

Physiotherapy Approaches for Chronic Low Back Pain: Evidence-Based Perspectives

Rakesh Sahebrao Jadhav¹, Anamika Sharma², Preeti Murlidhar Gajbhiye³, Varsha Suryakumar Sadavarte⁴, Preeti Dagduji Ghodge⁵

¹Dr. Bhanudas Dere College of Physiotherapy, Sangamner, Tal. Sangamner, Dist. Ahilyanagar, Maharashtra-422611

²Vedantaa Institute of Physiotherapy Sciences, Dahanu, Tal: Dahanu, Dist: Palghar, Maharashtra 401606

³Pruthviraj Deshmukh College of Physiotherapy, Lohara, Yavatmal, Maharashtra-445002

⁴Ojas College of Physiotherapy, Jalna, Maharashtra- 431203

⁵RJS College of Physiotherapy, Kopergaon Tal.Kopergaon, Dist.Ahilyanagar, Maharashtra -423601

*Corresponding Author E-mail: drrakeshsj@gmail.com

Abstract:

CLBP is one of the common conditions that cause disability globally and impacts physical function, quality of life and health services. Physiotherapy is a common conservative treatment for CLBP with a range of evidence-based treatments that can help reduce pain and enhance functional outcomes. The purpose of this review was to assess the effectiveness of modern physiotherapy techniques in the management of chronic low back pain from the perspective of human clinical trials. Major electronic databases were searched for literature (PubMed, Scopus, Web of Science, PEDro, Cochrane Library, Google Scholar) for randomized controlled trials, clinical trials, systematic reviews and meta-analyses from 2015 to 2026. Exercise therapy, manual therapy, The McKenzie Method, motor control and core stabilization exercises, Pilates, yoga, electrotherapy, dry needling, patient education, Cognitive Functional Therapy, and telerehabilitation were considered. The results showed that exercise-based rehabilitation (ESRs) showed the greatest evidence for reducing pain, function, and disability, especially core stabilization and motor control exercises. Multimodal physiotherapy programs that combined exercise, manual therapy, patient education and psychosocial interventions always demonstrated superior clinical outcome compared to individual interventions. Based on the available evidence, individualized, evidence-based physiotherapy is a valid approach to chronic LBP and offers benefits to patients in the long-term.

Keywords: Chronic low back pain, physiotherapy, exercise therapy, manual therapy, rehabilitation, evidence-based practice, core stabilization, telerehabilitation.

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1. INTRODUCTION

CLBP is a major public health problem because of its high prevalence, recurrence and high socio-economic burden, and is one of the leading causes of disability in the world¹. It is a pain that lasts for 12 weeks or more in the lower back, with or without spreading pain into the lower limbs. CLBP is often complicated by chronic pain, physical dysfunction, decreased physical activity, decreased work productivity, and decreased quality of life, as compared to acute low back pain. It is affected by several factors such as biomechanical, neuromuscular, psychological, occupational and lifestyle factors².

CLBP is burdensome, especially as a result of the aging population, sedentary lifestyles, obesity, and work-related MSDs. Along with physical limitations, CLBP often co-occurs with psychological issues like anxiety, depression and sleeping problems, which also impact wellbeing and healthcare expenses. These multi-dimensional effects show the importance of effective, patient-based management strategies.



Figure 1: Physiotherapy

Physiotherapy is a keystone of conservative care for CLBP and has evidence-based alternative non-invasive treatments which are targeted at reducing pain, restoring function and preventing reoccurrence³. Common physiotherapy interventions are exercise therapy, manual therapy, motor control and core stabilization exercises, McKenzie Method, Pilates, yoga, dry needling, electrotherapy, patient education, Cognitive Functional Therapy, and telerehabilitation. Human clinical studies in recent years have shown that single therapy is not as effective as individualized and multimodal physiotherapy on reducing pain, enhancing functional capacity and quality of life.

With the increasing focus on evidence-based practice, synthesis of existing human clinical evidence is crucial to inform physiotherapy practice and clinical decision-making. Thus, this paper reviews

critically the effectiveness of the current physiotherapy strategies to treat chronic low back pain, and compares their clinical effects with highlighting gaps in current research for future guidance in evidence based rehabilitation for achieving long-term good clinical outcomes with the patients⁴.

1.1 Background and Context

CLBP is one of the most prevalent musculoskeletal conditions and a major cause of disability globally, which has a profound impact on an individual's physical function, mental state and quality of life. CLBP is defined as pain experienced for over 12 weeks, and is caused by a combination of biomechanical, psychological and lifestyle factors, making management difficult⁵. It has further added to its burden in the world due to the rising prevalence of sedentary behavior, obesity, aging and occupational risk factors. CLBP leads to significant health care costs, absenteeism from work, and loss of productivity as well as pain and functional limitations. As a result, non-pharmacological treatments have become increasingly valued and physiotherapy is considered to be a keystone of evidence-based treatments.

1.2 Objectives of the Review

This review will critically appraise the available evidence regarding physiotherapy interventions for CLBP, highlighting the evidence provided by human clinical trials. The goals of this review are:

- To provide an overview of the epidemiology, risk factors, and pathophysiology of chronic low back pain.
- To examine the effectiveness of evidence-based physiotherapy interventions, including exercise therapy, manual therapy, McKenzie therapy, Pilates, electrotherapy, dry needling, and patient education.
- To compare the clinical outcomes of different physiotherapy approaches in terms of pain reduction, functional improvement, disability, and quality of life.
- To summarize findings from human clinical trials, randomized controlled trials, systematic reviews, and meta-analyses on physiotherapy management of chronic low back pain.
- To identify current research gaps and highlight future directions for improving evidence-based physiotherapy practice in chronic low back pain management.

1.3 Importance of the Review

The importance of this review can be summarized as follows:

- **Addresses a Major Health Concern:** Briefly highlights that chronic low back pain (CLBP) is one of the most common health conditions and is associated with substantial physical, psychological and socioeconomic consequences that contribute to disability.
- **Supports Evidence-Based Physiotherapy:** Integrates and analyses current clinical human evidence to assess the efficacy of current physiotherapy interventions.
- **Identifies Effective Treatment Approaches:** Describes the characteristics and evidence-based physiotherapy modalities available to increase pain relief, functional ability and quality of life.
- **Compares Physiotherapy Interventions:** Discusses the relative effectiveness of various rehabilitation approaches to inform choices for treatment.
- **Facilitates Clinical Decision-Making:** Helps physiotherapists and health care professionals apply patient-centered and evidence-based rehabilitation strategies.

2. OVERVIEW OF CHRONIC LOW BACK PAIN

In this section, the reader will learn about the basic characteristics of chronic LBP and the context for the following sections on evidence-based physiotherapy approaches to treating chronic LBP.

2.1 Definition and Classification

CLBP is pain, muscle tension or muscle stiffness of the back between the lower costal margin and the gluteal folds that lasts for 12 weeks or more, with and without radiating pain to the lower limbs⁶. It is not the same as acute low back pain that usually goes away within 6 weeks or subacute low back pain that can last from 6 to 12 weeks. A multi-factorial condition, CLBP can be caused by a combination of biological, mechanical, psychological and social factors and can lead to chronic pain, limited mobility, functional disability and a poorer quality of life. CLBP is a broad term that is generally divided into non-specific CLBP (the majority of cases), which cannot be traced to a specific pathological cause; specific CLBP, which is linked to a known cause (such as vertebral fracture, infection, inflammatory conditions, malignancies, and spinal deformities); and radicular CLBP, in which nerve root compression results in pain, numbness or weakness in the lower limbs⁷. Physiotherapy classification is a key determinant in selecting the correct interventions for the patient and designing an individualised, optimised rehabilitation program that will maximise clinical outcomes⁸.

Table 1. Classification of Chronic Low Back Pain

Type	Characteristics
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Acute Low Back Pain	Symptoms lasting less than 6 weeks
Subacute Low Back Pain	Symptoms lasting 6–12 weeks
Chronic Low Back Pain	Symptoms persisting for more than 12 weeks
Non-specific CLBP	No identifiable pathological cause; accounts for most cases
Specific CLBP	Associated with fractures, infection, tumor, inflammatory disease, or structural abnormalities
Radicular CLBP	Pain radiating to the lower limb due to nerve root involvement

2.2 Epidemiology

CLBP is one of the common musculoskeletal disorders globally and is a major contributor of disability in all age groups⁹. The Global Burden of Disease (GBD) studies indicate that low back pain is a major disease affecting hundreds of millions of people around the world, with low back pain being the primary cause of years lived with disability (YLDs). It is estimated that 60 to 80% of the population will develop back pain at some point during their lives, and about 20 to 30% of those who develop back pain will experience chronic symptoms (lasting more than 12 weeks). It is more common in adults aged 40–69 years, but it is also becoming more common among younger adults, as they spend more time sitting and watching screens¹⁰. The prevalence is slightly higher among women than men, which could be due to hormonal, occupational, and psychosocial reasons. The primary risk factors are repetitive tasks at work, long periods of sitting, smoking, psychological stress, poor work posture, physical inactivity, and age and obesity¹¹. The impact of CLBP is also socioeconomic; it has led to higher health service use, work absenteeism, decreased productivity and high health costs. These epidemiological trends show the need for using effective and evidence-based physiotherapy interventions to reduce disability and improve functional outcomes¹².

Table 2. Epidemiological Characteristics of Chronic Low Back Pain

Parameter	Description
Global lifetime prevalence	Approximately 60–80%
Chronic cases	About 20–30% of individuals with low back pain
Most affected age group	40–69 years
Gender distribution	Slightly higher prevalence in females
Major risk factors	Aging, obesity, sedentary lifestyle, occupational strain, smoking, psychological stress
Major consequences	Disability, reduced quality of life, work absenteeism, increased healthcare costs

2.3 Risk Factors

CLBP is a complex ailment that is affected by various biological, lifestyle, occupation-related, and psychosocial factors. The aging process is the strongest predictor due to progressive degenerative changes in intervertebral discs, facet joints, and back muscles¹³. Obesity and sedentary lifestyle lead to excessive loads on the lumbar spine and weakness of muscles thus causing the development of chronic pain. Occupation-related factors such as prolonged sitting, repeated bending, weight lifting, poor body position, and exposure to whole-body vibration further increase the risk of developing CLBP¹⁴. Smoking and lack of exercise as lifestyle-related factors have also been associated with spine diseases and problems with tissues regeneration. Moreover, psychological factors like stress, anxiety, depression, fear-avoidance behavior, and catastrophization can worsen pain perception. Having several risk factors can lead to an increased severity of pain, impairment of function, and less effective treatment¹⁵.

Table 3. Common Risk Factors Associated with Chronic Low Back Pain

Category	Risk Factors
Biological	Aging, obesity, poor muscle strength, spinal degeneration
Lifestyle	Physical inactivity, smoking, poor posture, sedentary behavior
Occupational	Heavy lifting, repetitive movements, prolonged sitting or standing, awkward postures, whole-body vibration
Psychological	Stress, anxiety, depression, fear-avoidance beliefs, pain catastrophizing
Environmental	Poor workplace ergonomics, low physical activity opportunities

2.5 Clinical Presentation and Functional Impact

CLBP is characterized by the presence of persistent pain or discomfort in the lumbar area lasting for over 12 weeks, either localized or spreading down the buttocks and legs. Patients often experience stiffness, limited mobility of the spine, muscle weakness, and pain aggravated by long periods of sitting, standing, bending, and lifting¹⁶. In certain situations, patients may suffer from neurological symptoms like numbness, tingling sensations, or weakness in their legs caused by nerve root irritation. Apart from the physical problems, CLBP causes considerable functional deficits like limited ability to carry out activities of daily living, reduced work capacity, poor physical performance, and restricted social and recreational activities. Furthermore, CLBP has negative psychological impact on patients, causing such conditions as anxiety, depression, kinesiophobia, sleep disorders, and poor self-efficacy, contributing to the worsening of pain and disability¹⁷.

Table 4: Summary of Literature on Physiotherapy Approaches for Chronic Low Back Pain

Author Name	Topic Covered	Research Study Title
Shipton (2018)¹⁸	Reviewed evidence on conservative physical therapy interventions for low back pain, including exercise therapy, manual therapy, patient education, and multidisciplinary rehabilitation. Emphasized individualized physiotherapy programs for improving pain, function, and quality of life.	Physical Therapy Approaches in the Treatment of Low Back Pain
Baroncini et al. (2024)¹⁹	Compared the effectiveness of physiotherapeutic and non-conventional interventions using a Bayesian network meta-analysis. Reported that multimodal physiotherapy provided superior pain relief and functional improvement in patients with chronic low back pain.	Physiotherapeutic and Non-Conventional Approaches in Patients with Chronic Low-Back Pain: A Level I Bayesian Network Meta-analysis
Malfliet et al. (2019)²⁰	Evaluated evidence-based rehabilitation strategies based on the biopsychosocial model. Highlighted the effectiveness of exercise therapy, pain neuroscience education, cognitive interventions, and graded activity in reducing pain and disability.	Best Evidence Rehabilitation for Chronic Pain Part 3: Low Back Pain
Mauck et al. (2022)²¹	Reviewed evidence-based interventions for chronic low back pain from a personalized medicine perspective. Concluded that individualized physiotherapy and multidisciplinary rehabilitation resulted in better clinical outcomes than standardized treatment approaches.	Evidence-Based Interventions to Treat Chronic Low Back Pain: Treatment Selection for a Personalized Medicine Approach
McGill (2025)²²	Discussed evidence-based prevention and rehabilitation of low back disorders, emphasizing spine stability, core strengthening, movement optimization, and biomechanical correction to prevent recurrence and improve functional performance.	Low Back Disorders: Evidence-Based Prevention and Rehabilitation

3. METHODOLOGY AND FINDINGS

The methods used for the review are detailed and the results of published human clinical trials of physiotherapy treatment for CLBP are reported²³. It reviews the evidence for different physiotherapy interventions and critically considers the effectiveness of these interventions in reducing pain, improving functional capacity, quality of life and long-term rehabilitation. The results are derived from the available evidence from randomized controlled trials, clinical trials, systematic reviews and meta-analyses²⁴.

3.1 Review Methodology

The aim of this review was to assess the effectiveness of evidence-based physiotherapy interventions in the management of CLBP based on published human clinical research. The electronic databases were searched to identify articles relevant to the research published between 2015 and 2026²⁵. The following terms were used to search: "chronic low back pain", "physiotherapy", "physical therapy", "exercise therapy", "manual therapy", "McKenzie method", "Pilates", "dry needling", "electrotherapy", "telerehabilitation", and "randomized controlled trial". Studies that included only adult patients with chronic low back pain (defined as LBP symptoms present for ≥ 12 weeks) were selected. Included in the list of eligible studies were randomized controlled trials, clinical trials, systematic reviews, and meta-analyses of human studies but not studies of acute low back pain, animal models, cadaveric studies, or non-English publications. Relevant information was critically appraised and collated for evidence-based overview of the effectiveness of modern physiotherapy interventions²⁶.

3.2 Evidence-Based Physiotherapy Approaches

Physiotherapy is a key part in the conservative treatment of CLBP and has a role to play in reducing pain, improving function, maintaining stability of the spine, and ensuring that CLBP doesn't reoccur²⁷. Modern physiotherapy practice takes a multimodal strategy and patients are encouraged to actively participate in the treatment using exercises, manual techniques, patient education and social support, depending on the individual patient's needs²⁸. In the last 20 years, there have been many RCTs, systematic reviews and meta-analyses exploring the effectiveness of different physical therapy techniques for adults with CLBP. The current evidence for the most frequently used physiotherapy approaches are summarized below²⁹.



Figure 2: Top 10 Physiotherapy Exercise for Lower Back Pain

3.2.1 Exercise Therapy

The cornerstone of physiotherapy management of CLBP is exercise therapy, which is always recommended as the first-line therapy in international clinical practice guidelines³⁰. It contains aerobic activity, strengthening exercises, flexibility exercises, endurance exercises, and functional movement exercises. Structured exercise programmes have been found to be effective in reducing the intensity of pain, improve physical functioning and reduce disability in humans. Progressive exercise prescription tailored to the individual has been found to have better long-term results than broad exercise program. Frequent exercise also enhances muscular endurance, spinal stability, cardiovascular fitness and quality of life, and decreases the risk of another low back pain episode³¹.

3.2.2 Manual Therapy

Manual therapy involves skilled physiotherapists using spinal manipulation, joint mobilization, and soft tissue mobilization techniques to alleviate pain and restore normal joint mechanics. There is evidence from randomized controlled trials that manual therapy can offer people short-term benefit in terms of pain and mobility, especially when added to exercise therapy as opposed to on its own. Spinal mobilization techniques are beneficial in reducing muscle stiffness, enhancing the ROM of the lumbar spine, and promoting functional recovery. Manual therapy, while not an effective treatment on its own, is more effective when used in conjunction with an overall rehabilitation program, and increases patient satisfaction.

3.2.3 McKenzie Method (Mechanical Diagnosis and Therapy)

MDT (McKenzie Method) is an assessment-based treatment method that types patients based on how they respond to repeated movements and sustained postures. The emphasis is on individualized exercises, posture correction and self-management techniques to "centralize" where the pain is and to optimize spinal function³². The McKenzie Method has been reported to significantly reduce pain intensity and disability in human clinical studies, especially among patients with a directional preference. The strategy further fosters patient autonomy, with patients actively involved in their care and empowered to manage their own conditions in the future, which is important for evidence-based physiotherapy practice³³.

3.2.4 Motor Control and Core Stabilization Exercises

The goal of the motor control exercises is to re-establish the coordinated activation of the deep trunk muscles, which are likely affected in people with CLBP: the transversus abdominis and the multifidus. The primary goal of core stabilization training is to increase the stability of the spine, increase the efficiency of its neuromuscular control and minimize excessive loading of its structures³⁴. Several RCTs have shown that these exercises reduce pain, enhance function and reduce disability. Motor control programs may yield more improvements in movement quality and long-term stability in the spine than traditional strengthening exercises, especially in patients with recurring or persistent symptoms.

3.2.5 Pilates- and Yoga-Based Rehabilitation

Based on flexibility, core strength, posture, breathing and body awareness, Pilates and yoga are becoming popular physiotherapy alternatives for CLBP. These initiatives enhance endurance of trunk muscles, spinal posture and postural control in patients with back pain; yoga trains both patients with back pain and physiological therapists in a combination of postures, breathing exercises and relaxation techniques that have a physical and psychological effect³⁵. Supervised Pilates and yoga programs have been shown to have moderate to significant benefits in pain, disability, flexibility, balance and quality of life in human clinical trials. The interventions are especially useful for those who are motivated to engage in structured rehabilitation, which can be done under the guidance of a professional.

3.2.6 Electrotherapy Modalities

Some examples of the electrotherapy modalities used are TENS, IFT, therapeutic ultrasound and low-level laser therapy and electrical muscle stimulation, all of which are commonly used as adjuncts to physiotherapy treatment. The main goals in their treatment are to alleviate pain, decrease muscle spasm and ease active rehabilitation³⁶. However, clinical evidence suggests that electrotherapy may have short-term symptomatic benefits, whereas the long-term efficacy is less clear than exercise-based interventions. Presently, recommendations are given that electrotherapy

should be used in addition to, and not instead of, active physiotherapy (e.g., exercise or patient education).

3.2.7 Dry Needling

Dry needling utilizes thin (sterile) needles to penetrate myofascial trigger points and alleviate muscle tension, decrease pain and enhance movement. That's common in people who have CLBP with myofascial dysfunction³⁷. Dry needling has been demonstrated to reduce pain intensity, increase pressure pain thresholds, and increase lumbar mobility, temporarily, in randomized controlled trials, particularly when used in addition to therapeutic exercise. There is, however, little evidence that it is effective over the longer term and it is recommended as an adjunctive treatment rather than as a more primary intervention.

3.2.8 Patient Education and Cognitive Functional Therapy

Patient education is an essential and core part of contemporary physiotherapy practice and empowers all people to obtain information about the nature of CLBP, healthy movement behaviours and to take an active role in their rehabilitation. Typically, when you are offered advice in education, you will hear about posture, ergonomics, changing your activity, managing pain and self care strategies. In addition to addressing maladaptive beliefs, fear of movement, pain catastrophizing, and behavioral factors that may play a role in chronic pain, Cognitive Functional Therapy (CFT) is another treatment that works. It has been found that the addition of patient education to exercise and cognitive therapy improves treatment adherence, decreases disability, increases self-efficacy and leads to long-term functional improvement in human clinical studies³⁸.

3.2.9 Telerehabilitation

Telerehabilitation is becoming an innovative way to remotely provide physiotherapy services using video consultation, mobile health apps and digital exercise platforms. Especially during the COVID-19 pandemic, and will continue to grow as a way to increase access to rehabilitation. Human clinical trials have shown that when structured exercise programs are provided and there is a high degree of professional supervision, telerehabilitation has the potential to improve pain, disability, adherence to the exercise program, and patient satisfaction, with results similar to traditional, in-person physiotherapy. Despite these barriers, telerehabilitation is a potential solution to provide evidence-based physiotherapy to patients with CLBP, especially in underserved and remote areas.

3.3 Overall Findings

The results of human clinical studies suggest that physiotherapy is a first-line conservative therapy for CLBP. Core stabilization and motor control exercises show most consistent evidence of reducing

pain, improving functional capacity and decreasing disability. Using manual therapy along with structured exercise programs is associated with more short-term benefits than manual therapy alone. There is moderate to strong evidence for the effectiveness of these modalities: McKenzie therapy, Pilates, and yoga in certain patient groups for pain, mobility, and quality of life. Active rehabilitation methods are more effective than electrotherapy modalities and dry needling seems to be effective for short-term pain relief. There is also growing evidence of the feasibility of telerehabilitation as an alternative to traditional in-person physiotherapy, and that the clinical outcomes are similar for those patients who are suitably selected. Evidence currently suggests that multimodal physiotherapy, utilising exercise, manual techniques, patient education and psychosocial interventions, delivered as individualised programmes, is the best approach for improved long-term outcomes for people with CLBP.

4. DISCUSSION

The discussion section critically analyzes the evidence that has been synthesized from human clinical evidence on the effectiveness of the physiotherapy interventions used for CLBP. It reviews the findings and assesses their clinical significance, contrasts effectiveness of various physiotherapy strategies and identifies implications for physiotherapy practice³⁸. Conversely, this section will detail areas of knowledge gaps and future research needs that will further enhance evidence-based physiotherapy management and long-term outcomes for people with CLBP.

4.1 Interpretation and Analysis

The results of this review showed that physiotherapy continues to be the mainstay of conservative treatment for CLBP and there is strong evidence to support the benefits of physiotherapy in reducing pain, improving functional capacity and quality of life. Of the different interventions, exercise-based rehabilitation was the most effective, and individualisation and progressive progression of individual exercise programs to the clinical needs of the patient was the most consistent intervention. Core stabilization and motor control exercises were especially beneficial in restoring spinal stability and improving neuromuscular control⁴⁰. Manual therapy techniques had encouraging short-term improvement in pain and mobility, especially when combined with active exercise techniques. Likewise, the McKenzie Method, Pilates, Yoga and Dry needling presented favourable clinical outcomes in specific patient subsets but was dependent on patient selection and treatment protocol. The review also emphasizes the growing importance of approaches to the biopsychosocial nature of the CLBP that involve patient education, cognitive functional therapy and telerehabilitation for long-term self-management. In general, the literature suggests that multimodal physiotherapy interventions yield better and longer lasting clinical outcomes than interventions involving just one modality.

4.2 Implications and Significance

This review has a number of important implications for physiotherapy practice, clinical decision making and future rehabilitation strategies. The main implications are the following:

- **Supports Evidence-Based Physiotherapy:** Emphasises the use of evidence-based methods to care for CLBP effectively.
- **Promotes Individualized Rehabilitation:** stresses the need for individualized physiotherapy treatment based on the clinical presentation, functional limitations, and rehabilitation goals of the patient.
- **Encourages Active Treatment Approaches:** Promotes exercise therapy, manual therapy and patient education as the main intervention for treatment, rather than relying on passive treatment modalities.
- **Addresses Psychosocial Factors:** Explores the importance of Cognitive Functional Therapy and patient education in overcoming fear-avoidance patterns, pain catastrophizing and other psychological obstacles to recovery.
- **Improves Clinical Decision-Making:** Neither ensures improved clinical decision making nor gives clinicians fast, up-to-date evidence to inform decision making regarding physiotherapy interventions for patients based on their needs.
- **Enhances Long-Term Outcomes:** Facilitates multimodal rehabilitation interventions to improve pain relief, functional capacity, quality of life and long-term self-management.
- **Expands Access to Care:** Shines a light on the rising importance of telerehabilitation in providing physiotherapy services for patients who may not have easy access to traditional in-person physiotherapy.

4.3 Gaps and Future Research Directions

While there has been a significant body of research on physiotherapy for the management of people with CLBP, there are still some areas that could benefit from further research. The following are areas that need to be explored in future research:

- **Large-Scale Clinical Trials:** Design and implement multicenter RCTs with larger sample sizes to bolster the evidence base.
- **Long-Term Follow-Up Studies:** Assess the long-term outcomes and sustainability of various physiotherapy treatments.

- **Comparative Effectiveness Research:** Make comparisons between multimodal rehabilitation programs and single treatment interventions to identify the most effective combinations of treatments.
- **Personalized Rehabilitation:** Research individual rehabilitation plans for patients of different ages, symptom severity, psychological and physical function and patient preference.
- **Emerging Technologies:** Discuss the potential for the use of artificial intelligence, wearable sensors, virtual reality and digital health technologies in improving assessment, treatment monitoring and rehabilitation as outcomes.
- **Standardization of Treatment Protocols:** To standardise physiotherapy protocols to ensure uniformity in clinical practice and research studies.
- **Cost-Effectiveness Analysis:** Evaluate the economic effect and cost effectiveness of various physiotherapy interventions in various healthcare settings.
- **Implementation in Diverse Populations:** Discuss how physiotherapy intervention might be effective in various age groups, occupations and culturally and socioeconomically diverse populations.

5. CONCLUSION

The purpose of this review was to summarise the evidence on physiotherapy interventions for CLBP derived from human clinical studies. The literature reviewed showed that physiotherapy is a safe, effective, and evidence-based conservative treatment method that can target pain, disability, functional limitations and quality of life. Modern rehabilitation focuses on personalized and multimodal care with attention to exercise, manual therapy, patient education and psychosocial interventions to maximize patient outcomes. The key findings are presented in the following sections, the main importance of the review is presented and recommendations for clinical application and future research are presented.

5.1 Summary of Main Insights and Conclusions

This review aimed to synthesize evidence from human clinical trials, randomized controlled trials, systematic reviews and meta-analyses to assess the effectiveness of physiotherapy interventions for CLBP. Exercise therapy, especially core stabilization and motor control exercises, was found to be the most significant interventions for pain reduction, functional capacity and disability measures, in all the findings. Manual therapies showed positive clinical effects in specific patient populations when performed alongside structured exercise programs, and other interventions such as the

McKenzie Method, Pilates, Yoga, dry needling and telerehabilitation also showed positive clinical effects. Furthermore, patient education and CFT played a crucial role in enhancing self-management, adherence, and long-term rehabilitation outcomes. The evidence as a whole suggests that individualised multimodal physiotherapy treatment is beneficial for treating chronic LBP, which includes a physical, functional and psychosocial component.

5.2 Reiteration of the Importance of the Review

This review underscores the importance of evidence-based physiotherapy in the treatment of chronic LBP and the need for personalized approaches to physiotherapy rehabilitation based on human clinical evidence. This review can be summarized as follows:

- **Addresses a Global Health Challenge:** CLBP is one of the most prevalent disabling conditions and poor quality of life conditions in the world.
- **Supports Evidence-Based Clinical Practice:** The review aims to draw conclusions from human clinical studies that will help the clinician identify the best physiotherapy treatment.
- **Highlights Effective Rehabilitation Approaches:** Discusses the exercise therapy, manual therapy, and multimodal approaches for rehabilitation as the most effective conservative treatment approaches.
- **Promotes Individualized Patient Care:** The review focuses on customizing physiotherapy care based on the clinical presentation, functional limitations, and psychosocial factors of patients.
- **Facilitates Clinical Decision-Making:** The condensed evidence supports the planning of patient-centred treatment for physiotherapists, healthcare professionals and rehabilitation specialists.
- **Identifies Research Gaps:** It points to the need for more quality clinical research which will further strengthen the evidence for emerging physiotherapy interventions.
- **Contributes to Improved Patient Outcomes:** The review supports the importance of evidence-based physiotherapy in the management of pain, the function and long-term quality of life.

5.3 Recommendations

Based on the evidence synthesized in this review, the following recommendations are made:

- **Prioritize Exercise-Based Rehabilitation:** Core stabilization and motor control exercises should be the first line of treatment for CLBP.
- **Adopt Multimodal Physiotherapy Programs:** Multimodal physiotherapy programs are recommended (exercise therapy, manual therapy, patient education and psychologically informed rehabilitation).
- **Individualize Treatment Plans:** Rehabilitation programmes should be customized based on the patient's clinical condition, functional status, social, and psycho-demographic factors, and age.
- **Promote Patient Education and Self-Management:** Patient education regarding posture, ergonomics, physical activity, and home exercise program for long-term adherence and to minimize recurrence.
- **Use Adjunctive Modalities Judiciously:** Dry needling, electrotherapy, Pilates, yoga, and the McKenzie Method should be used when indicated and when the patient's individual needs dictate the use.
- **Expand the Use of Telerehabilitation:** Digital physiotherapy services should be part of the continuum of care, more accessible and better engage patients.
- **Strengthen Future Research:** Large-scale randomized controlled trials, follow-up and emerging technologies like virtual rehabilitation, artificial intelligence and wearable devices should be evaluated in CLBP management should be focused by future studies

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