

## **Efecto del entrenamiento de fuerza isométrica a diferentes intensidades sobre la presión arterial: Una revisión sistemática de ensayos controlados aleatorizados**

### **Effect of isometric resistance training at different intensities on blood pressure: A systematic review of randomized controlled trials**

### **Efeito do treinamento de força isométrica em diferentes intensidades sobre a pressão arterial: Uma revisão sistemática de estudos controlados e randomizados**

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## **Resumen**

Actualmente existen 1.280 millones de adultos con hipertensión en todo el mundo, la mayoría (dos tercios) vive en países de bajos y medianos ingresos (World Health Organization, 2021). El entrenamiento de fuerza isométrica (EFI) genera beneficios antihipertensivos en esta población (Baffour-Awuah, Pearson, Dieberg, y Smart, 2023; Baffour-Awuah, Pearson, Dieberg, Wiles et al., 2023; Hansford et al., 2021; Loaiza-Betancur et al., 2020; Loaiza-Betancur y Chulvi-Medrano, 2020). Ninguna revisión

sistemática a comparado la efectividad y seguridad de diferentes intensidades del EFI en adultos. Por lo tanto, el objetivo de este trabajo fue identificar, evaluar y sintetizar los beneficios y los daños del EFI a diferentes intensidades sobre la presión arterial en adultos normo, pre e hipertensos.

Esta revisión sistemática siguió las recomendaciones de la declaración PRISMA (Page et al., 2021) y ha sido registrada en PROSPERO (CRD42019132393).se realizó la búsqueda en MEDLINE, Embase, CENTRAL, CINHAI, en registros de ensayos clínicos y repositorios de literatura gris desde su creación hasta el tres (3) de septiembre del 2023. Se incluyeron ensayos controlados aleatorios (ECAs) en adultos normo, pre e hipertensos que compararon diferentes intensidades del EFI sobre la presión arterial y los eventos adversos. Dos revisores de forma independiente realizaron el cribado a título, resumen y texto completo, la extracción de los datos, la evaluación del riesgo de sesgo y la certeza global de la evidencia.

Se incluyeron 12 ECAs (n = 467) (Baross et al., 2012; Carlson, 2017; Carlson et al., 2016; Decaux et al., 2022; Gill et al., 2015; Gregory, n.d.; Hess et al., 2016; Javidi et al., 2022; Kharva y Thakar, 2023; Pagonas et al., 2017; Seidel et al., 2021; Wiles et al., 2010). Los ECAs presentaron un alto riesgo de sesgo de selección y de desgaste. Se compararon tres intensidades de EFI (muy baja intensidad, baja intensidad y alta intensidad). En comparación con alta intensidad, EFI a baja intensidad redujo de forma significativa pero no clínicamente importante la PAS (DM -6.82 mm Hg, 95% CI -10.96 a -2.69, I<sup>2</sup> = 32 % (Javidi et al., 2022; Kharva y Thakar, 2023) y la PAM (DM -4.3 mmHg, 95 % CI -7.11 a -1.49, I<sup>2</sup>= NA (Javidi et al., 2022), muy baja certeza de la evidencia. No se encontraron diferencias significativas en las demás comparaciones y subgrupos. Los estudios no reportaron eventos adversos.

Este estudio concluye que la evidencia de muy baja calidad reporta que, no existen diferencias entre las intensidades del EFI sobre las reducciones en la presión arterial en adultos normo, pre e hipertensos. Nuestra certeza es que la evidencia fue limitada debido a estudios pequeños con problemas metodológicos. Finalmente, es probable que el verdadero efecto sea sustancialmente diferente de los encontrados en esta investigación.

**Palabras clave:** ejercicio, entrenamiento de fuerza, hipertensión, revisión sistemática.

## Abstract

There are currently 1.28 billion adults with hypertension worldwide, the majority (two-thirds) living in low- and middle-income countries (World Health Organization, 2021). Isometric resistance training (IRT) generates antihypertensive benefits in this population (Baffour-Awuah, Pearson, Dieberg, & Smart, 2023; Baffour-Awuah, Pearson, Dieberg, Wiles et al., 2023; Hansford et al., 2021; Loaiza-Betancur et al., 2020; Loaiza-Betancur & Chulvi-Medrano, 2020). No systematic review has compared the effectiveness and safety of different intensities of IRT in adults. Therefore, we aimed to identify, evaluate, and synthesize the benefits and harms of IRT at different intensities on blood pressure in normal, prehypertensive, and hypertensive adults.

This systematic review followed the recommendations of the PRISMA statement (Page et al., 2021) and has been registered in PROSPERO (CRD42019132393). We searched MEDLINE, Embase, CENTRAL, CINHAL, clinical trial registries, and gray literature repositories from their inception to September 3, 2023. We included randomized controlled trials (RCTs) in normal, normal to high blood pressure, and high blood pressure adults comparing different intensities of IRT on blood pressure and adverse events. Two reviewers independently performed title, abstract, and full-text screening, data extraction, assessment of the risk of bias, and the certainty of the evidence.

This systematic review included 12 RCTs (n = 467) (Baross et al., 2012; Carlson, 2017; Carlson et al., 2016; Decaux et al., 2022; Gill et al., 2015; Gregory, n.d.; Hess et al., 2016; Javidi et al., 2022; Kharva & Thakar, 2023; Pagonas et al., 2017; Seidel et al., 2021; Wiles et al., 2010). The RCTs had a high risk of selection and attrition bias. Three intensities of IST (very low intensity, low intensity, and high intensity) were compared. Very low certainty of evidence showed that compared with high intensity, IRT at low intensity significantly but not clinically important may reduce SBP (MD -6.82 mm Hg, 95% CI -10.96 to -2.69,  $I^2 = 32\%$ ) (Javidi et al., 2022; Kharva & Thakar, 2023) and MAP (MD -4.3 mm Hg, 95% CI -7.11 to -1.49,  $I^2 = NA$ ) (Javidi et al., 2022). No significant

differences were found in any other comparisons and subgroup analyses. No adverse events were reported by the studies.

Very low-quality evidence reports no differences between IRT intensities on reductions in blood pressure in normal, normal to high blood pressure, and high blood pressure adults. Our confidence in this body of evidence was limited due to small studies with methodological problems. Finally, the true effect is likely substantially different from those found in this research.

**Keywords:** exercise, resistance training, hypertension, systematic review.

## Resumo

Atualmente há 1,28 bilhão de adultos com hipertensão em todo o mundo, a maioria (dois terços) vive em países de baixa e média renda (Organização Mundial da Saúde, 2021). A treinamento de força isométrica (TFI) gera benefícios anti-hipertensivos nessa população (Baffour-Awuah, Pearson, Dieberg, & Smart, 2023; Baffour-Awuah, Pearson, Dieberg, Wiles, et al., 2023; Hansford et al., 2021; Loaiza-Betancur et al., 2020; Loaiza-Betancur & Chulvi-Medrano, 2020). Nenhuma revisão sistemática comparou a eficácia e a segurança de diferentes intensidades de TFI em adultos. Portanto, o objetivo deste trabalho foi identificar, avaliar e sintetizar os benefícios e danos do TFI em diferentes intensidades sobre a pressão arterial em adultos normais, pré-hipertensos e hipertensos.

Esta revisão sistemática seguiu as recomendações da declaração PRISMA (Page et al., 2021) e foi registrada no PROSPERO (CRD42019132393). Pesquisamos MEDLINE, Embase, CENTRAL, CINHAI, registros de ensaios clínicos e repositórios de literatura cinzenta desde o início até 3 de setembro de 2023. Incluímos ensaios clínicos randomizados controlados (ECRs) em adultos normo, pré e hipertensos que compararam diferentes intensidades de EFI sobre a pressão arterial e eventos adversos. Dois revisores realizaram, de forma independente, a triagem do título, do resumo e do texto completo, a extração de dados, a avaliação do risco de viés e a certeza geral das evidências.

Foram incluídos 12 ECRs (n = 467) (Baross et al., 2012; Carlson, 2017; Carlson et al., 2016; Decaux et al., 2022; Gill et al., 2015; Gregory, s.d.; Hess et al., 2016; Javidi et al., 2022; Kharva & Thakar, 2023; Pagonas et al., 2017; Seidel et al., 2021; Wiles et al., 2010). Os ECRs apresentavam alto risco de viés de seleção e atrito. Foram comparadas três intensidades de TFI (intensidade muito baixa, baixa intensidade e alta intensidade). Em comparação com a alta intensidade, o TFI de baixa intensidade reduziu de forma significativa, mas não clinicamente importante, a PAS (MD -6,82 mm Hg, IC 95% -10,96 a -2,69,  $I^2 = 32\%$  (Javidi et al., 2022; Kharva & Thakar, 2023) e a PAM (MD -4,3 mm Hg, IC 95% -7,11 a -1,49,  $I^2 = NA$  (Javidi et al., 2022), com certeza de evidência muito baixa. Não foram encontradas diferenças significativas nas outras comparações e subgrupos. Nenhum evento adverso foi relatado pelos estudos.

Este estudo conclui que o evidências de qualidade muito baixa relatam que não há diferenças entre as intensidades do TFI na redução da pressão arterial em adultos normo, pré e hipertensos. Nossa confiança nesse conjunto de evidências foi limitada devido a pequenos estudos com problemas metodológicos. Por fim, é provável que o efeito real seja substancialmente diferente dos encontrados nesta pesquisa.

**Palavras-chave:** exercício, treinamento de força, hipertensão, revisão sistemática.

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