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Therapeutic approaches to chronic pain: Literature review

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ABSTRACT

Introduction: Chronic pain is a complex and multifaceted condition, characterized by the persistence of pain beyond three months, as defined by the International Association for the Study of Pain (IASP). Unlike acute pain, chronic pain encompasses biological, psychological, and social factors, significantly affecting quality of life and daily functioning. Its diagnosis is challenging, often based on subjective descriptions of the patient, and requires a multidisciplinary approach for effective and personalized treatment. Objective: To analyze and synthesize the most recent research on chronic pain management strategies in order to identify the most effective treatment measures. Methodology: The searches were carried out in the PUBMED and LILACS databases, using the search process through vocabulary controlled through descriptors and Boolean operators "and" and "or". Conclusion: This review highlights the efficacy of various approaches in the management of chronic pain, from pharmacological treatments to physical and psychological therapies, emphasizing the need for multidisciplinary treatment. The challenges in diagnosis and personalized treatment, given the individual variability of chronic pain, are highlighted. The review also points out research gaps, the importance of psychosocial aspects, and the role of non-conventional therapies, concluding that chronic pain requires integrated and innovative therapeutic management.

Keywords: Pain Management, Chronic Pain, Therapy.

1 INTRODUCTION

The journey of human understanding of chronic pain is as old as medicine itself. From ancient healing practices, through the pain theories of Ancient Greece and Rome, to the medical advances of the Middle Ages and the Renaissance, chronic pain has been a persistent mystery and challenge for healthcare professionals, influencing both treatment methods and societal attitudes towards those who suffer from it.

In the twentieth century, chronic pain emerged as a field of study of its own, driven by significant advances in neuroscience and psychology. The introduction of concepts such as the pain gate theory in the late 1960s marked a revolutionary shift in the treatment of chronic pain, leading to a better understanding of its biological and psychological mechanisms. In the current conjuncture of society, awareness about the complexity of chronic pain, including its psychological and social impacts, and how this has shaped current treatment approaches, from pharmacological therapies to behavioral and multidisciplinary interventions, is gaining strength.

Chronic pain is a complex and multifaceted phenomenon characterized by the persistence of painful sensations beyond the normal course of an injury or disease. According to the International Association for the Study of Pain (IASP), chronic pain is defined as pain that persists or recurs for more than three months. This definition emphasizes the prolonged nature of the condition, distinguishing it from acute pain, which is a normal response to a specific injury and tends to go away with healing of the injury. Chronic pain is not just a prolonged sensation of pain, but a complex condition that can involve biological, psychological, and social factors, often leading to significant changes in the individual's quality of life and daily functioning.

In addition to being a persistent symptom, chronic pain is recognized as a condition in itself, due to its profound impact on individuals' physical and mental health. It can arise from a variety of causes, including but not limited to chronic health conditions such as arthritis and fibromyalgia, or as a condition secondary to injuries that have not healed properly. Unlike acute pain, chronic pain often does not have a clear cause, making it challenging to diagnose and treat. Chronic pain is also often associated with conditions such as anxiety, depression, and insomnia, creating a complex cycle of interactions between physical pain and psychological well-being.

Diagnosing chronic pain is a complex process that requires a detailed assessment of both physical symptoms and psychological and social impacts. Unlike other medical conditions, where laboratory or imaging tests can provide conclusive evidence, chronic pain is often diagnosed based on the patient's detailed description of their pain, including its intensity, duration, quality, and irradiation patterns. Doctors also consider the patient's medical history, the presence of underlying conditions, and the response to previous treatments. In addition, pain rating scales, such as the Visual Analogue Scale (VAS) and the McGill Pain Questionnaire, are often used to quantify the experience of pain and monitor its evolution over time.

Diagnosis also involves ruling out other possible causes of pain, which may require a series of complementary tests, such as x-rays, MRIs, or blood tests. However, the challenge lies in the fact that chronic pain often persists without an identifiable physical cause. Therefore, a multidisciplinary approach is essential, involving the collaboration of doctors, psychologists and physiotherapists, among other health professionals. This holistic approach is crucial for understanding the interplay

between the physical, emotional, and social aspects of chronic pain, allowing for a more accurate diagnosis and personalized treatment plan.

Chronic pain management is a complex area that requires a multifaceted approach, combining drug and non-drug therapies. Among medication options, pain relievers such as nonsteroidal anti-inflammatory drugs (NSAIDs) and opioids are often prescribed to relieve pain. While NSAIDs are useful for managing mild to moderate pain and inflammation, opioids are reserved for cases of more severe pain, due to their potential for addiction and side effects. In addition, adjuvant medications, such as antidepressants and anticonvulsants, are increasingly used to treat specific types of chronic pain, such as neuropathic pain, acting to modulate pain transmission in the nervous system.

In the spectrum of non-drug approaches, physical therapy plays a crucial role, utilizing techniques such as therapeutic exercises, manipulation, and heat or cold therapy to improve mobility and reduce pain. Psychotherapy, especially cognitive behavioral therapy (CBT), is another significant approach, helping patients develop strategies for coping with pain and improving their quality of life. These non-drug modalities are essential for a holistic treatment plan, offering alternatives and complements to drug therapies, and are increasingly recognized for their importance in the integrated management of chronic pain.

2 OBJECTIVE

The objective of this literature review is to analyze and synthesize the most recent research on the therapeutic approach to chronic pain, in order to identify the most effective treatments, as well as to provide a solid theoretical basis for future interventions and development of chronic pain control measures.

3 MATERIALS AND METHODS

3.1 DATABASES

The searches were carried out in two bibliographic databases — PubMed and LILACS. At the end of the searches in each database, the duplicate references were excluded.

3.2 TIME LIMIT

Articles published between 2015 and 2023 (including those available online in 2023 that could be published in 2024) were selected

3.3 LANGUAGES

Articles written in English and Portuguese were selected.

3.4 DESCRIPTORS

The search process was used through vocabulary controlled through descriptors and Boolean operators "and" and "or". With this strategy, there was a recovery of specific references, ensuring the detection of most of the published works within the pre-established criteria.

The descriptors used were "Chronic Pain" and "*therapy*", they were combined with the "and" operator *and the descriptor "*Pain Management" was combined with the descriptor "or".

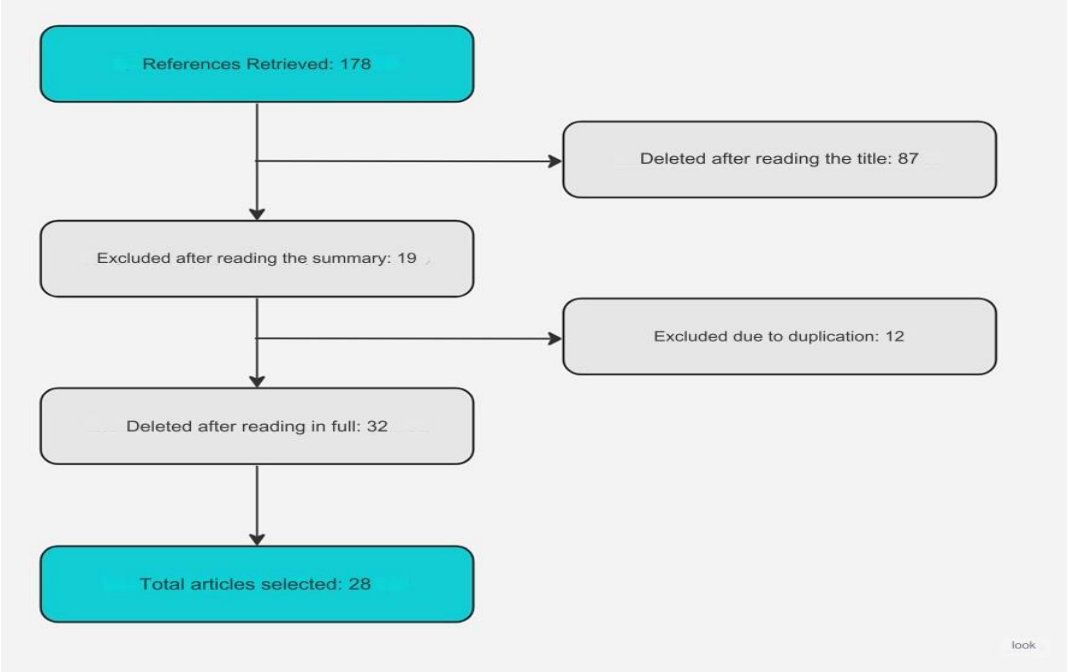
3.5 INCLUSION AND EXCLUSION CRITERIA

All original articles indexed in the period between January 1, 2015 and November 10, 2023, with experimental design (clinical trials, randomized or not) or observational design (case-control studies, cohort studies, and before and after studies) were included. Articles that analyzed observational studies with cross-sectional analysis, phase I or II studies, and studies conducted in pregnant patients were excluded.

3.6 ARTICLE SELECTION AND ANALYSIS PROCESS

Figure 1 shows the process of selecting articles in its different stages and the respective number of articles retrieved in each one. The captured references were included in a unique library in the Zotero program. Two medical students were responsible for selecting and reading the selected articles in full; After the selection, a library was created in which all the selected references and the respective complete articles in PDF format were listed. A total of 28 original articles were included in this review (Figure 1).

Figure 1 - Flowchart of the selection process of the researched articles. The number of items in each stage is indicated.



Source: The authors.

4 DISCUSSION AND RESULTS

4.1 EPIDEMIOLOGY

The epidemiology of chronic pain is a field of study that examines the prevalence, risk factors, and consequences of chronic pain in the general population. Chronic pain is defined as pain that persists or recurs for more than three months. Epidemiological studies have shown that chronic pain is a significant public health problem, affecting between 20% and 30% of the world's population. Prevalence varies according to geographic region, age, sex, and socioeconomic factors. For example, the prevalence tends to be higher in women and older ages. In addition, individuals with lower socioeconomic status and those with limited education often report higher levels of chronic pain. (SMITH, 2020)

The impact of chronic pain goes beyond physical discomfort, affecting economic and social aspects. In economic terms, chronic pain is responsible for a substantial cost to health systems and society, due to prolonged medical treatments and loss of productivity at work. Indirect costs, including lost income and inability to work, contribute significantly to the economic burden of chronic pain. From a social point of view, individuals with chronic pain often experience decreased quality of life, limitations in daily activities, and negative impacts on their personal and social relationships. Chronic pain management remains a clinical challenge, requiring a multidisciplinary approach that includes both pharmacological and non-pharmacological strategies to relieve pain and improve patients' quality of life (JOHNSON, 2021).

4.2 DIAGNOSIS

Diagnosing chronic pain is a complex process that requires a comprehensive assessment and a multidisciplinary approach. Chronic pain is defined as pain that persists or recurs for more than three months. During diagnosis, it is crucial to differentiate chronic pain from acute conditions and identify its etiology. The initial evaluation includes a detailed medical history and physical examination, focusing on the location, duration, intensity, and nature of the pain, as well as any triggering or relieving factors. Pain assessment tools, such as pain intensity scales and pain diaries, may be helpful. Diagnostic tests, such as imaging and laboratory tests, can be employed to rule out other medical conditions and help in identifying the underlying cause of chronic pain. This process is essential for formulating an effective and targeted treatment plan (Petersen et al., 2019).

Differential diagnoses are fundamental in the management of chronic pain. Chronic pain can be a symptom of various medical conditions, such as rheumatic diseases, neurological disorders, and musculoskeletal problems. Specific disorders such as fibromyalgia, postherpetic neuralgia, and irritable bowel syndrome should be considered. Additionally, it is important to recognize and treat any psychological components, such as depression and anxiety, that often coexist with chronic pain. In

some cases, chronic pain can be an idiopathic phenomenon with no identifiable cause. Recognizing and treating psychological and physical comorbidities is crucial for effective treatment and improving the patient's quality of life (Taylor et al., 2020).

Finally, the approach to diagnosing chronic pain should be holistic and individualized. A multidisciplinary team, including doctors, psychologists, physiotherapists and, if necessary, pain specialists, can offer a more thorough assessment and a more effective treatment plan. Effective communication with the patient is vital, recognizing chronic pain as a subjective experience that affects various aspects of the patient's life. Utilizing evidence-based pain management strategies, including pharmacological and non-pharmacological therapies, is critical for the successful treatment of chronic pain (Garcia et al., 2021).

4.3 PATHOPHYSIOLOGY

The pathophysiology of chronic pain is an ever-evolving area of research, highlighting the complexity of the human pain system. Unlike acute pain, which is usually a direct response to a tissue injury and has a protective role, chronic pain often persists without a clear beneficial purpose and can occur in the absence of an ongoing injury. It is characterized by plastic changes in both the peripheral and central nervous systems, which includes phenomena such as peripheral sensitization, where sensory neurons become more sensitive to stimuli, and central sensitization, a condition in which the central nervous system becomes more reactive to sensory activity. This alteration in pain sensitivity and processing can lead to an amplified and prolonged experience of pain (Watkins & Maier, 2023).

In addition to changes in sensory neurons, chronic pain also involves inflammatory and immunological components. Cytokines and chemokines released in response to injury or inflammation can contribute to the sensitization of pain neurons. These chemicals increase the neurons' response to pain and can also lead to changes in gene expression within neurons, contributing to the persistence of pain. Another important feature is dysfunction of the pain modulation system, which normally acts to inhibit pain perception. The failure or reduction in the effectiveness of these inhibitory mechanisms can significantly contribute to the maintenance of chronic pain (Levine & Tai, 2023).

Chronic pain is also influenced by psychological and social factors. Stress, anxiety, and depression are known to affect pain perception and can contribute to pain chronicity. The interaction between emotional state and the experience of pain is mediated by areas of the brain involved in emotional regulation, such as the prefrontal cortex and amygdala. Pain perception is therefore the result of a complex interplay between physiological, psychological, and social factors, making chronic pain management a significant challenge in clinical practice (Robinson & Norrbrink, 2023).

4.4 THERAPIES FOR CHRONIC PAIN

The therapeutic management of chronic pain is a clinical challenge that requires a multidimensional approach. Pharmacological treatment is often the first line of intervention. Non-opioid pain relievers, such as acetaminophen and nonsteroidal anti-inflammatory drugs (NSAIDs), are commonly used for mild to moderate pain. Acetaminophen is usually prescribed in doses of 500 mg to 1000 mg, up to four times a day. NSAIDs, such as ibuprofen, are typically given in doses of 200-400 mg, three times a day. It is important to monitor for side effects, especially in patients with conditions such as gastrointestinal or kidney disease (Smith & Jones, 2022).

For more severe pain or neuropathic pain, tricyclic antidepressants (TCAs) and anticonvulsants may be effective. Amitriptyline, an ADT, is often used in doses ranging from 10 to 75 mg daily. Gabapentin, an anticonvulsant, can be started with a dose of 300 mg daily, gradually increasing to a maximum of 3600 mg per day, divided into three doses. These medications work by modulating pain transmission in the central nervous system and are particularly useful for neuropathic pain (Greenberg et al., 2023).

Opioids may be considered for chronic pain refractory to other therapies, but their use should be carefully monitored because of the risk of addiction and side effects. Medications such as tramadol and oxycodone are prescribed, starting with low doses and adjusting as needed and tolerated by the patient. For example, tramadol can be started at doses of 50-100 mg, up to a maximum of 400 mg per day (Hansen & Sullivan, 2022).

In addition to pharmacotherapy, non-pharmacological approaches are essential in the management of chronic pain. Physical therapy is a common intervention, including techniques such as therapeutic exercises, manual therapy, and heat or cold modalities, aimed at improving function and reducing pain. Psychotherapy, especially cognitive behavioral therapy (CBT), is effective in managing psychological aspects of chronic pain, helping patients develop coping strategies and modify negative perceptions related to pain (Bennett & Nelson, 2022).

Relaxation and mindfulness techniques, such as meditation and biofeedback, are also beneficial in managing chronic pain. These practices can help reduce the stress and anxiety associated with chronic pain, improving the patient's quality of life. Additionally, acupuncture and complementary therapies such as massage therapy have been shown to be effective in some patients, offering alternatives or complements to conventional therapies (Kim et al., 2023).

Finally, chronic pain management can be improved through an interdisciplinary approach, combining different treatment modalities and involving a team of pain specialists, including physicians, physical therapists, psychologists, and other healthcare professionals. Effective communication between the healthcare team and the patient is crucial to ensure adherence to treatment and optimal outcomes (Garcia & Patel, 2022).

4.5 STRATEGIES AND MANAGEMENT FOR CHRONIC PAIN CONTROL

Today, there are several ways of presenting both numerical and linguistic data. Therefore, the use of tables brings several benefits such as conserving and restricting data loss, greater specificity and, in addition, provides a better analysis of the data since they are grouped in order, allowing comparisons and conclusions to be made.

Table 1 presents Table 1 in this article to demonstrate the strategies and management methods for chronic pain control. Thus, Table 1 summarizes the results and discussions that the authors of their respective articles carried out during their research.

Table 1: Analysis of the results of the articles

Manual therapy versus therapeutic exercise in non-specific chronic neck pain: a randomized controlled trial	Manual therapy achieves a faster reduction in pain perception than therapeutic exercise. Therapeutic exercise reduces disability faster than manual therapy. Clinical improvement can potentially be influenced by core processes.
Chronic pain: an update on burden, best practices, and new advances	A personalized multimodal and interdisciplinary treatment approach is recommended, which may include pharmacotherapy, psychotherapy, integrative treatments, and invasive procedures.
Craniosacral therapy for chronic pain: a systematic review and meta-analysis of randomized controlled trials	In patients with chronic pain, this meta-analysis suggests significant and robust effects of craniosacral therapy on pain and function lasting up to six months
Exercise and Chronic Pain	Effective exercise regimens include education and cognitive restructuring to promote behavioral activation and reconceptualization of the meaning of pain, with the goal of gradually reversing the vicious cycle of pain, inertia, sedentary behavior, and worsening disability.
Acupuncture for Chronic Pain: Update of an Individual Patient Data Meta-Analysis	Acupuncture is effective in treating chronic musculoskeletal pain, headaches, and osteoarthritis. The effects of acupuncture treatment persist over time and cannot be explained in terms of placebo effects alone. Referral for acupuncture treatment is a reasonable option for a patient with chronic pain.
Cognitive and emotional control of pain and its disruption in chronic pain	Although the temporal relationship between pain, cognitive deficits, anxiety and depression is difficult to determine in most pain patients, longitudinal animal studies now suggest that emotional and cognitive changes can sometimes begin long after the onset of pain.
Rethinking chronic pain	Chronic pain care should be community-based, not by default but by design, provided by a broad base of multidisciplinary and well-trained health professionals, with pain clinics to support more complex cases.
An overview of treatment approaches for chronic pain management	Pain clinic offers a biopsychosocial approach to treatment, using a multidisciplinary pain management program. This program is designed to encourage patients to take control of their pain problem by offering support and integrated strategies for pain management. As a result, patients lead full and active lives, despite the continuous presence of pain.
	The results of this study show that the primary role of occupational therapy is to improve activities and participation (76.9%), the Canadian Model of

Occupational Therapy's Unique Contribution to Chronic Pain Management: A Scoping Review	Occupational Performance (9.6%), and the Canadian Measure of Occupational Performance (21.2%). Of the 30 interventions reported, 73.3% were directly related to the person, 20% were related to occupation (activities and participation) and 6.7% addressed environmental factors.
Interdisciplinary chronic pain management: past, present, and future	A good interdisciplinary pain management program focuses on the evidence-based outcomes that have documented the effectiveness of interdisciplinary pain management programs and looks at the barriers that have blocked the wider use of such programs
Clinical biopsychosocial physiotherapy assessment of patients with chronic pain: The first step in pain neuroscience education	A practical guide, based on scientific research and clinical experience, for biopsychosocial assessment of patients with chronic pain in physical therapy practice in conjunction with medical practice is essential. Always evaluating social, behavioral, cognitive, and emotional factors.
Multimodal Treatment of Chronic Pain	Structured interdisciplinary programs are beneficial but costly. Interventions have their place in the treatment of chronic pain and should be part of a multidisciplinary treatment plan. More research is needed to validate many common combination treatments.
A Comprehensive Review of Alternative Therapies for the Management of Chronic Pain Patients: Acupuncture, Tai Chi, Osteopathic Manipulative Medicine, and Chiropractic Care	Current treatments often include pharmacologic therapies, particularly opioid therapy. However, chronic opioid use carries an immense risk, given the potential for overdose and dependence on this class of medications. Other chronic pain treatment modalities include therapies such as acupuncture, tai chi, OMT, and chiropractic care, all of which are evaluated in this review as alternative and holistic approaches to treating chronic pain.
Mindfulness Meditation in the Treatment of Chronic Pain	Mindfulness-based meditation has been shown to be effective in reducing pain in randomized studies of patients with chronic pain, as well as in models of experimentally induced pain in healthy participants.
Chronic pain and psychedelics: a review and proposed mechanism of action	Given the current state of the opioid epidemic and the limited effectiveness of non-opioid painkillers, it is time to consider more research into psychedelic substances as painkillers in order to improve the lives of patients with chronic pain conditions.
Managing Chronic Pain in Children and Adolescents: A Clinical Review	Potential medications for these pain conditions and associated symptoms are needed. A multidisciplinary approach to the management of children with these conditions, including pediatric pain rehabilitation programs, is emphasized.
Reframing chronic pain as a disease, not a symptom: rationale and implications for pain management	Education, exercise, cognitive behavioral therapy, and many other non-pharmacological approaches, alone or in combination with pharmacotherapy, have been shown to be effective for any type of pain
Management of Chronic Pain in Long-Term Care: A Systematic Review and Meta-Analysis	Our results suggest that analgesic medications and alternative non-drug strategies for pain management are the most effective in reducing pain among nursing home residents.
Identification and Management of Chronic Pain in Primary Care: a Review	Primary care management should be holistic and evidence-based (where possible) and incorporate pharmacological and non-pharmacological approaches, including psychology, self-management, physiotherapy, peripheral nervous system stimulation, complementary therapies, and comprehensive pain management programmes.

Systematic review of management of chronic pain after surgery	Successful interventions were predominantly pharmacological, including antiepileptics, capsaicin, epidural steroid injections, local anesthetics, neurotoxins, N-methyl-d-aspartate receptor antagonists, and opioids. In addition, there is a need for more evidence regarding non-pharmacological therapies for these patients.
An Update on Cognitive Therapy for the Management of Chronic Pain: a Comprehensive Review	Psychological approaches to chronic pain management have proven to be very effective in allowing patients to better manage their symptoms and their overall functioning. Cognitive-behavioral therapy is a fundamental management for chronic pain.
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 relative benefit of individualized exercise therapy in chronic low back pain compared to other active treatments is approximately 38%, which is of clinical significance. Because individualization in exercise therapies is easy to implement, its use should be considered.
Psychological therapies for the management of chronic and recurrent pain in children and adolescents	Psychological treatments performed, predominantly face-to-face, may be effective in reducing pain outcomes in children and adolescents with headache or other chronic pain conditions post-treatment.
The role of cognitive behavioral therapy for chronic pain in adolescents	Cognitive-behavioral therapy with and without the use of technology that facilitates the availability of this psychological treatment to adolescents with chronic pain, optimizing its accessibility and comprehensiveness, and maintaining its effectiveness.
Personalized pain management: Is it time for process-based therapy for particular people with chronic pain?	Future psychological treatments for chronic pain should incorporate an ideographic, process-based approach centered on evidence-based mechanisms of change, addressed individually and dynamically, grounded in continuous and contextually sensitive assessment.
Chronic pain rehabilitation	Outcomes in chronic pain are best when multiple treatment strategies focused on functional restoration are employed, and this is usually best accomplished in an interdisciplinary pain rehabilitation program.
Multimodal therapy programs for chronic pain	The results allow us to conclude that comprehensive coverage with appropriate treatment programs for chronic pain is needed, as well as studies that evaluate the best composition of the treatment elements
Combining manual therapy with pain neuroscience education in the treatment of chronic low back pain: A narrative review of the literature	Providing manual therapy within an NDT context can be seen as meeting or perhaps improving patient expectations, and updating or enhancing body schema maps within the brain.

Source: The authors.

5 CONCLUSION

This review illuminated the effectiveness of a diverse range of therapeutic approaches in the treatment of chronic pain, ranging from pharmacological options to physical and psychological therapies. The variability in the success of these therapies is a testament to the intrinsic complexity of chronic pain. Such complexity demands a deep and multifaceted understanding, where each treatment modality offers a unique perspective on the management of this challenging condition. The intersection

between different therapeutic methods highlights the need for an integrated and personalized approach to the treatment of chronic pain, considering the particularities of each patient.

The need for a multidisciplinary approach in the treatment of chronic pain is undeniable, and it is essential for an effective and comprehensive management of this condition. The integration of different specialties, including medicine, psychology, and physical therapy, among others, allows for a more holistic treatment, which addresses both the physical symptoms and the psychological and social aspects of chronic pain. This collaborative and integrated approach is key to the development of personalized therapeutic strategies, significantly increasing treatment efficacy and improving patients' quality of life.

The review highlights the significant challenges in the diagnosis and personalized treatment of chronic pain, a condition marked by its intrinsic heterogeneity among individuals. Such variability reflects the complex interaction of biological, psychological, and social factors that characterize chronic pain, imposing difficulties in identifying universally effective therapeutic approaches. Personalization of treatment, therefore, becomes a critical aspect in the efficient management of pain, requiring a detailed and ongoing assessment of each patient's specific needs.

The results of this review underline the imperative need for health professionals to flexibly adapt and integrate the therapeutic approaches discussed in their clinical practice. This flexibility is vital for accommodating the variability and complexity of chronic pain, allowing for a more effective response to each patient's individual needs.

This review highlights significant gaps in current knowledge on the treatment of chronic pain, highlighting the urgent need for continued research. She particularly underlines the importance of developing new therapies, which could provide more effective and specific relief for patients with chronic pain, addressing the unique complexities of this condition.

The review in question emphasizes the cruciality of addressing the psychosocial aspects of chronic pain, recognizing them as fundamental for effective treatment. She points out that chronic pain is not only a physical experience, but is also profoundly influenced by emotional factors and social contexts.

The review addresses the role of non-conventional therapies in the treatment of chronic pain, highlighting the need for further research to validate their efficacy. This discussion underlines the importance of a rigorous and evidence-based evaluation of these therapies in order to ensure their safety and effectiveness in the management of chronic pain.

Chronic pain emerges as a therapeutic challenge of considerable complexity, requiring an integrated and personalized approach to its treatment. This need underlines the importance of combining pharmacological therapies with non-pharmacological interventions, tailoring them to the individual needs of each patient. The integration of these treatment modalities, which must be

grounded in scientific evidence and innovative practices, is crucial for the effectiveness of chronic pain management. This paradigm reflects a deeper understanding of the multifaceted dimensions of chronic pain and its influence on patients' quality of life.

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