# Physical Activity Levels And Nonspecific Chronic Low Back Pain

## Níveis de Atividade Física e Lombalgia Crônica Inespecífica

## Niveles de Actividad Física y Lumbalgia Crónica Inespecífica

**RESUMO**
A Lombalgia Crônica Inespecífica (LCI) é uma das principais causas de incapacidade em todo o mundo, impactando negativamente a qualidade de vida das pessoas afetadas, gerando custos significativos para os sistemas de saúde. As evidências nas últimas duas décadas revolucionaram a condução da abordagem e tratamento dos casos, sendo que algumas arestas como os níveis de atividade física quanto às características das práticas, frequência, intensidade se apresentam vagas e pouco detalhadas de forma geral nas publicações da temática. O objetivo é investigar as relações entre níveis de atividade física e lombalgia crônica inespecífica. Desse modo, este estudo envolve uma revisão de literatura, de estudos publicados no período de 2012 a 2024 em inglês e português, com convergência com a temática e objetivo propostos. As plataformas Pubmed, SciELO, Biblioteca Cochrane, Scopus, Web of Science Physioterapia Evidence Database (PEDro). Foram selecionados, a partir dos critérios de inclusão e seleção, 35 estudos. Ficou evidente em relação aos níveis de atividade física que há necessidade de maior aprofundamento na temática pelos diferentes estudos, mas que há predomínio de indicações para práticas de intensidade moderada. A exposição gradual aos exercícios aeróbicos, de fortalecimento/resistência, de coordenação/estabilização e de controle motor, preferencialmente em estratégias multimodais como as estratégias combinadas com a cognição, bem como, a ioga, tanto realizados individualmente como em grupo, indicam benefícios sintomáticos e funcionais para pessoas com LCI.
**PALAVRAS CHAVES:** Lombalgia crônica inespecífica, atividade física, exercício.

**ABSTRACT**
Nonspecific Low Back Pain (NLBP) is one of the leading causes of disability worldwide, negatively impacting the quality of life of those affected, generating significant costs for health systems. The evidence in the last two decades has revolutionized the approach and treatment of cases, and some edges such as the levels of physicial activity in terms of the characteristics of the practices, frequency, intensity are vague and not very detailed in general in publications on the subject. The objective is to investigate the relationships between physical activity levels and chronic nonspecific low back pain. Thus, this study involves a literature review of studies published from 2012 to 2024 in English and Portuguese, with convergence with the proposed theme and objective. The pubmed, SsciELO, Cochrane Libraly, Scopus, Web of Science, Physiotherapy Evidence Database (PEDro) platforms. Based on the inclusion and selection criteria, 35 studies were selected. It was evident in relation to the levels of physical activity that there is a need for further study of thme theme by the different studies, but that there is a predominance of indications for moderate-intensity pratices. Gradual exposure to aerobic, strengthening/resistance, coordination/stabilization, and motor control exercises, preferably in multimodal strategies such as combined strategies with cognition, as well as yoga, both performed individually ans in groups, indicate symptomatic and functional benefits for people with Nonspecific Low Back Pain (NLBP).
**KEYWORDS:** Chronic nonspecific low back pain, physical activity, exercise.

**RESUMEN**
La Lumbalgia Crónica Inespecífica (LCI) es una de las principales causas de discapacidad en todo el mundo, impactando negativamente la calidad de vida de las personas afectadas y generando costos significativos para los sistemas de salud. Las evidencias de las últimas dos décadas han revolucionado el enfoque y tratamiento de los casos, pero algunos aspectos, como los niveles de actividad física en relación con las características de

DOI: https://doi.org/10.36489/saudecoletiva.2025v15i93p14647-14655

tema. El objetivo de este estudio es investigar las relaciones entre los niveles de actividad física y la lumbalgia crónica inespecífica. Este estudio consiste en una revisión de literatura de estudios publicados entre 2012 y 2024 en inglés y portugués, que convergen con el tema y los objetivos propuestos. Se utilizaron las plataformas PubMed, SciELO, Biblioteca Cochrane, Scopus, Web of Science y la base de datos de evidencia en fisioterapia (PEDro). Se seleccionaron 35 estudios según los criterios de inclusión y selección. En cuanto a los niveles de actividad física, se evidenció la necesidad de un mayor enfoque en este tema en los diferentes estudios, aunque predomina la recomendación de prácticas de intensidad moderada. La exposición gradual a ejercicios aeróbicos, de fortalecimiento/resistencia, de coordinación/estabilización y de control motor, preferentemente en estrategias multimodales como las combinadas con la cognición, así como el yoga, realizados tanto de forma individual como en grupo, muestran beneficios sintomáticos y funcionales para las personas con LCI.
**PALABRAS CLAVE:** Lumbalgia crónica inespecífica, actividad física, ejercicio.

**RECEIVED:** 01/172025 **APPROVED:** 01/30/2025

**How to cite this article:** Eichholz SL, Longen WC. Physical Activity Levels And Nonspecific Chronic Low Back Pain. Saúde Coletiva (Edição Brasileira) [Internet]. 2025 [acesso ano mês dia];15(93):14647-14655. Disponível em: DOI: 10.36489/saudecoletiva.2025v15i93p14647-14655

**Simoni Luiza Eichholz**
Physiotherapy graduate. Extension scholarship holder at the Specialized Center for Rehabilitation - CER II by the University of the Extreme South of Santa Catarina-UNESC. Criciúma. Santa Catarina. Brazil.
ORCID: https://orcid.org/0009-0006-9042-7375

**Willians Cassiano Longen**
Physiotherapist. Postgraduate degree in Traumato-Orthopedic Physiotherapy and in Sports Science and Sports Medicine. PhD in Health Sciences. Professor of the Postgraduate Program in Public Health-PPGSCol. University of the Extreme South of Santa Catarina-UNESC. Criciúma. Santa Catarina. Brazil.
ORCID: https://orcid.org/0000-0001-8336-2311

## INTRODUCTION

Low back pain is a highly prevalent, disabling and costly condition. The lifetime prevalence of low back pain is reported to be high, estimated at 84% of the global population. This morbidity negatively impacts individuals, their families, communities and the employment, social security and health systems worldwide. Furthermore, the economic burden of low back pain has increased due to absenteeism from work, lost productivity and the cost of treatment. [1] For many, pain follows a trajectory, recurring several times throughout life. [2] Furthermore, the Global Burden of Disease study has consistently ranked low back pain as the leading cause of years lived with disability since 1990. [3]

When classifying low back pain, it is commonly categorized as nonspecific (90%) or specific (10%) and as acute (<6 weeks), subacute (6–12 weeks) or chronic (more than 12 weeks) according to the duration of symptoms. 4 It is estimated that approximately 540 million people have nonspecific low back pain, that is, a condition with no specific cause and with a chronic condition. [5, 6]

Women are more prone to chronic nonspecific low back pain (CNLBP) than men, regardless of age. This greater vulnerability may be linked to genetic factors, lower efficiency in pain management, less effective diffuse inhibitory control, and greater sensitivity to mechanical changes or chemically induced pain. In addition, after menopause, women are at greater risk of musculoskeletal pain due to conditions such as osteoporosis and sarcopenia, which are related to musculoskeletal changes at this stage. [7]

Physical activity is widely recognized for its physiological and psychological benefits, and is defined by the WHO as any bodily movement that results in energy expenditure. Understanding its relationship with low back pain can inform preventive interventions. Adapted physical activity, which includes structured exercises, is recommended in the treatment of CNLBP. [8]

Physical activity is strongly recommended for the treatment of chronic nonspecific low back pain (CLBP), with evidence showing that general exercise, specific interventions and multidisciplinary programs reduced pain and improved physical function. Furthermore, it was observed that pa-


DOI: https://doi.org/10.36489/saudecoletiva.2025v15i93p14647-14655

tients with chronic nonspecific low back pain (CNLBP) who had moderate levels of physical activity at baseline felt less pain and disability after 12 months compared to sedentary individuals. [9] Although leisure-time physical activity has mixed results, it may reduce the risk of CNLBP in older adults. [7]

Clinical guidelines recommend physical activity for CNLBP due to its effectiveness, low cost and easy application, promoting improvements in mobility, quality of life and even psychological aspects. In addition, it can increase social and professional participation, as well as help in coping strategies and reduce fears related to CNLBP. [10]

Recent meta-analytic evidence suggests that exercises focused on functional strength, coordination (such as Pilates), biopsychosocial approaches (such as McKenzie), and stabilization training are the most effective for treating chronic nonspecific low back pain. [13]

A study in the Journal of Clinical Medicine found that exercise in older adults with CNLBP led to significant improvements in pain and physical function. There is a wide range of exercise types, durations, and intensities recommended for older adults with CNLBP. Programs focus on a variety of muscle groups, including the abdominals, quadriceps, and respiratory muscles, but this diversity makes it difficult to recommend a single protocol. Treatment should not only focus on the lower back, but should also include the lower limbs and chest, as well as the respiratory muscles. [10]

Physical activity levels for people with CNLBP are not explicitly clear to either healthcare professionals who provide direct care to patients or the general population. Although low back pain may discourage exercise, it is well-established that regular physical activity in general can significantly reduce the frequency of episodes of symptomatic manifestations of cases and the symptomatic and functional severity of low back pain. [14,15]

It is important to highlight that the evidence in this quarter of the 21st century has revolutionized the approach and treatment of CNLBP cases, but in general there is a generalization that exercise brings benefits, however, with little detail and specifications regarding the levels of physical activity, the types of practices regarding their characteristics, frequency, intensity, which in general are presented in little detail in many publications on the subject. In this sense, the objective of this study was to investigate the relationships between levels of physical activity and nonspecific chronic low back pain in adults.

## METHOD

This study followed the principles of exploratory research, through bibliographic research, which is understood as the reading, analysis and interpretation of printed material on the subject in scientific academic journals available online. The objective of exploratory research is to familiarize oneself with a subject that is still little known or explored. It generally takes the form of bibliographic research.

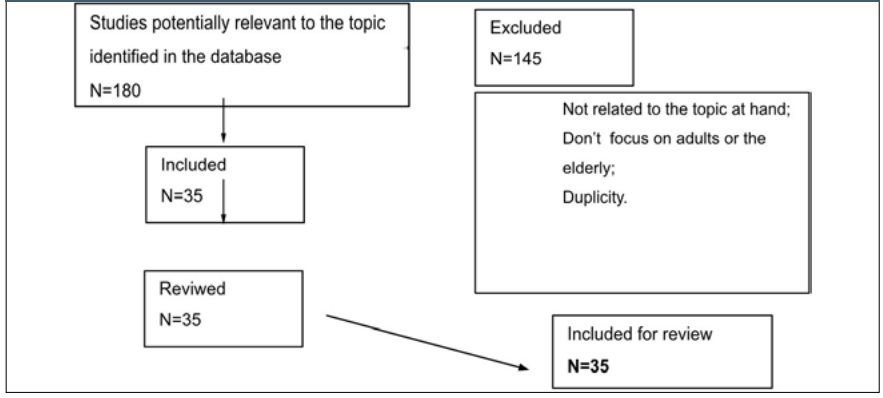
Therefore, to conduct the review on the association between physical activity levels and chronic nonspecific low back pain, the following platforms were used as research sources: Pubmed, SciELO, Cochrane Library, Scopus, Web of Science Physiotherapy Evidence Database (PEDro).

Searches on the platforms were performed using the following search terms: "chronic nonspecific low back pain", "physical activity", "exercise". Articles published between 2012 and 2024 were included, with articles written in English and Portuguese, demonstrating a relationship to the topic. After searching these platforms, 35 articles were selected that met the inclusion criteria, which were: being published within the predefined time range of the last 12 years, meeting the study objectives and providing access to the full studies. Studies that did not provide information that met the study objectives were excluded. The selection started from the title, followed by the abstracts and, after pre-selection of 180 works, 145 were excluded.

## RESULTS

A total of 180 articles potentially relevant to the topic were found. Of these, 35 were selected, considering that they met the inclusion criteria, which served as a basis for the preparation of the work (Figure 1).

**Figura 1. Fluxograma representativo do processo de seleção e etapas da pesquisa.**




DOI: https://doi.org/10.36489/saudecoletiva.2025v15i93p14647-14655

All searches and reading of articles were guided by the following hypothesis: it is believed that the level of physical activity can influence aspects such as the intensity of pain and maintenance of the general functionality of subjects and the community.

## DISCUSSION

In this review on the relationship between physical activity levels and CNLBP, the findings of the review suggest that regular physical exercise can have a positive impact on the prevention and management of this morbidity that affects so many people. In this sense, Elias and Longen [16] found that more than half of the participants in their sample of participants with CNLBP were sedentary, while among those who practiced physical exercise regularly, weight training was the most practiced modality among physically active people, with a prevalence of 14.5% of the total sample, followed by functional training with 11.3%, involving young women between 18 and 30 years old. In the same study, regarding the type of physical exercise, most of the volunteers were classified based on the criteria for subclassifying low back pain as having an indication for emphasis on stabilization (29%), that is, a multimodal approach combining therapeutic strategies, but with a higher proportion of muscle strengthening exercises. This subgroup was quite large quantitatively by sedentary volunteers, but also included some weight training practitioners, which opens up the reflection on the importance of in-depth analysis and studies on the prescription and effective execution of certain types of exercises and their objectives. This characteristic in terms of prescriptive exercise potential for a population with CNLBP of women, in parallel denotes a good prognosis considering that 91.9% showed a low risk score, in the Owestry Disability Index, that is, a good prognosis for pain treatment and 91.9% with minimal disability.

In the study by Cruz [17], The influence of physical activity levels on trunk mobility and pain perception in individuals with CNLBP was explored. It was observed that, in response to pain, these individuals tend to adopt protective movement patterns, reducing lumbar mobility as a strategy to minimize discomfort. The same study highlights that regular physical exercise, even at non-competitive or intense levels, therefore of moderate intensity, has shown benefits in maintaining or improving trunk mobility. Physically active individuals presented greater pain tolerance, better flexibility and greater range of motion, which are highlighted in this study as factors reducing the potential risk of worsening low back pain.

Fear and avoidance of movement are frequently observed in individuals with CNLBP and deserve special attention. Although these aspects are associated with functional disability, research has not indicated a direct relationship between fear of movement and reduced overall levels of physical activity, either through objective methods (accelerometers) or subjective methods (questionnaires). These findings, which certainly require further investigation and comparison with other specific studies on this dimension, partially challenge the fear-avoidance model, suggesting that the impact of fear is more concentrated on specific functional limitations than on overall physical inactivity. [18] This highlights the importance of considering psychological factors in the management of CNLBP and avoiding simplistic assumptions about the relationship between fear and physical activity.

Another important point involves the relationship between functional disability and physical activity levels. Disability, often assessed by instruments such as the Roland Morris Disability Questionnaire, reflects functional limitations associated with pain, while physical activity levels are measured by objective tools or self-reported questionnaires. Interventions that combine functional rehabilitation with physical activity promotion strategies show superior results, highlighting the need for personalized approaches. [19] The role of physical therapists is crucial, not only in the clinical setting but also in promoting active lifestyles in the community, especially considering the high rates of comorbidities associated with CNLBP, such as diabetes and cardiovascular disease.

Another review corroborates this, highlighting that both high and low levels of physical activity were associated with a higher prevalence of CNLBP, suggesting that not all patients with CNLBP have low levels of physical activity. Patients with CNLBP tend to be more active in the morning and less active in the evening, compared with healthy individuals. This pattern may reflect an adaptive strategy in which patients prioritize activity during periods of lower pain intensity. [22]

Despite this, this review evaluated lifestyle interventions to improve pain and functionality in individuals with CNLBP. Multimodal interventions, such as cognitive therapy associated with functional exercises, showed the best results, followed by stabilization exercises, resistance exercises and mind-body modalities (Pilates, Yoga, Tai Chi). Strategies that combine psychological approach with structured exercises reinforce the effectiveness of treating biopsychosocial aspects of pain. [20,10]

Therefore, current evidence indicates that the therapeutic approach based on active exercises is more ef-


DOI: https://doi.org/10.36489/saudecoletiva.2025v15i93p14647-14655

fective in the management of CNLBP. Modalities such as Pilates, resistance training, motor stabilization/control and aerobic exercises stand out for encouraging the patient to move in a progressive and guided manner, promoting significant benefits in reducing pain, improving physical function and strengthening mental health. In contrast, passive interventions, such as manual therapies and practices exclusively performed by the therapist, are less effective in the treatment of CNLBP. Active modalities not only reduce pain intensity to clinically significant levels, but also favor functional improvement and decrease in disability. Other modalities, such as yoga, aquatic exercises and combined exercises, have also demonstrated positive effects on patient functionality, suggesting that there are several effective physical training options for dealing with CNLBP. [23]

This study also found a high prevalence of nonspecific low back pain (NSLBP) in healthy postmenopausal Italian women, with low back pain being more common than pain in other regions of the spine. After a 24-month PA intervention, a significant reduction in the prevalence of NSLBP was observed among participants in the intervention group, but without significant differences compared to the control group. The lack of a clear effect between groups may be related to the nonspecific nature of the intervention and limitations in the study design. [21]

There is substantial evidence that physical activity declines with age in healthy individuals. Any additional factors, including musculoskeletal pain, that negatively impact physical activity levels in this group may have adverse consequences for overall health. Although the standardized mean difference is small, this difference may still be clinically relevant. [22] Another review, however, in elderly individuals, shows that PA has a direct impact on improving pain and functionality with CNLBP, but the relationship with physical activity levels (PAL) is complex and multifactorial. Despite the benefits observed in specific PA protocols, heterogeneity in methods and the lack of standardization represent complicating factors for a better understanding of how different levels of activity directly influence CNLBP in this population. Biological factors such as sarcopenia and reduced muscle strength play an important role in limiting PAL in elderly individuals with CNLBP. Regular PA practice, by reducing sarcopenia and increasing muscle capacity, not only alleviates CNLBP symptoms, but also has the potential to increase overall levels of physical activity, promoting greater autonomy and quality of life. [10]

When considering the biopsychosocial nature of CNLBP, a robust cohort study involving over 100,000 people in Copenhagen, the capital of Denmark, deserves to be highlighted. By deepening the discussion of what the study calls the "physical activity paradox", it highlights the comparisons between spontaneous physical activity, leisure-time physical activity, exercise practice chosen by the subjects, among other forms that preserve levels of autonomy, with the other extreme of physical activity inherent in work situations. By delving into this paradox, the study highlights that while leisure-time physical activity is widely associated with improvements in health in general, exemplified by the lower number of cardiovascular and metabolic events and reduced mortality, the necessary physical activity resulting from occupational contexts does not present the same benefits, on the contrary, being associated with greater morbidity and mortality. This dimension of the lives of large adult populations and with the progressive social security changes extending working time sociologically in the world, which involves work, is characterized in the aforementioned study as requiring prolonged, less self-determined efforts, monotonous activities and lack of adequate time for psychophysiological recovery, which can result in chronic fatigue, systemic inflammation, increased blood pressure among other adaptive aspects. [24]

Regular physical exercise, especially when well prescribed, can provide well-being to individuals, and is completely different from physical activity inherent to maintaining living and working conditions. This type of physical activity offers better health prospects, especially if the biopsychosocial aspects are considered. This understanding seems fundamental when attention is paid to the biomechanical, physiological/biochemical and psychosocial aspects involved. [25,26]

In the context of CNLBP, as already mentioned, the difference between the types of physical activity (leisure and occupational) is relevant, since the practice of exercises during leisure time has already demonstrated benefits in the management of pain and physical function. On the other hand, overload and lack of variation in occupational activities can aggravate cases of low back pain, especially due to the lack of functional and dynamic stimuli for the trunk stabilizing muscles. In the case of workers with a high workload of physical activity, strategies for the prevention and management of CNLBP should include specific exercises performed during leisure time, which can counterbalance the deleterious effects of the static workload. Therefore, for individuals with CNLBP, the incorporation of dynamic and individualized physical activities can be an effective approach to reduce

DOI: https://doi.org/10.36489/saudecoletiva.2025v15i93p14647-14655

pain, improve functionality and prevent complications associated with excessive workload. [24]

Personalized exercises, combined with self-care education, are strategies that help reduce symptoms and improve patients' quality of life. However, more research is needed to fully elucidate this relationship and establish more specific clinical practices.

What can be established at this time, based on the knowledge produced and identified with the strategies in this review, is that no particular type of exercise is superior to others. [27] Among the types of exercises, it is possible to consider that exercises such as aerobics, strengthening/resistance, strategies combined with cognition, coordination/stabilization, motor control, yoga, both performed individually and in groups, denote symptomatic and functional benefits for people with CNLBP. [25, 28] Patient preferences, needs, and capabilities when choosing the appropriate type of exercise for your patients. [29]

Moderate-intensity walking reduces pain intensity, frequency of crises, disability, fear and avoidance beliefs, and can be said to improve quality of life. 30 It is worth highlighting the fact that in interventions for the treatment of CNLBP, walking can be an adjuvant, such as the recommendation of regular practice and moderate intensity. [29, 30, 31]

Regarding the types of exercises that did not present significant justifiable evidence for their recommendation, some deserve to be highlighted. Considering that not all exercise practices and/or therapies have strong evidence of being effective for people with CNLBP. [30] In this group it is possible to include proprioceptive exercises, sensory discrimination training, and spinal school. [32]

The logic of biopsychosocial approaches in CNLBP, i.e., individual or collective management combining exercise therapy with psychological and/or social components of life and work, is in line with the available evidence supporting exercise therapy as a fundamental part of a multimodal approach to this dysfunction. This model, better known and understood especially in the last decade, reinforces the idea that patient expectations for treatment are generally not limited to exercise therapy as a single treatment, but include multimodal approaches. [33]

Patients with CNLBP may be impaired by maladaptive beliefs (pain) and fear of certain body movements or physical activities. [34] To address this debilitating aspect of the CNLBP experience, treatment approaches such as cognitive-engagement exercise therapy with graded behavioral activity and graded exposure to exercise have demonstrated good results. This is because cognitive-engagement exercise therapy and graded exposure confront patients with feared, avoided, and/or painful daily movements and activities with the goal of decreasing fear of these movements and activities. The available evidence supports the use of these approaches. This combination has demonstrated superior results to exercise therapy alone in people with CNLBP. [35] Graded behavioural activity resulted in greater improvements in disability compared to a waiting list or usual care, but not compared to other types of exercise therapy, and there is limited evidence to suggest that graded behavioural exposure is effective in improving disability and catastrophizing in the short term. An individualized approach, with high fear activities addressed using graded exposure and medium/low fear activities through graded behavioural activity and/or exercise therapy may be preferable. [35]

Although this review demonstrated the benefits of regular and programmed physical activity as a measure for the treatment of CLBP, methodological limitations, such as heterogeneity of samples in the studies and lack of robust longitudinal data, such as solid cohorts to support systematic reviews and guidelines, hinder more accurate comparisons. Future studies should seek to standardize interventions and increase the representativeness of samples to deepen the understanding of the relationship between physical activity levels and nonspecific chronic low back pain.

## CONCLUSION

This review highlighted that Chronic Nonspecific Low Back Pain (CLBP) is a complex and multifactorial condition, with a significant impact on the quality of life of individuals and high social impacts and burden on health systems. The results showed that regular practice of moderate physical activity, especially when combined with multimodal treatment strategies, represents an important strategy in the management of CLBP cases. Aerobic exercises, strengthening/resistance, coordination/stabilization, motor control, strategies combined with cognition, and yoga, both performed individually and in groups, indicate symptomatic and functional benefits for people with CLBP.

Regarding levels of physical activity, it was evident that there is a need for greater in-depth study of the topic through different studies and publications in the area, such as the need for greater uniformity in assessment and intervention methods. However, it is possible to state that the parameterization of physical exercise prescription, using physiological references of what represents moderate intensity for each subject, is a possibility that finds reference support to the detriment of


DOI: https://doi.org/10.36489/saudecoletiva.2025v15i93p14647-14655

very light practices or, at the other extreme, very intense ones. It is important to consider the indication of gradual exposure to movement and exercise, even if the physiological parameters in vogue suggest that in an initial phase of practice it is possible to advance in terms of physiological capacities, especially when fear and avoidance are involved. Thus, future studies may aim to prioritize more robust methodologies, longitudinal designs and representative samples to deepen the understanding of the relationship between physical activity levels and CNLBP.

This study reinforces the importance of integrated and evidence-based approaches to CNLBP, promoting the development of strategies that reduce the impact of this dysfunction on the functional health condition in society, while simultaneously improving population well-being.

## REFERENCES

1. Alzahrani, Hosam, et al. "The association between physical activity and low back pain: a systematic review and meta-analysis of observational studies." Scientific reports 9.1 (2019): 8244.

2. Grooten, Wilhelmus Johannes Andreas, et al. "Summarizing the effects of different exercise types in chronic low back pain—a systematic review of systematic reviews." BMC musculoskeletal disorders 23.1 (2022): 801.

3. Almeida, Matheus O., et al. "The McKenzie method for (sub) acute non-specific low back pain." Cochrane Database of Systematic Reviews 4 (2023).

4. Frizziero, Antonio, et al. "Efficacy of core stability in non-specific chronic low back pain." Journal of functional morphology and kinesiology 6.2 (2021): 37.

5. Hayden, Jill A., et al. "Individual recovery expectations and prognosis of outcomes in non-specific low back pain: prognostic factor review." Cochrane Database of Systematic Reviews 11 (2019).

6. Hayden, Jill A., et al. "Exercise therapy for chronic low back pain." Cochrane Database of Systematic Reviews 9 (2021).

7. Wong, Charles KW, et al. "Prevalence, incidence, and factors associated with non-specific chronic low back pain in community-dwelling older adults aged 60 years and older: a systematic review and meta-analysis." The journal of pain 23.4 (2022): 509-534.

8. Roren, Alexandra, et al. "Physical activity and low back pain: A critical narrative review." Annals of physical and rehabilitation medicine 66.2 (2023): 101650.

9. Alsufiany, Muhsen B., et al. "Non-specific chronic low back pain and physical activity: A comparison of postural control and hip muscle isometric strength: A cross-sectional study." Medicine 99.5 (2020): e18544.

10. Vadalà, Gianluca, et al. "Physical activity for the treatment of chronic low back pain in elderly patients: a systematic review." Journal of clinical medicine 9.4 (2020): 1023.

11. Li, Ying, et al. "Exercise intervention for patients with chronic low back pain: a systematic review and network meta-analysis." Frontiers in Public Health 11 (2023): 1155225.

12. Gordon, Rebecca, and Saul Bloxham. "A systematic review of the effects of exercise and physical activity on non-specific chronic

DOI: https://doi.org/10.36489/saudecoletiva.2025v15i93p14647-14655

low back pain." Healthcare. Vol. 4. No. 2. MDPI, 2016.

13. Fleckenstein, Johannes, et al. "Individualized exercise in chronic non-specific low back pain: A systematic review with meta-analysis on the effects of exercise alone or in combination with psychological interventions on pain and disability." The journal of pain 23.11 (2022): 1856-1873.

14. Saragiotto, Bruno T., et al. "Motor control exercise for chronic non-specific low-back pain." Cochrane Database of Systematic Reviews, 11, 2016.

15. Oliveira, Camila Teixeira de, Michel Kanas, and Marcelo Wajchenberg. "Treatment of non-specific chronic low back pain: resistance training with or without using weights?." Revista Brasileira de Medicina do Esporte 27.6 (2021): 603-609.

16. Elias, Juliana Pereira; Longen, Willians C. "Classification of low back pain into subgroups for diagnostic and therapeutic clarity." Coluna/Columna 19 (2020): 34-39.

17. Pérez-de la Cruz, Sagrario. "Influence and Relationship of Pain on Lumbar Biomechanics in a Young Adult Population with Non-Specific Low Back Pain." Sports 12.7 (2024): 190.

18. Carvalho, Flávia A., et al. "Fear of movement is not associated with objective and subjective physical activity levels in chronic nonspecific low back pain." Archives of physical medicine and rehabilitation 98.1 (2017): 96-104.

19. Morelhão, Priscila K., et al. "Physical activity and disability measures in chronic non-specific low back pain: a study of responsiveness." Clinical Rehabilitation 32.12 (2018): 1684-1695.

20. Herrero, Pablo, et al. "Effects of Lifestyle Interventions on the Improvement of Chronic Non-Specific Low Back Pain: A Systematic Review and Network Meta-Analysis." Healthcare. Vol. 12. No. 5. MDPI, 2024.

21. Marini, Mirca, et al. "Low back pain in healthy postmenopausal women and the effect of physical activity: A secondary analysis in a randomized trial." PLoS One 12.5 (2017): e0177370.

22. Griffin, Derek William, D. C. Harmon, and N. M. Kennedy. "Do patients with chronic low back pain have an altered level and/or pattern of physical activity compared to healthy individuals? A systematic review of the literature." Physiotherapy 98.1 2012: 13-23.

23. Owen, Patrick J., et al. "Which specific modes of exercise training are most effective for treating low back pain? Network meta-analysis." Br J Sports Med. 2020; 54(21):1279-1287.

24. Holtermann, A., Schnohr P., Nordestgaard B. G., Marott J. L. "The physical activity paradox in cardiovascular disease and all-cause mortality: the contemporary Copenhagen General Population Study with 104 046 adults." Eur Heart J. 2021; 42(15):1499-1511.

25. Longen WC. Efeitos do exercício aeróbico e da terapia manual sobre marcadores bioquímicos de lesão musculoesquelética e


DOI: https://doi.org/10.36489/saudecoletiva.2025v15i93p14647-14655

parâmetros funcionais em motoristas profissionais com lombalgia crônica inespecífica. Tese (Doutorado) - Curso de Programa de Pós-graduação em Ciências da Saúde, Universidade do Extremo Sul Catarinense, Criciúma; 2013. p. 106.

26. Longen WC; Brandolfi JA. Inatividade física na perpetuação do quadro sintomático e funcional da lombalgia crônica inespecífica. Rev Inspirar movimento e saúde. 2018;15(1):38-43.

27. National Institute for Health and Care Excellence. NICE guidelines: Low back pain and sciatica in over 16s: assessment and management. 2016.

28. Wewege MA, Booth J, Parmenter BJ. Aerobic vs. resistance exercise for chronic non-specific low back pain: A systematic review and meta-analysis. Journal of back and musculoskeletal rehabilitation 2018; 31(5): 889-99.

29. Vanti C, Andreatta S, Borghi S, Guccione AA, Pillastrini P, Bertozzi L. The effectiveness of walking versus exercise on pain and function in chronic low back pain: a systematic review and meta-analysis of randomized trials. Disability and rehabilitation 2019; 41(6): 622-32.

30. Malfliet A, Ickmans K, Huysmans E, et al. Best Evidence Rehabilitation for Chronic Pain Part 3: Low Back Pain. Journal of clinical medicine 2019; 8(7).

31. Sitthipornvorakul E, Klinsophon T, Sihawong R, Janwantanakul P. The effects of walking intervention in patients with chronic low back pain: A meta-analysis of randomized controlled trials. Musculoskeletal science & practice 2018; 34: 38-46.

32. Parreira P, Heymans MW, van Tulder MW, et al. Back Schools for chronic non-specific low back pain. The Cochrane database of systematic reviews 2017; 8: Cd011674.

33. Zhang Q, Jiang S, Young L, Li F. The Effectiveness of Group-Based Physiotherapy-Led Behavioral Psychological Interventions on Adults With Chronic Low Back Pain: A Systematic Review and Meta-Analysis. American journal of physical medicine & rehabilitation 2019; 98(3): 215-25.

34. Schemer L, Schroeder A, Ørnbøl E, Glombiewski JA. Exposure and cognitive-behavioural therapy for chronic back pain: An RCT on treatment processes. European journal of pain (London, England) 2019; 23(3): 526-38.

35. Andrioli IB.; Trombim PS.; Longen WC. Caracterização da Sintomatologia, Incapacidade e Potencial de Catastrofização de Trabalhadores com Lombalgia Crônica Inespecífica. Arquivos Catarinenses de Medicina, 2019; 20(2): 50-60.

DOI: https://doi.org/10.36489/saudecoletiva.2025v15i93p14647-14655