INFLAMMATORY AND DEGENERATIVE DISEASES IN THE CONTEXT OF PHYSIOTHERAPY: A SYSTEMATIC LITERATURE REVIEW

ABSTRACT

Understanding inflammatory and degenerative diseases is crucial within the scope of Physiotherapy, as this area of health plays a fundamental role in alleviating symptoms and improving the quality of life of affected patients. The main objective of this systematic review is to investigate physiotherapeutic interventions used in the treatment of inflammatory and degenerative diseases, focusing on arthritis, osteoarthrosis, arthroplasties, degenerative disc disease, disc herniation, spondylosis, osteo-metabolic diseases (osteoporosis, osteomalacia , scurvy, rickets) and its main treatment protocols. The research was carried out in the following databases: LILACS; BDEnf and MEDLINE, using MeSH (Medical Subject Headings) terms and keywords related to topics of interest, such as: “Degenerative diseases”; “inflammatory diseases” and “physiotherapy”. The search was restricted to studies published in the last 10 years in English and Portuguese. When we added the search descriptors in the selected databases, 227 studies were found. However, after applying the inclusion criteria, 207 studies were discarded. Among them, 62 were published before 2013, 59 were not in the established languages, 2 were incomplete and 87 did not meet the proposed objectives. In this way, we selected 17 relevant articles. Finally, it was concluded that the challenges in applying physiotherapy in these conditions are multifaceted and require an equally complex response. Opportunities for improvement include the adoption of evidence-based practices, technological integration, continuous research, innovative treatments and a personalized and multidisciplinary treatment approach.

Keywords : Degenerative diseases; inflammatory diseases and physiotherapy.

INTRODUCTION

Physiotherapy is a very important part of ensuring the patient's well-being, offering relief from symptoms. In addition, it is of great importance to investigate in more depth the involvement of these diseases [1].

Since investigating these diseases provides in-depth knowledge about their symptoms and characteristics. And so, it is known that inflammatory diseases trigger pain, swelling and lesions, however, degenerative conditions cause the gradual wear and tear of body structures and their functioning. , being very common among the elderly [2].

Physiotherapy has the possibility of studying advances in treatment and understanding these problems, and physiotherapists can also create treatment plans for these patients, thus enabling these therapeutic resources to be more efficient and effective [3,4].

Therefore, the process and treatment of inflammatory diseases focuses on minimizing pain and maintaining joint movement, while degenerative diseases focus on slowing the progression of the disease. Therefore, the physiotherapist works from the prevention to the treatment of these conditions [1]. Furthermore, exploring inflammatory and degenerative diseases and their effective treatment has become increasingly critical in health sciences. As these conditions are universally observed and have a powerful impact on the general well-being of patients, in the case of inflammatory diseases these include, for example, rheumatoid arthritis , a disease in which the body's immune system attacks tissues and inflammation causes a chain inflammatory response that results in damage to the locomotor system. On the other hand, degenerative diseases, such as osteoarthritis, degenerate tissues over time, especially in the joints. Both types of condition share symptoms, including pain, difficulty and reduced ability to perform, which can seriously affect the patient's life.

Physiotherapy is essential in addressing the impact of global health, and physiotherapy is an extremely important practice in the intervention of inflammatory diseases, such as rheumatoid and arthritis, since these diseases cause constant discomfort and inflammation in the affected areas, causing damage, mainly to the joints in the long term [5].

In this sense, the flexibility of the tissues, particularly cartilage, results in comfort for patients suffering from degenerative diseases, such as osteoarthritis, as well as other diseases that cause restricted movement [6].

Controlling these diseases requires the introduction of physiotherapy, which is appropriate not only for relieving symptoms, but also for preventing the worsening of the pathology and thus improving the usefulness of these patients. The main objective of physiotherapy includes reducing pain, increasing range of motion, increasing muscle strength, suppressing deformities and ensuring self-sufficiency in the daily life of patients [7].

To achieve these goals, physiotherapists apply a variety of approaches and strategies. Maintaining muscle and joint function depends on therapeutic exercises, tissue elasticity is maintained through stretching, and joint mobilizations are currently used to increase or maintain mobility in the affected joints. Manual therapies, including massage, can be administered to relieve muscle tension and reduce pain [4].

Thus, understanding inflammatory and degenerative diseases and their effective treatment has become increasingly vital, as these conditions have a profound impact on patients' well-being [4].

METHODOLOGY

Definition of the Research Problem

The main objective of this systematic review was to investigate the physiotherapeutic interventions used in the treatment of inflammatory and degenerative diseases, focusing on arthritis, osteoarthritis, arthroplasties, degenerative disc disease , herniated disc, spondylosis, osteometabolic diseases (osteoporosis, osteomalacia, scurvy, rickets) and their main treatment protocols.

Search Strategy

The research was carried out in the following databases: Latin American and Caribbean Literature in Health Sciences (LILACS); Specialized Bibliographic Database in the Nursing Area (BDEnf) and *Medical Literature Analysis and Retrieval System Online* (MEDLINE), using MeSH (Medical Subject) terms Headings

) and keywords related to topics of interest, such as: “Degenerative diseases”; “inflammatory diseases” and “physiotherapy”.

Inclusion and Exclusion Criteria

Original studies published in the last 10 years in English and Portuguese that addressed the use of physiotherapy in the treatment of the conditions mentioned were included. Studies in languages other than those specified, studies unrelated to the topic, case reports and editorials were excluded.

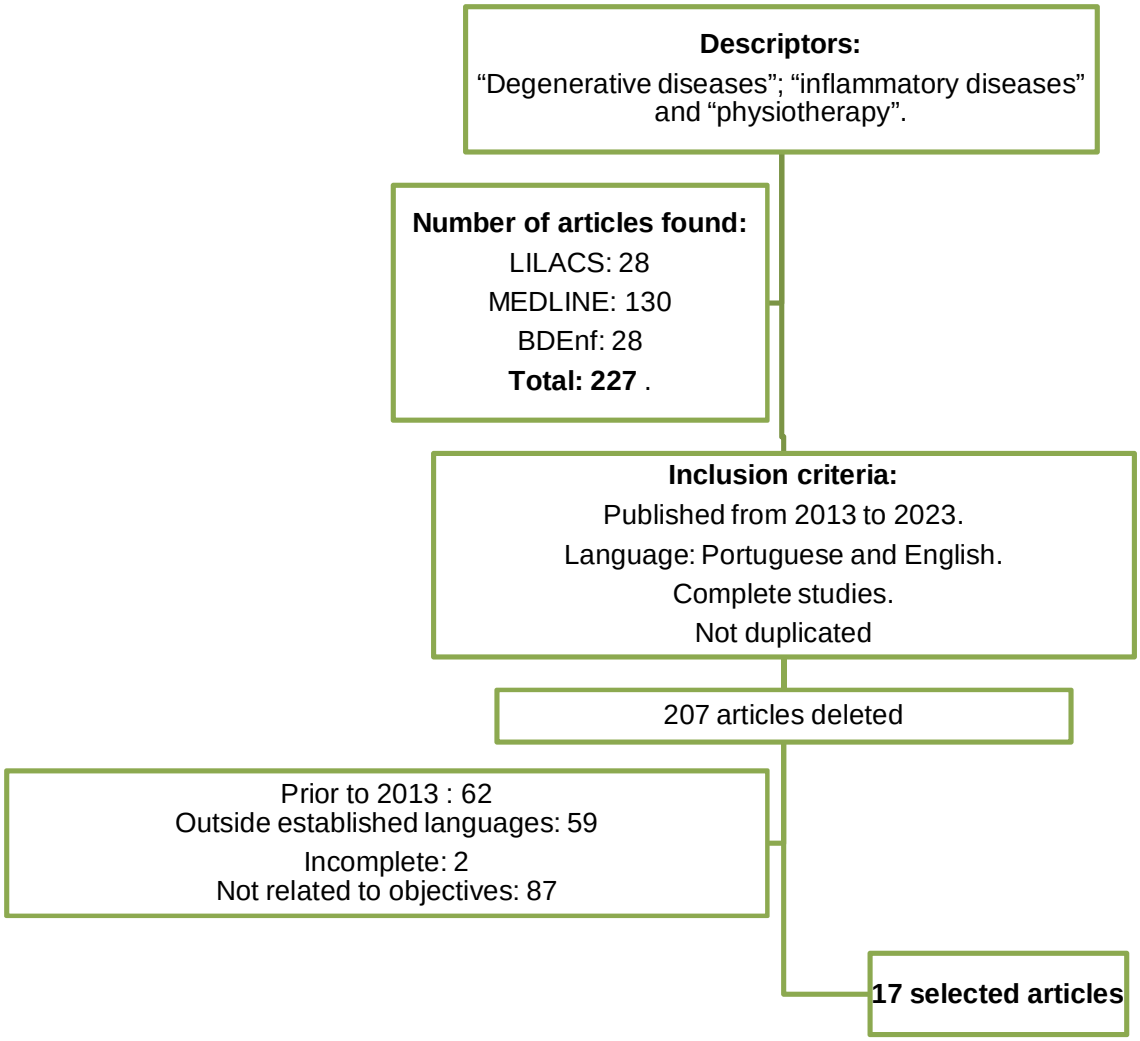
Data Extraction, Synthesis and Analysis

The extracted data were analyzed qualitatively to identify patterns, gaps in the literature and trends in the use of physiotherapy for the diseases studied. Tables and graphs were prepared to present the main findings in a clear and concise manner.

RESULTS AND DISCUSSION

When the search descriptors were added to the selected databases, 227 studies were found. However, after applying the inclusion criteria, 207 studies were discarded. Among them, 62 were published before 2013, 59 were not in the established languages, 2 were incomplete and 87 did not meet the proposed objectives. Thus, we selected 17 relevant articles, as shown in Figure 1.

Figure 1. Study selection flowchart.



Source: Prepared by the authors.

The selected studies were presented in Table 1 and organized in chronological order, presenting authorship, source, type of publication, relationship with the research objectives, methodological approach and main findings.

Table 1. Organization of selected studies.

AUTHOR/YEAR	SOURCE	PUBLICATION TYPE	RELATIONSHIP WITH THE OBJECTIVES OF SEARCH	METHODOLOGICAL APPROACH	MAIN FINDINGS
Andrade *et al.* [1]	Journal Health NPEPS	Article	Yes	Longitudinal and interventional study	The kinesiotherapy exercise program performed in this study demonstrated to be effective in reducing pain in individuals with osteoarthritis.
Bennell. *et al.* [4]	PT, Pain, Function, and Hip Osteoarthritis	Article	Yes	Randomized clinical trial	Among adults with painful hip osteoarthritis, physical therapy did not result in greater improvement in pain or function compared with sham treatment, raising questions about its value for these patients.
Andrade *et al.* [2]	Brazilian Journal of health Review	Article	Yes	Bibliographic review	Arthritis is influenced by a combination of genetic and environmental factors. Genetic predisposition is significant, with polymorphisms associated with the condition being identified. In addition, environmental factors, such as smoking and infections, can trigger or aggravate the condition. Early clinical diagnosis and physiotherapy are emphasized, since the identification of clinical symptoms, such as rheumatoid nodules and radiographic changes, are essential for effective management of the disease.
Levada *et al.* [8]	Brazilian Journal of Implantology and Health Sciences	Article	Yes	Literature review	The study on herniated discs highlights that treatment can vary between conservative approaches, such as physiotherapy and the use of anti-inflammatories, and surgical interventions in more severe cases. Most patients improve with conservative treatment within twelve weeks, but in cases of neurological impairment, surgery becomes necessary. Discectomy is one of the most common surgeries, with recurrence rates ranging from 5% to 18%. The research also highlights the

					importance of a multidisciplinary approach, considering physical and mental aspects, and the need for further studies to validate new therapies, such as the use of stem cells.
Medeiros *et al.* [11]	Contributions to the Social Sciences	Article	Yes	Literature review	They indicate that physical activity, mediated by physiotherapy, is essential in the management of rheumatic diseases. The recommended treatment includes progressive resistance exercise, aerobic exercise and pain self-management strategies, complemented by health education on rheumatic conditions. The use of technology, such as smartphone applications, was also highlighted as a factor that can enhance the results of interventions.
Marks; Castanhetti ; Fan [10]	Inova Health Magazine	Article	Yes	Case study	The application of the Pilates Method was important in reducing lower back pain, increasing the patients' abdominal muscle strength and positive changes were obtained in the EVA and QNSO results.
Melo *et al.* [12]	Brazilian Journal of Implantology and Health Sciences	Article	Yes	Bibliographic review	It presents scientific material that covers a detailed study on the origin, causes and evolution of Rheumatoid Arthritis (RA) and identifies the most commonly used approaches in physiotherapy treatment. Hydrotherapy is mentioned, as aquatic physiotherapy in a heated pool can be beneficial for patients with rheumatoid arthritis, since water provides support and pressure relief on the joints, making it easier to perform exercises.
Radominski*et al.*[16]	Journal of Rheumatology	Article	Yes	Literature review	The main objective of osteoporosis treatment is to prevent fractures. Identifying this population at risk through early diagnosis and clinical and physiotherapeutic treatment is of fundamental importance.
Wood *et al.* [9]	Journal of Neurosurgery :	Article	Yes	Systematic review	Rehabilitation has been a common feature in the postoperative management of patients undergoing

	Spine				spinal fusion. Although caregivers from a variety of disciplines agree that most of their patients will benefit from this effort, supporting data remain scarce.
Iolascon*et al* .[6]	Rehabilitation Medicine for Elderly Patients	Article	Yes	Literature review	The key element of rehabilitation is therapeutic exercise, particularly resistance training, which is effective in both maintaining bone health and improving muscle performance.
Pear tree*et al.* [14]	Research, Society and Development	Article	Yes	Bibliographic review	Hydrotherapy, therapeutic massage, laser therapy and physical exercise methods have shown their effectiveness in the health of individuals with rheumatoid arthritis (RA), but there was no consensus regarding the parameters of the methods. Therefore, the study proved to be relevant for the analysis of the effectiveness of physiotherapeutic approaches in individuals with RA.
Kong *et al.*[7]	Risk management and healthcare policy	Article	Yes	Retrospective study	Consideration of disc degeneration, M/D, fat infiltration of paraspinal muscles, sROM , ISA, LL, BMI, and intensity of physical load before surgical intervention may contribute to the prevention of rLDH after PETD and lead to a more satisfactory operative outcome and the development of a reasonable rehabilitation program after discharge.
Schnornberger *et al.* [17]	Rev Dor	Article	Yes	Case report	This is a case series study of five female patients, with a mean age of ±54 years. After the initial evaluation, the patients underwent a physiotherapeutic intervention program based on kinesiotherapy, which was carried out in groups, with a frequency of two weekly sessions and a duration of 50 minutes per session, totaling 10 sessions. The proposed intervention program was effective in improving the pain and vitality domains related to the analysis of quality of life in women with rheumatoid arthritis.

Dantas; Salvini; Mcalindon[5]	Brazilian Journal of Physical Therapy	Article	Yes	Literature review	There is a need for healthcare professionals to move away from poor quality and ineffective treatments and educate themselves and their patients on current evidence-based best practices for knee OA.
Teixeira *et al.* [19]	Research, Society and Development	Article	Yes	Literature review	He described the main methodologies that contribute to the prevention and clinical and physiotherapeutic treatment used in knee osteoarthritis. Among them, the following stand out: acupuncture, manual therapy, devices (orthoses, shoes, walkers), weight loss, electrotherapy (TENS, ultrasound and laser) and thermal modalities such as cryotherapy, thermotherapy and hydrotherapy.
Shah; Shinde [18]	DY Patil Journal of Health Sciences	Article	Yes	Systematic review	It has been shown that regular exercise can help reduce pain and improve function in patients with gouty arthritis.
Quicke *et al.* [15]	Osteoarthritis and Cartilage	Article	Yes	Literature review	Analyzed the incidence and risk factors associated with osteomalacia and scurvy, and reviewed available treatment options.

Source: Authors (2024).

The analyses presented in Table 1 present information aimed at managing inflammatory and degenerative diseases in the context of physiotherapy. Among the findings, it is worth highlighting the economic viability of preventing osteoporosis through the bone microarchitecture process, the treatment with ustekinumab for patients with peripheral arthritis and spondylitis, the importance of managing the patient's waiting time for surgery to restore the knee extensor mechanism, and the importance of Pilates in reducing low back pain and increasing abdominal muscle strength [16].

Furthermore, research addresses issues such as the relationship between oxidative stress and inflammation in neurodegenerative diseases, progress in the diagnosis and treatment of osteoarthritis, mechanisms of articular cartilage degeneration, and postoperative rehabilitation strategies for patients undergoing spinal fusion [9].

In the studies by Medeiros *et al.* [11]showed that physical activities mediated by physiotherapy are significant when it comes to pain management for rheumatic diseases. They mentioned progressive resistance exercises, aerobic exercises and pain self-management strategies, complemented by health education about rheumatic conditions as excellent factors in the care process.

The findings of Pereira *et al* .[14] showed that hydrotherapy, therapeutic massage, laser therapy and physical exercise methods are effective in the health of individuals with rheumatoid arthritis. On the other hand, they debate the parameters of these methods, as no consensus was reached.

In the production of Teixeira *et al.*[19] described the main methodologies that contribute to the prevention and clinical and physiotherapeutic treatment used in knee osteoarthritis. Highlighting acupuncture, manual therapy, devices (orthoses, shoes, walkers), electrotherapy (TENS, ultrasound and laser) and thermal modalities such as cryotherapy, thermotherapy and hydrotherapy.

Therefore, the clinical study discusses the efficacy of many therapeutic approaches, such as physiotherapy for hip osteoarthritis and robotic-assisted surgery for acetabular cup placement. In addition, issues related to the prudence of postoperative complications, risk factors associated with recoveries, and the

significance of evidence-based education for health professionals in the treatment of osteoarthritis are addressed [4].

The multiplicity of materials covered in the studies improves cognition about the possibilities of physiotherapeutic treatments for the care of inflammatory and degenerative pathologies and helps to develop instructive knowledge in the area, adding valuable subsidies for the improvement of professionals in clinical practice. That said, the main findings are presented.

DISCUSSION

Diseases in which inflammation and degeneration are associated with the musculoskeletal system are a difficult problem for both patients and health professionals. In this context, the role of physiotherapy in the treatment and improvement of the quality of life of these individuals is discussed, through a variety of interventions that address pain, reduce inflammation, improve joint function and prevent future damage, in order to help these patients.

Effectiveness of Physiotherapeutic Interventions in Inflammatory and Degenerative Diseases

The treatment of degenerative and inflammatory diseases that affect the musculoskeletal system is a challenge for both the patient and the health professional, and therefore, physiotherapists stand out for having a fundamental role in reestablishing the patient's well-being [5].

The techniques offered by these professionals cover a range of strategies aimed at relieving pain, reducing inflammation, improving joint function and stability, and even preventing future damage [9].

et al. [1] were mentioned , which demonstrated the benefits of physiotherapy, through physical exercise, for reducing pain in individuals with osteoarthritis. While Schnornberger, *et al.* [17] also highlighted that physiotherapy presents itself as a beneficial resource that can be used in all phases of rheumatoid arthritis, with the aim of improving joint mobility, muscle strength and coordination, flexibility, resistance to

fatigue, aerobic capacity and, finally, preserving and/or restoring general functional ability.

Radominski 's preparation*et al* . [16], issues such as prioritizing fracture prevention as a fundamental objective in the treatment of osteoporosis, emphasizing the importance of early detection and intervention to identify high-risk individuals.

Furthermore, Bennell *et al* . [4] presented a provocative finding that physical therapy did not produce a notable improvement in pain or function in adults with hip osteoarthritis when compared to placebo treatment, suggesting that there is a need to reevaluate or incorporate additional interventions into physical therapy approaches for certain patients.

According to Teixeira *et al* . [19], osteoarthritis is also a slowly progressive disease, and radiographic changes can take up to three years to be measured. This makes conservative treatment uncomfortable without the use of other auxiliary resources. This highlights the importance of physiotherapy as a crucial component of a comprehensive disease management strategy.

According to Medeiros *et al.* [11] .in relation to the treatment of rheumatoid arthritis, rowing exercise can be a useful means applied by physiotherapists to reduce joint impact and consequently bring about pain reduction.

The production of Levada *et al* . [8]argued that for patients without severe symptoms related to the treatment of herniated disc, non-surgical management is generally recommended. Conservative measures, such as physical therapy and medications, are effective and often avoid the need for surgery, which is reserved for cases with severe or progressive symptoms. While the surgical process, although effective in quickly relieving symptoms, can present complications.

At this point, Madera *et al* . [9] further emphasized the need for additional research to optimize rehabilitation protocols specifically for spinal fusions.

On the other hand, in the scenario of osteoarthritis Teixeira *et al.* [19]highlighted that although a definitive cure has not yet been achieved, the existence of disease-modifying drugs is currently being discussed, which have the ability to alter the progression of joint degeneration. And these drugs have managed to slow the progression of osteoarthritis , which, in some cases, has made it practically asymptomatic. Becoming essential factors and capable of achieving extremely positive results if combined with physiotherapy sessions.

It is also worth highlighting the advances in the process of diagnosis and treatment of osteoarthritis, which according to Andrade *et al* . [1], encompasses not only the emergence of new therapies, but also the integration of these therapies into physiotherapeutic interventions, offering a multidisciplinary approach .In addition, Kong *et al* . [7] contributed valuable knowledge about surgical techniques and preoperative factors that can potentially impact surgical results and the subsequent rehabilitation process.

The importance of health professionals adopting evidence-based practices has been emphasized by Dantas, Salvini and Mcalindon [5]. This perspective is supported by the research conducted by Shah and Shinde [18], who highlighted the positive impact of regular exercise on patients with arthritis, as well as by the comprehensive review conducted by Quicke *et al* . [15], who examined treatments for diseases such as osteomalacia and scurvy.

Still on arthritis, Schnornberger, *et al.* [17]highlighted that physiotherapy, especially kinesiotherapy, becomes a beneficial and viable strategy, with the aim of relieving pain and combating inflammatory processes, to allow restoring the range of joint movement and muscle activity, preventing the onset of new deformities, promoting physical, psychological and social well-being and, consequently, improving the clinical condition of patients.

Furthermore, Melo *et al.* [12] highlighted that these patients not only suffered from joint pain and inflammation, but were also severely affected by depression, social isolation, and feelings of invalidity when the disease takes away their freedom to do simple things. For this reason, physiotherapy is more than necessary for the physical and mental health of patients.

It is important to recognize that while some research suggests the effectiveness of certain physiotherapy treatments, other research advocates critical evaluation and the search for alternative treatments. In the future, we seek to improve the physiotherapy effectiveness of treatments.

Ultimately, Shah and Shinde 's systematic review [18] demonstrated that exercise is routinely performed as a form of treatment for pain and to improve function in patients with arthritis. This assertion is supported by research demonstrating the effectiveness of specific exercises, such as the Pilates Method, in relieving low back pain and improving muscle function.

Physiotherapy Treatment Protocols for Different Conditions

In the field of physiotherapy, there is a range of treatment protocols designed specifically for musculoskeletal conditions, including arthritis, osteoarthritis, degenerative disc disease, herniated disc, spondylosis and osteometabolicdiseases . These protocols aim to provide patients with effective strategies to reduce pain, increase mobility and, ultimately, improve their overall quality of life. However, the effectiveness of these interventions is often examined through rigorous clinical studies and comprehensive literature reviews, which are conducted with the aim of scientifically validating the adopted practices [5].

Physiotherapy is often used as a treatment for osteoarthritis, with interventions such as muscle strengthening exercises, proprioception training, and pain relief techniques such as thermotherapy and electrotherapy. However, a study by Bennell *et al* . [4] challenged the effectiveness of these practices. The research found that physical therapy did not lead to significant improvements in pain or function in patients with hip osteoarthritis when compared to a placebo treatment.

The finding indicates that personalized treatment protocols and a combination of multidisciplinary approaches may be necessary for effective management of this condition, aligning with the recommendation of Dantas, Salvini, and Mcalindon [5] to educate professionals and patients on evidence-based best practices for treatment of knee osteoarthritis. Regular physical activity has been consistently recommended as part of arthritis treatment, with Shah and Shinde [18] emphasizing its ability to alleviate pain and improve functionality. This finding is supported by Iolasco*et al* . [6], who highlighted the importance of therapeutic exercise, especially resistance training, in maintaining bone health and improving muscle performance. These aspects are particularly relevant in the context of osteometabolic diseases such as osteoporosis, whose main objective, according to Radominski*et al* . [16], fracture prevention.

The optimization of physiotherapy treatment protocols in the post-arthroplasty rehabilitation process is essential, careful selection of the type of implant and guidance on postoperative activities are essential for effective recovery. Likewise, they recognized the limited availability of substantial evidence, but agreed that most patients present positive results through postoperative physiotherapy, highlighting the importance of rehabilitation in these cases [9].

In the field of specific spinal diseases, such as degenerative disc disease, herniated disc, and spondylosis, the physiotherapy course may encompass several approaches, including spinal traction, exercises to increase mobility and strength, and techniques to manage pain. Kong *et al* . [7] emphasized the importance of considering factors such as disc degeneration and muscle condition before resorting to surgical interventions, as this knowledge can guide the development of more efficient rehabilitation protocols.

In their study, Levada *et al.* [8] highlighted regarding the treatment of disc herniation that non-surgical strategies are often the first line of treatment and have shown comparable results to surgical methods in terms of medium- and long-term efficacy. Conservative treatment, which may include anti-inflammatory drugs, physical therapy, and corticosteroid injections , offers temporary pain relief, but the efficacy of alternative therapies such as acupuncture is still under investigation.

The choice between conservative and surgical treatment should consider the severity of symptoms and the response to conservative treatment. It is worth noting that the evolution of surgical techniques and the effectiveness of conservative approaches highlight the importance of personalized treatment and the continued need for research to optimize patient outcomes and recovery [5].

In this scenario, it is argued that during treatment with conservative methods, such as NSAIDs and physiotherapy, it is possible to identify that most patients improve within eight to twelve weeks. In cases where there is severe neurological impairment or failure of conservative treatment, options such as epidural corticosteroid injections and surgery, including discectomies and fusions, are considered, and from this point on physiotherapy plays a supportive role in the management of symptoms. Its strategies aim to improve function and relieve pain, although recognizing that the main focus continues to be pharmacological and other biomedical treatments [15].

Impact of Physiotherapy on Patients' Recovery and Quality of Life

As a health science, physiotherapy focuses on harnessing the body’s innate healing capacity and aims to enhance functional recovery, alleviate pain, and ultimately improve the overall well-being of patients. In cases of inflammatory and degenerative diseases, physiotherapy plays a crucial role not only in treating

immediate symptoms but also in preventing future complications, providing training in disease management, and promoting a healthier and more independent lifestyle [16]

Physiotherapy plays a crucial role in preventing osteoporosis, a condition that can be treated through early intervention. According to Radominski 's findings *et al* . [16], who emphasized the importance of fracture prevention as a primary goal in the treatment of osteoporosis. Strengthening and balance exercises are among the recommended interventions to prevent falls and fractures.

The study carried out by Bennell *et al* . [4] raised doubts about the efficacy of physical therapy in the treatment of hip osteoarthritis. Their findings showed no significant differences in pain or function between patients who received physical therapy and those who underwent sham treatment. However, it is important not to completely dismiss physical therapy, as highlighted by Dantas, Salvini and Mcalindon [15], who emphasized the importance of health professionals and patients staying informed about the latest evidence-based practices. This suggests the need for more individualized treatment approaches and the potential integration of innovative therapies, as raised by Pereira *et al.* [14] There is favorable evidence that low-level laser can reduce pain in patients with knee osteoarthritis, mainly with doses of 6 J per point and 48 J per treatment session, but it is suggested that further studies on laser dosimetry in other joints affected by the disease, such as the hip, should be conducted.

When it comes to postoperative complications, specifically those related to the restoration of the knee extensor mechanism, physiotherapy is essential for rehabilitation. It helps in the recovery of range of motion and muscle strength, as well as the recovery process after arthroplasty, highlighting the need to use techniques that consider the patient's clinical case [18].

In this sense, Marques, Castanhetti and Fan [10] delved into the Pilates Method, a physiotherapeutic intervention that has been shown to be effective in relieving low back pain and increasing abdominal muscle strength. This positive result is reflected in the results of the visual analogue pain scale (VAS) and in the overall quality of life. These findings suggest that therapeutic techniques that prioritize core strengthening and stability may be advantageous for individuals suffering from spinal diseases, such as herniated disc and spondylosis.

The value of physical therapy in the post-operative rehabilitation of patients undergoing spinal fusion is highlighted in research conducted by Madera *et al* . [9].

Although there may be a paucity of empirical evidence, professionals in the field broadly agree on the benefits of physical therapy, a sentiment echoed by the emphasis placed on therapeutic exercise as a crucial component of rehabilitation [6].

Furthermore, Levada *et al.* [8] supported that early postsurgical rehabilitation has shown good results in most cases, although more high-quality clinical trials are needed to validate these treatments in clinical practice.

Challenges and Opportunities in the Application of Physiotherapy in these Conditions

When it comes to conditions such as arthritis, osteoarthritis, arthroplasty, degenerative disc disease, herniated disc, spondylosis and metabolic osteopathies, physiotherapy, as a health science, faces a multifaceted scenario. These diseases, which have a direct impact on patients' quality of life, present substantial obstacles in terms of treatment effectiveness and financial viability of health systems [2].

Radominski 's studies *et al* . [16], highlighted the significance of fracture prevention as the main objective in the treatment of osteoporosis and the importance of early diagnosis and intervention. The notion of prevention is also supported by studies such as that of Kong *et al* . [7], who identified risk factors that, if identified early, may indicate preventive measures.

Despite understanding the importance of preventive measures, a study carried out by Bennell *et al* . [4] revealed that traditional physical therapy did not produce notable improvements for individuals suffering from hip osteoarthritis when compared to sham treatment. This finding highlights the difficulty of formulating and implementing treatments that are genuinely effective for degenerative and joint diseases.

To address these obstacles in the field of physical therapy, it is crucial to adopt an evidence-based approach [15]. They emphasize the importance of continuing education to ensure that professionals are equipped with the most up-to-date and effective techniques. An excellent example of this is the use of the Pilates Method, which has shown promising results in relieving low back pain [10].

In the domain of postoperative management, rehabilitation is widely accepted as standard practice. However, as emphasized by Madera *et al* . [9], substantial evidence is still lacking to fully endorse its efficacy. This highlights the need for

continued research and the establishment of treatment protocols firmly based on proven results.

The importance of physiotherapy exercise is emphasized by Iolasco*et al* . [6] who stated that resistance training plays a crucial role in preserving bone health and improving muscle performance. Furthermore, Sha and Shinde [18] supported these findings by confirming the advantages of regular exercise in the treatment of arthritis.

In the elaboration of Pereira *et al.* [14] discussed this point, highlighting that the Federal Council of Physiotherapy and Occupational Therapy (COFFITO, 2013) recommends as physiotherapeutic treatment resistance exercises to improve muscle strength and travel time, aerobic exercises to improve quality of life and functional capacity, both on a regular basis.

The field of physical therapy faces significant challenges in the treatment of degenerative and osteometabolicdiseases . One of these challenges involves the need to validate the efficacy of physical therapy and integrate it with evidence-based practices. To overcome these obstacles, it is crucial to engage in continuous clinical research and promote innovation in treatment methods [13].

One example is that in the production of Andrade *et al.* [1] they demonstrated that the kinesiotherapy exercise program discussed in the study was effective in reducing pain in individuals with osteoarthritis, according to the VAS. They also obtained analyses of how pain varies between different groups, elderly and non-elderly, and groups between men and women. However, although the research provides data on the effectiveness of these programs, it highlights that there is a lack of previous productions with specific investigations on these points andlack of collection of these data before and after interventions. In other words, as mentioned previously, there is a need for research and innovations in this area to better understand how physiotherapy can be applied effectively in different populations.

To optimize patient recovery and therapeutic efficacy, physiotherapy must adopt a treatment model that incorporates collaboration with several health professionals. As Andrade *et al.* [2] highlighted, psychological support is essential, since the pathologies mentioned are debilitating diseases. Therefore, multidisciplinary support plays an important and fundamental role in the well-being of the patient, who, in addition to the physiotherapist, must be supported by occupational therapists and a psychotherapist.

A study conducted by Quicke *et al* [15] proposed that treatment should be tailored to the specific needs and responses of each patient, emphasizing the importance of individualization. This is particularly relevant when considering the incidence and risk factors associated with diseases such as osteomalacia and scurvy.

Therefore, it is imperative that patients understand the intricate connections between inflammation, chronic disease, and physical therapy. This understanding allows them to recognize the importance of adhering to the recommendations of health care professionals [20]

The complexities involved in implementing physiotherapy for these conditions require a multifaceted approach. To increase the effectiveness of treatments, it is essential to adopt evidence-based practices, integrate technology, conduct ongoing research, explore innovative therapies, and adopt a personalized and multidisciplinary treatment model. By addressing these challenges with well-informed strategies, physiotherapy has the potential to improve functional outcomes and quality of life for patients, while contributing to the long- term viability of health systems [3].

CONCLUSION

This research demonstrated that physiotherapy is essential for improving the lives of patients with musculoskeletal issues, as it requires pain relief, reducing inflammation and improving joint function, thus preventing future malignancies.

In conditions such as osteoporosis, observations show that physiotherapy devices help prevent falls and fractures, showing a positive impact. In osteoarthritis, results may vary, indicating the need for personalized and multidisciplinary approaches.

Regarding post-surgical rehabilitation, it was possible to confirm that therapeutic exercises and practices such as Pilates are recommended for these patients. Therefore, physiotherapy proves to be valuable in the care of patients with inflammatory and degenerative diseases.

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1.

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