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The Role of Physiotherapy in Managing and Preventing Low Back Pain

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Abstract

Low back pain (LBP) is a growing global health concern, with a significant increase in years lived with disability (YLDs) since 1990, particularly in low- and middle-income countries. Risk factors for LBP include smoking, obesity, sedentary occupations, and low socioeconomic status. Current clinical guidelines advocate for non-pharmacological and non-invasive approaches to managing LBP, emphasizing patient education, exercise therapy, and judicious use of diagnostic imaging, medications, and surgical interventions. Prevention strategies include public health initiatives addressing obesity and low physical activity levels. Exercise alone or combined with education effectively prevents LBP, with a pooled relative risk of 0.55 (95% CI: 0.41–0.74). For acute non-specific LBP, initial management includes reassurance, advice to stay active, and self-management strategies. Primary conservative physical treatments for chronic LBP include exercises, yoga, manual therapy, and interdisciplinary rehabilitation. Pilates, walking, and mobilization and manipulation therapies have shown promising outcomes in reducing pain and disability. The McKenzie Method of Mechanical Diagnosis and Therapy (MDT) has demonstrated superiority over other rehabilitation interventions in chronic LBP. Future strategies should focus on educating the public, modifying disability and compensation policies, addressing modifiable risk factors, optimizing healthcare pathways, and aligning practice with evidence by encouraging activity, functional improvement, and work participation.

Keywords: Physiotherapy, Low Back Pain, LBP

Introduction

Low back pain (LBP) has emerged as a growing global health concern. This increase is attributed to the ageing and expanding global population (Clark & Horton, 2018). Since 1990, the years lived with disability (YLDs) due to LBP have risen by over 50%, with the most significant increases observed in low-income and middle-income countries (Hartvigsen et al., 2018). Risk factors for LBP include smoking, obesity, sedentary occupations, and low socioeconomic status, which are often associated with reduced quality of life and limited resources. In low- and middle-income countries, the burden of disability and associated costs from LBP is expected to escalate, particularly in regions with fragile healthcare systems that are ill-equipped to manage the increasing demand. In 2016, globally, LBP accounted for 57.6 million years lived with disability, with a 95% uncertainty interval (UI) of 40.8–75.9 million, representing 7.2% (UI 6.0–8.3) of total YLDs (Vos et al., 2017).

The cultural, social, and political context surrounding LBP can influence individuals' pain perception, the degree of resulting disability, and patterns of healthcare utilization. High-quality economic evaluations comparing surgical interventions to conservative management strategies, which may include a range of treatment options, are particularly important in managing chronic low back pain (CLBP). This discussion is informed by previously conducted research and does not involve any studies involving human or animal participants undertaken by the author.

Clinical Guidelines for Low Back Pain

Current clinical guidelines advocate for non-pharmacological and non-invasive approaches to managing LBP. These recommendations include advising patients to remain active, providing patient education, and incorporating exercise therapy into treatment plans (Jorgensen et al., 2018). Regular endorsement is given to physical exercise for addressing non-specific LBP. Guidelines also emphasize judicious use of diagnostic imaging, medications, and surgical interventions. The National Institute for Health and Care Excellence (NICE) guidelines recommend employing risk stratification tools to tailor treatments to specific risk subgroups (Foster et al., 2018; O'Connell et al., 2016).

A clinical assessment forms the basis of triaging patients with LBP. This assessment involves obtaining a detailed medical history, conducting a physical examination, and performing neurological evaluations to identify radicular symptoms. Screening for "red flags" is essential to rule out serious underlying conditions, with diagnostic tests, including imaging, reserved for cases where such conditions are suspected.

It is also crucial to assess psychosocial risk factors, often referred to as "yellow flags," using prognostic screening tools to identify individuals at risk of poor outcomes. Shared decision-making between clinicians and patients can guide whether less-intensive management strategies are appropriate. If no improvement occurs after four weeks and there is a suspicion of serious pathology or radiculopathy, specialist consultation is advised.

Examples of less-intensive management include providing guidance and reassurance on self-care strategies, advising patients to remain active and avoid prolonged bed rest, encouraging a return to normal activities, or referring patients to group or individual exercise programs. These approaches may be combined with manual or psychological therapies as part of a comprehensive rehabilitation program (O'Connell et al., 2016).

Prevention

Public health initiatives aimed at addressing obesity and low physical activity levels should be established to mitigate the impact of low back pain (LBP) on daily functioning. For chronic low back pain (CLBP), much of the evidence for prevention and treatment originates from high-income countries, raising questions about the applicability of these guideline recommendations to low- and middle-income countries. Additionally, the urgency and design of public health programs may vary significantly between high-income nations and their low- and middle-income counterparts. A key barrier to implementing changes in healthcare pathways lies in the existing models of healthcare reimbursement. Mapping the entire care pathway for LBP, from initial contact through specialized care, is essential.

Healthcare professionals play a crucial role in regularly educating the public about the causes, mechanisms, natural progression, and prognosis of LBP while emphasizing the advantages of physical activity and exercise (Buchbinder et al., 2018).

Evidence of moderate quality suggests that exercise alone or combined with education effectively prevents LBP. This preventive effect is substantial, with a pooled relative risk of 0.55 (95% CI: 0.41–0.74) (Steffens et al., 2016). Intensive programs could focus exercise on secondary prevention.

In 2014, a systematic review and meta-analysis identified only four trials addressing pediatric low back pain, highlighting a lack of robust evidence for treatment in children. Moderate-

quality evidence indicated that education alone was ineffective in children, and very low-quality evidence suggested that ergonomically designed furniture was ineffective in preventing LBP.

A more recent meta-analysis examined the role of exercise in preventing LBP. Exercise alone was associated with a 33% risk reduction for LBP (risk ratio = 0.67; 95% CI: 0.53–0.85; $I^2 = 23\%$; eight randomized controlled trials; n = 1,634). When combined with education, the risk reduction was 27% (risk ratio = 0.73; 95% CI: 0.59–0.91; $I^2 = 6\%$; six trials; n = 1,381). Exercise groups also showed reductions in LBP intensity and associated disability compared to control groups. The analysis concluded that exercise reduces the risk of LBP and its associated disability, with a combination of strengthening, stretching, or aerobic exercises performed two to three times weekly recommended for prevention in the general population.

Management of Acute Low Back Pain

For acute non-specific LBP, where serious pathology has been excluded, initial management includes reassurance, advice to stay active, and self-management strategies. Self-management may involve self-directed exercises or educational resources, such as booklets or online materials about LBP.

Primary conservative physical treatments include exercises, superficial heat, and manual therapy, alongside guidance for resuming normal activities or participation in individual or group exercise programs (Haldeman et al., 2018). Pharmacological options, such as nonsteroidal anti-inflammatory drugs (NSAIDs) and short-term use of weak opioids, may be considered; however, paracetamol is not recommended. Progress should be reviewed within 7–14 days.

Evidence supporting low-level laser therapy as more effective than placebo laser for pain relief is limited. Similarly, acupuncture has shown only modest effectiveness for acute LBP. The McKenzie method of mechanical diagnosis and therapy (MDT), which categorizes patients into subgroups (e.g., derangement, dysfunction, postural syndrome) for targeted exercises and postural advice, has not demonstrated superiority over other rehabilitation interventions in reducing pain and disability in acute LBP. Back schools, which incorporate various exercises and educational techniques, have very low-quality evidence suggesting they are more effective than no treatment, with a mean difference of −6.10 (95% CI: −10.18 to −2.01) (Parreira et al., 2017).

Pharmacological options for acute LBP include NSAIDs, skeletal muscle relaxants, and short-term use of weak opioids, but not paracetamol.

Most patients with acute LBP improve with or without therapy, though the benefits of treatment are generally small to moderate and short-term. Progress should be reassessed within 7–14 days, with guidance provided to return to normal activities or referrals made for individual or group exercise programs.

Currently, there is no clear recommendation on acceptable pain levels during exercise or the extent of pain tolerance at each stage of exercise progression. A systematic review protocol has been developed to evaluate the impact of differentiating exercises based on patient-reported LBP intensity in primary care.

In conclusion, guidelines emphasize early non-pharmacological interventions, including education, self-management, and the resumption of normal activities and exercise. For patients with persistent symptoms, psychological programs may also be included.

Physical Treatment Preferences

Clinical guidelines for low back pain (LBP) strongly advocate avoiding bed rest and continuing regular activities. The primary objective of physical treatments is to enhance functionality and prevent further disability. For chronic low back pain (CLBP), exercise therapy is recommended as a first-line treatment and should be routinely implemented.

In cases where recovery is slow and risk factors for persistent disabling pain are present, early supervised exercise therapy is advised (Chou et al., 2016). For LBP lasting more than 12 weeks, physical treatments involving graded activity or exercise programs aimed at improving functionality are recommended. Exercise is consistently endorsed as a first-line treatment for persistent LBP in all recent clinical practice guidelines, though access to structured programs often remains inconsistent.

Clinical practice guidelines exhibit considerable variation in the recommended types of exercise programs, such as yoga, stretching, hydrotherapy, tai chi, McKenzie exercises, and back schools, as well as in how these are delivered, whether in group sessions, individual programs, or supervised home exercises. The choice of exercise program may ultimately depend on patient preferences and the expertise of the therapist. Current guidelines encourage utilizing a diverse range of exercises. Exercise is believed to alleviate pain through the activation of central inhibitory pathways, involving mechanisms linked to opioids, serotonin, and N-methyl-d-aspartate (NMDA) in the rostral ventromedial medulla (Lima et al., 2017).

While LBP prevalence is low in children, it increases during adolescence. Evidence suggests that interventions incorporating exercise are most effective for prevention and treatment in this age group.

There is currently no evidence indicating that one type of exercise is superior to another. Guidelines emphasize considering individual preferences, needs, and capabilities when selecting the type of exercise. Assessment tools, such as movement control tests, laterality judgment, and two-point discrimination, have demonstrated validity in distinguishing chronic LBP populations, though their reliability remains to be established.

For managing chronic LBP without serious pathology, conservative physical treatments include exercises, yoga, biofeedback, progressive relaxation, massage, manual therapy, and interdisciplinary rehabilitation.

Management of Chronic Low Back Pain (Without Serious Pathology)

1. **Initial Clinical Assessment**:
    - Includes history-taking, physical examination, and neurological tests to identify radicular features.
    - Screen for "red flags" to rule out serious pathologies and conduct diagnostic tests like imaging only if pathology is suspected.
2. **Screening for Psychosocial Risk Factors**:
    - Assess "yellow flags" (e.g., low self-efficacy, fear of movement, catastrophizing) to predict poorer outcomes.
    - Employ risk stratification tools such as STarT.
3. **Non-Pharmacological Management**:
    - Recommended as first-line treatment and includes education, self-management, resuming normal activities, and exercise.
    - Psychological programs may be added for patients with persistent symptoms.
4. **Primary Conservative Physical Treatments**:
    - Exercises such as walking, Pilates, yoga, tai chi, and progressive relaxation, along with manual therapy and massage as endorsed in some guidelines.
    - The choice of exercise should account for patient preferences and therapist expertise.
5. **Avoidance of Passive Therapies**:
    - Passive methods such as rest and reliance on medications are linked to worsening disability and are not recommended.
    - Other passive methods, including short-wave diathermy, traction, interferential therapy, back supports, and ultrasound, are largely ineffective and not recommended (Qaseem et al., 2017).

6. **Pharmacological Options**:
    - If necessary, limited use of nonsteroidal anti-inflammatory drugs (NSAIDs) or antidepressants at the lowest effective dose for the shortest duration.
7. **Advanced Interventions**:
    - Injections, denervation procedures, and surgery are generally not recommended.
    - In cases of spinal pain with radiculopathy, exercise and spinal manipulation may be used selectively, though some guidelines do not endorse these methods or make them optional for patients unresponsive to other treatments.

A systematic review highlighted the need for high-quality randomized controlled trials (RCTs) to evaluate the effectiveness of transcutaneous electrical nerve stimulation (TENS), as current studies often lack consistent reporting and appropriate parameters (Resende et al., 2018).

Association with Psychosocial Factors

In the physiotherapeutic management of back pain, psychosocial factors such as self-efficacy, fear of movement, and catastrophizing have been identified as associated with outcomes in pain and disability. A systematic review investigating these psychosocial factors in patients with chronic low back pain treated by physiotherapists revealed significant correlations between these factors and changes in pain and disability outcomes.

Pilates

Pilates, a system of exercises emphasizing controlled movement, stretching, and breathing, has shown promising outcomes in the management of low back pain. A systematic review adhering to PRISMA guidelines examined 23 studies published between 2005 and 2016. Recent clinical trials over the past five years indicate that Pilates effectively reduces pain and disability, making it a valuable rehabilitation tool (Byrnes et al., 2018).

Walking

Walking, known for its simplicity and accessibility, has been investigated as a treatment for chronic low back pain. A meta-analysis of nine randomized controlled trials examined its impact on pain, disability, and quality of life at various follow-up durations, categorized as short-term (<3 months), intermediate-term (3–12 months), and long-term (>12 months). The analysis revealed low- to moderate-quality evidence that walking is as effective as other non-pharmacological interventions in reducing pain and disability in both short- and intermediate-term follow-ups, thereby supporting its recommendation (Sitthipornvorakul et al., 2018).

Mobilization and Manipulation Therapies

A systematic review and meta-analysis examined mobilization and manipulation therapies for treating chronic low back pain, with quality assessments conducted using the Scottish Intercollegiate Guidelines Network criteria and GRADE system. Data from nine trials involving 1,176 participants indicated a significant reduction in pain (SMD = −0.28, 95% CI −0.47 to −0.09, $p = 0.004$; $I^2 = 57\%$) following these treatments. Comparisons of mobilization or manipulation with other active therapies across seven trials (923 patients) revealed a reduction in disability (SMD = −0.33, 95% CI −0.63 to −0.03, $p = 0.03$; $I^2 = 78\%$).

Subgroup analyses showed that mobilization was significantly more effective than active comparators, including exercise, in reducing pain (SMD = −0.20, 95% CI −0.35 to −0.04, $p = 0.01$; $I^2 = 0\%$), but not disability (SMD = −0.10, 95% CI −0.28 to 0.07, $p = 0.25$; $I^2 = 21\%$). Similarly, manipulation showed significant reductions in pain and disability when compared to active comparators such as physical therapy and exercise (pain: SMD = −0.43, 95% CI −0.86 to 0.00, $p = 0.05$, $I^2 = 79\%$; disability: SMD = −0.86, 95% CI −1.27 to −0.45, $p < 0.0001$, $I^2 = 46\%$).

A 2018 systematic review and meta-analysis concluded that manipulation and mobilization provided moderate-quality evidence for decreasing pain and improving function in chronic low back pain, with manipulation being slightly more effective than mobilization. Both methods were considered safe (Coulter et al., 2018).

Movement Control Exercises

A systematic review and meta-analysis explored the effects of movement control exercises (MVCE) on individuals with non-specific low back pain and movement control impairments. The findings demonstrated very low- to moderate-quality evidence for positive effects on disability at treatment completion (SMD = −0.38, 95% CI −0.68 to −0.09) and after 12 months (SMD = −0.37, 95% CI −0.61 to −0.04). Significant reductions in pain intensity were observed at the end of treatment (SMD = −0.39, 95% CI −0.69 to −0.04), but not after 12 months (SMD = −0.27, 95% CI −0.62 to 0.09) (Matheve et al., 2017).

Technology-Supported Exercise Therapy

Technology-supported exercise therapy (TSET), such as electromyography feedback (EMG-FB), has emerged as a promising approach to enhance exercise therapy for low back pain. A systematic review revealed improvements in pain, disability, and quality of life among patients with low back pain undergoing TSET. However, due to the limited number of randomized controlled trials available for most technological systems, definitive conclusions on their efficacy could not be drawn (Matheve et al., 2017).

McKenzie Method of Mechanical Diagnosis and Therapy (MDT)

The McKenzie Method of Mechanical Diagnosis and Therapy (MDT) involves prescribing specific exercises and postural recommendations based on a detailed assessment. A recent systematic review and meta-analysis identified moderate- to high-quality evidence supporting MDT's superiority over other rehabilitation interventions in reducing pain and disability in chronic low back pain. However, its effectiveness depended on the nature of the interventions used for comparison.

Pregnancy

A meta-analysis determined that osteopathic manipulative treatment provided clinically significant benefits for managing low back and pelvic girdle pain during and after pregnancy. Additionally, a 2018 meta-analysis of randomized controlled trials (RCTs) found that exercise reduced the risk of low back pain in pregnancy by 9% [pooled risk ratio (RR) = 0.91; 95% CI 0.83–0.99; I^2 = 0%, seven trials, n = 1175]. However, no protective effect was observed for pelvic girdle pain (RR = 0.99; CI 0.81–1.21; I^2 = 0%; four RCTs, n = 565) or lumbar-pelvic pain (RR = 0.96; CI 0.90–1.02; I^2 = 0%; eight RCTs, n = 1737). Exercise was found to prevent new episodes of sick leave due to lumbar-pelvic pain (RR = 0.79; CI 0.64–0.99; I^2 = 0%; three RCTs, n = 1168) (Shiri et al., 2018).

Back Schools

A recent Cochrane systematic review of RCTs assessed the effectiveness of back schools in managing low back pain. The findings indicated low-quality evidence suggesting that back schools were not superior to exercise in the intermediate-term (mean difference [MD] = −4.46; 95% CI −19.44 to 10.52) or at long-term follow-up (MD = 4.58; 95% CI −0.20 to 9.36). It remains uncertain whether back schools are effective for chronic low back pain. At long-term follow-up, very low-quality evidence suggested passive physiotherapy might be more beneficial than back schools (MD = 9.60; 95% CI 3.65–15.54) (Parreira et al., 2017).

Outcome Measures

Consensus reviews and systematic analyses of patient-reported outcome measures (PROMs) indicate that the Roland Morris Disability Questionnaire-24 item (RMDQ-24) and the Oswestry Disability Index 2.1a (ODI 2.1a) are the most frequently utilized tools for assessing physical functioning. The Quebec Back Pain Disability Scale (QBPDS) was identified as the third most used PROM for this purpose.

A systematic review investigating the reliability of physical functioning tests in patients with low back pain identified several tests with good test-retest reliability. These include the flexor endurance test (ICC = 0.90–0.97), extensor endurance test (ICC = 0.93–0.97), 50-foot walking test (ICC = 0.76–0.96), 5-minute walking test (ICC = 0.89–0.99), sit-to-stand test (ICC = 0.91–

0.99), loaded forward reach test (ICC = 0.74–0.98), and shuttle walk test (ICC = 0.92–0.99). Only the Biering-Sörensen test (ICC = 0.88–0.99) demonstrated good inter-rater reliability, whereas no clinical tests showed good intra-rater reliability (Denteneer et al., 2018).

Clinical Guidelines

Clinical guidelines aim to promote consistent best practices, minimize unnecessary variations, and discourage low-value interventions. However, limited evidence exists on strategies for healthcare providers to improve adherence to evidence-based practices in managing low back pain (Hodder et al., 2016).

Self-management strategies include self-directed exercises, educational materials (e.g., booklets or online resources), and smartphone applications for low back pain, although strong evidence supporting these methods is lacking. Most guidelines recommend physical exercise for non-specific low back pain.

The STarT Back Screening Tool, a validated nine-item self-report questionnaire, categorizes patients as low, medium, or high risk for persistent non-specific low back pain. The NICE guidelines suggest using risk stratification tools, such as STarT or Orebro, to guide shared decision-making and determine whether simpler support or more intensive interventions are appropriate. Recommendations include reassuring patients, promoting activity, providing self-management guidance, or referring them for individualized or group exercise programs, combined physical and psychological therapies, or multidisciplinary rehabilitation.

For chronic low back pain, Canadian and U.S. guidelines favor multidisciplinary pain management programs. Danish, U.S., and UK guidelines recommend exercise alone or combined with non-pharmacological therapies such as tai chi (U.S.), massage (U.S. and UK), and spinal manipulation (Danish, U.S., and UK).

Current Practice

Recent reviews summarizing guidelines from the U.S., Belgium, Denmark, and the UK suggest prioritizing non-pharmacological interventions, such as physical exercise and cognitive behavioral therapy, before considering pharmacological treatments like nonsteroidal anti-inflammatory drugs (NSAIDs) or antidepressants. Multidisciplinary treatments are also recommended, while injections, denervation procedures, and surgery are generally discouraged. Pharmacological treatments, if used, should be at the lowest effective dose for the shortest duration.

Future Strategies

Public health initiatives should focus on educating the public about preventing low back pain, modifying policies on disability and compensation claims, and addressing modifiable risk factors for disabling low back pain. Policymakers should allocate resources and prioritize strategies for low back pain prevention at both national and international levels.

Health care pathways should be optimized to ensure patients receive appropriate treatment from the right professionals at the right time. Improved training for healthcare providers may reduce unnecessary medical interventions, while restructuring clinical pathways can promote best practices and integrate disability-reduction measures in healthcare and occupational settings.

Early identification and education of patients at risk for persistent low back pain and disability are critical. Passive approaches such as rest and medication are associated with increased disability, whereas active strategies, including exercise, are linked to reduced disability.

Efforts should focus on aligning practice with evidence by encouraging activity, functional improvement, and work participation. Active multidisciplinary rehabilitation should emphasize self-management, healthy lifestyles, and reintegration into work.

Research into effective implementation strategies for low back pain management is limited. Future implementation trials should adhere to best-practice methodologies, incorporating the Standards for Reporting Implementation Studies of complex interventions guidelines.

A planned meta-analysis of RCTs will compare physical therapy interventions with placebo or no intervention in patients with low back pain, with primary outcomes being pain intensity and disability. Physical therapy exercise approaches remain the first-line treatment for chronic low back pain and should be routinely employed.

Conclusion

Low back pain (LBP) remains a significant global health concern, with its burden particularly pronounced in low- and middle-income countries. Physiotherapy plays a pivotal role in its management, prevention, and rehabilitation. Current evidence supports non-pharmacological approaches as first-line treatments, emphasizing the importance of physical exercise, education, and patient-centered care strategies. Various physiotherapy interventions, including Pilates, yoga, walking, and movement control exercises, have demonstrated effectiveness in reducing pain and disability, albeit with some variations in outcomes and evidence quality.

Moreover, physiotherapy addresses psychosocial factors such as fear of movement and catastrophizing, which are closely associated with pain and disability outcomes. For special populations, such as pregnant women, physiotherapy interventions have shown benefits in reducing low back and pelvic girdle pain and preventing work absenteeism. Innovations like technology-supported exercise therapy and evidence-based methodologies, such as the McKenzie Method, further enhance the scope of physiotherapy in managing chronic conditions.

Future strategies should focus on aligning practice with evidence-based guidelines, improving healthcare pathways, and promoting multidisciplinary approaches. Additionally, research into implementation strategies is essential to optimize care delivery. As a cornerstone of non-invasive management, physiotherapy is integral to advancing patient outcomes, reducing disability, and enhancing quality of life for individuals with low back pain.

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