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EFFECTIVENESS OF PHYSIOTHERAPY INTERVENTIONS IN THE MANAGEMENT OF CHRONIC LOW BACK PAIN: A SYSTEMATIC REVIEW

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ABSTRACT:
Chronic back pain is a frequently occurring musculoskeletal disorder, characterized by persistent pain, disability, diminished physical function and poor quality of life. It is managed extensively by physiotherapy, with varying effects of different interventions. The purpose of this systematic review was to assess the effectiveness of physiotherapy interventions in adults with chronic low back pain. The search of PubMed and Google Scholar was performed in a systematic manner for English language, open access studies from the period 2016-2025. Randomized controlled trials that reported pain or disability outcomes, physical function, mobility or quality of life after physiotherapy-related interventions were included. Studies were selected according to PRISMA principles, and 10 studies were used for the final qualitative synthesis. The Cochrane Risk of Bias 2 was used to evaluate methodological quality. The studies included were those related to conventional physiotherapy, graded activity, stabilization exercises, neuromuscular electrical stimulation, exercise and relaxation therapy, mobile-health interventions, Wuqinxi exercise, supervised biopsychosocial exercise, e-health rehabilitation, myofascial vacuum therapy, and combined exercise methods. Overall, structured exercise-based physiotherapy was correlated with improvements in pain, disability, function, mobility and quality of life. Passive adjunctive modalities had less consistent effects, and multimodal and individualized interventions often yielded additional benefits. Physiotherapy seems to be effective for chronic low back pain, focusing on structured, progressive and personalized exercise activities and utilising behavioural, manual and/or technology-based methods as appropriate.

KEYWORDS: Chronic low back pain; Physiotherapy; Exercise therapy; Rehabilitation; Pain management

1. INTRODUCTION

Chronic low back pain (CLBP) refers to a persistent and multifactorial musculoskeletal pain condition that involves pain, functional limitation, decreased participation in daily activities and significant health care use. Chronic presentations are not only related to musculoskeletal dysfunction, but also to behavioral, psychological, occupational and lifestyle factors. As a result, it's no longer sufficient solely to assess the efficacy of the treatment based on the reduction of pain, but also on multiple domains such as pain intensity, disability, physical function, psychosocial status, and quality of life (Tagliaferri et al., 2020). It is important to note that sleep disturbances can also play a role in pain persistence and in the inability to recover from the pain, and therefore together with patient-related factors, it can be considered as a part of physical therapist practices (Nijs et al., 2018).

The ability to effectively participate in self-management strategies can also be influenced by central pain mechanisms and pain-related beliefs (Georgopoulos et al., 2024). There are non-pharmacological and pharmacological measures for the management of CLBP. Pharmacological therapies however have limited or short-term effects and may have adverse effects, which has led to an increased interest in active rehabilitation and non-pharmacological management options (Cashin et al, 2023). For chronic primary low back pain, there is evidence that structured exercise is an important element of care, although the magnitude of benefit depends on the type of exercise, supervision, dose, and patient characteristics (Verville et al., 2023a). Motor skill training designed to enhance functional movement patterns has been shown to result in better functional outcomes than traditional strength and flexibility training, indicating that the training approach of an exercise may be a factor in how the exercise is responded to clinically (van Dillen et al., 2021).

Other interventions for chronic nonspecific LBP include educational and exercise-based interventions, including back-school programmes, which have demonstrated variable results depending on the programme design and comparison interventions (Parreira et al., 2017). Modern physiotherapy has thus transcended the traditional focus on simply exercising to holistic treatment strategies. Biopsychosocial emphasizes physical rehabilitation and the behavioural and psychological variables that can be involved in chronic pain and disability. Primary care data indicates that biopsychosocial (BPS)

interventions are effective for people with CLBP, but effectiveness of individual components varies across programs (van Erp et al., 2019). In chronic nonspecific low back pain (LBP), psychological interventions that are part of treatment can also help reduce pain-related disability, fear avoidance, and coping (Ho et al., 2022). In a clinical trial, cognitive functional therapy has been proven to show clinically significant reductions in disability and pain intensity when compared to usual care, which further highlights the importance of individual behavioural and movement-based rehabilitation (Kent et al., 2023). Subsequent studies indicate that shifts in pain related beliefs, self-efficacy and movement related behaviours may account for some of the clinical outcomes of cognitive functional therapy (Schütze et al., 2025).

The use of technology has also increased the range of ways in which physiotherapy is provided. Mobile health applications can enable education, monitoring of physical activity, adherence to exercise, and self-management in the home and community (Moreno-Ligero et al., 2023). Mobile messaging has demonstrated promise to aid with exercise strengthening and productivity and clinical management for patients with CLBP (Itoh et al., 2022). Self-management programmes delivered over a smartphone have also shown to be feasible for chronic low back pain care to be delivered beyond face-to-face rehabilitation (Chhabra et al., 2018). The findings also showed that, overall, physical therapists reported being satisfied with using e-health for chronic low back pain, but that implementation can rely upon patient suitability, technological availability, and physical therapists' confidence (Martínez de la Cal et al., 2021). Another emerging treatment option for chronic musculoskeletal pain rehabilitation is virtual reality active training, but there is still variation in the design of the intervention and quality of the evidence (Lo et al., 2024). Other self-management interventions such as technology-assisted complementary methods, like auricular point acupressure, have also been examined, but with preliminary evidence (Yeh et al., 2022).

Increased uptake of physiotherapy self-management programmes, especially in low and middle-income countries, highlights the need for such models to be accessible and sustainable (Motha et al., 2024). Other non-invasive modalities have been studied as augmentation to rehabilitation. TENS has been extensively studied in the treatment of acute and chronic pain, and some studies have shown that it can reduce pain during and after treatment (Johnson et al., 2022). However, there is not enough evidence specifically for the use of TENS as a primary treatment for chronic primary low back pain, and TENS should be used as an adjunct treatment (Verville et al., 2023b). More broadly, there are various other interventions that could impact chronic pain processing that vary significantly in invasiveness, mechanism, and evidence of efficacy (Knotkova et al., 2021).

The aim of this systematic review was to evaluate the effectiveness of physiotherapy interventions in the management of chronic low back pain. The aim was to identify relevant RCTs, compare the different physiotherapy and exercise-based interventions, provide information on the effects on pain, disability, physical function and quality of life in people with CLBP, assess the methodological quality of included evidence, and draw conclusions on which physiotherapy and exercise-based interventions show the best evidence of good clinical outcomes.

2. METHODOLOGY

2.1 Review Design

This systematic review aimed to assess the efficacy of physiotherapy treatments in chronic low back pain (CLBP). The review was conducted according to the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) guideline. The review was mainly restricted to randomized controlled trials of physiotherapy, exercise-based rehabilitation, manual therapy, electrotherapy and other interventions in chronic low back pain patients. After the screening and eligibility, 10 studies were selected for final qualitative synthesis.

2.2 Search Strategy and Information Sources

A systematic literature search was performed through the databases PubMed and Google Scholar to find relevant studies that were published from 2016–2025. The key concepts of chronic LBP, physiotherapy interventions and treatment effectiveness were used to develop search terms. The main keywords used were chronic low back pain, chronic nonspecific low back pain, physiotherapy, physical therapy, exercise therapy, manual therapy, therapeutic exercise, rehabilitation, effectiveness, efficacy, pain, disability, and functional outcome. Boolean operators AND and OR were used to combine the search terms.

A representative search structure was:

(“chronic low back pain” OR “chronic nonspecific low back pain”) AND (“physiotherapy” OR “physical therapy” OR “exercise therapy” OR “manual therapy” OR “therapeutic exercise”) AND (“effectiveness” OR “efficacy” OR “pain” OR “disability” OR “functional outcome”).

The search was restricted to English-language, open-access original research articles published within the predefined period. Preference was given to randomized and randomized controlled clinical trials.

2.3 Eligibility Criteria

Only studies that included adults with a chronic or chronic, non-specific, diagnosis of low back pain and assessed a physiotherapy-based intervention were included. Interventions eligible for inclusion were exercise therapy, supervised rehabilitation, manual therapy, stabilization exercises, electrotherapy-supported exercise, therapeutic exercise, and technology-assisted rehabilitation. Studies had to include clinically relevant outcomes, including pain intensity, disability, physical function, mobility or quality of life.

The original interventional studies published from 2016 to 2025 and with full-text articles in English were included. Studies were not included when they were based on acute or subacute low back pain, populations that did not have a clear diagnosis of chronic low back pain, or interventions not related to physiotherapy. Studies that did not report relevant

clinical outcomes were also excluded as were reviews, meta-analyses, study protocols, observational studies, case reports, editorials and studies not reporting clinical outcomes that were relevant.

2.4 Study Selection

Using the database search method, 390 records were found in PubMed and Google Scholar, while no records were found from other databases. The number of records after the removal of 51 duplicate records was 339, which were then subjected to title and abstract screening. A total of 212 records were rejected in the screening process due to not fulfilling the pre-defined eligibility criteria. Therefore, 127 full text articles were evaluated for eligibility. From these, 117 were removed because they did not have full text.

Reasons were that the population did not include chronic low back pain (n = 28), the intervention was not primarily physiotherapy or physical therapy (n = 24), the study design was inappropriate (n = 22), there was no relevant pain/disability/functional outcome measures (n = 18), the study included acute/subacute or other kind of low back pain (n = 15), and full text was not available or was not in an open-access resource (n = 10). In the end, 10 studies had been taken into account for the final systematic review. The PRISMA process resulted in 390 individual records being identified, from which 10 studies were found to be eligible for inclusion and were included in the final synthesis (as shown in Figure 1).

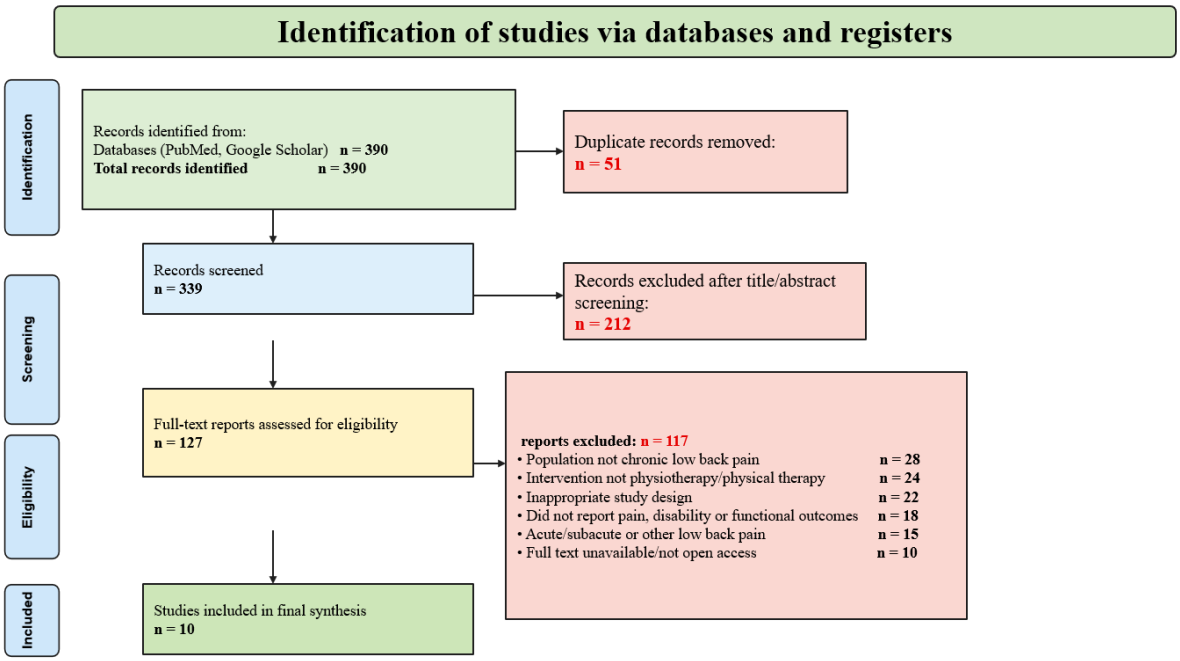

Figure 1. PRISMA Flow Diagram of Study Selection

2.5 Data Extraction and Synthesis

A standard data extraction framework was used to systematically extract data from each included study. The information extracted comprised author and year of publication, study design, study participants, sample size, type of intervention, comparator or control intervention, intervention time, outcome measures, key results and conclusions. The importance of outcomes focusing on pain intensity, disability, functional status, physical performance and quality of life were emphasized.

A narrative synthesis was conducted instead of a metanalysis as included studies used various physiotherapy techniques, varied intervention duration, various comparator groups, varied sample characteristics and different outcome measures. This was done according to the type of intervention, and comparisons were made regarding pain reduction, disability, functional improvement and other clinically relevant findings. To establish the overall pattern of evidence on the efficacy of physiotherapy interventions for chronic LBP similar and different features of the included trials were explored.

2.6 Quality Assessment

Randomized controlled trials (RCTs) included were evaluated for methodological quality using the Cochrane Risk of Bias 2 (RoB 2) tool. These five domains were evaluated: Bias from the randomization procedure, Bias of deviations from intended interventions, Bias of missing outcome data, Bias in outcome measurement, and Bias in selection of the reported result. For each domain, the studies were assigned to one of three categories: low risk of bias, some concerns, and high risk of bias, based on the information they reported about their methodological procedures.

Specific attention was paid to random sequence generation, allocation procedures, blinding, if possible, completeness of outcome data, objectivity and reliability of the measurement of outcomes, and consistency between the intended and the reported outcomes. An overall quality assessment for each study included was obtained from the domain-level judgments. The studies were included in the overall synthesis if they were of an acceptable methodological quality, and if they contained methodological concerns, the findings were interpreted with the necessary caution.

3. RESULTS

3.1 Study Selection

A systematic search of PubMed and Google Scholar was carried out, which resulted in the retrieval of 390 records. A total of 339 records were screened for title and abstract after eliminating 51 duplicate records. A total of 212 of these records were removed due to the predesigned-inclusion criteria. Of the 127 potentially eligible articles, the full texts of 117 were excluded for several reasons: inappropriate population, non-physiotherapy intervention, inappropriate study design, a lack of relevant clinical outcomes, acute or subacute low back pain, or inability to access full text.

Finally, ten randomized controlled trials were chosen to be included in the final qualitative synthesis. The studies included ranged from 2017 to 2024 and used various physiotherapy interventions, such as conventional physiotherapy, graded activity, stabilization exercise, neuromuscular electrical stimulation, exercise with relaxation, mobile-health-supported physical activity, Wuqinxi exercise, supervised exercise with a biopsychosocial approach, e-health rehabilitation, myofascial vacuum therapy, and exercise and manual therapy or kinesiotaping.

3.2 Characteristics of the Included Studies

The 10 trials included were highly heterogeneous with respect to intervention characteristics, study population size, length of treatment, comparison condition, and outcome measures (Table 1). Sample sizes for the various trials and studies ranged from 30 participants in the stabilization exercise trial to larger sample sizes in the supervised exercise studies. The most common outcomes reported were pain intensity and disability, and a few studies also investigated range of motion, quality of life, fear avoidance, Kinesio phobia, muscle strength, physical activity, and psychological factors.

Table 1. Characteristics of the included studies

Study	Sample	Intervention	Comparator	Main outcomes	Main finding
Şahin et al. (2017)	104	Physical therapy modalities + exercise and medication	Exercise + medication	Pain, ODI, functional disability	Both groups improved, but additional physical therapy produced greater longer-term improvement
Magalhães et al. (2018)	66	Graded activity	Physiotherapy exercise	Pain, disability	Both interventions produced similar medium-term outcomes
Alrwaily et al. (2019)	30	Stabilization exercise + NMES	Stabilization exercise	Pain, disability, fear avoidance, muscle strength	NMES provided no significant additional benefit
Shariat et al. (2019)	72	Exercise, relaxation, or combined exercise-relaxation	No intervention	Pain, ROM, anxiety, quality of life	Combined exercise and relaxation demonstrated broader benefits
Amorim et al. (2019)	68	Physical activity + health coaching + mobile-health support	Advice/booklet	Care seeking, pain, activity limitation	Intervention was feasible; clinical between-group effects were not statistically significant
Yao et al. (2020)	72	Wuqinxi exercise	General exercise/control intervention	Pain, muscle strength, quality of life	Wuqinxi was associated with improvements in pain and physical outcomes
Hrkać et al. (2022)	180	Graded activity or supervised exercise	Control	Pain, disability, fear avoidance, physical function, QoL	Both active treatments were effective; graded activity showed superior follow-up effects
Lara-Palomo et al. (2022)	74	Video-supported McKenzie exercise + TENS	Printed home rehabilitation	Pain, disability, mobility, QoL	E-health intervention produced greater post-treatment improvements in several outcomes
Rodríguez-Huguet et al. (2022)	50	Myofascial vacuum therapy + core exercise	Core exercise	Pain, mobility, disability, QoL	Combined therapy produced greater improvement than exercise alone

Blanco-Giménez et al. (2024)	55	Exercise alone or exercise + manual therapy/kinesiotaping	Active exercise comparator	Disability, pain sensitivity, kinesiophobia, self-efficacy	Combined approaches provided additional benefits for selected outcomes

3.3 Effects of Physiotherapy Interventions

3.3.1 Conventional Physical Therapy and Exercise

A combination of conventional physiotherapy and exercise had a positive impact on pain and functional disability. A randomized trial with 104 patients with chronic nonspecific low back pain showed that both the physical therapy group and exercise and medication control group experienced good results about pain and disability. The differences between groups, however, were in Favor of the physical therapy group at the 3-month and 1-year follow-up assessments, indicating that the use of physical therapy modalities with exercise may be more beneficial in reducing pain and enhancing functional status at long-term follow-up (Şahin et al., 2017).

In not all cases, graded activity was not evidently superior to standard physiotherapy. Magalhães et al. (2018) conducted a comparison between graded activity and physiotherapy-based exercise in 66 participants. There was no significant difference between the two groups in terms of pain intensity or disability either at 3 months or 6 months follow-up. For instance, the difference between groups for pain was −0.1 at three months and 0.1 at six months, reflecting negligible differences in the medium-term effectiveness (Magalhães et al., 2018). This indicates that several active physiotherapy modalities could be beneficial for chronic low back pain, however, that one or another modality doesn't necessarily work best.

3.3.2 Stabilization Exercise and Adjunctive Modalities

There was no evidence that all physical modalities added to stabilization exercises would be beneficial. Alrwaily et al. (2019) compared the effects of stabilization exercise alone to stabilization exercise combined with a neuromuscular electrical stimulation (NMES). Although NMES was well tolerated, there were no statistically significant between-group differences in pain, disability, fear-avoidance beliefs, or paraspinal muscle strength. Thus, NMES did not seem to be any more clinically beneficial than with stabilization exercise alone (Alrwaily et al., 2019).

A combined myofascial approach, on the other hand, seemed to be more promising. Rodríguez-Huguet et al. (2022) compared negative pulsed-pressure myofascial vacuum therapy plus core therapeutic exercise to core therapeutic exercise alone. The interventions comprised 15 sessions over five weeks in each. Several outcome measures were statistically significantly better for the combined vacuum therapy group, such as pain, mobility, pressure-pain threshold, function, and quality of life (Rodríguez-Huguet et al., 2022).

3.3.3 Exercise Combined with Behavioural or Psychological Approaches

The results of a multimodal intervention (physical and psychological) showed benefits in several outcomes. Shariat et al. (2019) studied the effects of exercise, relaxation, exercise relaxation and control on a group of office workers who had chronic low back pain. There was a significant reduction in pain intensity and anxiety in all the active intervention groups when compared with the control group. The exercise and combined-intervention groups showed greater improvements in range of motion, and the combined exercise-relaxation group showed improvements in a wider variety of outcomes including pain, mobility, anxiety, and quality of life (Shariat et al., 2019).

A similar finding was reported by Hrkać et al. (2022) who showed that both graded activity and supervised exercise therapy showed significant results when compared with the control group. Immediately after treatment, graded activity resulted in a mean decrease of 22.64 points in pain compared to control, while supervised exercise resulted in a mean decrease of 21.08 points. Compared to supervised exercise and control condition, graded activity showed greater improvements in pain, disability, fear avoidance, spinal endurance, range of motion, and quality of life at 3- and 6-months follow-up (Hrkać et al., 2022).

3.3.4 Technology-Assisted Physiotherapy

The technology-supported interventions showed mixed, but generally encouraging results. The IMPACT pilot trial tested the effectiveness of physical activity promotion with health coaching, the mobile-health platform and an activity tracker. The rate of care seeking in the intervention group was 38% lower, although this difference was not significant and no significant differences were found between groups in terms of pain and activity limitation. However, participants' satisfaction with the intervention and the data completion indicated that it was feasible (Amorim et al., 2019).

More favourable results were reported for individualized e-health rehabilitation. Lara-Palomo et al. (2022) conducted a study to compare video-based McKenzie exercises with TENS with a written home rehabilitation program. After 8 weeks both groups had improved, but the group e-health had significantly better changes in pain intensity and lumbar flexion and in certain quality of life dimensions (Lara-Palomo et al., 2022).

3.3.5 Alternative and Combined Exercise Approaches

There was also potential benefit of traditional therapeutic exercise. Yao et al. (2020) evaluated the effect of Wuqinxi exercise on chronic low back pain patients and measured pain intensity, trunk muscle strength, quality of life and sleep-related outcomes. The results indicated that Wu Qin Xi could be a potential exercise therapy that alleviates pain and enhances physical and quality-of-life outcomes (Yao et al., 2020).

Blanco-Giménez et al. (2024) investigated the combination of core stabilization exercises with manual therapy or kinesiotaping versus core stabilization exercise alone. It was a trial of 55 participants with the analysis of disability, pain sensitivity, kinesiophobia, catastrophizing and self-efficacy. The results revealed that exercise was effective and that the combination of manual therapy and/or kinesiotaping could also provide some added benefit in some clinical outcomes, but the benefits were not consistent in all variables (Blanco-Giménez et al., 2024).

3.4 Overall Synthesis of Effectiveness

Table 2. Summary of evidence according to intervention category

Intervention category	Included studies	Effect on pain	Effect on disability/function	Overall interpretation
Conventional physiotherapy/exercise	Şahin et al. (2017); Magalhães et al. (2018)	Positive	Positive	Effective, although different exercise approaches may produce comparable outcomes
Stabilization exercise ± adjunctive modalities	Alrwaily et al. (2019); Rodríguez-Huguet et al. (2022)	Mixed to positive	Mixed to positive	Core exercise is beneficial; additional modalities vary in added value
Exercise + psychological/behavioral component	Shariat et al. (2019); Hrkać et al. (2022)	Positive	Positive	Multimodal and graded approaches show consistent benefits
Mobile/e-health physiotherapy	Amorim et al. (2019); Lara-Palomo et al. (2022)	Mixed to positive	Mixed to positive	Video-supported rehabilitation appears promising; mobile coaching alone showed preliminary effects
Traditional/combined therapeutic exercise	Yao et al. (2020); Blanco-Giménez et al. (2024)	Positive	Positive	Structured exercise, with or without complementary techniques, can improve clinical outcomes

Overall, active physiotherapy interventions, especially exercise-based interventions were the most supported. Eight of the 10 studies included in the analysis reported a significant reduction in pain, disability, physical function, or related outcomes after physiotherapy treatment, with varying magnitude and comparative advantage of the physiotherapy treatments compared to each other. With most successful interventions, exercise seemed to be the shared therapeutic factor. Other methods, such as manual therapy, myofascial therapy, relaxation, e-health delivery and graded activity can improve some outcomes, while NMES showed no clear improvement when compared with stabilization exercise alone (Alrwaily et al., 2019; Hrkać et al., 2022; Rodríguez-Huguet et al., 2022).

The results suggest that physiotherapy is, in general, effective for chronic low back pain, with structured and sustained exercise programmes showing the greatest benefits. But there was no single intervention that proved to be an overall best practice. The magnitude and duration of the treatment effects seemed to be affected by individualization, supervision, behavioral components and the incorporation of exercise with appropriate adjunctive therapies.

3.5 Quality of the Included Evidence

The methodological quality evaluation showed that most of the trials selected were acceptable to be included in the synthesis. There were seven studies overall that were deemed low risk of bias and three studies that presented some concerns. None of the studies included in the final review were at an overall high risk of bias. The main methodological issues were the lack of blinding of the participants and therapists in many physiotherapy and exercise interventions, and the use of subjective measures of outcomes, like self-reported pain and disability.

Table 3. Summary of methodological quality of the included studies

Overall risk-of-bias category	Number of studies	Percentage
Low risk	7	70%
Some concerns	3	30%
High risk	0	0%
Total	10	100%

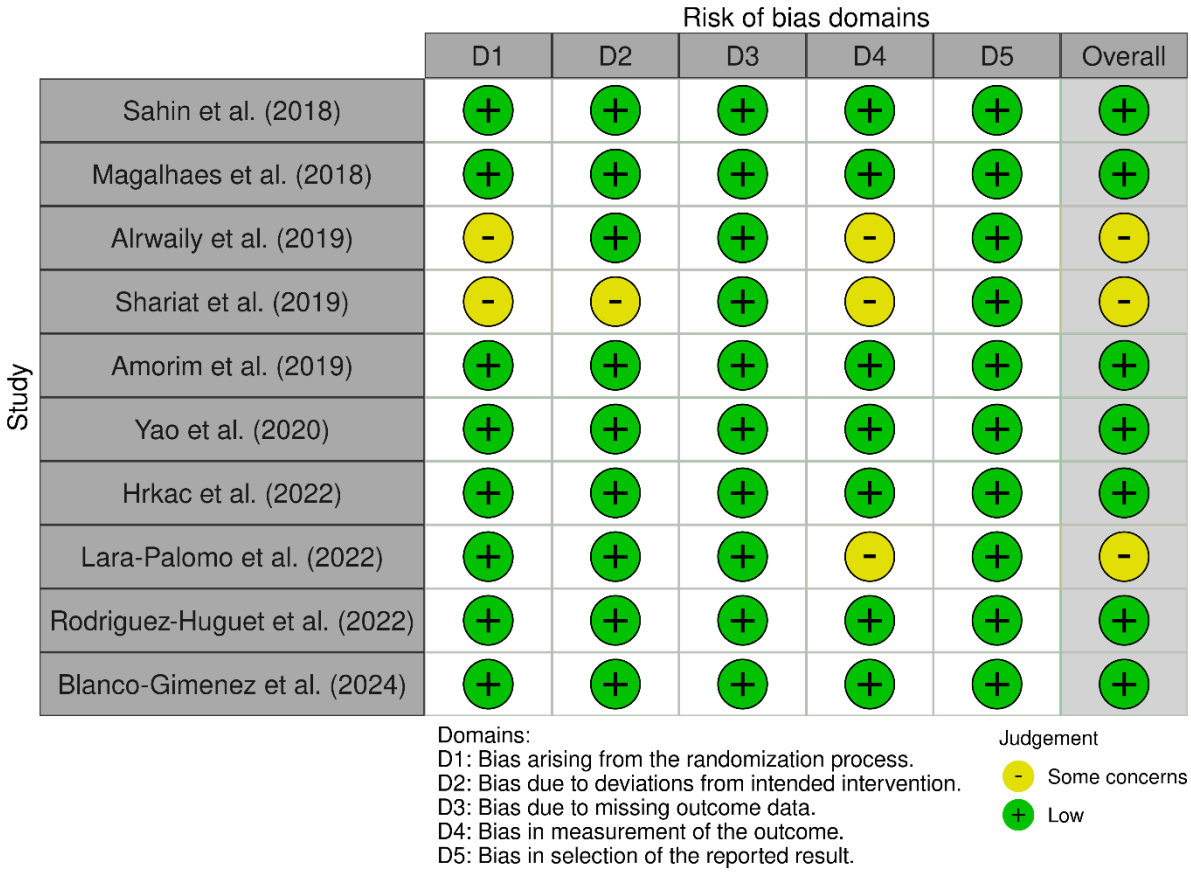

Figure 2. Risk of Bias Assessment of Included Studies Using the Cochrane RoB 2 Tool

The majority of the studies included (n = 13) had a low overall risk of bias, with three studies presenting some concerns and none considered to be high risk (see Figure 2).The overall body of evidence was deemed acceptable to conduct a narrative synthesis, but the results of smaller sample size trials or preliminary designs, specifically the pilot mobile-health study, should be interpreted with caution (Amorim et al., 2019).

4. DISCUSSION

The current systematic review is based on the evidence from 10 randomized controlled trials (RCTs) investigating the physiotherapy interventions used in chronic low back pain (CLBP). The results suggest that active physiotherapy interventions have an overall beneficial effect on reducing pain, disability and improving physical function, although the extent to which this happens depends on the type of intervention, its intensity, duration, and patient characteristics. These findings align with the larger evidence of structured exercise being a key element of the management of CLBP (Verville et al., 2023a). In some patients, conventional physical therapy plus exercise was linked to sustained improvement in pain and functional status, indicating a benefit beyond exercise alone in these patients (Şahin et al., 2017). However, no clear superiority of graded activity over the conventional physiotherapy was found, suggesting that various active therapies may provide similar benefits (Magalhães et al., 2018).

Both motor-skill training and strength-flexibility exercise have been shown to have a positive effect on function in individuals with CLBP, as is evidenced by similar studies.Both motor-skill training and strength-flexibility exercise have been demonstrated to have a positive effect on function in individuals with CLBP, with evidence from similar studies. Generalised evidence syntheses also indicated that none of the interventions consistently outperformed the others across all of the patients with NCLBP (Amorim Filho et al., 2025).

Stabilization exercise was also an important intervention. The addition of neuromuscular electrical stimulation to stabilization exercise did not result in significant extra benefits for pain, disability, fear avoidance or muscle strength (Alrwaily et al., 2019). This is consistent with evidence suggesting TENS can offer short-term analgesia in all chronic pain conditions, but findings that are not always positive for long-term pain relief for CLBP (Johnson et al., 2022). Evidence specific to chronic primary low back pain also indicates TENS should be used as an adjunct intervention rather than a primary intervention (Verville et al., 2023b). While peripheral nerve stimulation and other forms of neuromodulation have a wider application than physiotherapy practice for chronic pain, there are specific populations that can benefit from these methods (Xu et al., 2021).

There is also a wide variation in the invasiveness, working mechanism and evidence base of neuromodulation approaches (Knotkova et al., 2021). Active rehabilitation seemed to be supported by psychological and behavioral factors. In office workers with CLBP, exercise and relaxation improved pain, mobility, anxiety and quality of life (Shariat et al., 2019).

Supervised exercise with a biopsychosocial approach also proved to have an effect on pain, disability, fear avoidance, physical function and quality of life (Hrkać et al., 2022). The findings do support the need for psychological factors to be embedded in chronic pain rehabilitation (Ho et al., 2022). CFT is also shown to be clinically effective and significant for chronic disabling low back pain (Kent et al., 2023). There are similar benefits seen when cognitive functional therapy is used in comparison to core exercise and manual therapy in individuals with persistent low back pain after spinal surgery (Avila et al., 2024). There were also indications of potential from traditional and complementary approaches. Wuqinxi exercise showed improvement in pain, trunk muscle function and quality of life, indicating the potential of mind-body exercise as a rehabilitation strategy (Yao et al., 2020).

In addition, complementary techniques like cupping and scraping have been found to improve chronic nonspecific low back pain in the short term (He et al., 2024). Some patients with CLBP have been shown to experience a decrease in pain severity with electroacupuncture compared with sham treatment, but it is not a standard physiotherapy treatment (Kong et al., 2020). The use of leech therapy in CLBP has also been studied, but has been limited to integration with routine rehabilitation, thus limiting its applicability to mainstream physiotherapy (Hohmann et al., 2018). The results of technology-assisted rehabilitation were mixed and promising. The mobile-health supported physical activity and coaching were feasible in the IMPACT pilot trial, however improvements in pain and activity limitation between groups were limited (Amorim et al., 2019). Individualized e-health rehabilitation using McKenzie exercises and TENS, on the other hand, improved pain and selected functional outcomes more than did conventional home rehabilitation (Lara-Palomo et al., 2022).

The results align with the evidence on the potential of mHealth interventions for helping manage pain and enhance function in chronic pain populations (Moreno-Ligero et al., 2023). Strengthening exercise can also extend rehabilitation beyond face-to-face care (Itoh et al., 2022), and mobile education can also achieve this goal. Physical activity, weight, sleep, and general health-related habits related to persistent low back pain (LBP) can be further refined to enhance outcomes in lifestyle-focused rehabilitation (Mudd et al., 2025). Active exercises seemed to be most effective when used in combination with manual and myofascial therapies. Combining negative pulsed-pressure myofascial vacuum therapy with therapeutic exercise resulted in greater improvements in pain, mobility, function, and quality of life when compared to exercise alone (Rodríguez-Huguet et al., 2022).

Combined interventions of exercise and manual therapy or kinesiotaping also resulted in further improvements in selected outcomes (Blanco-Giménez et al., 2024). Manual interventions have neurophysiological evidence that they can change nociceptive processing and sensorimotor responses (Gevers-Montoro et al., 2021). Osteopathic manipulative treatment has also been shown to decrease pain and disability with chronic spinal pain; however, findings from chronic neck pain must be applied with caution to CLBP (Cholewicki et al., 2022).

Overall, it is recommended that a multimodal, individualized and exercise-based approach to physiotherapy is warranted in CLBP. None of the interventions proved to be entirely successful. Rather, the most effective form of structured exercise seems to be provided in conjunction with and/or along with behavioral, manual, technological, lifestyle, and selected complementary strategies, where applicable. Mostly low risk of bias and limited methodological concerns leave the results with high confidence, but there is some heterogeneity in intervention and outcome measurement, which suggests caution in interpretation and the results are presented in narrative format and not quantitatively pooled.

5. CONCLUSION

This systematic review shows that physiotherapy is a good option for the management of chronic low back pain, especially if it focuses on structured and progressive exercise. In all the randomized controlled trials (RCTs) included in the analysis, there was a benefit in pain intensity, disability, physical function, mobility, and quality of life, with some studies showing greater benefit than others depending on the intervention and participants' characteristics. The common therapeutic element was the exercise-based rehabilitation. All graded activity, stabilization exercises, supervised exercise, mind-body exercise, or combined rehabilitation strategies showed a positive effect. Selected outcomes may be further improved by the addition of manual therapy, myofascial techniques, relaxation strategies and technology-assisted rehabilitation, provided these are added in an appropriate way to active exercise. Passive or adjunctive modalities were less consistently effective and should not be used as a substitute for active rehab. The results also align with the concept of a multimodal and individualized treatment of chronic low back pain, especially if physical rehabilitation is combined with behavioral, psychological, or self-management treatment. The methodological quality was generally satisfactory, though methodological variability in intervention protocols and durations, and outcome measures, made direct comparisons between studies difficult. Overall, physiotherapy should continue to play a major role in the management of chronic low back pain and interventions that are individualised, exercise based and patient centred have the greatest potential for long-term clinical improvement.

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