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Review Article

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Assessment of the reporting quality of resistance training interventions in randomised controlled trials for lower limb tendinopathy: A systematic review protocol

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Abstract

Review objectives: (1). To describe what exercises and intervention variables are used in resistance training interventions in randomised controlled trials for lower limb tendinopathy. (2). To assess completeness of reporting as assessed by the Consensus on Exercise Reporting Template (CERT) and the Toigo and Boutellier framework. (3). To assess the implementation of scientific resistance training principles. (4). To assess therapeutic quality of exercise interventions with the i-CONTENT tool.

Design: Systematic review.

Elligibility criteria: Randomized controlled trials only, that have reported using resistance exercises for common lower limb tendinopathies including Achilles, patellar, gluteal, and plantar heel pain.

Methods: The authors will search for a wide range of sources to find both published and unpublished studies via EBSCOhost, including, but not limited to, MEDLINE, SPORTDiscus, CINAHL, Cochrane Central Register of Controlled Trials (CENTRAL), and Allied and Complementary Medicine Database (AMED). Studies published in a language other than English will only be considered if a translation is available. Data synthesis will be presented in tabular form with an accompanying narrative synthesis. Completeness of reporting will be presented as the number of items reported for each of the tools used: the CERT, Toigo and Boutellier framework, i-CONTENT tool, and resistance training principles. Dissemination of the reporting findings of efficacious resistance training interventions used for lower limb tendinopathies, will allow for translation into clinical practice.

Introduction

Lower limb tendinopathies are some of the most prevalent musculoskeletal disorders seen in clinical practice, with a concurrently high prevalence among athletes and the general population [1]. Collectively, incidence and prevalence across the general population has been found to range from 7.0-11.8 and 10.5-16.6 per 1000 people, respectively [2,3]. Prevalence of Achilles and Patellar tendinopathies is higher in elite athletes, having been reported as high as 23 and 45% in elite running and jumping athletes [4,5]. Plantar heel pain has been reported in up to 18% in a cohort of running athletes [6]. The clinical hallmarks of lower limb tendinopathies include chronic tendon pain, functional limitations, impaired athletic performance, and reduced quality of life, with a recognised impact on an individual's psychological state [7,8]. The pathological hallmarks of tendinopathy involve a disrupted healing process, characterised by neovascularisation, presence of inflammatory cells and collagen structural derangement [9]. In total, a plethora of extrinsic and intrinsic factors linked

to the pathogenesis of tendinopathy have been suggested, highlighting the multifactorial and heterogenic nature of both risk and pathological state in individuals with tendinopathy [10]. Resistance training, particularly eccentric resistance training has been the recognised gold standard first-line management option for lower limb tendinopathies for several years, due to a plethora of literature highlighting positive outcomes [11,12]. Despite the existence of a plethora of literature confirming the effectiveness of various types of resistance training for improving clinical outcomes for lower limb tendinopathies, there have been no comprehensive reviews examining the quality of the content and reporting of the employed resistance training interventions, despite their widespread clinical recommendations and implementation [13-20].

It may be regarded as a highly important objective to determine the content, quality, and scientific implementation of common resistance training interventions in lower limb tendinopathy, as despite clinical benefit reported in the short-term, long-term outcomes often remain inadequate [21]. If reporting of the description and content of resistance training programs is inadequate, then optimal translation of interventions to clinical practice may be suboptimal [22]. In recent years, attempts have been made to improve the reporting of exercise interventions in rehabilitation research to enhance exercise reproducibility and clinical translation. This effort has included the publication of two specific reporting tools in the British Journal of Sports Medicine (BJSM): The Consensus on Exercise Reporting Template (CERT) in 2016 [23]. and the i-CONTENT tool in 2021 [24]. The i-CONTENT tool was developed to assess the therapeutic quality of exercise interventions in Randomised controlled trials (RCTs) and the CERT allows for reporting detailed descriptions of exercises and their variables such as progression and tailoring, allowing clinical replication. Another common reporting tool, known as the Toigo and Boutellier framework, addresses limitations of the previous two tools, by including mechanobiological resistance training descriptors such as rest intervals, time under tension and relative load [25]. A recent systematic review by Holden et al [26]. published in the BJSM, assessed reporting quality of exercise interventions for patellofemoral knee pain using the TIDieR tool and Toigo and Boutellier framework. The authors highlighted the poor overall reporting of exercise interventions in patellofemoral pain, which limits the clinical translational of exercise research findings and recommended that future studies should use both the CERT and Toigo and Boutellier framework in conjunction to increase comprehensiveness of reporting. Both reporting tools have been used in several systematic reviews assessing exercise content reporting in rehabilitation for musculoskeletal disorders other than lower limb tendinopathy [27-29]. However, no previous systematic reviews have been conducted assessing exercise reporting in RCTs for lower limb tendinopathies, despite recommendations that tools such as the CERT be used for reporting in tendinopathy trials [30-32]. The aims of this systematic review were to evaluate the reporting of resistance training interventions for treating lower limb tendinopathies in RCTs. The review was guided by addressing the following review objectives on specific aspects of exercise reporting within lower limb tendinopathy resistance training interventions: (1). To describe what exercises and intervention variables are used in resistance training interventions in randomised controlled trials for lower limb tendinopathy. (2). To assess completeness of reporting as assessed by the Consensus on Exercise Reporting Template (CERT) and the Toigo and Boutellier framework. (3). To assess the implementation of scientific resistance training principles. (4). To assess therapeutic quality of exercise interventions with the i-CONTENT tool.

Methods

The methods of this systematic review will be guided by Cochrane guidelines and the protocol will be registered a priori in the PROSPERO International Prospective register of Systematic reviews. The systematic review will be reported in accordance with the Preferred Reporting Items for Systematic reviews and Meta-analysis (PRISMA) guidelines [33].

Data sources

A 3-step search strategy will be implemented in this systematic review. It will incorporate the following: (1) a limited search of MEDLINE and CINAHL using initial keywords, followed by analysis of the text words in the title or abstract and those used to describe articles to develop a full search strategy; (2) The full search strategy will be adapted to each database and applied to MEDLINE, CINAHL, AMED, EMBase, SPORTDiscus, and the Cochrane library (Controlled trials, Systematic reviews). The following trial registries will be searched: ClinicalTrials.gov, ISRCTN, The Research Registry, EU-CTR (European Union Clinical Trials Registry), ANZCTR (Australia and New Zealand Clinical Trials Registry). Databases were searched from inception to December 2021. (3) For each article located in steps 1 and 2, a search of cited and citing articles using Scopus and hand-searching where necessary, will be conducted. Studies published in a language other than English will only be included if a translation is available as translation services are not available to the authors.

Inclusion/exclusion criteria

The review will include adults aged eighteen years or older with a diagnosis of a lower limb tendinopathy for any time duration. All lower limb tendinopathies will be included, such as gluteal, hamstring, patellar, Achilles, tibialis posterior and peroneal tendinopathy. Plantar heel pain will be included as it is considered to have a similar pathophysiology to tendinopathy [22]. This review will consider randomised controlled trials (RCTs) only for inclusion. RCTs evaluating resistance training for the treatment of lower limb tendinopathies, including any type or format will be considered. Any type of resistance training, including eccentric, concentric, isotonic, isometric, plyometric, heavy slow resistance training, general strength training or combinations of these exercise types will be considered. The resistance training may be used as a first or second-line intervention for tendinopathy and may be delivered in isolation or combined with other treatments. Resistance training may be delivered across a range of settings, delivered by health or exercise professionals. Resistance training interventions may be delivered in a supervised or unsupervised manner, using any methods for training progression and monitoring.

Screening

Following the search, all identified citations will be collated and uploaded into RefWorks and duplicates removed. Titles and abstracts will then be screened by two independent reviewers for assessment against the inclusion criteria for the review.

Potentially relevant studies will then be retrieved in full, and their citation details imported into Covidence (Veritas Health Innovation, Melbourne, Australia). Two independent reviewers will assess the full text of selected citations in detail against the inclusion criteria. Any disagreements that arise between the reviewers at each stage of the study selection process will be resolved through discussion or by input from a third reviewer.

Main outcomes

(1). Description of exercises and intervention variables used in resistance training interventions in randomised controlled trials for lower limb tendinopathy. (2). Assessment of completeness of reporting of resistance training as assessed by the Consensus on Exercise Reporting Template (CERT) and the Toigo and Boutellier framework. (3). Assessment of the implementation of scientific resistance training principles (specificity, progression, overload, individualisation) and reporting of relevant prescription components (frequency, intensity, sets, repetitions) and reporting of intervention adherence. (4). Assessment of therapeutic quality of exercise interventions with the i-CONTENT tool.

Data extraction

Data will be extracted from studies using data extraction tools developed specifically by the reviewers. The data extracted will include specific details regarding the population, concept, context, study methods and key findings relevant to the review questions. Any disagreements that arise between the reviewers will be resolved through discussion. The data extracted will include dimensions such as authors, year of publication, study type, purpose, population & sample size, methods, details of resistance training intervention, specific exercises and outcome measures used. Details of the resistance training interventions will include setting, mode of delivery, type, dosage, and methods used to progress and adjust the training stimulus. The contents and variables of the specific resistance training exercises will be extracted using the 13-item Toigo and Boutellier framework for exercise mechanobiological description and includes parameters such as repetitions, load magnitude and time under tension. General information from the resistance training interventions such as exercise supervision and delivery methods will be extracted using the CERT tool. Data on the therapeutic quality of exercise interventions will be extracted using the 7 item i-CONTENT tool. An evaluation of the implementation of scientific resistance training principles will also be conducted, by extracting data on the principles of specificity, overload, progression, individualisation, and adherence.

Risk of bias assessment

Included studies will be critically appraised by two independent reviewers at study level for methodological quality using the standardized Cochrane risk of bias tool. Any disagreements that arise between the reviewers will be resolved through discussion or with a third reviewer. The results of the critical appraisal will be reported in narrative form, and in tables and figures. All studies meeting the inclusion criteria, regardless of their methodological quality, will undergo data extraction and synthesis and be included in the review.

Data analysis

The extracted data will be presented in tabular form as tables and figures, in a manner that aligns with the objective of this systematic review. A narrative summary will accompany the tabulated results and describe how the results relate to the review objectives. Completeness of information regarding the resistance training interventions will be presented as the number of complete items of the CERT, Toigo and Boutellier framework, i-CONTENT tool, and resistance training principles for each study.

Declarations

Funding: No sources of funding were used to assist in the preparation of this article.

Conflicts of interest/competing interests: The authors declare no conflicts of interest relevant to the content of this review.

Authorship contributions: IB conceptualised the work and wrote the first draft of the manuscript. IB and AM revised the manuscript and approved the final manuscript.

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