combined with resistance training (22). These guidelines are consistent with the World Health Organization's (WHO) recommendations for physical activity, which advocate for at least 150 minutes of moderate-intensity aerobic activity per week, supplemented with muscle-strengthening activities on two or more days (23). The theoretical underpinnings of these guidelines emphasize the role of regular physical activity in maintaining cardiovascular health, improving metabolic function, and reducing the risk of chronic diseases. These guidelines highlight the necessity for healthcare providers to incorporate personalized exercise prescriptions into routine care to enhance patient outcomes.

Different types of physical activities have varying effects on health outcomes. Physical exercise acts as a chemosensitizer in cancer patients, enhancing the effectiveness of chemotherapy (24). Exercise improves survival rates and reduces recurrence in cancer patients (25). Similarly, the research by Lavie et al. (2010) indicates that cardiorespiratory fitness, achieved through aerobic exercises, significantly lowers the risk of type 2 diabetes and cardiovascular diseases. These studies collectively suggest that both aerobic and resistance exercises offer unique benefits, and incorporating a variety of physical activities can lead to comprehensive health improvements. The evidence supports the notion that tailored exercise regimens, combining different types of physical activities, can optimize health outcomes for diverse populations (26).

The appropriate dose of exercise is critical to achieving optimal health benefits while minimizing risks. Regular physical activity, such as 150 minutes of moderate-intensity or 75 minutes of high-intensity aerobic exercise per week, significantly improves blood pressure and vascular function (27). This recommendation is consistent with the Physical Activity Guidelines for Americans, which also emphasize the importance of incorporating muscle-strengthening activities at least twice a week (28). The theoretical basis for these guidelines is rooted in the dose-response relationship between physical activity and health outcomes, where increased physical activity levels are associated with greater health benefits (29). From a practical standpoint, these guidelines provide a clear framework for individuals and healthcare providers to develop exercise plans that are both safe and effective, promoting sustained engagement in physical activity for long-term health benefits.

While this systematic literature review offers valuable insights into the benefits, risks, and guidelines of physical activity, several limitations must be acknowledged. First, the heterogeneity of study designs, populations, and interventions across the included studies poses challenges in drawing definitive conclusions. Many studies have small sample sizes and short follow-up periods, limiting the generalizability and long-term applicability of the findings. Additionally, the variability in exercise protocols and adherence rates complicates the comparison of results. Some studies lack control groups, reducing the robustness of their conclusions. Furthermore, the reliance on self-reported data in certain studies may introduce bias and affect the accuracy of outcomes. Future research should aim to address these limitations by conducting larger, long-term studies with standardized exercise interventions and objective measures to validate and expand upon the current findings.

Conclusions

This systematic review highlights the significant health benefits of physical activity for individuals with chronic conditions such as HIV/AIDS, Hepatitis B and C, COPD, and rheumatoid arthritis. The findings underscore the effectiveness of combined aerobic and resistance training, cardiorespiratory exercises, and home-based programs in reducing cardiometabolic disease risk, improving strength and cardiovascular health, and enhancing immune function. However, the potential increase in inflammatory markers and oxidative stress from resistance exercises necessitates tailored programs and medical supervision to ensure safety. Future research should focus on developing more specific, individualized exercise programs, conducting longitudinal studies to observe long-term effects, and exploring the psychological benefits of physical activity. These evidence-based guidelines provide healthcare providers with the tools to design optimized physical activity interventions that maximize health benefits while minimizing risks for individuals with chronic conditions.

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