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The Effect of Pelvic Floor Muscle Exercises on Chronic Low Back Pain

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Abstract

Introduction: Chronic low back pain represents a major problem for the global population, as it adversely affects individuals` overall well-being, diminishes work productivity and leads to high treatment costs. Non-pharmacological treatment, including physiotherapy, is a key method for managing this type of pain condition. One of the less studied physiotherapy methods that potentially contributes to the management of chronic low back pain is pelvic floor muscle training, the effectiveness of which we evaluated through this literature review. *Methods:* In the systematic literature review, randomized controlled trials identified through the PubMed and Google Scholar databases were included. All studies, regardless of the year of publication, written in English language and meeting the inclusion criteria, were reviewed. These criteria included that the studies were randomized controlled trials, with participants being individuals with chronic lower back pain, and that the intervention involved pelvic floor muscle exercises. The quality of included studies was assessed using the PEDro scale. *Results:* Seven randomized controlled trials were included in the systematic literature review. Their methodological quality was rated as "fair" (> 4) according to the PEDro scale. The results of the studies showed that a treatment consisting of standard physiotherapy (electrotherapy, thermotherapy, ultrasound therapy, back muscle strengthening exercises) and pelvic floor muscle training significantly reduces pain and improves the functionality of people with chronic low back pain. Furthermore, this combination proved to be significantly more effective intervention than standard physiotherapy treatment alone. Nevertheless, the reduction in chronic low back pain is more pronounced when we add trunk stabilization exercises to standard treatment than when we add pelvic floor muscle exercises. *Discussion and conclusions:* The main finding of our literature review suggests that integrating pelvic floor muscle training into

standard treatment represents an effective approach for reducing pain and improving functionality in individuals with chronic low back pain. More high-quality randomized controlled trials with a broader spectrum of participants are warranted in order to support the development of more precise guidelines for physiotherapeutic approaches in individual treatment. Additionally, research investigating the long-term effects of pelvic floor muscle training on chronic low back pain would be beneficial for a better understanding of its long-term therapeutic potential.

Keywords: *low back pain, pelvic floor muscles, exercise, physiotherapy treatment*

Introduction

Low back pain is characterized by pain, muscle tension, or stiffness localized between the 12th rib and the gluteal fold (Hayden et al., 2021) and can radiate to the lower extremities. Approximately 80% of people experience low back pain at least once in their lifetime (Wang et al., 2012). In 2% to 10% of cases, this pain can develop into chronic low back pain (CLBP), defined as pain persisting for more than three months (Alleva et al., 2016). The persistance of pain is often influenced not only by biological factors but also by psychological and social factors (Knezevic et al., 2021).

Chronic low back pain (CLBP) represents a significant social issue, impacting individual well-being and leading to high treatment costs, absenteeism or reduced productivity at work (Meucci et al., 2015). Early and effective treatment is therefore crucial. This may include invasive treatments such as surgeries and epidural steroid injections, or pharmacological approaches using non-opioid analgesics, nonsteroidal anti-inflammatory drugs, opioids, muscle relaxants, and antidepressants (Alleva et al., 2016; Hong et al., 2022; Qaseem et al., 2017). Additionally, non-pharmacological treatments are integral to managing CLBP and include patient education about their condition and coping techniques, lifestyle modifications, progressive muscle relaxation, cognitive-behavioral therapy and physiotherapy utilizing physical agents, manual therapy, and various types of exercise, including pelvic floor muscle training (PFMT) (Fernández-Rodríguez et al., 2022; Hong et al., 2022; Knezevic et al., 2021).

Pelvic floor muscles (PFM) are a group of muscles situated between the pubic bone, coccyx, and ischial tuberosities (Bi et al., 2013). These muscles are crucial for supporting pelvic organs, maintaining continence, and sexual function (Eickmeyer, 2017). They also play an important role in stabilizing the trunk and the sacroiliac joint, which, if unstable, can lead to the occurrence of CLBP (Hodges et al., 2007; Lee et al., 2016; Pel et al., 2008). Due to the numerous functions of PFM, they are becoming increasingly important in physiotherapeutic treatment. PMFT, which involves repeated contractions and relaxations of the PFM and anal sphincter, is used to enhance the strength and coordination of these muscles (Hite and Curran, 2021). These exercises have shown benefits in preventing and treating urinary incontinence (Alouini et al., 2022), im-

proving symptoms related to pelvic organ prolapse (Espiño-Albela et al., 2022), and enhancing sexual function in the postpartum period (Hadizadeh-Talasaz et al., 2019). This systematic literature review aims to determine the effectiveness of PFMT in managing CLBP.

Methods

Search Strategy

The literature review included studies identified through the PubMed and Google Scholar databases, which were searched in October 2023. The search was conducted using keywords »pelvic floor« and »low back pain,« with the condition that both phrases must appear in the article title. The final search query in PubMed was: (»pelvic floor«[Title]) AND (»low back pain«[Title]) and in Google Scholar: allintitle: »pelvic floor« »low back pain«.

Inclusion and Exclusion Criteria

All studies written in English that met the PICOS criteria were included, regardless of publication year (Methley et al., 2014). Studies were eligible if they involved participants with CLBP, included at least one of the experimental group receiving pelvic floor muscle exercises, and compared the effectiveness of PFMT with a control group or reported data on pain intensity before and after the intervention. Only randomized controlled trials were included. Exclusion criteria included studies involving participants with other pathologies, experimental groups receiving additional treatments besides PFMT (except for standard CLBP treatment), and studies that did not include any experimental group performing PFMT.

Methodological Quality

The quality of the randomized controlled trials was assessed using the PEDro scale, which assigns a score from 0 to 10 (Maher et al., 2003). Studies scoring 9 to 10 were considered excellent, 6 to 8 were considered good, 4 to 5 were considered fair, and below 4 were considered poor quality. The average quality of the included randomized controlled trials was assessed as fair (average score: 4.28). Among these, two were of good quality, two were of fair quality, and three were classified poor quality.

Results

When the mentioned search term was entered in the databases, a total of 40 hits were displayed, 9 in PubMed and 31 in Google Scholar. After removing 3 duplicates, the titles and abstracts of the remaining 37 articles were reviewed. 9 articles met the inclusion criteria and were fully reviewed. Subsequently, 2 studies were excluded due to inappropriate language and population criteria. The

remaining 7 studies were included in the literature review. The search and selection process is shown in Figure 1.

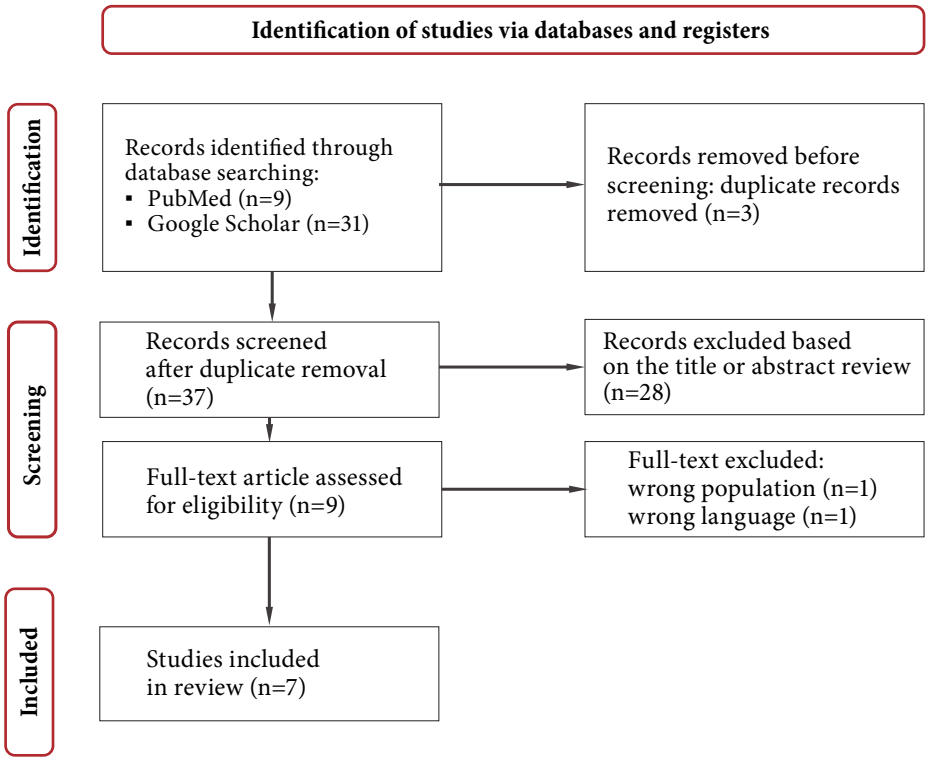

Figure 1: Searching and selecting studies for inclusion in the literature review.

Table 1 outlines the basic characteristics of seven studies that investigated the effect of PFMT on CLBP. The studies found that combining PFMT with standard physiotherapy treatment resulted in better outcomes for managing CLBP compared to standard physiotherapy alone, which typically includes ultrasound therapy, transcutaneous electrical nerve stimulation, thermotherapy, infrared light therapy, shortwave diathermy, and various exercises for strengthening flexors, extensors, and trunk stabilizers (Bhatnagar and Sahu, 2017; Bi et al., 2013; Dsingh and Kaur, 2020; Ghaderi et al., 2016; Kumar et al., 2015; Mohseni-Bandpei et al., 2011; Rathi, 2013). Adding PFMT to standard treatment improved initial and final pain scores and functionality in most included studies (Bhatnagar and Sahu, 2017; Bi et al., 2013; Dsingh and Kaur, 2020; Ghaderi et al., 2016; Kumar et al., 2015; Rathi, 2013). It also increased the endurance and strength of PFM (Ghaderi et al., 2016; Mohseni-Bandpei et al., 2011) and abdominal muscles (Ghaderi et al., 2016; Kumar et al., 2015). However, the combination of standard treatment with trunk stabilization exercises was found to be more effective in reducing CLBP than combining standard treatment with PFMT (Kumar et al., 2015).

Table 1: Overview of included studies.

Study	*Participants*	*Pelvic floor muscle exercise program*	*Main findings*
Mohseni--Bandpei et al., 2011	20 subjects with chronic low back pain (age = 20-50 years)	8-week progressive program (6x/day) Contraction: 5-10 s Rest: 4 s Cycles: 4-10	Pelvic floor muscle exercise group* showed greater improvement in endurance and strength of pelvic floor muscles than standard treatment group ($p < 0{,}001$); pain and functionality improved the same in both groups ($p < 0{,}01$)
Bhatnagar and Sahu, 2017	30 subjects with chronic low back pain (age = 25-50 years)	6-week progressive program Contraction: 6 s Rest: 6 s Cycles: 25-100, 5/min	Pelvic floor muscle exercise group* showed greater improvement in pain and functionality than standard treatment group ($p < 0.05$)
Kumar et al., 2015	30 subjects with postpartum chronic low back pain (age = 25-35 years)	4-week program (5x/week) Contraction: 3-5 s Rest: no information Cycles: no information	Trunk stabilization exercise group showed greater improvement in pain ($p < 0.001$), functionality ($p < 0.05$) and abdominal muscle endurance ($p < 0.05$) than pelvic floor muscle exercise group*
Dsingh and Kaur, 2020	27 subjects with sitting jobs and chronic low back pain (age = 18-45 years)	5-week progressive program (3x/week) Contraction: 6 s Rest: 6 s Cycles: 5/min, 30 min	Pelvic floor muscle exercise group* and postural control exercise group showed greater improvement in pain and functionality than standard treatment group
Bi et al., 2013	47 subjects with chronic low back pain (age = 18-60 years)	24-week progressive program (3x/week) Contraction: 6 s Rest: 6 s Cycles: 25-100, 5/min	Pelvic floor muscle exercise group* showed greater improvement in pain ($p = 0.045$) and functionality ($p = 0.034$) than standard treatment group; strength and endurance of the trunk muscles improved the same in both groups
Ghaderi et al., 2016	60 subjects with urinary incontinence and chronic low back pain (age = 45-60 years)	12-week program (3x/week) Contraction: 30% max voluntary contraction Rest: no information Cycles: no information	Pelvic floor muscle exercise group* showed greater improvement in strength and endurance of the trunk stabilization muscles than standard treatment group ($p < 0.05$); pain and functionality improved the same in both groups
Rathi, 2013	30 subjects with chronic low back pain (age = 20-40 years)	4-week progressive program (5x/week, 3x/day) Contraction: 5s or more Rest: 5 s or less Cycles: 10	Pelvic floor muscle exercise group* showed greater improvement in pain and functionality than standard treatment group ($p < 0.05$)

* Pelvic floor muscle exercise group also received standard treatment

Discussion

Through a systematic literature review, we aimed to determine the effectiveness of PFMT in individuals dealing with CLBP. The main finding of our systematic review was that PFMT significantly reduces CLBP. However, it was found that physiotherapy treatment combined with PFMT was not significantly more effective than standard physiotherapy treatment in all studies. Additionally, there were no significant differences observed in the method of execution or duration of PFMT that would impact the effectiveness of treatment for patients with CLBP.

The interventions in the included studies examined varying durations of PFM contractions, rest periods, and the overall length of the intervention. Regardless of the duration of PFM contraction or rest periods between them, all studies have consistently shown a significant reduction in CLBP. However, there is no consensus on the optimal length for such interventions – in the studies analysed, the intervention period ranged from 4 to 24 weeks, with all studies reporting pain reduction outcomes. In previous research where pelvic floor exercises were used to treat urinary incontinence, interventions typically lasted around 12 weeks, which was sufficient to improve PFM strength (McLean et al., 2013).

PFMT has been proven effective when integrated with other interventions. In most of the reviewed studies (Bhatnagar and Sahu, 2017; Bi et al., 2013; Dsingh and Kaur, 2020; Ghaderi et al., 2016; Mohseni-Bandpei et al., 2011; Rathi, 2013), PFMT was used in combination with back or abdominal muscle strengthening exercises, except in one study (Kumar et al., 2015) where PFMT was applied without other exercise interventions. Combining PFMT with core muscle strengthening exercises is reasonable to include in physiotherapeutic treatment of individuals with CLBP (Sapsford and Hodges, 2001) due to the indispensable connection between core muscles (especially the multifidus and transverse abdominal muscles) and PFM. The concurrent activation of these muscle groups enhances intra-abdominal pressure (Rathi, 2013). This increase in pressure facilitates improved segmental stability, which is essential for mitigating pain and functional impairment in individuals with CLBP (Kim and Lee, 2013). This could explain how PFMT impacts CLBP. There is still no consensus on whether PFM strengthening alone affects CLBP or if the pain reduction is a result of the strengthened core muscles that are simultaneously trained with PFM (Bernard et al., 2021).

In this systematic literature review, several limitations need to be considered. The interventions were relatively short-term. The included studies involved a small number of participants, and it is also worth noting the generally lower quality of the research.

Conclusion

PFMT is a physiotherapy method used to adress various conditions, including urinary incontinence, symptoms associated with pelvic organ prolapse, and sexual function in the postpartum period. It is also gaining importance in the management of CLBP. The main finding of our literature review is that combining PFMT with standard treatment is an effective approach to reducing pain and improving functionality in individuals with CLBP. Additionally, in most of the studies, standard treatment augmented with PFMT was found to be more effective than standard treatment alone. In the future, more high-quality randomized controlled trials with a larger number of participants are needed on the topic of PFMT to contribute to the establishment of clearer guidelines for the physiotherapeutic management of individuals with CLBP. It

would also be beneficial to conduct studies that observe the long-term effects of PFMT on CLBP.

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