

Isometric exercise with handgrip: scoping protocol

Exercício isométrico com handgrip: protocolo de revisão de escopo

Marvyn de Santana do Sacramento^{1,2,3,4} , Uilma Sacramento Santana² , Thayssa dos Santos Aragão² , Jorge Luiz Rubbo Adbo⁵ , Ana Flávia Couret de Carvalho Braga⁶ , Ramon Martins Barbosa^{1,7} , Jefferson Petto^{1,3} 

1. Escola Bahiana de Medicina e Saúde Pública, Salvador, BA, Brazil

2. Centro Universitário Adventista do Nordeste, Cachoeira, BA, Brazil

3. Actus Cordios Reabilitação Cardiovascular, Salvador, BA, Brazil

4. Faculdade Atenas, Valença, BA, Brazil

5. Universidade Estadual do Sudoeste da Bahia, Jequié, BA, Brazil

6. Faculdade de Ciências Médicas de Minas Gerais, Belo Horizonte, MG, Brazil

7. Faculdade da Região Sisaleira – FARESI, Conceição do Coité, BA, Brazil

ABSTRACT

Introduction: Isometric exercise with handgrip has been reported as a strong ally in the fight against hypertension; however, there are other possibilities for the application of this intervention. **Objectives:** To map scientific studies on the use of isometric handgrip exercise, identifying the number of studies, the population studied, prescription strategies, outcomes and gaps for further research. **Methods:** This is a scoping review based on the steps proposed by the Preferred Report Items for Systematic Reviews and Meta-Analysis - Extension for Scoping Reviews (PRISMA-ScR). The searches will take place in the following databases: Ovid Medline, Embrase, Cochrane Library, CINAHL, SCOPUS, SPORTDiscus, Latin American and Caribbean Health Sciences Literature (LILACS) and JBI Evidence Synthesis and gray literature. The searches will be carried out using the keywords “Handgrip” AND “Isometric Exercise”, accompanied by their synonyms, with no time or language restrictions. Two independent authors will conduct the searches and data extraction. The data will be recorded in a Microsoft Excel table and the results will be summarized in tables and graphs. **Ethics and dissemination:** No ethical approval is required for the review. The results will be submitted to a peer-reviewed journal and presented at academic conferences. **Registration:** The scoping review has been registered with the Open Science Framework (<https://osf.io/zdesu>).

Keywords: handgrip; isometric exercise; hypertension.

RESUMO

Introdução: O exercício isométrico com handgrip tem sido relatado como forte aliado no combate à hipertensão, no entanto, existem outras possibilidades para a aplicação desta intervenção. **Objetivos:** Mapear as produções científicas com uso do exercício isométrico com handgrip, identificando o número de produções, a população estudada, as estratégias de prescrição, os desfechos e as lacunas para novas pesquisas. **Métodos:** Trata-se de uma revisão de escopo conduzida com base nas etapas proposta pelo Preferred Report Items for Systematic Reviews and Meta-Analysis - Extension for Scoping Reviews (PRISMA-ScR). As buscas ocorrerão nos seguintes bancos de dados: Ovid Medline, Embrase, Cochrane Library, CINAHL, SCOPUS, SPORTDiscus, Literatura Latino-Americana e do Caribe em Ciências da Saúde (LILACS) e JBI Evidence Synthesis e literatura cinzenta. As buscas serão realizadas utilizando as palavras-chave “Handgrip” AND “Isometric Exercise”, acompanhado dos seus sinônimos, sem restrição de tempo ou idioma. Dois autores independentes conduzirão as buscas e extração de dados. Os dados serão registrados em tabela do software Microsoft Excel e os resultados serão sintetizados em tabelas e gráficos. **Ética e divulgação:** Nenhuma aprovação ética é necessária para a revisão. Os resultados serão submetidos a uma revista revisada por pares e apresentados em conferências acadêmicas. **Registro:** A revisão de escopo foi registrada no Open Science Framework (<https://osf.io/zdesu>).

Palavras-chave: handgrip; exercício isométrico; hipertensão.

Introduction

Isometric handgrip exercise has been reported as a strong ally in the fight against hypertension by organizations such as the American Heart Association - 2017 [1] and the Brazilian Society of Cardiology [2]. Despite its recognition in the management of hypertension [3], it is possible that other conditions are a fruitful field for further research, as demonstrated in the study by Brignolle et al. [4], in which the handgrip was 99% effective in aborting syncopal events.

Therefore, this review aims to map scientific production on the use of isometric contraction with handgrip, identifying the number of productions, the population studied, prescription strategies, outcomes and gaps for further research.

Methods

Design

This is a scoping review of the literature, registered with the Open Science Framework (<https://osf.io/zdesu/>) and conducted based on the steps proposed by the Preferred Report Items for Systematic Reviews and Meta-Analysis - Extension for Scoping Reviews (PRISMA-ScR) for scoping reviews [5].

Research question

Some questions were formulated for this review:

- What is the scientific production on intervention with isometric handgrip exercise?
- What are the populations, the purpose of the protocols and the outcomes demonstrated through the use of the handgrip?
- What are the limitations and gaps in the studies?

Eligibility criteria

In order to answer the research questions of this study, scientific evidence will be selected that has used the handgrip as a form of intervention in human beings. Chart I details the eligibility criteria.

Data source and search strategy

The databases included in this study will be: Ovid Medline, Embase, Cochrane Library, CINAHL, SCOPUS, SPORTDiscus, Latin American and Caribbean Health Sciences Literature (LILACS) and JBI Evidence Synthesis. Both published literature in scientific journals and gray literature (e.g. dissertations, theses, publications in conference proceedings) will be searched and we will contact the relevant parties to obtain additional gray literature, where applicable. The reference list of potentially eligible articles will be searched manually. To check the protocols of studies not published in scientific journals, we will consult the Clinical trials portal and the

Brazilian Registry of Clinical Trials (REBEC). As a search strategy, investigations will be carried out using the keywords “Handgrip” AND “Isometric Exercise”, along with their synonyms. The operators will be adapted for each database.

Chart I - Study eligibility criteria

	Inclusion	Exclusion
Population	<ul style="list-style-type: none"> - Human studies - Participants of all ages - Participants of all genders - Healthy participants or those with any medical condition 	None
Concept	Studies that carried out a structured handgrip prescription for acute or chronic exercise effects.	Studies with incomplete information on the prescription protocol
Outcome	<ul style="list-style-type: none"> - Cardiovascular (direct or indirect, e.g. heart rate, blood pressure) - Respiratory - Muscular (e.g. strength, endurance) - Metabolic (e.g. glycemic control, insulin, glucose tolerance) - Inflammatory - Physical performance (e.g. 6-minute walk test, maximal exercise test) 	None
Context	Any context where research has been conducted	None
Type of publication	<ul style="list-style-type: none"> - Clinical trials with or without randomization, cross-sectional studies, study protocols. - Articles published in scientific journals, gray literature; - Articles published in any language; - Publication time: no restrictions; 	Articles not available in full.

Study selection process

Two experienced researchers will carry out independent searches of the databases, gathering all eligible studies by title and abstract. All the results will then be exported to Endnote, where duplicates will be identified and eliminated. After this process, the researchers will begin to read the articles in full and apply the exclusion criteria. In the event of a disagreement over the selection of any study, a third researcher will make the judgment.

Data extraction process

A preliminary spreadsheet will be provided to the researchers for data extraction, following the model in Table I.

Table I - Data extraction model

Study details
<ul style="list-style-type: none"> • Authors (names, country, education) • Full reference • Identification of studies • Year of study publication • Country of origin of the study • Journal (name, impact factor, index and area) • Objective of the study • Study design • Type of study (acute, chronic) • Study registration (yes, no)
Population
<ul style="list-style-type: none"> • Number of percipients • Age (years) • Ethnicity is reported (yes, no) • Sex (proportion of men and women in the study) • Menstrual cycle is reported (yes, no) • Health condition
Context
<ul style="list-style-type: none"> • Place of study (e.g. school, laboratory, etc.)
Concept
<ul style="list-style-type: none"> • Determining maximum handgrip strength • Handgrip load • Number of series • Number of repetitions • Execution time • Rest break • Number of sessions • Intervention group size • Control group size
Outcome
<ul style="list-style-type: none"> • Outcome of the studies
Analysis
<ul style="list-style-type: none"> • Determining the power of the study • Statistical approach (e.g. determining the probability of the null hypothesis, effect size) • Comparison between groups (yes, no)
Discoveries
<ul style="list-style-type: none"> • Key points reported by the studies

Data overview

The data extracted will be recorded in tables in Microsoft Excel software version 365 (Microsoft Corporation, Redmond, Washington). The data will be summarized according to the study populations, study settings and methodological aspects. A descriptive analysis of the data will be carried out using Stata software (version 16.0, StataCorp), presenting the absolute and relative frequency and categorical distribution of the findings. The data will be presented in tables and, where appropriate, the information will be represented using graphs.

Ethics and dissemination

As this is a scoping review, this study does not require ethical approval. All data will come from publicly available sources and no primary data will be collected. The results of this research will be submitted for publication in a peer-reviewed scientific journal and presented at scientific events.

Academic links

This production is part of the Master's thesis by Marvyn de Santana do Sacramento, supervised by Dr. Jefferson Petto at the Bahiana School of Medicine and Public Health.

Potential conflict of interest

No potential conflicts of interest relevant to this protocol have been reported.

Sources of funding

This work was supported by the Coordination for the Improvement of Higher Education Personnel (CAPES) (Grant number: 28008014002P6).

Authors' contribution

Conception and design: Sacramento MS, Santana US, Aragão TS, Petto J; **Planning and methodological aspects:** Sacramento MS, Santana US, Aragão TS, Barbosa RM; **Writing of the manuscript:** all authors; **Critical revision of the manuscript for intellectual content:** Sacramento MS, Petto J.

References

1. Whelton PK, Carey RM, Aronow WS, Casey DE Jr, Collins KJ, Dennison Himmelfarb C, et al. 2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults: Executive Summary: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *Hypertension*. 2018;71(6):1269-324. doi: 10.1161/HYP.0000000000000066
2. Carvalho T, Milani M, Ferraz AS, Silveira AD, Herdy AH, Hossri CAC, et al. Diretriz Brasileira de Reabilitação Cardiovascular – 2020. *Arq Bras Cardiol*. 2020;114(5):943-87. doi:10.36660/abc.20200407
3. Farah B, Germano-Soares A, Rodrigues S, Santos C, Barbosa S, Vianna L, et al. Acute and chronic effects of isometric handgrip exercise on cardiovascular variables in hypertensive patients: a systematic review. *Sports*. 2017;5(3):55. doi: 10.3390/sports5030055
4. Brignole M, Croci F, Menozzi C, Solano A, Donateo P, Oddone D, et al. Lolli G. Isometric arm counter-pressure maneuvers to abort impending vasovagal syncope. *J Am Coll Cardiol*. 2002;40(11):2053-9. doi: 10.1016/s0735-1097(02)02683-9
5. Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. *Ann Intern Med*. 2018;169(7):467-73. doi: 10.7326/M18-0850