Artigo de Revisão

Physical Exercises in the Treatment of Chronic Pain in Older People: A Narrative Review

Exercícios físicos no tratamento da dor crônica em pessoas idosas: uma revisão narrativa

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ABSTRACT

This study aims to present the effects of physical exercise on chronic pain management in older individuals through a narrative literature review. Given the aging population and the significant impact of chronic pain on quality of life, articles in Portuguese and English were analyzed, without date restrictions, that investigate the relationship between physical exercise and chronic pain treatment in older adults. Studies with unclear results, restricted access to the full text, or a focus on specific conditions not applicable to the older population were excluded. The search was conducted in the PubMed, SciELO, and Google Scholar databases using keywords such as “physical exercise,” “chronic pain,” “elderly,” and “treatment.” The analysis of the studies revealed that aerobic and resistance exercises and mind-body practices such as Pilates and Tai Chi effectively reduce pain intensity and improve functionality and quality of life in older individuals. Aerobic and resistance exercises, when performed at moderate intensity and with a frequency of two to three times per week, promote more excellent stability, increased muscle strength, and reduced depressive symptoms. Mind-body practices, in addition to alleviating pain, also enhance balance and self-confidence. The findings reinforce that when prescribed in an individualized and adapted manner, physical exercise is an effective and safe intervention for managing chronic pain in the older adult, contributing to a more active and functional aging process.

Descriptors: aging, pain, physical exercise

RESUMO

Este estudo tem como objetivo apresentar os efeitos do exercício físico no controle da dor crônica em pessoas idosas, por meio de uma revisão narrativa da literatura. Diante do envelhecimento populacional e do impacto significativo da dor crônica na qualidade de vida, foram analisados artigos em português e inglês, sem restrição de data, que investigam a relação entre exercícios físicos e o tratamento da dor crônica em idosos. Foram excluídos estudos com resultados pouco claros, acesso restrito ao texto completo ou foco em condições específicas não aplicáveis à população idosa. A busca foi realizada nas bases PubMed, SciELO e Google Scholar, utilizando palavras-chave como “exercícios físicos”, “dor crônica”, “idosos” e “tratamento”. A análise dos estudos revelou que exercícios aeróbicos, de resistência e práticas corpo-mente, como Pilates e Tai Chi, são eficazes na redução da intensidade da dor, além de contribuírem para a melhora da funcionalidade e da qualidade de vida dos idosos. Exercícios aeróbicos e de resistência, quando realizados com intensidade

moderada e frequência de duas a três vezes por semana, promovem maior estabilidade, aumento da força muscular e redução de sintomas depressivos. Já as práticas corpo-mente, além de auxiliarem no alívio da dor, também aprimoram o equilíbrio e a autoconfiança. Os resultados reforçam que o exercício físico, quando prescrito de forma individualizada e adaptada, é uma intervenção eficaz e segura para o manejo da dor crônica em idosos, contribuindo para um envelhecimento mais ativo e funcional.

Descritores: envelhecimento, dor, exercício físico

INTRODUCTION

Chronic pain is a prevalent and debilitating condition among older people, significantly affecting their functionality, independence, and overall quality of life[1]. As populations continue to age, the management of chronic pain has become a critical public health challenge, given its association with reduced mobility, increased risk of falls, and psychological distress[2]. While pharmacological treatments are widely used, they often present limitations such as side effects, dependency risks, and diminished long-term efficacy[3]. In this context, non-pharmacological interventions, particularly physical exercise, have gained prominence as an effective and safe approach for managing chronic pain in older adults[4].

Scientific evidence indicates regular physical activity can modulate pain perception, improve musculoskeletal function, and enhance psychological well-being[5]. Various exercise modalities, including aerobic and resistance training and mind-body practices such as Pilates and Tai Chi, have significantly reduced pain intensity, increased mobility, and promoted emotional stability[6]. However, despite the well-documented advantages, adherence to exercise programs among older individuals remains challenging, often influenced by fear of movement, comorbidities, and lack of professional guidance[7].

Given this context, this study aims to explore the role of physical exercise in chronic pain management in older individuals through a narrative literature review. By analyzing relevant scientific studies in Portuguese and English, this review highlights the most effective exercise modalities, their physiological and psychological benefits, and best practices for implementation in clinical and community settings. Furthermore, it underscores the importance of individualized exercise prescriptions tailored to the specific needs and limitations of the older population, ensuring safety, adherence, and long-term effectiveness.

METHOD

Studies published in Portuguese and English from any year that addressed the relationship between physical exercise and chronic pain in older populations were included. Studies were

excluded if they did not present precise results, were not accessible in full-text format, or focused exclusively on specific conditions that were not generalizable to the older population.

The literature search was conducted in academic databases, including PubMed, SciELO, and Google Scholar, using keywords such as "physical exercise," "chronic pain," "elderly," and "treatment." Various combinations of these keywords allowed for the identification of many relevant publications.

After selecting the articles, a detailed reading of the texts was carried out to extract relevant information regarding exercise types, pain assessment methods, and observed outcomes. The collected data were synthesized, emphasizing key findings on the effectiveness of physical exercise in managing chronic pain.

RESULTS AND DISCUSSION

Chronic pain is one of the most prevalent health conditions among the older adult (>65 years) and is strongly associated with functional impairment. In older adults, chronic pain significantly limits mobility, contributes to the development of depression and anxiety, and can negatively impact family and social interactions[8]. In contrast, acute pain is a dynamic and unpleasant experience, typically triggered by tissue damage or inflammatory processes. It serves an adaptive function, aiding survival and recovery. However, when pain persists beyond the expected healing period (typically three months), it can evolve into a pathological condition[9].

Pain is a distressing yet essential experience for survival, signaling the need to modify behaviors that may cause tissue damage and alerting individuals to potential harm. It is inherently subjective and influenced by various genetic, sensory, psychological, emotional, cultural, and social factors, all of which affect the intensity and perception of acute pain through peripheral and central mechanisms. Nociceptors—specialized sensory receptors—are activated by harmful stimuli and transmit pain signals through nerve fibers to the spinal cord, where these signals are modulated before reaching the brain. Several brain regions then process these signals, integrating sensory perception, awareness, memory, and emotions to shape the pain experience[10]. Notably, chronic pain has been shown to impair cognitive performance, further highlighting the complex interplay between pain processing in the brain and cognitive functions[11].

Descending pathways from the brain can either amplify or inhibit pain perception, modulating nociceptive signals and demonstrating how pain is influenced by contextual factors such as threat perception, anxiety, emotional state, and pain-related memories. Central sensitization,

a key mechanism in transitioning from acute to chronic pain, explains how prolonged pain can alter brain activity. In acute pain, the activated neural networks primarily involve sensory processing regions, whereas, in chronic pain, activity shifts toward areas associated with emotional processing, such as the prefrontal cortex. These changes in brain networks reflect the intricate relationship between physiological and psychological factors, which may explain why individuals with chronic pain often experience behavioral consequences, including cognitive and memory deficits[10].

Disabling chronic pain is associated with maladaptive neuroplastic changes in brain networks, often linked to central sensitization, and is classified as nociplastic pain. This pain arises from altered nociception without clear evidence of tissue damage or injury to the somatosensory system. It is characterized by peripheral and central sensitization, spinal cord reorganization, and heightened responsiveness to painful and non-painful stimuli. Additionally, it is frequently associated with fatigue, sleep disorders, anxiety, and depressive mood. Recognizing nociplastic pain is crucial, as it requires distinct treatment approaches compared to nociceptive and neuropathic pain[12].

There is a common misconception that chronic pain is an inevitable consequence of aging. While its prevalence is notably high among older adults, exceeding 50%, with 70% of older individuals experiencing pain in multiple locations, it is not an unavoidable condition. The most prevalent pain-related conditions in older adults are arthritis-related disorders. However, systemic chronic diseases such as diabetic complications, cancer-related pain, and post-stroke pain also have high incidence rates among the older population[8].

Chronic pain has been linked to various comorbidities and risk factors. Studies indicate that women are more likely to develop chronic pain disorders due to sex-related differences in neurobiology and pain perception. These factors contribute to a greater intensity of pain experiences, making the female gender a relevant risk factor[13].

Advanced age has also been identified as a significant risk factor, as demonstrated by multiple epidemiological studies. According to the Centers for Disease Control and Prevention (CDC), data from the 2019 National Health Interview Survey show that among individuals aged 65 and older, 30.8% experience chronic pain, compared to 25.8% of those aged 45 to 64 and 14.6% of those aged 18 to 29. Therefore, a comprehensive understanding of the various risk factors and comorbidities in individuals 65 and older is important for effective pain management and intervention strategies[13].

Pain perception is not necessarily proportional to the degree of tissue or nerve damage. Instead, it results from a complex interplay of physiological, cognitive, emotional, and

sociocultural factors. Additionally, it is significantly influenced by comorbidities such as stress, anxiety, depression, and sleep disorders[14].

To effectively treat pain in the older adult, a comprehensive assessment is essential. Although self-reported pain levels serve as a helpful indicator, many older adults underreport their pain due to beliefs that pain is a normal part of aging, fear of receiving a serious diagnosis, or concerns about losing their independence. Furthermore, they often present with multiple comorbidities and overlapping diagnoses that may contribute to pain. Therefore, a thorough medical history and physical examination are recommended to identify various pain sources. It is also important to consider that older adults are at higher risk of incidental findings in medical imaging, and additional tests should only be requested when supported by clinical evidence[8].

The global population is aging rapidly, with projections indicating that the number of adults aged 65 and older will double to approximately 1.5 billion by 2050, while the number of individuals aged 80 and older will triple to 426 million. This demographic shift will have a profound impact on healthcare, quality of life, retirement systems, and caregiving, increasing the burden of chronic diseases and disabilities. Aging is an inevitable and progressive process, beginning as early as 20–30 and continuing over several decades[15].

According to current classifications, chronic pain is defined as "pain that persists or recurs for more than three months." It can be categorized as primary—when pain itself is the disease (e.g., fibromyalgia)—or secondary, when it results from a pre-existing condition (e.g., cancer-related pain). In older adults, most chronic pain cases are secondary to other disorders, including cancer, neuropathic pain, musculoskeletal conditions, chronic post-traumatic or post-surgical pain, chronic visceral pain, chronic headaches, and orofacial pain[16].

Brazil is undergoing a demographic transition characterized by the rapid aging of its population. Data from the Brazilian Institute of Geography and Statistics (IBGE) indicate that the country has approximately 188 million inhabitants, of whom 20 million are older adult. Projections suggest that by 2030, the older population will reach 41.5 million. This demographic shift has led to changes in morbidity and mortality patterns, with a higher prevalence of chronic diseases, particularly among women. Among these chronic conditions, pain is one of the most common. It is frequently associated with musculoskeletal dysfunctions and tissue damage, significantly affecting the health and well-being of older adults[17].

Chronic pain is a significant public health concern, contributing to high healthcare costs, reduced productivity, and lower quality of life. It also negatively impacts self-esteem, leading to limitations in both social and personal life. Among the older adult, chronic pain exacerbates

frailty, threatening their safety, autonomy, and independence. It compromises their ability to perform daily living activities (ADLs) and limits social interaction, further affecting their psychological and emotional well-being[18].

Research indicates that the prevalence of chronic pain in community-dwelling older adults ranges from 25% to 76%, with even higher rates in residential care facilities, where prevalence reaches 83% to 93%. The most commonly affected areas include the lower back, legs (knees or hips), and other joints. The impact of chronic pain on the older adult is profound, leading to depression, anxiety, reduced mobility, and increased healthcare costs[19].

Women represent the majority of the older population worldwide, with estimates suggesting that women live, on average, five to seven years longer than men. A recent national data project shows that in 2050, women will outnumber men in Brazil by approximately 7 million. Furthermore, the proportion of older women reaching advanced ages is significantly higher than that of men. The population of individuals aged 80 and older is predominantly female, highlighting the feminization of aging[18].

Nociception is the process by which intense thermal, mechanical, or chemical stimuli are detected by a specialized subclass of peripheral nerve fibers known as nociceptors[20]. The cell bodies of these nociceptors are located in the dorsal root ganglia (DRG) for the body and in the trigeminal ganglion for the face. Each nociceptor has a peripheral axonal branch that innervates its target organ and a central branch that projects into the spinal cord[20].

Nociceptors are activated only when stimuli reach noxious intensity, indicating that they possess specific biophysical and molecular properties that allow them to detect and respond to potentially harmful stimuli[21]. There are two primary categories of nociceptors: Aδ fibers – Medium-diameter, myelinated fibers that transmit sharp, localized pain, often referred to as “first” or “fast” pain. They are distinct from Aβ fibers, larger, faster-conducting fibers that respond to innocuous mechanical stimuli such as light touch. C fibers – These are small-diameter, unmyelinated fibers that transmit diffuse, poorly localized pain, known as “second” or “slow” pain[22]. Understanding the mechanisms of nociception is crucial for developing effective pain management strategies, particularly in older adults, who are more susceptible to chronic pain syndromes and central sensitization.

One of the most common conditions leading to chronic pain and disability in older adults is osteoarthritis. This is likely associated with the burden of obesity, combined with connective tissue senescence during aging, which can result in painful changes both during activity and at rest. Additionally, frailty has been linked to osteoarthritis, possibly through the activation of

inflammatory pathways, with osteoarthritis-related pain serving as an aggravating factor for the severity of frailty itself[16].

While sedentary behavior has been strongly associated with an increased risk of chronic diseases, engaging in light, moderate, or intense physical activity has been positively correlated with perceived health improvements in older individuals. Brazilian older adults are generally increasingly seeking a healthier, more active, and independent lifestyle. Promoting exercise and physical activity has been a central objective of various public health policies and programs, aiming to foster a better quality of life, mainly when activities are performed systematically[17].

Physical exercise is crucial in managing chronic pain in older adults, incorporating interventions such as mind-body exercises, resistance training, and aerobic activities. Pilates, which focuses on core stability and strength, has demonstrated greater efficacy in pain relief and functional improvement than aerobic activities, making it a recommended strategy for pain management in older individuals. Moreover, it is essential to personalize exercise prescriptions to accommodate individual needs, adjusting intensity and modality based on symptom severity and environmental factors[23].

For example, treating chronic low back pain in older adults requires a multifaceted approach, integrating aerobic and strength training at least three times per week for sessions lasting over 60 minutes, sustained for a minimum of 12 weeks. This regimen has been linked to improved quality of life and mobility. However, further high-quality studies are needed to confirm its effects on functional indices such as SF-36 and TUG[24].

Another effective method is neuromuscular exercise (NM), which enhances proprioception, functional stability, and pain reduction, particularly in older adults experiencing musculoskeletal pain across multiple sites. This approach also offers psychological benefits, such as reducing depressive symptoms, further supported by social interaction during physical activity[25]. Additionally, aerobic training not only mitigates cognitive decline in older adults with dementia but also improves physical function and reduces behavioral symptoms, making it a low-risk and valuable option for promoting both mental and physical well-being[26].

Resistance training is a key strategy for muscle mass preservation and strength enhancement, counteracting age-related functional decline. When performed with progressive overload, it stimulates type II muscle fiber hypertrophy and neuromuscular control, essential for maintaining independence and functional capacity in aging individuals[27]. Importantly, pain management does not require high-intensity exercise. While some studies suggest that certain chronic pain patients can engage in exercise intensities sufficient to trigger exercise-induced

hypoalgesia, further research is needed to understand better exercise tolerance and its effects across different chronic pain populations[28].

Aerobic exercises such as walking, cycling, and swimming are widely recommended for older adults due to their cardiovascular benefits and role in reducing chronic pain perception. Research suggests that moderate-intensity aerobic activities (50-70% of VO_2 max), performed for approximately 150 minutes per week—divided into 30- to 60-minute sessions—are practical and safe for older individuals. This regimen also enhances pain tolerance and reduces anxiety, with a low incidence of adverse effects[29].

On the other hand, resistance training is fundamental for muscle strengthening and lean mass preservation, both critical in pain relief and functional improvement. Moderate to high intensities (60-80% of one-repetition maximum, 1RM) are recommended for older adults, with two to three sessions per week. Each session should include two to three sets of 8 to 12 repetitions targeting major muscle groups, particularly the lower limbs, and core, essential for stability and balance. This type of training reduces musculoskeletal pain and supports functional independence, delaying the natural decline in muscle mass associated with aging[27,30.]

Mind-body modalities, such as Pilates and Tai Chi, offer physical and psychological benefits, improving proprioception, balance, and stress relief. Pilates has proven particularly effective in core strengthening and reducing disability associated with chronic pain, especially when compared to standalone aerobic exercises. Additionally, these activities help mitigate psychosocial factors such as anxiety and stress, which are frequently linked to chronic pain in older adults.

Low- to moderate-intensity Tai Chi sessions, lasting 45 to 60 minutes and performed two to three times per week, are recommended for optimal benefits. These sessions enhance functional stability and self-confidence, providing a safe and integrative approach to pain management[23,25].

CONCLUSION

Well-structured and personalized exercise interventions can significantly reduce pain intensity and improve the quality of life in older adults. Various exercise modalities, including aerobic exercise, resistance training, and mind-body practices such as Pilates and Tai Chi, have proven effective in pain management and providing additional benefits, such as enhanced stability, muscle strength, and mental health.

Aerobic exercises, performed at moderate intensities, contribute to increased pain tolerance and a reduction in psychosocial factors such as anxiety. Resistance training, focusing on specific muscle groups, is crucial in preserving muscle mass and functional capacity, serving as a foundation for healthy aging. Additionally, mind-body practices have emerged as a valuable complementary approach, integrating physical and emotional benefits that support treatment adherence and self-confidence among older adults.

These findings highlight the importance of an individualized approach tailored to the physical condition of each older individual. This ensures that exercise prescriptions consider volume, intensity, and safety. By treating exercise as both a preventive and therapeutic strategy, it becomes a key tool for chronic pain management, fostering active and functional aging.

In summary, physical exercise is a safe and effective intervention, essential for improving the physical and mental well-being of older adults with chronic pain.

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CONTATO

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