

CADTH RAPID RESPONSE REPORT:
SUMMARY WITH CRITICAL APPRAISAL

Strength-based Exercise for Chronic Non-Cancer Back Pain: A Review of Clinical Effectiveness

Service Line: Rapid Response Service
Version: 1.0
Publication Date: September 27, 2019
Report Length: 7 Pages

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Cite As: Strength-based exercise for chronic non-cancer back pain: a review of clinical effectiveness. Ottawa: CADTH; 2019 Sep. (CADTH rapid response report: summary with critical appraisal).

ISSN: 1922-8147 (online)

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Funding: CADTH receives funding from Canada's federal, provincial, and territorial governments, with the exception of Quebec.

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Abbreviations

CRD	Centre for Reviews and Dissemination
PRISMA	preferred reporting items for systematic reviews and meta-analyses

Context and Policy Issues

Chronic primary pain typically refers to pain in one or more parts of the body that recurs or lasts for longer than 12 weeks.¹ Up to 20% of Canadians live with chronic pain and two-thirds report that their pain is moderate to severe.² Chronic primary pain may lead to significant emotional distress, anxiety and depressed mood and may cause functional disability and interfere with daily activities.²

The back is considered one of the most common locations of chronic non-cancer pain.³ Although back pain is often attributed to a diverse group of factors^{2,3} such as genetics, sex, pregnancy status, environmental factors, and psychological factors, its true etiology is difficult to determine.⁴ Notwithstanding the complexity of diagnosing chronic back pain, there are several pharmacological and non-pharmacological options that are used to manage the condition. Pharmacological options include opioids, nonsteroidal anti-inflammatory drugs, acetaminophen, muscle relaxants, antiseizure medications, antidepressants, and corticosteroids.³ These medications are known to have mild to severe side effects, and in some cases are accompanied with a significant risk of addiction.⁵ Alternate management options range from mind-body practices and acupuncture to surgery, physical therapy, and exercise.⁶ Given that there may be a link between muscle weakness, low physical activity, and increased risk of back pain, strength-based exercise has been extensively explored as a potentially viable treatment option for chronic back pain.⁷⁻⁹ For the purposes of this report, strength-based exercise is defined as exercise that increases muscular strength or toning (i.e., resistance training, intense and low-level weightlifting, body weight exercise designed for strength, and machine repetitions). Specifically, aerobic exercise, yoga, Pilates, tai chi, physiotherapy, and sling training are not included in this definition.

A summary of abstracts published by CADTH in 2017 identified 46 systematic reviews (12 with meta-analysis) that evaluated the clinical benefits and harms of exercise for adults with back pain, with publication dates between January 1, 2012 and July 21, 2017.¹⁰ The included systematic reviews covered various strengthening exercises, motor control exercises, core-strength training strategies, and resistance training, among other forms of exercise. Strength-based exercise was the intervention of interest in four of the systematic reviews, however, their focus was not exclusively on patients with chronic pain and their comparators were mixed and in some cases, undefined.¹⁰

The current review aims to summarize and evaluate evidence regarding the clinical effectiveness of strength-based exercise alone relative to pharmacological interventions alone for chronic non-cancer back pain in non-pregnant people.

Research Questions

1. What is the clinical effectiveness of strength-based exercise for chronic non-cancer back pain?

Key Findings

No evidence was found regarding the clinical effectiveness of strength-based exercise alone compared with pharmacological interventions for chronic non-cancer back pain in non-pregnant people.

Methods

Literature Search Methods

A limited literature search was conducted by an information specialist on key resources including Medline via OVID, the Cochrane Library, the University of York Centre for Reviews and Dissemination (CRD) databases, the websites of Canadian and major international health technology agencies, as well as a focused Internet search. The search strategy was comprised of both controlled vocabulary, such as the National Library of Medicine's MeSH (Medical Subject Headings), and keywords. The main search concepts were back pain and strength-based exercise. Search filters were applied to limit retrieval to health technology assessments, systematic reviews, meta-analyses, or network meta-analyses, randomized controlled trials, or controlled clinical trials. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 1, 2014 and September 6, 2019.

Selection Criteria and Methods

One reviewer screened citations and selected studies. In the first level of screening, titles and abstracts were reviewed and potentially relevant articles were retrieved and assessed for inclusion. The final selection of full-text articles was based on the inclusion criteria presented in Table 1.

Table 1: Selection Criteria

Population	Individuals with chronic back pain from any cause (other than cancer), who are not pregnant
Intervention	Strength-based exercise (i.e., weightlifting, resistance training) alone, excluding aerobic exercise, yoga, Pilates, tai chi, physiotherapy, or sling training
Comparator(s)	Pharmacological interventions (e.g., analgesics; including usual care if usual care is continuation of pharmacological interventions alone)
Outcome(s)	Clinical effectiveness (e.g., pain reduction, functional performance, quality of life, disability level, global impression of recovery, adverse events)
Study Designs	Health technology assessments, systematic reviews, meta-analyses, and randomized controlled trials

Exclusion Criteria

Articles were excluded if they did not meet the selection criteria outlined in Table 1, they were duplicate publications, or were published prior to 2014. Studies that may have included strength-based exercise but focused on aerobic exercise, yoga, Pilates, tai chi, physiotherapy or sling training as the primary intervention were excluded. Importantly, studies were excluded where strength-based exercise was embedded within another intervention.

Summary of Evidence

Quantity of Research Available

A total of 446 citations were identified in the literature search. Following screening of titles and abstracts, 432 citations were excluded and 14 potentially relevant reports from the electronic search were retrieved for full-text review. Two potentially relevant publications were retrieved from the grey literature search and other sources for full text review. Of these 16 potentially relevant articles, none met the inclusion criteria for this report and all 16 publications were excluded for various reasons. Appendix 1 presents the PRISMA¹¹ flowchart of the study selection.

Summary of Study Characteristics

No health technology assessments, systematic reviews, meta-analyses, or randomized controlled trials were found that met the study inclusion criteria, therefore a summary could not be compiled.

Summary of Critical Appraisal

No relevant studies were found therefore, a summary could not be compiled.

Summary of Findings

No relevant studies were found therefore, a summary could not be compiled.

Conclusions and Implications for Decision or Policy Making

This current review found no evidence on the clinical effectiveness of strength-based exercise alone compared with pharmacological interventions for chronic non-cancer back pain in non-pregnant people.

Research comparing strength-based training alone with pharmacological interventions alone for chronic non-cancer back pain may provide decision-makers with valuable insights and help to inform important public health policies for the Canadian population.

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Appendix 1: Selection of Included Studies

